FOUR YEAR UNDERGRADUATE PROGRAM (NEP 2020) PROGRAM BACHELOR DISCIPLINE

POLITICAL SCIENCE

2024-28

(ENGLISH)

10/6/24

1-54 Pages

10/06/2024

PROGRAMME OUTCOMES. After completion of the programme A graduate in Political science students shall be able to ...	
PO 1	**Create** critical thinking and have the Capacity to examine the arguments, claims, and beliefs with independence and originality, and to assess practices, policies and theories unhindered by the influence of schools of thought.
PO 2	**Evaluate** and communicate thoughts and ideas effectively in writing and orally.The ability to listen carefully, and present complex information in a clear and concise manner.
PO 3	**Analyze** the values and beliefs of multiple cultures ; a global and cosmopolitan perspective, and a capacity to effectively engage in a multicultural society and interact respectfully with diverse communities and groups.
PO 4	**Apply** the holistic knowledge with the ability to make logical and critical analysis and develop their devotion and research vision towards society and nation and help them to become a competent, aware and dedicated citizen.
PO 5	aquants the foundational knowledge of Political Science and a thorough grasp of the theoretical and applied aspects of the discipline which leads towards self directed and lifelong learning process.

PROGRAM SPECIFIC OUTCOMES

- The programme imparts basic knowledge of important concepts such as power, authority, legitimacy, sovereignty, freedom, justice, democracy, party system and political theory to the students.
- The programme introduces the Indian Constitution, constitutional provisions, values and constitutional development.
- The programme provides comprehensive knowledge of the values, personalities and achievements of the Indian National Movement and freedom struggle.
- The programme introduces the ancient, mediaeval, modern and contemporary knowledge of political ideologies, western and Indian political philosophy.
- The programme provides comprehensive knowledge of modern political science through comparative politics, comparative analysis, comparative constitutional studies.
- The programme introduces the students to the theoretical and practical aspects of international politics, comprehensive knowledge of international organisations and their functioning.
- The programme provides theoretical and practical knowledge of public administration, public policy, development administration.
- The programme introduces comprehensive knowledge of Gandhian studies.
- The programme introduces students to various concepts and processes of political sociology.
- The programme provides in-depth knowledge of various concepts, processes, organisations and global dynamics of political economy.
- The programme provides comprehensive knowledge of various theoretical and practical dimensions of politics of states including Chhattisgarh and human rights.
- The programme enhances employability of students through proper knowledge of survey, research and e-governance.

10/6/24

10.06.2024

10/06/2024

10-06-2024

10-06-24

For 4 Credits

Four-year undergraduate course; 2024 - 28
Department of Political Science Course Curriculum

PART A INTRODUCTION				
PROGRAMME: Bachelor in socialscienceCertificate/Diploma/Degree/Honors			**Semester - I**	Session: 2024-2025
1	Course Code	**PSSC 01**		
2	Course Title	**Introduction to Political Theory**		
3	Course Type	**DSC : Discipline Specific course**		
4	Prerequisite (if, any)	***As per Program***		
5	Course Learning. Outcomes (CLO)	After completion of the course, the student shall be able to.. • **Create** the understanding of the concept of political science, and methodology . • **Evaluate** the concept of state, Its theories of origin, functions and relation with individuals . • **Analyse** the basic concepts of Political Science like liberty, right, sovereignty . • **Apply** the knowledge of democracy and democratic norms, the functional machinery of electoral democracy like political party system and pressure groups. Role of State as welfare agency , and as an agency of social change .		
6	Credit Value	**4 Credits**	***Credit = 15 Hours - learning & Observation***	
7	Total Marks	**Max. Marks: 100**		**Min Passing Marks: 40**

PART B CONTENT OF THE COURSE

Total No. of Teaching - Learning Periods (01 Hr. Per period) - 60 Periods (60 Hours)

Unit	Topics (Course Content)	No. of Periods
I	**POLITICAL SCIENCE - Initial** Political science : Concept, nature, Scope. Power, Authority - meaning, characteristics, types . Legitimacy - concept, relationship of power, authority and legitimacy. Study methods of political science, Behaviouralism and post-behaviouralism.	15
II	**STATE** State: Concept, Development of State, Essential Elements. Theories of origin state - Divine, power theory, social contract and evolutionary theory, Theories of functions of state - Marxist, liberal, neo-liberal, pluralist, theory. Law: Definition: Source, Classification Public welfare state. Nationalism : Concept , types.	15
III	**Concepts** Sovereignty: concept, types, Characteristics, Principles of Sovereignty: Legal or Monistic and Pluralist. Rights : Meaning, types major Theories, Duties. Freedom: Meaning Types, Positive and Negative Theory of Freedom. Equality : Meaning type and relation to freedom. Political Obligation, Justice : Concept, types. Democracy : Concept, types, Merits and demerits, Principles of democracy. Necessary conditions for the success of Democracy.	15
IV	**State in Function** Forms of Government :Unitary and Federal, Parliamentary and Presidential. Totalitarianism : Concept, types. Organs of Government : Legislature, Executive and Judiciary. Theory of Separation of Powers and Checks and Balances. Constitution : meaning and kinds. Political Party : meaning, kinds, major theories, merits and demerits. Pressure Groups: meaning, kinds and technique. Public Opinion, Social Justice, Theories of Representation.	15

Keywords : Political theory, state, sovereignty, right, liberty, democracy, constitution, party.

Name and Signature of Convener & Members of CBoS:

10.06.2024 10.06.2024 10/06/2024 10/6/24 10.06.24

PART C	Learning Resources: Text Books, Reference Books and Others

Text Books Recommended

1- अंबादत्त पंत हरिमोहन जैन मदन गोपाल (1985) : राजनीति शास्त्र के मूल आधार ।सेन्ट्रल पब्लिशिंग हाउस। इलाहाबाद । उ.प्र.

2- संधु ज्ञान सिंह (1986) : राजनीतिक सिद्धांत हिन्दी माध्यम कार्यान्वयन निदेशालय , दिल्ली विश्व विद्यालय,नई दिल्ली

3- जौहरी जे सी (1986) : राजनीति शास्त्र के मूल सिद्धांत, साहित्य भवन आगरा ।

4- भागर्व राजीव. और अशोक आचार्य (एड.), राजनीतिक सिधांत: एक पिरचय, दिल्ली,पिएर्सन, 2008.

5- कुमार, संजीव (एड.), राजनीतिक सिद्धांत की समझ, दिल्ली: ओरिएण्ट ब्लैक स्वान, 2019.

6- हुसैन शकील (2018) : राजनीतिक सिद्धांत : अवधारणात्मक परिचय । छ.ग. राज्य हिन्दी ग्रन्थ अकादमी . रायपुर, छ. ग

7- Eddy Asirvatham & K.K. Mishra (2010) Political Theory, S. Chand Publishing Delhi (pdf available)

8- O.P. Gauba (2014) An Introduction to Political Theory, MacMillan Publishers, Delhi.

Online resource : **e- books / pdf**

आशीर्वादम (1985) : राजनीतिक सिद्धांत - एस चन्द एण्ड कम्पनी । नई दिल्ली । (ई पुस्तकालय पर pdf उपलब्ध)https://epustakalay.com/book/27958-rajniti-shastra-by-adi-ashirvadam-ganga-ratna-pandey/

वर्मा एस पी (1985) : विकास प्रकाशन दिल्ली ई पुस्तकालय पर pdf उपलब्ध) https://epustakalay.com/book/45890-adhunik-rajaneetik-siddhant-by-s-p-varma/

पुखराज जैन (1988) : राजनीति विज्ञान के सिद्धान्त , साहित्य भवन आगरा

https://epustakalay.com/book/60211-rajniti-vigyan-ke-sidhant-by-dr-pukhraj-jain/

Introduction to Political Science by Mark Carl Rom, Georgetown University

https://open.umn.edu/opentextbooks/textbooks/1179

Online resource : e-learning portals

NPTEL https://youtu.be/fdTNlx52Weg?si=1mzAJsSfwtPVckKq. **CEC**

https://youtu.be/o05gcwF3_Mk (in Hindi)

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods

Maximum Marks: 100	Continuous Internal Assessment(CIA) : 30	End Semester Exam (ESE): 70

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test/Quiz-(2):**20 & 20** Assignment / Seminar - 10 Total Marks - 30	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE):	**Two section – A & B** Section A: **Q1**. Objective – 10 x1= **10** Mark; **Q2**. Short answer type- **5x4 =20 Marks** Section B: Descriptive answer type qts.,**1 out of 2** from each unit- **4x10=40 Marks**	

Name and Signature of Convener & Members of CBoS:

(1) 10.06.24

(2) 10.06.24

(3) 10.06.24

10/06/24

Per 2 Credits AEC/ VAC (Hindi Med.)

Four-year undergraduate course; 2024 - 28
Department of Political Science Course Curriculum

PART A INTRODUCTION				
PROGRAM : Bachelor in social science Certificate/Diploma/Degree/Honors			**SEMESTER I**	**Session 2024-25**
1	**Course code**	**PSVAC 01**		
2	**Course Title**	**constitutional Values**		
3	**Course Type**	**VAC : Value added course**		
4	**Prerequisite (if,any)**	**As per Program**		
5	**Course Learning. Outcomes (CLO)**	After completion of the course, the student shall be able to • **Develop** students as good citizens that will act based on constitutional values. • **Evaluate** the separation of power system in our constitution. • **Interpret** the fundamental rights and duties that are described in the Indian Constitution. • **Explain** democratic and constitutional values of Self governance.		
6	**Credit Value**	**2 credits**	**Credit = 15 Hours - learning & Observation and 30 Hrs for Practices/ Field work**	
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks: 20**	

PART B - Content of the Course

Total No. of Teaching–Learning Periods (01 Hr. per period) 30 Period (30 Hours)

UNIT	Topics (Course Content)	No. of Periods
I	**Philosophy of Constitution** Meaning of Constitution, meaning of Constitution values, constitutional values- Sovereignty, Republic (Vajji Sangha & Malla Sangh in Mahajanapada period) justice: social, economical & political, liberty, equality, fraternity, dignity of individual, unity and integrity of the nation.	**8 hours**
II	**Division of Powers and Balance of Power** Indian federal system, parliamentary democracy, independence and integrated judicial system, executive constantly accountable to the parliament.	**7 hours**
III	**Rights and Duties** Meaning of Fundamental rights and duties , Aim of directive Principles of State Policy, international peace and just international order (Vasudhaiva Kutumbkam), a unique blend of rights of LGBT and speciâlly blessed people.	**8 hours**
IV	**Self-Governance** Composite culture, Free and fair elections, Local self government for rural and urban areas (Sabha & Samiti in vedic period)	**7 hours**

Keywords : sovereignty, Republic, justice, liberty, equality,judicial system

Name and Signature of Convener & Members of CBoS:

PART C	Learning Resources: Text Books, Reference Books and Others

Text Books

1- बसु दुर्गादास, भारत का संविधान:: एक परिचय, वाधवा एंड कंपनी लॉ पब्लिशर्स,1989

2- पांडे जय नारायण, भारत का संविधान, सेंट्रल लॉ एजेंसी, प्रयागराज, 1971

3- कश्यप सुभाष,हमारा संविधान: भारत का संविधान और संवैधानिक विधि, नेशनल बुक ट्रस्ट, इंडिया 1996

Reference books

4- Kohli Atul, The success of India's democracy, Cambridge University Press, Cambridge,2001

5-Manor J, Public institution in India: performance and design,New Delhi: Oxford University Press, 2005

6. Austin G., the Indian Constitution : cornerstone of a nation, Oxford University Press, 1999

7-Ready S, fundamentalness of fundamental rights and Directive Principles on Indian constitution, journal of the Indian Law Institute, 22 (3) PP 399-407, 1980

8-Bagchi A, Rethinking federalism: Overview on current debates with some reflection in Indian context, Economic and political weekly,35(34),3023-3036

Online resource : e- books

Constitution of India (pdf)
https://legislative.gov.in/constitution-of-india/

संविधान सभा और संविधान, इंदिरा गांधी राष्ट्रीय मुक्त विश्वविद्यालय, नई दिल्ली।
https://egyankosh.ac.in/handle/123456789/58295

भारतीय संविधान, इंदिरा गांधी राष्ट्रीय मुक्त विश्वविद्यालय, नई दिल्ली।
https://egyankosh.ac.in/handle/123456789/53790

e-learning portals

NPTEL https://youtu.be/0DbQ_Eq8wJ0?feature=shared(English)
https://youtu.be/RdXVmWaF6w8?feature=shared(English)
https://youtu.be/e18xmGhdsOg?feature=shared. (Hindi)https://youtu.be/VoDn0gori0o?feature=shared

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**50 Marks**
Continuous Internal Assessment (CIA):	**15 Marks**
End Semester Exam (ESE):	**35 Marks**

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Two section – A & B** Section A: **Q1**. Objective – **05 x1= 05** Mark; **Q2**. Short answer type- **5x2 =10 Marks** Section B: Descriptive answer type qts.,**1 out of 2** from each unit- **4x05 =20 Marks**	

Name and Signature of Convener & Members of BOS:

10.06.24

10-06-24

10.06.24

10/06/2024

For 4 Credits

Four-year undergraduate course; 2024 - 28
Department of Political Science Course Curriculum

PART A INTRODUCTION				
PROGRAM : Bachelor in social science Certificate/Diploma/Degree/ Honors			**SEMESTER II**	**Session 2024-25**
1	**Course code**	**PSSC 02**		
2	**Course Title**	**Constitutional Government in India**		
3	**Course Type**	**DSC : Discipline specific course**		
4	**Prerequisite(if,any)**	**As per Program**		
5	**Course Learning. Outcomes (CLO)**	**After completion of the course, the student shall be able to..** • **Construct** the political ideals mentioned in the preamble of the constitution. • **Assess** the provisions of citizenship, fundamental rights and duties and their correlation . • **Examine** the role of president and the functioning of union executive . • **Interpret** the provisions and functioning of the union legislature and constitutional bodies of functional democracy, like election commission, finance commission and C&AG.		
6	**CreditValue**	**4 credits**	**Credit = 15 Hours - learning & Observation and 30 Hrs for Practices/ Field work**	
7	**Total Marks**	**Max. Marks: 100**	**Min Passing Marks: 40**	

PART B - Content of the Course

Total No. of Teaching–Learning Periods (01 Hr. per period) 60 Period (60 Hours)

UNIT	Topics (Course Content)	No. of Periods
I	**Constitution Citizenship and Rights** Making of Indian Constitution : Cabinet mission plan and Constituent assembly. Preamble, features, Sources. Schedules,citizenship Fundamental Rights and Duties, Directive Principles of State Policy. Constitution Amendment Process	15
II	**Union** President, Vice President, Council of Ministers and Prime Minister. Federal Parliament Lok Sabha and Rajya Sabha. Supreme court - Organization Functions, Powers, Judicial Review.	15
III	**Union and Federal administration** controller and auditor general .Centre State Relations: Legislative, Financial, Administrative.Union and state public service commission, Election Commission, Finance Commission.	15
IV	**State and Local self government** Legislature, Executive: Governor, Council of Ministers and Chief Minister. State High Court - Organization , Functions, Rights.	15

Keywords : Act, assembly, constitution, president, parliament, judiciary, panchayati raj.

Name and Signature of Convener & Members of BOS:

FOUR YEAR UNDERGRADUATE PROGRAM - (2024-28)
DEPARTMENT OF **HINDI**
COURSE CURRICULUM

PART -A : Introduction				
Program: Bachelor in Arts Certificate/Diploma/Degree/Honors		Semester - **I**		Session: 2024-25
1	Course Code	HNSC-01		
2	Course Title	**हिन्दी साहित्य का इतिहास (आदिकाल से रीतिकाल तक)**		
3	Course Type	DSC		
4	Pre-requisite (if any)	As per requirement		
5	Course Learning Outcome (CLO)	1. विद्यार्थी साहित्येतिहास, काल विभाजन एवं नामकरण संबंधी ज्ञान से अवगत हो सकेंगे। 2. युगीन परिस्थितियों और साहित्यिक प्रवृत्तियों के आधार पर साहित्य और समाज के अन्तर्संबंधो को समझ पाने में सक्षम हो सकेंगे। 3. युगीन सामाजिक सांस्कृतिक परिस्थितियों के परिप्रेक्ष्य में व्यापक दृष्टिकोण की समझ का विकास हो सकेगा। 4. आदिकाल से रीतिकाल तक के सम्पूर्ण रचनाकारों की रचनाओं और उसके विविध विषयों पर विश्लेषणात्मक विचारशीलता का विकास हो सकेगा। 5. हिन्दी गद्य के आविर्भाव के प्रधान कारणों एवं परिस्थितियों को समझ सकेंगे।		
6	Credit Value	4 Credits	(01 Credit = 15 Hours - learning & Observation)	
7	Total Marks	Maximum Marks : 100		Minimum Passing Marks : 40

PART -B : Content of the Course		
Total No. of Teaching-Learning Periods (01 Hr. Per Period) - 60 Periods (60 Hours)		
Unit	Topics (Course Contents)	No. of Period
I	**हिन्दी साहित्य का इतिहास व काल विभाजन –** अ. हिन्दी साहित्य के इतिहास लेखन की परम्परा, समस्या ब. हिन्दी साहित्य के इतिहास का कालविभाजन व नामकरण	15
II	**आदिकाल –** अ. आदिकाल : सामान्य परिचय प्रमुख प्रवृत्तियां व कवि, सिद्ध साहित्य, नाथ साहित्य ब. रासो काव्य, लौकिक साहित्य, जैन साहित्य	15
III	**भक्तिकाल –** अ. भक्तिकाल : सामान्य परिचय, प्रमुख प्रवृत्तियां व कवि । निर्गुण भक्तिधारा (प्रेममार्गी, ज्ञानमार्गी) ब. सगुण भक्तिधारा (रामकाव्य, कृष्णकाव्य)	15
IV	**रीतिकाल –** अ. रीतिकाल : सामान्य परिचय, प्रमुख प्रवृत्तियां व कवि ब. रीतिबद्ध, रीतिसिद्ध एवं रीतिमुक्त काव्यधारा	15
Keywords		

Signature of Convener & members (CBos) :

11/6/2024 11/6/24 11-06-2024

PART -C : Learning Resource
Text Books, Reference Books and Others
1. हिन्दी साहित्य का इतिहास – आचार्य रामचन्द्र शुक्ल, लोक भारती प्रकाशन, इलाहाबाद 2. हिन्दी साहित्य का इतिहास – डॉ. नगेन्द्र, राजकमल प्रकाशन, नई दिल्ली 3. हिन्दी साहित्य का आदिकाल – आचार्य हजारीप्रसाद द्विवेदी, राजकमल प्रकाशन, नई दिल्ली 4. हिन्दी साहित्य उदभव और विकास – आचार्य हजारीप्रसाद द्विवेदी, राजकमल प्रकाशन, नई दिल्ली 5. हिन्दी साहित्य युग और प्रवृत्तियां – डॉ. शिवकुमार शर्मा 6. हिन्दी साहित्य का विवेचनात्मक इतिहास – डॉ. सरयूकांत शास्त्री 7. हिन्दी साहित्य की भूमिका – हजारी प्रसाद द्विवेदी 8. हिन्दी साहित्य का आलोचनात्मक इतिहास – राम कुमार वर्मा, लोक भारती प्रकाशन प्रयागराज 9. हिन्दी भाषा साहित्य का इतिहास तथा काव्यांग विवेचन – डॉ. आर.के.पाण्डेय, शताक्षी प्रकाशन रायपुर
Online Resources -
1. epgpathshala 2. https://www.hindwi.org

PART -D : Assessment And Evaluation		
Suggested Continuous Evaluation Methods : Maximum Marks : 100 Marks Continuous Internal Assessment (CIA) : 30 Marks End Semester Exam (ESE) : 70 Marks		
Coninuous Internal Assessment : (CIA) : (By Course Teacher)	Internal Test/Quiz-(2) : 20 & 20 Marks Assignment/Seminar - 10 Total Marks 30	Better marks out of the two Text/Quiz obtained marks in assignment shall be considered against 30 Marks
End Semester Exam (ESE) :	Two Section - A&B Section A : Q1 Objective - 10X1=10 Marks Section A : Q2 Short Answer Type - 5X4=20 Marks Section B : Descriptive Answer Type Qts. 1 out of 2 From Each Unit - 4X10=40 Marks Total =70 Marks	

Name and Signature of Convener & Members of CBoS:

11/6/2024

11/6/24

11-06-2024

FOUR YEAR UNDERGRADUATE PROGRAM - (2024-28)
DEPARTMENT OF **HINDI**
COURSE CURRICULUM

PART -A : Introduction				
Program: Bachelor in Arts Certificate/Diploma/Degree/Honors		Semester - **II**		Session: 2024-25
1	Course Code	HNSC-02		
2	Course Title	**हिन्दी साहित्य का इतिहास – आधुनिक काल**		
3	Course Type	DSC		
4	Pre-requisite (if any)	As per requirement		
5	Course Learning Outcome (CLO)	1. युगीन परिस्थितियों और साहित्यिक प्रवृत्तियों के आधार पर विद्यार्थी पुनर्जागरण काल एवं जागरण सुधार काल के प्रमुख रचानाकारों की उपादेयता को गहनता से समझ सकेंगे। 2. हिन्दी पद्य के साथ गद्य के क्रमबद्ध विकास को समझ सकेंगे। 3. छायावाद एवं छायावादोत्तर काव्य के माध्यम से तद्कालीन स्वतंत्रता आंदोलन की पृष्ठ भूमि से विद्यार्थी अवगत होंगे। 4. स्वातंत्र्योत्तर पद्य और गद्य की विभिन्न विधाओं के माध्यम से विद्यार्थी बदलते हुए सामाजिक–सांस्कृतिक मूल्यों को समझने में सक्षम हो सकेंगे। 5. भूमण्डलीकरण के दौर में युगीन हिन्दी साहित्य को विश्व साहित्य के समानान्तर रख कर मूल्यांकनपरक दृष्टि एवं समझ का विकास हो सकेगा।		
6	Credit Value	4 Credits	(01 Credit = 15 Hours - learning & Observation)	
7	Total Marks	Maximum Marks : 100		Minimum Passing Marks : 40

PART -B : Content of the Course		
Total No. of Teaching-Learning Periods (01 Hr. Per Period) - 60 Periods (60 Hours)		
Unit	Topics (Course Contents)	No. of Period
I	**आधुनिक काल व हिन्दी नवजागरण – भातेन्दु युग** अ. आधुनिक काल की राजनैतिक, सामाजिक, आर्थिक एवं सांस्कृतिक पृष्ठभूमि, हिन्दी नवजागरण ब. भारतेन्दु युग – प्रमुख साहित्यकार, साहित्य एवं साहित्यिक विशेषताएं	15
II	**द्विवेदी युग व छायावाद** अ. द्विवेदी युग के प्रमुख साहित्यकार, साहित्य एवं विशेषताएं ब. छायावाद के प्रमुख साहित्यकार, साहित्य एवं विशेषताएं	15
III	**छायावादोत्तर काल (विभिन्न प्रवृत्तियाँ)** अ. प्रगतिवाद व प्रयोगवाद के प्रमुख साहित्यकार, साहित्य एवं विशेषताएं ब. नई कविता व समकालीन कविता के प्रमुख साहित्यकार, साहित्य एवं विशेषताएं	15
IV	**हिन्दी गद्य का विकास** अ. कहानी एवं उपन्यास का उद्भव एवं विकास, सामान्य प्रवृत्तियां व प्रमुख कथाकार, उपन्यासकार ब. निबंध एवं नाटक का उद्भव एवं विकास, सामान्य प्रवृत्तियां व प्रमुख निबंधकार तथा नाटककार	15
Keywords		

Signature of Convener & members (CBos) :

11-06-2024 11/6/2024 11/6/24

PART -C : Learning Resource
Text Books, Reference Books and Others
1. महावीर प्रसाद द्विवेदी और हिन्दी नवजागरण – डॉ. रामविलास शर्मा, राजकमल प्रकाशन, नई दिल्ली 2. भारतेन्दु हरिशचंद्र और हिन्दी नवजागरण – डॉ. रामविलास शर्मा, राजकमल प्रकाशन, नई दिल्ली 3. छायावाद की प्रासंगिकता – रमेशचन्द्र शाह, वाग्देवी प्रकाशन बिकानेर 4. नवजागरण की समस्याएं – डॉ. रामविलास शर्मा, राजकमल प्रकाशन, नई दिल्ली 5. भारतेन्दु की रंग परिकल्पना – सत्येन्द्र तनेजा 6. छायावादोत्तर प्रतिनिधि कवि और उनकी कविताएं – विश्वविद्यालय प्रकाशन वाराणसी 7. हिन्दी गद्य का विकास – भारतेन्दु हरिशचंद्र 8. आधुनिक हिन्दी गद्य का इतिहास – आचार्य रामचन्द्र शुक्ल, राजकमल प्रकाशन, नई दिल्ली 9. भारतेन्दु युग – डॉ.सत्यपाल शर्मा 10. हिन्दी नाटक उदभव और विकास – दशरथ ओझा, राजपाल प्रकाशन 11. आधुनिक साहित्य की प्रवृत्तियां – नामवर सिंह, राजकमल प्रकाशन, दिल्ली
Online Resources -
1. E-Adhyayan 2. https://epustakalay.com.book 3. info@hindibook.com
PART -D : Assessment And Evaluation
Suggested Continuous Evaluation Methods : Maximum Marks : 100 Marks Continuous Internal Assessment (CIA) : 30 Marks End Semester Exam (ESE) : 70 Marks

Coninuous Internal Assessment : (CIA) :	Internal Test/Quiz-(2) : 20 &	Better marks out of the two
End Semester Exam (ESE) :		Two Section - A&B

Name and Signature of Convener & Members of CBoS:

11-06-2024

11/6/2024

11/6/24

FOUR YEAR UNDERGRADUATE PROGRAM (2024-28)
DEPARTMENT OF HISTORY

PART-A: Introduction				
Program: Bachelor in Arts *(Certificate / Diploma / Degree/Hons)*		**Semester - I**		Session: **2024-2025**
1	**Course Code**	**HISC 01**		
2	**Course Title**	***Ancient Indian History (From the beginning to Satvahan Dynasty)***		
3	**Course Type**	**DSC**		
4	**Pre-requisite(if, any)**	***As per Program***		
5	**Course Learning. Outcomes (CLO)**	➢ *Student will acquire knowledge about ancient period, Life style* ➢ *They can qather knowledge about the society culture & religion.* ➢ *Political condition of ancient period and the role of different social class.* ➢ *Student will learn about the Historigraphical trends as well as sources of ancient Indian History* ➢ *Student will be familiar vedic period, Jainism, Buddhism and all ruling dynasties of Ancient India.*		
6	**Credit Value**	**04**	***(Credit = 15 Hours - learning & Observation and 30 Hrs for Practices/ Field work)***	
7	**Total Marks**	**Max. Marks: 70+30=100**	**Min Passing Marks: 40**	

PART -B: Content of the Course

Total No. of Teaching–learning Periods 60 (01 Hr. per period)

Module / Unit	Topics (Course contents)	No. of Period
I	1. Geographical Features of India. 2. Sources of Ancient Indian History. 3. Pre Stone age and the New Stone age. 4. Harappan civilization & Founder, Extension, Town Planning, Political, Social, Economic - Religious Condition.	15
II	1. Rigvedic age. 2. Later Vedic age. 3. Mahajanpad age. 4. Jainism. 5. Buddhism	15
III	1. Invasion of Alexander and its effects. 2. Causes for the rise of Magadha Empire. 3. Chandragupta Maurya & his conquests 4. Mauryan Administration.	15
IV	1. Ashoka and his Dhamma. 2. Sunga Dynasty. 3. The Kushanas. 4. Satvahan Dynasty	15

R. Singh Sir

FOUR YEAR UNDERGRADUATE PROGRAM (2024-28)
DEPARTMENT OF HISTORY

PART-A: Introduction				
Program: Bachelor in Arts *(Certificate / Diploma / Degree/Hons)*		**Semester - I**		Session: **2024-2025**
1	**Course Code**	**HISC 01**		
2	**Course Title**	**प्राचीन भारत का इतिहास (आरम्भ से सातवाहन वंश तक)**		
3	**Course Type**	**DSC**		
4	**Pre-requisite(if, any)**	***As per Program***		
5	**Course Learning. Outcomes (CLO)**	1 छात्र प्राचीन काल की जीवन शैली के सम्बन्ध में ज्ञान प्राप्त करेंगे 2 वे समाज की संस्कृति और धर्म के बारे में ज्ञान प्राप्त कर सकते हैं। 3 प्राचीन काल की राजनीतिक स्थिति एवं विभिन्न सामाजिक वर्ग की भूमिका से परिचित होंगे 4 छात्र ऐतिहासिक प्रवृत्तियों के साथ-साथ प्राचीन भारतीय इतिहास के स्रोतों के बारे में जानेंगे 5 छात्र वैदिक काल, जैन धर्म, बौद्ध धर्म और प्राचीन भारत के सभी शासक राजवंशों से परिचित होंगे।		
6	**Credit Value**	**04**	***(Credit = 15 Hours - learning & Observation and 30 Hrs for Practices/ Field work)***	
7	**Total Marks**	**Max. Marks: 70+30=100**	**Min Passing Marks: 40**	

PART -B: Content of the Course

Total No. of Teaching–learning Periods 60 (01 Hr. per period)

Module / Unit	Topics (Course contents)	No. of Period
I	1. भारत की भौगोलिक दशा 2. प्राचीन भारतीय इतिहास के स्रोत 3. पूर्व पाषाण काल एवं उत्तर पाषाण काल 4. हड़प्पा सभ्यता – निर्माता, प्रसार, नगर योजना, राजनीतिक, सामाजिक, आर्थिक, धार्मिक संरचना	15
II	1. ऋगवैदिक काल 2. उत्तर वैदिक काल 3. महाजनपद काल 4. जैन धर्म 5. बौद्ध धर्म	15
III	1. सिकंदर का आक्रमण एवं प्रभाव 2. मगध साम्राज्य के उदय के कारण 3. चन्द्रगुप्त मौर्य एवं उसकी विजयें	15

R. Singh Sinha

	4. मौर्य कालीन प्रशासन	
IV	1. अशोक एवं उसका धम्म 2. शुंग वंश 3. कुषाण वंश 4. सातवाहन वंश	**15**
Keywords	.....	

Signature of Convener & Members:

PART–C

Learning Resources: Text Books, Reference Books and Others

Text Books Recommended –

1. *K. L. Khurana – History of India from earliest time to 1526 A. D.*
2. *K. L. Khurana – Ancient India from earliest time to 1206 A. D.*
3. *Vincent smith – oxford history of India.*
4. *L. Prasad – Ancient India –Indus velley civilization to 1200 A. D.*
5. *रतिभान सिंह नाहर – प्राचीन भारतीय इतिहास एवं संस्कृति*
6. *बी. एन. लुनिया – प्राचीन भारतीय संस्कृति*
7. *भार्गव – प्राचीन भारत*
8. *एस. आर. शर्मा – प्राचीन भारत*
9. *शांता शुक्ला – भारत का राजनीतिक इतिहास*
10. *ए. के. मित्तल – भारत का इतिहास प्रारम्भ से 1206 ई.*
11. *ए. के. मित्तल एवं डॉ. आर अग्रवाल – विश्व का इतिहास 1453 से 1890 ई.*

Online Resources–

- **e-Resources / e-books and e-learning portals**

Online Resources–

- **e-Resources / e-books and e-learning portals**

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: **100 Marks**
Continuous Internal Assessment (CIA): **30 Marks**
End Semester Exam (ESE): **70 Marks**

Continuous Internal Assessment (CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **20 & 20** Assignment/Seminar +Attendance - **10** Total Marks - **30**	Better marks out of the two Test / Quiz **+** obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE):	**Two section – A & B** Section **A**: **Q1**. Objective – **10 x1**= 10 Mark; **Q2**. Short answer type- **5x4 =20 Marks** Section **B**: Descriptive answer type qts.,**1out of 2** from each unit- **4x10 =40 Marks**	

Name and Signature of Convener & Members of CBoS:

R. Singh

FOUR YEAR UNDERGRADUATE PROGRAM (2024-28)
DEPARTMENT OF HISTORY

PART-A: Introduction				
Program: Bachelor in Arts *(Certificate / Diploma / Degree/Hons)*		**Semester - II**		Session: **2024-2025**
1	**Course Code**	**HISC 02**		
2	**Course Title**	***Ancient Indian History (From Gupta age to 1206 A. D.)***		
3	**Course Type**	**DSC**		
4	**Pre-requisite(if, any)**	***As per Program***		
5	**Course Learning. Outcomes (CLO)**	➢ *Student will acquire knowledge about ancient period, Life style* ➢ *They can qather knowledge about the society culture & religion.* ➢ *Political condition of ancient period and the role of different social class.* ➢ *Student will learn about the Historigraphical trends as well as sources of ancient Indian History* ➢ *Student will be familiar vedic period, Jainism, Buddhism and all ruling dynasties of Ancient India.*		
6	**Credit Value**	**04**	***(Credit = 15 Hours - learning & Observation and 30 Hrs for Practices/ Field work)***	
7	**Total Marks**	**Max. Marks: 70+30=100**	**Min Passing Marks: 40**	

PART -B: Content of the Course

Total No. of Teaching–learning Periods 60 (01 Hr. per period)

Module / Unit	Topics (Course contents)	No. of Period
I	1. Gupta Dynasty. 2. Samudragupta and his Conquests. 3. Chandragupta Second and his Conquests. 4. Gupta Administration.	15
II	1. Gupta period Golden age of India. 2. Sangam Dynasty – Chola, Cher, Pandya 3. Pallav Dynasty. 4. Chalukya and Rastrakuta.	15
III	1. Harshvardhan – Conquests and Administration. 2. Origin of Rajputs. 3. Culture of Rajput age. 4. Gurjar, Pratihar, Pal and Sen Dynasty.	15
IV	1. India's Relation with South East Asia. 2. Arab Invasion in India 3. Mahmud Ghajanavi. 4. Muhammad Guari..	15

R. Singh

Keywords	.....

Signature of Convener & Members :

PART–C

Learning Resources: Text Books, Reference Books and Others

Text Books Recommended –

1- *K. L. Khurana – History of India from eariest time to 1526 A. D.*
2- *K. L. Khurana – Ancient India from eariest time to 1206 A. D.*
3- *Vincent smith – oxford history of India.*
4- *L. Prasad – Ancient India –Indus velley civilization to 1200 A. D.*
5- *रतिभान सिंह नाहर – प्राचीन भारतीय इतिहास एवं संस्कृति*
6- *बी. एन. लुनिया – प्राचीन भारतीय संस्कृति*
7- *भार्गव – प्राचीन भारत*
8- *एस. आर. शर्मा – प्राचीन भारत*
9- *शांता शुक्ला – भारत का राजनीतिक इतिहास*
10- *ए. के. मित्तल – भारत का इतिहास प्रारम्भ से 1206 ई.*
11- *ए. के. मित्तल एवं डॉ. आर अग्रवाल – विश्व का इतिहास 1453 से 1890 ई.*

Online Resources–

- **e-Resources / e-books and e-learning portals**

Online Resources–

- **e-Resources / e-books and e-learning portals**

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Internal Assessment (CIA):	**30 Marks**
End Semester Exam (ESE):	**70 Marks**

Continuous Internal Assessment (CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **20 & 20** Assignment/Seminar +Attendance - **10** Total Marks - **30**	Better marks out of the two Test / Quiz **+** obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE):	**Two section – A & B** Section **A**: **Q1**. Objective – **10 x1**= 10 Mark; **Q2**. Short answer type- **5x4 =20 Marks** Section **B**: Descriptive answer type qts.,**1out of 2** from each unit- **4x10 =40 Marks**	

Name and Signature of Convener & Members of CBoS:

R. Singh Sisn

FOUR YEAR UNDERGRADUATE PROGRAM(2024-28)
DEPARTMENT OF SOCIOLOGYCOURSE CURRICULUM

PART-A: INTRODUCTION

PROGRAM: Bachelor in Arts (Certificate/ Diploma/Degree/Honors)	SEMESTER–I	SESSION:2024-25

SUBJECT: **SOCIOLOGY**

1	COURSE CODE:	**SOSC -01**
2	COURSE TITLE:	INTRODUCTION TO SOCIOLOGY
3	COURSE TYPE:	DSC
4	Pre-requisite	As per Government norms
5	COURSE LEARNING OUTCOME (CLO):	**After completion of the course, the student will be able to achieve the following objectives-** • The course is designed to incorporate all the key concept of sociology which would enable the learner to develop keen insight to distinguish between the common sense knowledge and sociological knowledge • The conceptual learning of society, association, institution, community will help the student with their day to day understanding of society • The concept of Indian social institution such as family, marriage, kinship will enable students to consider their roles in solving many problems. • Concept of globalization and media imperialism will make the students to understand global geopolitical scenario conceptually. • Concept of social stratification and social change will make the students better understand the concept of different generational gap and minimize it in due course.
6	CREDIT VALUE:	04(Credit= 15 Hour- Learning and observation)
7	TOTAL MARKS:	MAX MARKS:100 / MIN PASS MARKS:40

PART-B : CONTENT OF THE COURSE

Total Number of Teaching-Learning Periods(01 hr. Per Period)- 60 Period (60 Hours)

UNIT	TOPICS : Course Content	No.ofPeriods
UNIT-I Introduction to Sociology	1. Sociology as a Discipline: Meaning, Emergence and Scope 2. Community and Society, Institution and Association 3. Relationship with other social Sciences: Economics, Psychology, Political Science 4. Concept of Role and Status	15
UNIT-II Social Institution	1. Relationship between Individual and Society. 2. Socialization: Process and Importance 3. Family, Marriage and Kinship 4. Mutual Relationship between Culture and Civilization	15
UNIT-III Social Process	1. Interaction, Cooperation, Competition, Conflict 2. Caste and Class: Concept and Critique 3. Social Control: Characteristics and Impact 4. Industrialization:and its Impact.	15
UNIT-IV Social Stratification and Social Change	1. Social Stratification: Concept 2. Social Stratification: Factors 3. Social Change : Concept 4. Social Change: Types	15

Signature of Convener & Members :

10.6.24

PART-C : LEARNING RESOURCES,REFERENCE BOOKS & OTHERS		
AUTHOR	**TITLE**	**PUBLISHER**
TEXTBOOK		
Anthony Giddens and Philip W. Sutton	Sociology	Atlantic Publisher and Distributors Private Limited
C.N.Shankar Rao	Sociology: Principles of Sociology with an introduction of social thought	S Chand and Co.
Vidya Bhushan and Dr. Sachdeva	An Introduction to Sociology	Kitab Bhawan Publication
REFRENCE		
Anthony Giddens	Sociology	Oxford University Press
Vineeta Pandey	Indian Society and Culture	Rawat Publucation
Hortun and Hunt	Sociology- The Discipline and its Dimensions	New Central Book Agency
Haralambos and Holborn	Sociology :Themes and Prespective	Collins

Online Resources	
1	https://www.swayamprabha.gov.in/index.php
2	https://vidyamitra.inflibnet.ac.in/index.php
3	https://epgp.inflibnet.ac.in/Home/ViewSubject
4	https://descg.gov.in/

PART-D:ASSESSMENT AND EVALUATION		
SuggestedContinuousEvaluationMethods: **MaximumMarks:** **100MarksContinuousInternalAssessment(CIA):** **30Marks** **EndSemesterExam(ESE):** **70Marks**		
ContinuousInternal Assessment(CIA): (ByCourseTeacher)	InternalTest/Quiz-(2):**20&20** Assignment/Seminar- **10** TotalMarks- **30**	BettermarksoutofthetwoTest/Quiz +obtainedmarksinAssignmentshallbeconsidered against**30**Marks
EndSemesterExam(ESE):	**Twosection–A&B** SectionA:**Q1**.Objective–10x1=**10**Mark;**Q2**.Shortanswertype-**5x4=20Marks** SectionB:Descriptiveanswertypeqts.,**1outof2**fromeachunit-**4x10=40Marks**	

NameandSignatureofConvener&MembersofCBoS

1.
2. 10.6.2024
3.
4.
5.
6.
7. 10.6.24

FOUR YEAR UNDERGRADUATE PROGRAM(2024-28)
DEPARTMENT OF SOCIOLOGYCOURSE CURRICULUM

PART-A : INTRODUCTION

PROGRAM: Bachelor in Arts (Certificate/ Diploma/Degree/Honors)		**SEMESTER–II**	**SESSION:2024-25**
SUBJECT: **SOCIOLOGY**			
1	COURSE CODE:	SOSC-02	
2	COURSE TITLE:	**CHANGING SOCIAL INSTITUTIONS IN INDIA**	
3	COURSE TYPE:	DSC	
4	Pre-requisite	As per Government norms	
5	COURSE LEARNING OUTCOME (CLO):	**After completion of the course, the student will be able to achieve the following objectives-** • The students will learn and understand the classical background ofIndian society. • Students will learn about the Indian social structure. • The course will enhance understanding about pre dominant issues of Indian society. • This course will enhance the understanding about rural structure, development and issues. • The students will learn about social problems of India.	
6	CREDIT VALUE:	04(Credit= 15 Hour- Learning and observation)	
7	TOTAL MARKS:	MAX MARKS:100	MIN PASS MARKS:40

PART-B : CONTENT OF THE COURSE

Total Number of Teaching-Learning Periods(01 hr. Per Period)- 60 Period (60 Hours)

UNIT	TOPICS	No. of Periods
UNIT-I Classical Indian: Society and Changes	1. Classical Indian Society and Changes 2. Ashram, Purusharth 3. Karma: Views on Past and Present 4. Caste Roles and Varna Formulations	15
UNIT-II Indian Social Structure	1. Family Roles and its Changing Nature 2. Marriage and its Challenges 3. Kinship: Principle and Pattern 4. Jajmani and Agrarian Relationship	15
UNIT-III Rural Social System	1. Rural Development and Change 2. Rural Migration and Urbanisation 3. Religiosity and superstition in rural society 4. Problem of Peasants	15
UNIT-IV Social Issues in India	1. Poverty and Unemployment : Causes and Remedies 2. Problem of Corruption: Causes and Remedies 3. Drugs Abuse: Types, Causes and Remedies 4. Cyber Crime: Types, Causes and Remedies	15

Signature of Convener & Members :

1. 2. 10-6-24 3. 4. 5. 6. 7. 10-6-24

PART-C : LEARNING RESOURCES ,REFERENCE BOOKS& OTHERS		
AUTHOR	**TITLE**	**PUBLISHER**
TEXTBOOK		
C.N.Shankar Rao	Indian Social Problems	S Chand
Ram Ahuja	Social Problems in India	Rawat Publication
C.N.Shankar Rao	Sociology of Indian Society	S Chand Publication
REFERENCES		
Rajendra Kumar Sharma	Indian Society: Institutions and Change	Atlantic Publication
B.R.Chauhan	Indian Villages	Rawat Publication
Indra Dewa	Society and Culture in India	Rawat Publucation

Online Resources	
1	https://epgp.inflibnet.ac.in
2	https;//vidyamitra.inflibnet.ac.in
3	https://vidyamitra.inflibnet.ac.in/index.php/search
4	https://www.swayamprabha.gov.in

PART-D:ASSESSMENT AND EVALUATION		
SuggestedContinuousEvaluationMethods: **MaximumMarks:** **100MarksContinuousInternalAssessment(CIA):** **30Marks** **EndSemesterExam(ESE):** **70Marks**		
ContinuousInternal Assessment(CIA): (ByCourseTeacher)	InternalTest/Quiz-(2):**20&20** Assignment/Seminar- **10** TotalMarks- **30**	BettermarksoutofthetwoTest/Quiz +obtainedmarksinAssignmentshallbeconsidered against**30**Marks
EndSemesterExam(ESE):	**Twosection–A&B** SectionA:**Q1**.Objective–10x1=**10**Mark;**Q2**.Shortanswertype-**5x4=20Marks** SectionB:Descriptiveanswertypeqts.,**1outof2**fromeachunit-**4x10=40Marks**	

NameandSignatureofConvener&MembersofCBoS

1
2 10.6.24
3
4
5
6 24/4/11
7 10.6.24

FOUR YEAR UNDERGRADUATE PROGRAM
DEPARTMENT OF ECONOMICS
COURSE CURRICULUM – 2024-28

PART-A, INTRODUCTION			
PROGRAM: Bachelor in Art (Certificate/Diploma/Degree/Honors)		**Sem -I**	**SESSION:2024-2025**
SUBJECT: **ECONOMICS**			
1	COURSE CODE:	ECSC -01	
2	COURSE TITLE:	**BASICS OF ECONOMICS**	
3	COURSE TYPE:	DSC	
4	Pre-requisite	As per program	
5	COURSE LEARNING OUTCOME (CLO):	• This course gives a general idea about the basics of economics. • It tries to bridge the gap between higher secondary syllabus and higher education. • This paper creates eagerness and enthusiasm among students to know more about economics. • It also envisages the basic knowledge of micro and macroeconomics and tries to create an interest.	
6	CREDIT VALUE:	4 Credits	Credit= 15 Hours-Learning and observation
7	TOTAL MARKS:	Max Marks:100	Min Passing Marks:40

PART-B, CONTENT OF THE COURSE

Total No. of Teaching-Learning Periods (01Hr per period) -60 Periods (60 Hours)

UNIT	TOPICS (Course Contents)	No of Periods
UNIT I- What is Economics	1. Origin of economics in Indian culture 2. Definition, Nature and Scope of Economics. 3. Major fields- Micro and Macro 4. Classical, Neo-classical and Modern Economists. 5. Major contribution by various economists (in brief) – Adam Smith, J M Keynes, Marshal, Pigou.	15
UNIT II- Basics of Macro Economics	1. Circular Flow of Income 2. Measurement of National Income 3. Basics of GDP, GNP, NNP 4. Money and its functions 5. Demand and supply of money 6. Concept of consumption and saving	15
UNIT III- Basics of Micro Economics	1. Meaning of consumer behavior 2. Concept of utility 3. Demand and elasticity 4. Basics of Production function	15

	5. Various markets in the economy (In brief) .	
UNIT IV- Economy of Chhattisgarh	1. Agriculture in Chhattisgarh- Agricultural Production, Land use, Irrigation facilities. 2. Industries in Chhattisgarh – Major Industries, Mineral based industries in Chhattisgarh 3. Infrastructure in Chhattisgarh, Road and Railways. 4. Per Capita income and Gross State domestic Product in C.G.	15

Signature of Convener & Members CBoS:-

PART-C, LEARNING RESOURCES

AUTHOR	TITLE	PUBLISHER
सिन्हा, वी.सी., पुष्पा सिन्हा	व्यष्टि अर्थशास्त्र	SBPD
पंत जे॰सी॰ एवं मिश्रा	सूक्ष्म अर्थशास्त्र	साहित्य भवन
जैन, के. पी.	आधुनिक माइक्रो अर्थशास्त्र	रतन प्रकाशन मंदिर
Jhingan, M.L.	Micro Economic Theories (Hindi & English)	Vrinda Publications
Ahuja, H.L.	Principles of Micro Economics (Hindi & English)	S Chand & Co
Seth, M.L.	Micro Economics (Hindi & English)	L.N Agrawal
Dhingra, I. C., V. K. Garg	Principles of Micro Economics (Reference)	Sultan Chand & Sons
Bose, D., A. Marimuthu	An Introduction to Micro Economics (Reference)	Himalaya Publishing House

Online Resources

1	https://www.swayamprabha.gov.in/index.php
2	https://vidyamitra.inflibnet.ac.in/index.php
3	https://epgp.inflibnet.ac.in/Home/ViewSubject
4	https://descg.gov.in/

PART-D ASSESSMENT & EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks :100 Marks
Continuous Internal Assessment (CIA) : 30 Marks,
End Semester Exams (ESE) :70 marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Tests/Quiz–(2) : 20 & 20 Assignment/Seminar/Attendance - 10 Total Marks - 30	Better marks out of the two Test /Quiz +Obtained marks in Assignment

I - अर्थशास्त्र क्या है	1. भारतीय संस्कृति में अर्थशास्त्र की उत्पत्ति 2. अर्थशास्त्र की परिभाषा, प्रकृति और क्षेत्र। 3. प्रमुख क्षेत्र- व्यष्टि एवं समष्टि 4. प्रतिष्ठित , नव- प्रतिष्ठित और आधुनिक अर्थशास्त्री 5. विभिन्न अर्थशास्त्रियों द्वारा प्रमुख योगदान (संक्षेप में) - एडम स्मिथ, जे एम कीन्स, मार्शल, पीगू	**15**
II- व्यापक अर्थशास्त्र की अवधारणा	1. आय का चक्रीय प्रवाह 2. राष्ट्रीय आय का मापन 3. जीडीपी, जीएनपी, एनएनपी की मूल बातें 4. मुद्रा और उसके कार्य 5. मुद्रा की मांग और पूर्ति 6. उपभोग एवं बचत की अवधारणा	**15**
III- सूक्ष्म अर्थशास्त्र की अवधारणा	1. उपभोक्ता व्यवहार का अर्थ 2. उपयोगिता की अवधारणा 3. मांग और लोच 4. उत्पादन फलन की मूल बातें 5. अर्थव्यवस्था में विभिन्न बाज़ार (संक्षेप में)	**15**
IV- छत्तीसगढ़ की अर्थव्यवस्था	1. छत्तीसगढ़ में कृषि- कृषि उत्पादन, भूमि उपयोग, सिंचाई सुविधाएं। 2. छत्तीसगढ़ में उद्योग - प्रमुख उद्योग, छत्तीसगढ़ में खनिज आधारित उद्योग 3. छत्तीसगढ़ में बुनियादी ढांचा, सड़क और रेलवे। 4. छ.ग. में प्रति व्यक्ति आय एवं सकल राज्य घरेलू उत्पाद	**15**

हस्ताक्षर, सदस्य एवं संयोजक (केंद्रीय अध्ययन मंडल)-

खंड – स : अध्ययन स्रोत / साधन

लेखक	शीर्षक	प्रकाशक
सिन्हा, वी.सी., पुष्पा सिन्हा	व्यष्टि अर्थशास्त्र	SBPD
पंत जे॰सी॰ एवं मिश्रा	सूक्ष्म अर्थशास्त्र	साहित्य भवन
जैन, के. पी.	आधुनिक माइक्रो अर्थशास्त्र	रतन प्रकाशन मंदिर

Jhingan, M.L.	Micro Economic Theories (Hindi & English)	Vrinda Publications
Ahuja, H.L.	Principles of Micro Economics (Hindi & English)	S Chand & Co
Seth, M.L.	Micro Economics (Hindi & English)	L.N Agrawal
Dhingra, I. C., V. K. Garg	Principles of Micro Economics (Reference)	Sultan Chand & Sons
Bose, D., A. Marimuthu	An Introduction to Micro Economics (Reference)	Himalaya Publishing House

ऑनलाइन स्रोत :

1	https://www.swayamprabha.gov.in/index.php
2	https://vidyamitra.inflibnet.ac.in/index.php
3	https://epgp.inflibnet.ac.in/Home/ViewSubject
4	https://descg.gov.in/

खंड – द : आंकलन एवं मूल्यांकन

अनुशंसित सतत मूल्यांकन प्रविधि

पूर्णांक - अंक	सतत आंतरिक मूल्यांकन (CIA) : 30 अंक अंत सेमेस्टर परीक्षा (ESE): 70 अंक	
सतत आंतरिक मूल्यांकन (CIA) : (कोर्स शिक्षक द्वारा)	आंतरिक जाँच परीक्षा/ प्रश्नोत्तरी परीक्षा (दो) : 20 +20 कार्यभार / सेमिनार / उपस्थिति – 10 कुल अंक - 30	दोनों आंतरिक परीक्षा उच्चतर प्राप्तांक + कार्यभार में प्राप्तांक : 30 अंक के परिपेक्ष्य में अधिग्रहित किया जाएगा
अंत सेमेस्टर परीक्षा (ESE)	दो खंड - अ तथा ब खंड – अ : प्रश्न 1 – वस्तुनिष्ठ प्रश्न – 10x1= 10 अंक प्रश्न 2 – लघु उत्तरीय प्रश्न - 5x4=20 अंक खंड – ब : वर्णात्मक प्रकार के प्रश्न – 2 प्रति इकाई से (1-1 प्रश्न हल करना है) – 4x10 = 40 अंक	

हस्ताक्षर, सदस्य एवं संयोजक (केंद्रीय अध्ययन मंडल)-

FOUR YEAR UNDERGRADUATE PROGRAM
DEPARTMENT OF ECONOMICS
COURSE CURRICULUM – 2024-28

PART-A, INTRODUCTION			
PROGRAM: Bachelor in Art (Certificate/Diploma/Degree/Honors)		**Sem -II**	**SESSION:2024-2025**
SUBJECT: **ECONOMICS**			
1	COURSE CODE:	ECSC-02	
2	COURSE TITLE:	**BASICS OF INDIAN ECONOMY**	
3	COURSE TYPE:	DSC	
4	Pre-requisite	As per program	
5	COURSE LEARNING OUTCOME (CLO):	• The students learn about the state of Indian economy pre and post-independence. • The students learn about the planning process and its achievements in Indian economy. • The students come across with the new economic reforms introduced in Indian economy in the year 1991 and its role in India's development. • The students will come to know about some social problems like overpopulation, education, health & malnutrition, poverty, unemployment etc. • The students learn the problems and prospects of agriculture sector in India. • The students learn various aspects of industrial development and reforms process in the industrial economy. • The students learn the role of foreign trade on Indian economy. They will also learn various aspects of foreign trade in India. • The students learn the state income of Chhattisgarh in the form of GSDP, Per capita income, sectorial contribution etc. • The students also learn about the importance of agriculture in Chhattisgarh's economy. • The students learn about various crops their production and productivity. • The students learn about various industries and infrastructure facilities in Chhattisgarh.	
6	CREDIT VALUE:	4 Credits	Credit= 15 Hours-Learning and observation
7	TOTAL MARKS:	Max Marks:100	Min Passing Marks:40

PART-B, CONTENT OF THE COURSE		
Total No. of Teaching-Learning Periods (01Hr per period) -60 Periods (60 Hours)		
UNIT	**TOPICS (Course Contents)**	**No of Periods**
UNIT I- AN INTRODUCTION TO INDIAN ECONOMY	1. INDIAN ECONOMY AT THE TIME OF INDEPENDENCE 2. POST INDEPENDENCE INDIAN ECONOMY	15

	3. DEVELOPMENT THROUGH FIVE YEAR PLANS 4. NITI AAYOG 5. NEW ECONOMIC REFORMS	
UNIT II- DEMOGRAPHY	1. DEMOGRAPHIC TRENDS OF INDIA 2. ISSUES OF EDUCATION, HEALTH, MALNUTRITION AND MIGRATION. 3. POVERTY AND INEQUALITY 4. UNEMPLOYMENT & OCCUPATIONAL DISTRIBUTION	15
UNIT III- AGRICULTURE	1. NATURE & IMPORTANCE OF AGRICULTURE 2. AGRICULTURE PRODUCTION & PRODUCTIVITY 3. MAJOR PROBLEMS IN INDIAN AGRICULTURE 4. LAND USE PATTERN & LAND REFORMS 5. NEW AGRICULTURE STRATIGIES & GREEN REVOLUTION	15
UNIT IV- INDUSTRY & FOREIGN TRADE	1. INDUSTRIAL GROWTH & PRODUCTIVITY 2. INDUSTRIAL POLICY & ECONOMIC REFORMS 3. MICRO, SMALL & MEDIUM INDUSTRIES (MSME) 4. PROBLEMS OF SMALL SCALE INDUSTRIES 5. PUBLIC ENTERPRIZES IN INDIA 6. ROLE OF FOREIGN TRADE IN INDIA'S DEVELOPMENT	15

Signature of Convener & Members CBoS:-

PART-C, LEARNING RESOURCES ,Reference Books& others

AUTHOR	TITLE	PUBLISHER
Uma Kapila	India Economy: Performance & Policies	Academic Foundation
Datt, Ruddar & K.P.M. Sundharam	Indian Economy	S. Chand & Co. new Delhi
Mishra & Puri	Indian Economy	Himalaya Publishing House
Govt. of India	Economic Survey (Various Issues)	Govt. of India
Brahmanand, P.R. & V.R. Panchmukhi (Eds)	The development process of the Indian Economy	Himalaya Publishing, Mumbai

मिश्रा एवं पुरी	भारतीय अर्थव्यवस्था	हिमालया पब्लिशिंग हाउस
अग्रवाल, ए. एन.	भारतीय अर्थव्यवस्था	न्यू ऐज इंटरनेशनल पब्लिशर्स
मिश्र, जे. पी.	भारतीय अर्थव्यवस्था	साहित्य भवन पब्लिकेशन, आगरा
छत्तीसगढ़ सरकार	आर्थिक सर्वेक्षण	आर्थिक एवं सांख्यिकीय संचालनालय, रायपुर
Uma Kapila	India Economy: Performance & Policies	Academic Foundation

Online Resources

1	https://epgp.inflibnet.ac.in
2	https;//vidyamitra.inflibnet.ac.in
3	https://vidyamitra.inflibnet.ac.in/index.php/search
4	https://www.swayamprabha.gov.in
5	https://www.rbi.org.in/
6	http://descg.gov.in
7	https://www.indiabudget.gov.in/economicsurvey/
8	https://www.cso.ie/en/index.html

PART-D ASSESSMENT & EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks :100 Marks
Continuous Internal Assessment (CIA) : 30 Marks,
End Semester Exams (ESE) :70 marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Tests/Quiz–(2) : 20 & 20 Assignment/Seminar/Attendance - 10 Total Marks - 30	Better marks out of the two Test /Quiz +Obtained marks in Assignment shall be considered against 30 Marks
End Semester Exams (ESE) :	**Two Section – A & B** **Section A**:Q 1- Objective- 10x1=10 Marks Q 2-Short answer type- 5x4=20 Marks **Section B**: Descriptive answer type questions, 1 out of 2 from each unit - 4x10=40 Marks	

Signature of Convener & Members CBoS:-

चार वर्षीय स्नातक पाठ्यक्रम (2024-28)

अर्थशास्त्र विभाग

कोर्स करिकुलम

खंड – अ : परिचय			
पाठ्यक्रम : बैचलर इन आर्ट्स (सर्टिफ़िकेट / डिप्लोमा / डिग्री / आनर्स / आनर्स सह रिसर्च		**सेमेस्टर – II**	**सत्र – 2024-2025**
1	**कोर्स कूट**	ECSC - 02	
2	**कोर्स शीर्षक**	**भारतीय अर्थव्यवस्था की सामान्य जानकारी**	
3	**कोर्स प्रकार**	DSC	
4	**पूर्व अपेक्षित (यदि हो)**	आवश्यकता अनुरूप	
5	**कोर्स लर्निंग आउटकम (CLO)**	• छात्र आजादी से पहले और आजादी के बाद भारतीय अर्थव्यवस्था की स्थिति के बारे में सीखते हैं। • छात्र भारतीय अर्थव्यवस्था में योजना प्रक्रिया और इसकी उपलब्धियों के बारे में सीखते हैं। • छात्र वर्ष 1991 में भारतीय अर्थव्यवस्था में शुरू किए गए नए आर्थिक सुधारों और भारत के विकास में इसकी भूमिका से परिचित हुए। • छात्रों को कुछ सामाजिक समस्याओं जैसे अधिक जनसंख्या, शिक्षा, स्वास्थ्य और कुपोषण, गरीबी, बेरोजगारी आदि के बारे में पता चलेगा। • छात्र भारत में कृषि क्षेत्र की समस्याओं और संभावनाओं को सीखते हैं। • छात्र औद्योगिक विकास और औद्योगिक अर्थव्यवस्था में सुधार प्रक्रिया के विभिन्न पहलुओं को सीखते हैं। • छात्र भारतीय अर्थव्यवस्था पर विदेशी व्यापार की भूमिका सीखते हैं। वे भारत में विदेशी व्यापार के विभिन्न पहलुओं को भी सीखेंगे। • छात्र जीएसडीपी, प्रति व्यक्ति आय, क्षेत्रीय योगदान आदि के रूप में छत्तीसगढ़ की राज्य आय सीखते हैं। • छात्र छत्तीसगढ़ की अर्थव्यवस्था में कृषि के महत्व के बारे में भी सीखते हैं। • छात्र विभिन्न फसलों, उनके उत्पादन और उत्पादकता के बारे में सीखते हैं। • छात्र छत्तीसगढ़ में विभिन्न उद्योगों और बुनियादी सुविधाओं के बारे में सीखते हैं।	
6	**क्रेडिट महत्व**	4 क्रेडिट	क्रेडिट = 15 घंटे का अध्ययन / प्रशिक्षण/ प्रवेक्षण
7	**कुल अंक**	पूर्णांक - 100	उत्तीर्णांक - 40

खंड – ब : कोर्स की विषयवस्तु

कुल अध्यापन कालखंड (01घंटा प्रति काल खंड) – 60 कालखंड (60 घंटे)

इकाई	**प्रसंग (विषय वस्तु)**	**कालखंड की संख्या**
I - भारतीय अर्थव्यवस्था का परिचय	1. स्वतंत्रता के समय भारतीय अर्थव्यवस्था 2. स्वतंत्रता के बाद की भारतीय अर्थव्यवस्था 3. पंचवर्षीय योजनाओं के माध्यम से विकास 4. नीति आयोग 5. नए आर्थिक सुधार	**15**
II- जनांकिकी	1. भारत की जनसांख्यिकीय प्रवृत्तियाँ 2. शिक्षा, स्वास्थ्य, कुपोषण और प्रवासन के मुद्दे	**15**

	3. गरीबी और असमानता 4. बेरोज़गारी और व्यावसायिक वितरण	
III- कृषि	1. कृषि की प्रकृति एवं महत्व 2. कृषि उत्पादन एवं उत्पादकता 3. भारतीय कृषि की प्रमुख समस्याएँ 4. भूमि उपयोग तरीक़ा एवं भूमि सुधार 5. नई कृषि रणनीतियाँ और हरित क्रांति	**15**
IV- उद्योग एवं विदेशी व्यापार	1. औद्योगिक विकास और उत्पादकता 2. औद्योगिक नीति एवं आर्थिक सुधार 3. सूक्ष्म, लघु एवं मध्यम उद्योग (एमएसएमई) 4. लघु उद्योगों की समस्याएँ 5. भारत में सार्वजनिक उद्यम 6.भारत के विकास में विदेशी व्यापार की भूमिका	**15**

हस्ताक्षर, सदस्य एवं संयोजक (केंद्रीय अध्ययन मंडल)-

खंड – स : अध्ययन स्रोत / साधन

लेखक	शीर्षक	प्रकाशक
Datt, Ruddar & K.P.M. Sundharam	Indian Economy	S. Chand & Co. new Delhi
Mishra & Puri	Indian Economy	Himalaya Publishing House
Govt. of India	Economic Survey (Various Issues)	Govt. of India
Brahmanand, P.R. & V.R. Panchmukhi (Eds)	The development process of the Indian Economy	Himalaya Publishing, Mumbai
मिश्रा एवं पुरी	भारतीय अर्थव्यवस्था	हिमालया पब्लिशिंग हाउस
अग्रवाल, ए. एन.	भारतीय अर्थव्यवस्था	न्यू ऐज इंटरनेशनल पब्लिशर्स
मिश्र, जे. पी.	भारतीय अर्थव्यवस्था	साहित्य भवन पब्लिकेशन, आगरा
छत्तीसगढ़ सरकार	आर्थिक सर्वेक्षण	आर्थिक एवं सांख्यिकीय संचालनालय, रायपुर
Uma Kapila	India Economy: Performance & Policies	Academic Foundation

ऑनलाइन स्रोत :

1	https://epgp.inflibnet.ac.in
2	https;//vidyamitra.inflibnet.ac.in
3	https://vidyamitra.inflibnet.ac.in/index.php/search
4	https://www.swayamprabha.gov.in
5	https://www.rbi.org.in/
6	http://descg.gov.in
7	https://www.indiabudget.gov.in/economicsurvey/
8	https://www.cso.ie/en/index.html

खंड – द : आंकलन एवं मूल्यांकन

अनुशंसित सतत मूल्यांकन प्रविधि		
पूर्णांक - अंक	सतत आंतरिक मूल्यांकन (CIA) : 30 अंक अंत सेमेस्टर परीक्षा (ESE): 70 अंक	
सतत आंतरिक मूल्यांकन (CIA) : (कोर्स शिक्षक द्वारा)	आंतरिक जाँच परीक्षा/ प्रश्नोत्तरी परीक्षा (दो) : 20 +20 कार्यभार / सेमिनार / उपस्थिति – 10 कुल अंक - 30	दोनों आंतरिक परीक्षा उच्चतर प्राप्तांक + कार्यभार में प्राप्तांक : 30 अंक के परिपेक्ष्य में अधिग्रहित किया जाएगा
अंत सेमेस्टर परीक्षा (ESE)	दो खंड - अ तथा ब खंड – अ : प्रश्न 1 – वस्तुनिष्ठ प्रश्न – 10x1= 10 अंक प्रश्न 2 – लघु उत्तरीय प्रश्न - 5x4=20 अंक खंड – ब : वर्णात्मक प्रकार के प्रश्न – 2 प्रति इकाई से (1-1 प्रश्न हल करना है) – 4x10 = 40 अंक	

हस्ताक्षर, सदस्य एवं संयोजक (केंद्रीय अध्ययन मंडल)-

NATIONAL EDUCATION POLICY-2020

DEPARTMENT OF C.G.HIGHER EDUCATION

FOUR YEAR UNDERGRADUATE PROGRAM

2024-28

CURRICULUM

GENERIC ELECTIVE (COGE)

FACULTY OF COMMERCE

FOUR YEAR UNDERGRADUATE PROGRAM- 2024-28

FACULTY OF COMMERCE
COURSE CURRICULUM

PART-A : Introduction				
Program : Bachelor in Commerce (Certificate/Diploma/Degree /Honors)		**Semester- I**		**Session : 2024-25**
1	**Course Code**	COGE-01		
2	**Course Title**	Fundamental of Accounting		
3	**Course Type**	Generic Elective Course (COGE)		
4	**Pre-requisite (if any)**	As per program		
5	**Course Learning Outcomes (CLO)**	• Explain the process and methods of financial decision making. • Identify appropriate financial theory and techniques to solve various corporate financial problems. • Identify fundamental concepts of generally accepted accounting principles and can also Identify challenges of accounting • Classify capital and revenue concept, understand basic principles, concepts and conventions of financial accounting • Construct final accounts of firm and apply various aspects of computerised accounting system.		
6	**Credit Value**	**4 Credits**	Credit= 15 Hours-learning & Observation	
7	**Total Marks**	**Max. Marks :100**		**Minimum Passing Marks :40**

PART - B: Content of the Course

Total No. of Teaching-learning Periods (01 Hr. per period)-60 periods (60 Hours)

Unit	Topics (Course Contents)	No. of Period
I	**Accounting: An introduction:** Development, Definition, Needs, Objectives, Branches of Accounting, Basic Accounting Principles Concept and Conventions. Accounting standard: National & International. Brief History & Contribution of Father of the accountancy profession in India : Shree K.S. Aiyear (1859-1940)	15
II	**Accounting Transaction:** Concept of Single and Double entry system, Books of original Records, journal, ledger, Sub division of Journal cash book (including GST Transaction) and Trial balance. Depreciation accounting; methods of recording depreciation. Depreciation of different assets.	15
III	**Final Accounts:** Manufacturing Accounts, Trading Accounts, Profit Loss Account, Balance Sheet, Adjustment Entries with various provision and reserves. Rectifications of Errors: Classification of errors, location of errors, Suspense account, Effect on profit.	15
IV	**Computerized Accounting System**-Theoretical application, Practical Application (using any popular accounting software); Creation of Vouchers; recording transactions; preparing reports, cash book, bank book, ledger accounts, Trial balance, Profit and loss account, Balance Sheet. Selecting and shutting a Company, Backup and Restore data of a Company.	15
Key Words	Accounting, National, International, Contribution, Double Entry System, Journal, Depreciation, Final Accounts, Rectification, Suspense Account, Computerized Accounting.	

Signature of Convener & Members (CBoS):

10/06/24 10.6.24 10/6 10/6/24

PART-C:Learning Resource

Text Books, Reference Books and Others

Text Books Recommended:-

1. Shukla S.M.; Financial Accounting ; Sahitya Bhawan Publication ; Agra. .(Hindi & English Medium)
2. Karim & Khanuja; Financial Accounting; SBPD Publishing House; Agra.(Hindi & English Medium)
3. Agrawal & Mangal; Financial Accounting Universal Publication (Hindi Medium)

Note: Learners are advised to use latest edition of text books.

Reference Books:

1. Gupta, R.L. and Radhaswamy. M; Financial Accounting Sultan Chand and Sons , New Delhi.
2. Monga J.R. Ahuja Girish and Sehgal Ashok: Financial Accounting ; Mayur Paper Back, Noida.
3. Shukla M.C. Grewal T.S. and Gupta , S.C. : Advanced Accounts; S. Chand & Co. New Delhi.
4. Singh B.K. Financial Accounting ; Wisdom Publishing House, Varanasi.

On line Resources : * e-Resources/e-books and e-learning portals:

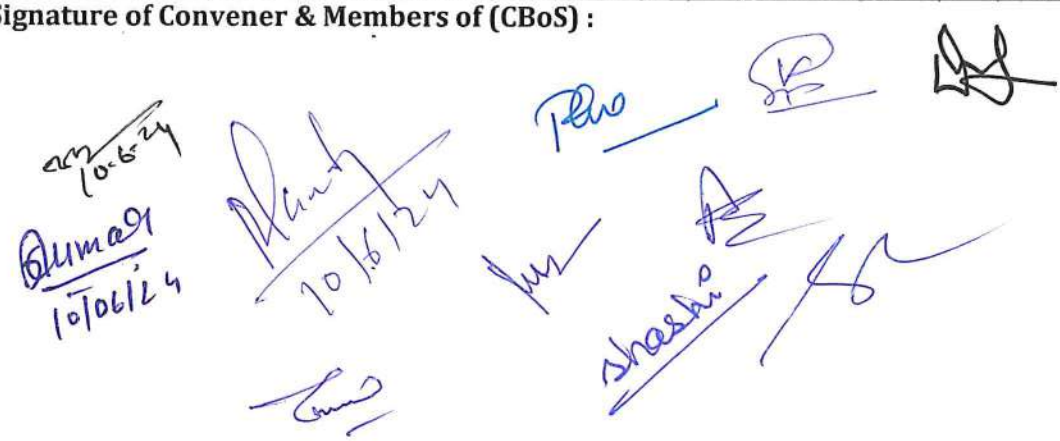
https://indianaccounting.org/econtent_book_finance.
https://onlinecourses.swayam2.ac.in/nou24_cm02/
https://youtu.be/v-djL7SPw4c?si=qRK_dBVZ2lob99EV
https://onlinecourses.swayam2.ac.in/aic20_sp60/preview
https://youtu.be/v-djL7SPw4c?si=qRK_dBVZ2lob99

PART -D : Assessment and Evaluation

Suggested Continuous Evaluation Methods: Maximum Marks:100 Marks
Continuous Internal Assessment (CIA) : 30 Marks
End Semester Exam. (ESE) : 70 Marks

Continuous Internal Assessment(CIA) : (By Course Teacher)	Internal Test/Quiz-(2) : 20 & 20 (Assignment/Seminar): 10 Total Marks - 30	Highest Marks out of the Two Test/Quiz + obtained marks in Assignment shall be considered against 30 Marks
End Semester Exam.(ESE):	Two Section :- A & B **SectionA:**Q.1-Objective-**10x1=10Marks**;Q.2-ShortAnswertype-**5x4= 20 Marks** **Section B :** Descriptive answer type qts. 1 out of 2 from each unit-**4x10=40 Marks**	

Name and Signature of Convener & Members of (CBoS) :



FOUR YEAR UNDERGRADUATE PROGRAM-2024-28

FACULTY OF COMMERCE
COURSE CURRICULUM

PART-A : Introduction				
Program : Bachelor in Commerce (Certificate/Diploma/Degree /Honors		**Semester- I**		**Session : 2024-25**
1	**Course Code**	COGE-02		
2	**Course Title**	Business Law		
3	**Course Type**	Generic Elective Course (COGE)		
4	**Pre-requisite (if any)**	As per program		
5	**Course Learning Outcomes (CLO)**	• Demonstrate the basic concepts terms & provisions of business law. • Classify various types of contract and illustrate the related case studies. • Interpret the regulation governing the Contract of Sale of Goods. • Discuss the laws governing partnership and legal consequences of the transactions and other actions in relation with the partnership, and examine contractual obligations and provisions governing limited liability partnership. • Explain the significant provisions of the Negotiable Instrument Act and provisions of the Consumer Protection Act to protect the interest of the consumers.		
6	**Credit Value**	**4 Credits**	Credit= 15 Hours-learning & Observation	
7	**Total Marks**	**Max. Marks : 100**		**Minimum Passing Marks : 40**

PART- B: Content of the Course

Total No. of Teaching-learning Periods (01 Hr. per period)-60 Periods(60 Hours)

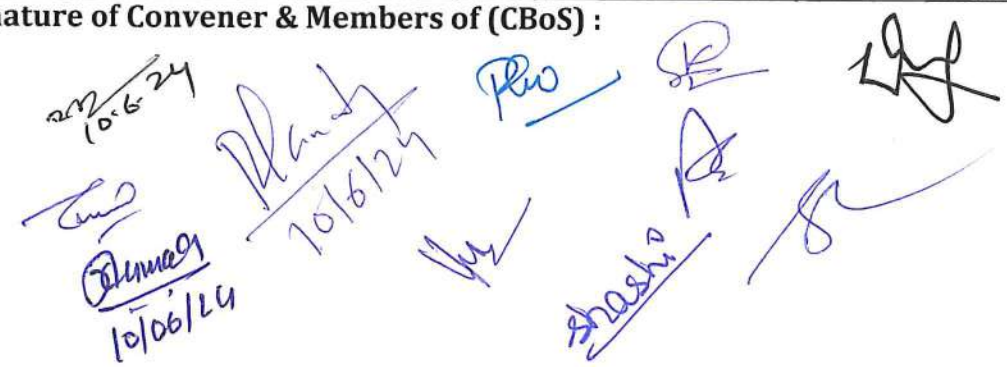
Unit	Topics (Course Contents)	No. of Period
I	**Law of contract (1872):** Nature of contract classification; offer and acceptance, Capacity of parties to contract, free consent, considerations, Agreement declared void, Performance of Contract, and Discharge of Contract, Remedy for Breach of Contract.	15
II	**Special contracts**: Indemnity &; Guarantee, Bailment and pledge; Law of Agency- Meaning, Modes of creating Agency, Types of Agents, Personal Liability of an Agent and Termination of Agency.	15
III	**Sale of Goods Act (1930):** Definition, Sale &; Agreement to sale, Types of Goods, Conditions & Warranties, Sale by Non-owners, Unpaid Seller, CIF, FOB and Ex-Ship Contracts. **The Consumer Protection Act 2019**	15
IV	**Negotiable Instrument Act 1881:**Negotiable Instrument Act (1881) Definition of Negotiable instrument; Feature; promissory note; Bill of exchange cheque; Holder and holder in the due course; crossing of a cheque, types of crossing; Negotiation; dishonor and discharge of negotiable instrument, **Limited Liabilities Partnership Act 2008.**	15
Key Words	Law of Contract, Special Contract, Sale of Goods Act, Consumer Protection Act, Negotiable Instrument Act, Limited Liabilities Partnership Act.	

10/06/24 10.6.24 10/6/24

Signature of Convener & Members (CBoS):

PART-C:Learning Resources		
Text Books,Reference Books and Others		
Text Books Recommended:- 1.Shukla & Sahaya, Sahitya Bhawan Publication, Agra(Hindi Medium) 2.Prof.R.C.Agrawal,SBPD Publication, Agra (HĩndiMedium) 3.Dr.O.P.Gupta,SBPD Publication,Agra (English Medium) 4. Dr. G.K. Varshney: Business Law; Sahitya Bhawan Publication Agra (English Medium) 5.Dr.B.K.Singh & Dr.A.Tiwari, Business Regulatory Framework, SBPD Publications (Hindi Medium) 6.R.L.Naulakha,Business Law, Ramesh Book Depo,Jaipur (Hindi Medium) 7.Dr.Arun Kumar Gangele, Business Regulartory Framework, Ramprasad & Sons,(Hindi Medium) **Note: Learners are advised to use latest edition of text books.**		
Reference Books: 1.Kuchal M.C. Business Law: Vikas publishing house, Delhi. (Hindi & English Medium) 2. Kapoor N.D.: Business Law; Sultanchand & Sons, New Delhi. (English Medium) 3. Chandha P.R.: Business Law; Galgotia New Delhi. (English Medium)		
On line Resources : * e-Resources/e-books and e-learning portals: https://onlinecourses.swayam2.ac.in/nou24_cm11/preview https://www.toppr.com/guides/business-law/ https://www.youtube.com/watch?v=BZshaldOlUo https://www.youtube.com/watch?v=HrF9D2V8Ixk https://www.youtube.com/watch?v=ol2BXgF-P48		
PART-D:Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks		**100 Marks**
Continuous Internal Assessment (CIA) :		**30 Marks**
End Semester Exam. (ESE) :		**70 Marks**
Continuous Internal Assessment(CIA) : (By Course Teacher)	Internal Test/Quiz-(2) : 20 & 20 (Assignment/Seminar)- 10 Total Marks - 30	Better Marks out of the Two Test/Quiz + obtained marks in Assignment shall be considered against 30 Marks
End Semester Exam.(ESE):	Two Section :- A & B **Section A:** Q.1.Objective**10x1=10 Marks**;Q.2.Short Answer type-**5x4=20 Marks** **Section B :** Descriptive answer type qts., 1 out of 2 from each unit-**4x10=40 Marks**	

Name and Signature of Convener & Members of (CBoS) :



FOUR YEAR UNDERGRADUATE PROGRAM-2024-28

FACULTY OF COMMERCE
COURSE CURRICULUM

PART-A : Introduction			
Program : Bachelor in Commerce (Certificate/Diploma/Degree /Honors)		**Semester- I**	**Session : 2024-25**
1	**Course Code**	COGE-03	
2	**Course Title**	Business Economics	
3	**Course Type**	Generic Elective Course (COGE)	
4	**Pre-requisite (if any)**	As per program	
5	**Course Learning Outcomes (CLO)**	• Demonstrate how different economic systems function and evaluate implications of various economic decisions. • Understand how consumers try to maximize their satisfaction by spending on different goods. • Analyze the relationship between inputs used in production and the resulting outputs and costs. • Analyze and interpret market mechanism and behaviour of firms and response of firms to different market situations. • Discover various facets of pricing under different market situations.	
6	**Credit Value**	**4 Credits**	Credit= 15 Hours-learning & Observation
7	**Total Marks**	**Max. Marks :100**	**Minimum Passing Marks : 40**

PART –B: Content of the Course

Total No. of Teaching-learning Periods (01 Hr. per period)-60 Periods (60 Hours)

Unit	Topics (Course Contents)	No. of Period
I	**Brief history and Contribution of Indian Economists:** Kautilya, Dada Bhai Naurogi, Gopal Krishna Gokhle, Dr. Gadgil, V K R V Rao, Amartya Sen. **Business Economics:** Meaning, Definition, objective and nature &Scope, Role and Responsibilities of a business Economist. **Market Demand Analysis:** Meaning of Demand and Determinants of Demand, Changes in Demand, Demand Function Law of Demand, Types of Demand and Exceptions of Law of Demand	15
II	**Consumer Behaviour and Elasticity of Demand:** Utility Analysis of Demand, Law of Diminishing marginal utility & Consumer Surplus, Indifference Curve technique, Price Line or Budget Line , Concept of Elasticity of Demand, Importance, Types, Calculations of different concepts of Elasticity, Methods of measurement of Price Elasticity of demand	15
III	**Production Analysis:** Meaning of Supply and Supply function, Concepts of Stock and Flow, Determinants of Supply, Law of Supply, Changes in Supply, Production Function: a) Law of Variable Proportions b) Law of Returns to Scale, Economies and Diseconomies of Scale	15
IV	**Market Morphology and Equilibrium of the Firm and Industry:** Meaning, Classification and Types of Market, Market structure formed on the basis of perfect and imperfect competition, Price and output determination under Perfect Competition, monopoly, Discrimination Monopoly, Monopolistic Competition, Oligopoly	15
Key Words	Business Economics, Demand, Elasticity, Consumer Behaviour, Production Analysis, Market Structure, Equilibrium of Firm & Industry.	

10/06/24 10/6/24 10/6/24

Signature of Convener & Members (CBoS):

PART- C: Learning Resources		
Text Books, Reference Books and Others		
Text Books Recommended:- 1. Dr. V.C. Sinha; SBPD Publishing House, Agra. (Hindi English and Hindi Medium) 2.Dr. Jai Prakash Mishra, Sahitya Bhawan Publication, Agra. (Hindi and English Medium) 3. M. L. Jhingan, Vrinda publication, Delhi. (English and Hindi medium) 4.Dr. J. K. Jain, Madhya Pradesh Hindi Granth Academy: Bhopal. (Hindi medium) **Note: Learners are advised to use latest edition of text books.**		
Reference Books: 1.Ahuja, H. L New Delhi: Sultan Chand Publishing House,Delhi 2. Koutsoyannis, A. London: Palgrave Macmillan. 3. Chaturvedi, D. D., & Gupta, S. LInternational Book House Pvt. Ltd. . New Delhi: 4. Kennedy, M. J., Himalaya Publishing House. Mumbai:		
On line Resources : * e-Resources/e-books and e-learning portals: https://onlinecourses.swayam2.ac.in/imb24_mg06/preview https://www.businesseconomics.in/ https://www.wallstreetmojo.com/business-economics/ https://www.youtube.com/playlist?list=PLgC10_Xv-BGirAqOr-hU8e-N_Nz0UpgJ- https://www.youtube.com/watch?v=9kai9P-KeNo study material of ICAI: www.icai.org. https://www.icsi.edu/media/website/Business%20Economic https://www.businesseconomics.com/		
PART-D:Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks- 100 Marks **Continuous Internal Assessment (CIA) : 30 Marks** **End Semester Exam. (ESE) : 70 Marks**		
Continuous Internal Assessment(CIA) : (By Course Teacher)	Internal Test/Quiz-(2) : 20 & 20 Assignment/Seminar: 10 Total Marks- 30	Better Marks out of the Two Test/Quiz + obtained marks in Assignment shall be considered against 30 Marks
End Semester Exam.(ESE):	Two Section :- A & B **Section A:**Q.1-Objective **10x1=10Marks**;Q.2.Short answer type-**5x4=20Marks** **Section B:** Descriptive answer type qts., 1 out of 2 from each unit-**4x10=40 Marks**	

Name and Signature of Convener & Members of (CBoS) :

10/6/24

10/6/24

10/06/24

FOUR YEAR UNDERGRADUATE PROGRAM-2024-28

FACULTY OF COMMERCE
COURSE CURRICULUM

PART-A : Introduction			
Program : Bachelor in Commerce (Certificate/Diploma/Degree /Honors		**Semester- II**	**Session : 2024-25**
1	**Course Code**	COGE-04	
2	**Course Title**	Business Accounting	
3	**Course Type**	Generic Elective Course (COGE)	
4	**Pre-requisite (if any)**	As per program	
5	**Course Learning Outcomes (CLO)**	• Understand concept of partnership and can prepare financial statements of partnership firm. • Explain the accounting technique related to disposal of assets and payment of liabilities. • Utilize various methods of accounting for hire purchase transactions. • Identify main sources of Income and learn the technique of preparing Income and Expenditure account from Receipts and Payments account and also able to prepare Balance Sheet. • Understand concept of branch accounting and prepare the accounts on the basis of different methods.	
6	**Credit Value**	**4 Credits**	Credit- 15 Hours-learning & Observation
7	**Total Marks**	**Max. Marks : 100**	**Minimum Passing Marks : 40**

PART –B: Content of the Course		
Total No. of Teaching-learning Periods (01 Hr. per period) 60 Period (60 Hours)		
Unit	Topics (Course Contents)	No. of Period
I	Accounting for Partnership Firm : Fundamental of Partnership Firm ,Partnership Deed, Final Accounts of a Firm, Admission of new partner, Retirement and Death of a partner,	15
II	**Dissolution of a partnership firm**, Amalgamation of partnership Firms, Conversion of partnership firm into limited liability Company.	15
III	**Accounting for Hire-Purchase Transaction**, Journal entries and ledger account in the books of Hire Venders and Hire purchase for large value items including Default and repossession. **Accounting for Installment Purchase System.**	15
IV	**Accounting for Non Trading Institutions: Accounting** for Inland Branches: Concept of dependent and Independent branches, accounting aspects, debtor's system, stock and debtor's system, branch final accounts system and wholesale basis system. Preparation of consolidated profit and loss accounts and balance sheet with adjustments. **Departmental Accounts.**	15
Key Words	Partnership, Firm, Deed, Amalgamation, Limited Liability, Hire-Purchase, Installment Purchase, Non Trading Institutions, Departmental Accounts	

Signature of Convener & Members (CBoS):

PART- C:Learning Resources

Text Books,Reference Books and Others

Text Books Recommended:-

1.Shukla S.M., Sahitya Bhawan Publication ; Agra. .(Hindi & English Medium)
2.Gupta, R.L. and Radhaswamy. M; Sultan Chand and Sons , New Delhi.
3.Karim & Khanuja; SBPD Publishing House; Agra.(Hindi & English Medium)
4.Agrawal & Mangal; Universal Publication (Hindi Medium)
Note: Learners are advised to use latest edition of text books.

Reference Books:

1.Monga J.R. Ahuja Girish and Sehgal Ashok: Mayur Paper Back, Noida.
2.Shukla M.C. Grewal T.S. and Gupta , S.C. : S. Chand & Co. New Delhi.(English Medium)
3.Singh B.K. ,Wisdom Publishing House, Varanasi.

On line Resources : * e-Resources/e-books and e-learning portals:

https://indianaccounting.org/econtent_book_finance.
https://onlinecourses.swayam2.ac.in/nou24_cm02/
https://youtu.be/v-djL7SPw4c?si=qRK_dBVZ2lob99EV
https://onlinecourses.swayam2.ac.in/aic20_sp60/preview
https://youtu.be/v-djL7SPw4c?si=qRK_dBVZ2lob99

PART-D:Assessment and Evaluation

Suggested Continuous Evaluation Methods: Maximum Marks 100 Marks
Continuous Internal Assessment (CIA) : 30 Marks
End Semester Exam. (ESE) : 70 Marks

Continuous Internal Assessment : (CIA) : (By Course Teacher)	Internal Test/Quiz -(2): 20 & 20 Assignment/Seminar- 10 Total Marks- 30	Better marks out of the two Test/Quiz+obtained marks in Assignment shall be considered against 30 Marks
End Semester Exam. (ESE):	Two Section :- A & B **SectionA:**Q.1-Objective–**10x1=10Marks**; **Q.2**-ShortAnswertype-**5x4= 20 Marks** **Section B :**Descriptive answer type qts.,01 out of 02 from each unit-**4x10=40Marks**	

Name and Signature of Convener & Members of (CBoS) :

10/06/24 15/6/24 16/6/24

FOUR YEAR UNDERGRADUATE PROGRAM-2024-28

FACULTY OF COMMERCE
COURSE CURRICULUM

PART-A : Introduction			
Program : Bachelor in Commerce (Certificate/Diploma/Degree /Honors		**Semester-II**	**Session : 2024-25**
1	**Course Code**	COGE-05	
2	**Course Title**	Business Mathematics	
3	**Course Type**	Generic Elective Course (COGE)	
4	**Pre-requisite (if any)**	As per program	
5	**Course Learning Outcomes (CLO)**	• Explore the application of business mathematical techniques to solve problems. • Solve the ratio, proportion, variation and percentage and determine its application in different fields. • Evaluate the profit or loss arising out of business transactions. • Describe the practical application related to commission, brokerage, profit and loss, simple interest and compound interest. • Solve numerical computations quickly and faster with the help of Vedic mathematics sutras.	
6	**Credit Value**	**4 Credits**	Credit= 15 Hours-learning & Observation
7	**Total Marks**	**Max. Marks : 100**	**Minimum Passing Marks : 40**

PART –B: Content of the Course		
Total No. of Teaching-learning Periods (01 Hr. per period)-60 Periods(60 Hours)		
Unit	Topics (Course Contents)	No. of Period
I	**Vedic mathematics:**-Brief history of Vedic mathematics in Indian knowledge tradition, methods and practice of quick calculation of addition, multiplication, division, square and square root of numbers through Vedic mathematics, method of quick verification of answers from Digit Sum. **Simultaneous Equation**:-Meaning, Characteristics, Methods of Solving Equation in Two Variables-Graphical, Substitution, Elimination and Cross Multiplication.	15
II	**Basic Financial Arithmetic:** Simple and Compound interest- Principal, amount, concept of real and nominal rate of interest, difference between simple interest and compound interest, practical problems related to interest, time, rate, principal and amount. **Logarithm and Antilogarithm**-Practical use of logarithm and antilogarithm table.	15
III	**Commercial Arithmetic-I**-Ratio & Proportion, Arithmetic Average, Percentage.	15
IV	**Commercial Arithmetic-II**-Commission, Brokerage, Discount, Profit and Loss.	15
Key Words	Vedic Maths, Simultaneous Equation, Simple & Compound Interest, Logarithm and Antilogarithm, Ratio, Proportion, Average, Percentage, Commission, Brokerage, Discount. Profit & Loss.	

Signature of Convener & Members (CBoS):

PART- C:Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:-

1. Dr.S.M.Shukla,&Dr.S.K.Jain,Sahitya Bhawan Publication,Agra (Hindi & English Medium)
2. Dr. Karim & Agrawal, Business Mathematics SBPD Publishing house, Agra(Hindi & English Medium)
3. Agrawal Dr. Mahesh, Business Mathematics Ramprasad and sons Bhopal

Note: Learners are advised to use latest edition of text books.

Reference Books:

1. Magar Dr. Abhilasha, Business Mathematics Himalaya publication Mumbai
2. Sancheti & Kapoor, Business Mathematics Sultan chand and sons New Delhi
3. Sharma J.K., Business Mathematics IK International pvt. Ltd. New Delhi
4. Kumar Mrityunjay, Business Mathematics S. Chand Publishing New Delhi

On line Resources : * e-Resources/e-books and e-learning portals:

https://onlinecourses.swayam2.ac.in/nou24_cm08/preview

https://www.geektonight.com/business-mathematics-notes/

https://open.umn.edu/opentextbooks/textbooks/642

https://byjus.com/maths/business-mathematics/

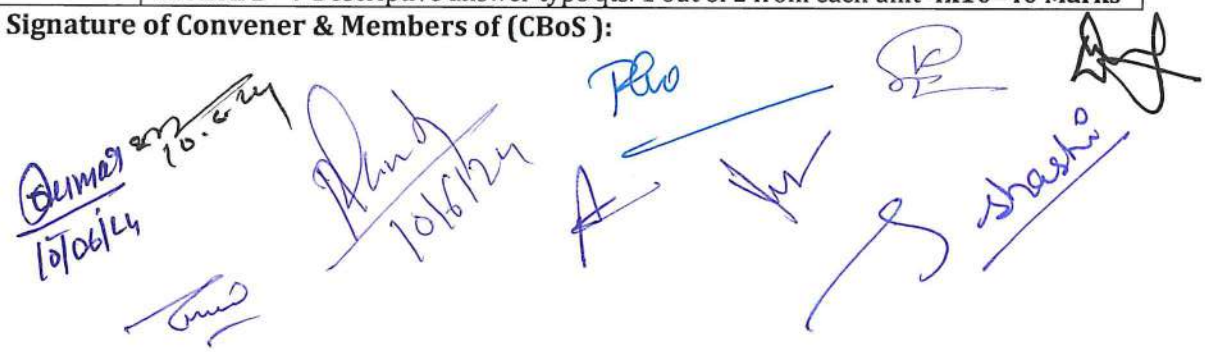
https://www.youtube.com/watch?v=FWj2joeVKEU

PART-D:Assessment and Evaluation

Suggested Continuous Evaluation Methods: Maximum Marks **100 Marks**
Continuous Internal Assessment (CIA) : **30 Marks**
End Semester Exam. (ESE) : **70 Marks**

Continuous Internal Assessment : (CIA)- (By Course Teacher)	Internal Test/Quiz : 20 & 20 (Assignment/Seminar): 10 Total Marks - 30	Better marks out of the two test/quiz+ obtained marks in Assessment shall be considered against 30 Marks
End Semester Exam.(ESE):	Two Section :- A & B **Section A** : Q.1-Objective -**10x1=10Marks**; Q.2-Short Answer type-**5x4=20Marks** **Section B** : Descriptive answer type qts. 1 out of 2 from each unit-**4x10=40 Marks**	

Name and Signature of Convener & Members of (CBoS):



FOUR YEAR UNDERGRADUATE PROGRAM-2024-28

FACULTY OF COMMERCE
COURSE CURRICULUM

PART-A : Introduction			
Program : Bachelor in Commerce (Certificate/Diploma/Degree /Honors		**Semester-II**	**Session : 2024-25**
1	**Course Code**	COGE-06	
2	**Course Title**	Business Environment	
3	**Course Type**	Generic Elective Course (COGE)	
4	**Pre-requisite (if any)**	As per program	
5	**Course Learning Outcomes (CLO)**	• Understand relationship between environment and business. • Demonstrate and develop conceptual frame work of business environment and generate interest in international business. • Indentify the nature of local business environment and its component. • Demonstrate govt. policies and different roles for the emergence, upliftment and smooth functioning of business organization. • Extend knowledge of Industrial Policy and NITI AYOG	
6	**Credit Value**	**4 Credits**	Credit= 15 Hours-learning & Observation
7	**Total Marks**	**Max. Marks : 100**	**Minimum Passing Marks : 40**

PART –B: Content of the Course

Total No. of Teaching-learning Periods (01 Hr. per period)-60 Periods (60 Hours)

Unit	Topics (Course Contents)	No. of Period
I	Business Environment: Type of Environment-internal, external, micro and macro environment. Competitive structure of industry, environmental analysis and strategic management. Managing diversity. Scope of business, characteristics of business. Objectives and the uses of study. Process and limitations of environmental analysis.	15
II	Economic Problem of Growth: Inflation, Parallel Economy, Industrial Sickness. Economic Factors of Growth: Foreign Direct Investment (FDI), Foreign Portfolio Investment (FPI), Micro, Small and Medium Enterprises (MSMEs)	15
III	Govt. Policies: Export-Import Policy, Monetary & Fiscal Policy, Privatization, Liberalization, Globalization, Demonetization, Disinvestment. A brief Introduction of Indian Economic Planning : NITI AAYOG. Industrial Policy of Chhattisgarh.	15
IV	International Environment: Trends in World Trade & The Problems of Developing Countries, Foreign Trade & Economic Growth, International Economic Groups: GATT, WTO, UNCTAD, World Bank, IMF, TRIPS, TRIMS Regional Trade Agreements: European Union (EU), ASEAN, SAARC,NAFTA	15
Key Words	Business Environment, Economic Problem of Growth, Economic Factor of Growth, Govt. Policies, Economic Planning, Industrial Policy, International Environment, International Economic Group, Agreement of Regional Trade	

Signature of Convener & Members (CBoS):

10/06/24 10.6.24 10/6/24

PART-C:Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:-

1.Sinha V.C., Business Environment, SBPD Publications Agra, (Hindi & English)
2.Dr.J.P.Mishra,Shahitya Bhawan Publication,Agra(Hindi Medium)
3. Singh Ranjeet ,Business Environment, Kalyani Publishers New Delhi.
4. Upadhyay Sharma Dayal, Business Environment (Hindi), Ramesh Book Depot Jaipur
5. Singh, Dr. S.K., Business Environment (Hindi), Sahitya Bhawan Publication Agra.
6. Jain Dr. S.C., Business Environment (Hindi), Kailash Pustak Sadan, Bhopal
7. Joshi Rosy, Kapoor Sangam, Business Environment (Hindi), Kalyani Publishers New Delhi.

Note: Learners are advised to use latest edition of text books.

Reference Books:

1.Sheikh Saleem, Business Environment, Pearson.
2. Francis, Cherunilan, Business Environment, Himalaya Publishing House.
3. Gupta C.B., Business Environment Sultan Chand & Sons.
4. Paliwar Veena Keshav, Business Environment, PHI Learning Private Limited, Delhi.

On line Resources : * e-Resources/e-books and e-learning portals:

https://onlinecourses.swayam2.ac.in/imb24_mg33/preview
https://egyankosh.ac.in/handle/123456789/3142
https://www.youtube.com/watch?v=Q1yw7Tchsc8
https://www.youtube.com/watch?v=9jUHXPGEBEM
https://www.youtube.com/playlist?list=PLJtJvO3aaWe2oQxrJov7CfDFDC3aebxi1

PART-D:Assessment and Evaluation

Suggested Continuous Evaluation Methods: Maximum Marks		**100 Marks**
Continuous Internal Assessment (CIA) :		**30 Marks**
End Semester Exam. (ESE) :		**70 Marks**
Continuous Internal Assessment : (CIA)- (By Course Teacher)	Internal Test/Quiz : 20 & 20 (Assignment/Seminar): 10 Total Marks- 30	Better marks out of the two test/quiz+ obtained marks in Assessment shall be considered against 30 Marks
End Semester Exam.(ESE):	**Two Section :- A & B** **Section A:** Q.1-Objective -**10x1=10** Marks; Q.2-Short Answer type-**5x4=20Marks** **Section B :** Descriptive answer type qts. 1 out of 2 from each unit-**4x10=40 Marks**	

Name and Signature of Convener & Members of (CBoS) :

10/06/24
10/6/24

Part - I
SYLLABUS FOR ENVIRONMENTAL STUDIES AND HUMAN RIGHTS
(Paper code-0828)

MM. 75

इन्वारमेंटल साईंसेस के पाठ्यक्रम को स्नातक स्तर भाग–एक की कक्षाओं में विश्वविद्यालय अनुदान आयोग के निर्देशानुसार अनिवार्य रूप से शिक्षा सत्र 2003–2004 (परीक्षा 2004) से प्रभावशील किया गया है। स्वशासी महाविद्यालयों द्वारा भी अनिवार्य रूप से अंगीकृत किया जाएगा।

भाग 1, 2 एवं 3 में से किसी भी वर्ष में पर्यावरण प्रश्न–पत्र उत्तीर्ण करना अनिवार्य है। तभी उपाधि प्रदाय योग्य होगी।

पाठ्यक्रम 100 अंकों का होगा, जिसमें से 75 अंक सैद्धांतिक प्रश्नों पर होंगे एवं 25 अंक क्षेत्रीय कार्य (Field Work) पर्यावरण पर होंगे।

सैद्धांतिक प्रश्नों पर अंक – 75 (सभी प्रश्न इकाई आधार पर रहेंगे जिसमें विकल्प रहेगा)

(अ) लघु प्रश्नोंत्तर – 25 अंक
(ब) निबंधात्मक – 50 अंक

Field Work – 25 अंकों का मूल्यांकन आंतरिक मूल्यांकन पद्धति से कर विश्वविद्यालय को प्रेषित किया जावेगा। अभिलेखों की प्रायोगिक उत्तर पुस्तिकाओं के समान संबंधित महाविद्यालयों द्वारा सुरक्षित रखेंगे।

उपरोक्त पाठ्यक्रम से संबंधित परीक्षा का आयोजन वार्षिक परीक्षा के साथ किया जाएगा।

पर्यावरण विज्ञान विषय अनिवार्य विषय है, जिसमें अनुत्तीर्ण होने पर स्नातक स्तर भाग–एक के छात्र/छात्राओं को एक अन्य विषय के साथ पूरक की पात्रता होगी। पर्यावरण विज्ञान के सैद्धांतिक एवं फील्ड वर्क के संयुक्त रूप से 33: (तैंतीस प्रतिशत) अंक उत्तीर्ण होने के लिए अनिवार्य होंगे।

स्नातक स्तर भाग–एक के समस्त नियमित/भूतपूर्व/अमहाविद्यालयीन छात्र/छात्राओं को अपना फील्ड वर्क सैद्धांतिक परीक्षा की समाप्ति के पश्चात् 10 (दस) दिनों के भीतर संबंधित महाविद्यालय/परीक्षा केन्द्र में जमा करेंगे एवं महाविद्यालय के प्राचार्य/केन्द्र अधिक्षक, परीक्षकों की नियुक्ति के लिए अधिकृत रहेंगे तथा फील्ड वर्क जमा होने के सात दिनों के भीतर प्राप्त अंक विश्वविद्यालय को भेजेंगे।

UNIT-I THE MULTI DISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Definition, Scope and

Importance Natural Resources:

Renewable and Nonrenewable Resources

(a) Forest resources: Use and over-exploitation, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people and relevant forest Act.

(b) Water resources: Use and over-utilization of surface and ground water, floods drought, conflicts over water, dam' s benefits and problems and relevant Act.

(c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.

(d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

(e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources.

(f) Land resources: Land as a resource, land degradation, man induced landslides soil erosion and desertification.

(12 Lecture)

UNIT-II ECOSYSTEM

(a) Concept, Structure and Function of and ecosystem

- Producers, consumers and decomposers.
- Energy flow in the ecosystem
- Ecological succession
- Food chains, food webs and ecological pyramids.
- Introduction, Types, Characteristics Features, Structure and Function of Forest, Grass, Desert and Aquatic Ecosystem.

(b) Biodiversity and its Conservation

- Introduction - Definition: genetic. species and ecosystem diversity
- Bio-geographical classification of India.
- Value of biodiversity: Consumptive use. Productive use, social ethics, aesthetic and option values.
- Biodiversity at global, National and local levels.
- India as mega-diversity nation.

- Hot spots of biodiversity.
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wild life conflict.
- Endangered and endemic species of India.
- Conservation of biodiversity: In situ and Ex-situ conservation of biodiversity.

(12 Lecture)

UNIT- III

(a) Causes, effect and control measures of

- Air water, soil, marine, noise, nuclear pollution and Human population.
- Solid waste management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.
- Disaster Management: floods, earthquake, cyclone and landslides.

(12 Lecture)

(b) Environmental Management

- From Unsustainable to sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, watershed management.
- Resettlement and rehabilitation of people, its problems and concerns.
- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.
- Wasteland reclamation
- Environment protection Act: Issues involved in enforcement of environmental legislation.
- Role of Information Technology in Environment and Human Health.

UNIT- IV

General background and historical perspective- Historical development and concept of Human Rights, Meaning and definition of Human Rights, Kind and Classification of Human Rights. Protection of Human Rights under the UNO Charter, protection of Human Rights under the Universal Declaration of Human Rights, 1948. Convention on the Elimination of all forms of Discrimination against women. Convention on the Rights of the Child, 1989.

UNIT- V

Impact of Human Rights norms in India, Human Rights under the Constitution of India, Fundamental Rights under the Constitution of India, Directive Principles of State policy under the Constitution of India, Enforcement of Human Rights in India. Protection of Human Rights under the Human Rights Act, 1993- National Human Rights Commission, State Human Rights Commission and Human Rights court in India. Fundamental Duties under the Constitution of India.

Reference/ Books Recommended

1. SK Kapoor- Human rights under International Law and Indian Law.
2. HO Agrawal- Internation Law and Human Rights
3. एस.के. कपूर – मानव अधिकार
4. जे.एन. पान्डेय – भारत का संविधान
5. एम.डी. चतुर्वेदी –भारत का संविधान
6. J.N.Pandey - Constitutional Law of India
7. Agarwal K.C. 2001 Environmental Biology, Nidi pub. Ltd. Bikaner
8. Bharucha Erach, the Biodiversity of India, Mapin pub. Ltd. Ahmedabad 380013, India, Email: mapin@icenet.net(R)
9. Bruinner R.C. 1989, Hazardous Waste Incineration. McGraw Hill Inc.480p
10. Clark R.S. Marine pollution, Clanderson press Oxford (TB)
11. Cuningham, W.P.Cooper. T.H.Gorhani, E & Hepworth. M.T,200
12. Dr. A.K.- Environmental Chemistry. Wiley Eastern Ltd.
13. Down to Earth, Center for Science and Environment (R)
14. Gloick, H.P. 1993 Water in crisis. pacific institute for studies in Deve. Environment & Security. Stockholm Eng. Institute. Oxford University, Press. m 473p.
15. Hawkins R.E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Mumbai (R)

CENTRAL BOARD OF STUDIES-COMMERCE-PROPOSED SYLLABUS	
Class Name:	**B.Com Part- 2 (DCC- 2023)**
Paper code/PaperNo:	Paper- 3 (DC-2301)
Title of Subject:	Corporate Accounting
Objectives:	1. Corporate Accounting aids management and investors in planningfor the future so the aim is to explain the functioning of the company and it's important to the students through the syllabus. 2. Preparing financial statements in accordance with appropriatestandards. 3. Interpreting the business implications of financial statementinformation.
Max Marks: 75 + 25	Min. Marks: 25 + 10
Credit Points:	5

Detailed Syllabus

Units	Content of Syllabus	No. of Lectures
Unit -1	**Shares & Debentures:** Issue, forfeiture, and reissue of shares, Issue of bonus share, under writing of share, redemption of preference shares, Issue and redemption of debentures,	15
Unit -2	Financial Statements and Final Accounts (as per company act 2013), Liquidation of company.	15
Unit -3	Valuation of Goodwill andShares	15
Unit- 4	Accounting for Amalgamation of companies as per accounting standard 14; Accounting for internal reconstruction- excluding 152intercompany holdings and reconstruction schemes	15
Unit- 5	Consolidated Balance Sheet of holding companies with one subsidiary only. Relevant provisions of Accounting Standard 21 (ICAI).	15

Case study/Skill based activities/field work/project work as applicable (for extra credit)

Learning Out Comes:	1. Students will be able to understand account for various adjustments linked to share capital and prepare the final accounts of joint stock firms after completing this course.
	2. Students will learn to Prepare accounts for companies that are merging and accounting forcompanies that are undergoing internal reconstruction.
	3. Explain the concepts of company liquidation and prepare the final statement of accounts for liquidators.

CENTRAL BOARD OF STUDIES-COMMERCE-PROPOSED SYLLABUS	
Class Name	बी.कॉम. भाग– 2 (DCC- 2023)
Paper Code	प्रश्न पत्र– 3 (DC-2301)
Title of Subject	निगमीय लेखांकन
Objective	1. निगमित लेखांकन ,प्रबंधन और निवेशकों को भविष्य की योजना बनाने में मदद करता है, इसलिए इसका उद्देश्य पाठ्यक्रम के माध्यम से छात्रों को कंपनी के कामकाज की व्याख्या करना एवं महत्व समझाना है। 2. उपयुक्त मानक के अनुसार वित्तीय विवरण तैयार करना। 3. वित्तीय विवरण जानकारी के व्यावसायिक प्रभावों की व्याख्या करना ।
Max Marks – 75+25	Min. Marks: 25+10
Credit Value	5

Detailed Syllabus

Units	Content of the syllabus	No. of lectures
इकाई– 1	**अंश एवं ऋणपत्र** : अंशों का निर्गमन, अंशों का हरण और उनका पुननिर्गमन , बोनस अंशों का निर्गमन, अंशों का अभिगोपन, पूर्वाधिकार अंशो का शोधन, ऋणपत्रों का निर्गमन और शोधन	15
इकाई– 2	वित्तीय विवरण एवं अंतिम खाते (कंपनी अधिनियम 2013 के अनुसार), कंपनी का समापन	15
इकाई– 3	ख्याति व अंशों का मूल्यांकन	15
इकाई– 4	लेखा मानक 14 के अनुसार कंपनियों के समामेलन के लिए लेखांकन, आंतरिक पुनर्निर्माण के लिए लेखांकन– 152 इंटरकंपनी होल्डिंग्स और पुनर्निर्माण योजनाएं को छोड़कर	15
इकाई– 5	केवल एक सहायक कंपनी के साथ सूत्रधारी कंपनियों का समेकित चिठ्ठा (लेखांकन मानक 21(ICAI) का प्रासंगिक प्रावधान)	15

Case study/Skill based activities/field work/project work etc. (for extra credit)

पाठ्यक्रम अध्ययन की परिलब्धियां	1. शेयर पूंजी से जुड़े विभिन्न समायोजन खाते को छात्र समझ सकेंगे और छात्र इस कोर्स को पूरा करने के बाद संयुक्त स्टॉक फर्मों के अंतिम खाते तैयार कर सकेंगे 2. छात्र विलय करने वाली कंपनी के लिए खाते तैयार करना सीखेंगे और उन कंपनियों के लिए लेखांकन करना सीखेंगे जो आंतरिक पुनर्निर्माण दौर से गुजर रही हैं 3. कंपनी परिसमापन की अवधारणाओं की व्याख्या करें और परिसमापक के लिए खातों का अंतिम विवरण तैयार करना।

CENTRAL BOARD OF STUDIES-COMMERCE PROPOSED SYLLABUS		
Class Name:	B.Com. Part- 2 (DCC-2023)	
Paper Code/Paper No.:	Paper- 4 (DC-2302)	
Title of Subject:	Company Law And Secretarial Practice	
Objectives:	1. To enable the students to Understand the provisions and changes of the Companies Act 2013	
	2. To evaluate corporate problems, identify appropriate legal obligations, duties, rights and remedies.	
	3. To help the students to understand the various provisions related to member of a company.	
Maximum 75 + 25	Minimum 25 + 10	
Credit Points	5	
Detailed Syllabus		
Units	**Content of the Syllabus**	**No. of Lectures**
Unit- 1	**Introduction , Promotion and Incorporation of Companies:** Introduction: Definition of Company, Characteristics and Limitations, Is Company a Citizen? Lifting of the Corporate Veil, Kinds of Company. Social Responsibility of corporate. Promotion: Promoter - Meaning, Legal Position, Duties, Liabilities, Rights, Remuneration. Procedural Aspects in the formation of Companies. Incorporation: Documents to be filed with Registrar, Certificate of Incorporation, Registration, Preliminary Contracts: Memorandum of Association, Articles of Association - Meaning, Purpose, Contents and Alteration. Doctrine of Constructive Notice, Doctrine of Indoor Management and its exceptions.	15
Unit-2	**Issue of Share Capital:** Prospectus – Contents, red herring prospectus, shelf prospectus, Mis-statement in prospectus and their consequences, Statement in lieu of Prospectus, Deemed Prospectus. Share Capital – Meaning and Kinds, Alteration of Capital, Reduction of Capital, Bonus shares, Transfer and Transmission of shares .	15
Unit-3	**Capital Management and Membership:** Capital management - borrowing powers, mortgages and charges, debentures. Dematerialization and Rematerialization of Securities. Membership in company, Member and shareholders, Who can become a member, Cessation of membership – Rights and liabilities of members – Register and index of members .	15
Unit-4	**Corporate Personalities** - Directors - Meaning, Appointment, Remuneration and duties. Managing Director, Women Director, whole time director. Company Secretary –Appointment, Legal position and qualifications, Rights, Duties and liabilities, Professional misconduct.	15

Unit-5	**Company Meetings and Company Secretary:** Company meetings - kinds, Notice, quorum, agenda, voting rights, proxy, resolutions, minutes. Role of Company Secretary in company's meetings - Drafting of notice, agenda, minutes and resolutions. Winding up of companies, Modes of winding up. Liquidator - appointment, duties and rights, remuneration.	15
Case study/Skill based activities/field work/project work etc. as applicable (for extra credit)		
Learning Out comes:	1. Understand the provisions and changes of the Companies Act 2013.	
	2. Understand the use of MOA, AOA and prospectus in a company.	
	3. Evaluate corporate problems identify appropriate legal obligations, duties, rights and remedies.	
	4. Identify areas of corporate law in need of reform and be able to argue why that reform would be beneficial.	

Suggested Readings:

1. Sing Avatar; Company Law; Eastern Book Company Lucknow,
2. Dr SM Shukla Sahitya Bhawan Agra,
3. Dr. R. C. Agrawal Sahitya Bhavan Agra
4. Kapoor Andy, Company Law Incorporating the Provisions of the Companies Amendment Act, 2013 Chand & Sons, New Delhi

Name and Signature of Member

Chairman		HOD PG Department		HOD UG Department		Subject Expert	
1	Saluja Sir	1	07/06/22	1		1	C.G.A.Bhatta
2	07/06/22	2		2	K.S. Pusam	2	
3		3		3	Mr. R.K. Tekkumar	3	A.H.KHAN
4		4	Sandhya Arora	4		4	
5		5		5		5	
6							

CENTRAL BOARD OF STUDIES-COMMERCE-PROPOSED SYLLABUS	
Class Name	बी.कॉम. भाग– 2 (DCC-2023)
Paper Code	प्रश्न पत्र – 4 (DC-2302)
Title of Subject	कंपनी अधिनियम एवं सचिवीय पद्धति
Objective	1. विद्यार्थियों को कंपनी अधिनियम 2013 के प्रावधानों एवं परिवर्तनों को समझने में सक्षम बनाना। 2. निगमीय समस्याओं का मूल्यांकन करने, उचित कानूनी दायित्वों, कर्तव्यों, अधिकारों और उपायों की पहचान करने में सक्षम बनाना । 3. कंपनी के सदस्यों से संबधित विभिन्न प्रावधानों को समझने में सक्षम बनाना।
Max Marks – 75+25	Min. Marks: 25+10
Credit Value	5

Detailed Syllabus

Units	Content of the syllabus	No. of lectures
इकाई– 1	**परिचय, कंपनियों का प्रवर्तन एवं समामेलनः** परिचयः कंपनी की परिभाषा, विशेषताऐं एवं सीमाऐं, क्या कंपनी एक नागरिक है?, निगमन का आवरण उठाना, कंपनी के प्रकार। निगमों का सामाजिक उत्तरदायित्व। प्रवर्तन – प्रवर्तक – अर्थ, वैधानिक स्थिति, कर्त्तव्य, दायित्व एवं अधिकार, पारिश्रमिक। कंपनी गठन के क्रियात्मक पहलू। समामेलन – रजिस्ट्रार के पास जमा किये जाने वाले प्रपत्र, समामेलन का प्रमाण पत्र, पंजीयन, प्रारंभिक अनुबंध – पार्षद सीमानियम, पार्षद अंर्तनियम – अर्थ, उद्देश्य, विषय सामग्री एवं उसमें परिवर्तन । रचनात्मक सूचना का सिद्धांत, आंतरिक प्रबंध का सिद्धांत एवं इसके अपवाद।	15
इकाई– 2	**अंशपूंजी का निर्गमनः** प्रविवरण – विषय सामग्री, रेड हेरिंग प्रविवरण, शेल्फ प्रविवरण, प्रविवरण में असत्य कथन एवं उसके परिणाम। स्थानापन्न प्रविवरण, गर्भित प्रविवरण। अंश पूंजी – आशय एवं प्रकार, पूंजी का परिवर्तन, पूंजी में कमी, बोनस अंश, अंशों का हस्तांतरण एवं हस्तांकन।	15
इकाई– 3	**पूंजी प्रबंध एवं सदस्यताः** पूंजी प्रबंध– कंपनी के ऋण लेने के अधिकार, बंधक एवं प्रभार, ऋणपत्र, प्रतिभूतियों का अभौतिकीकरण एवं पुनःभौतिकीकरण। कंपनी में सदस्यता – सदस्य एवं अंशधारी, सदस्य कौन बन सकता है ? सदस्यता की समाप्ति, सदस्यों के अधिकार एवं उत्तरदायित्व, सदस्यों का रजिस्टर एवं अनुक्रमाणिका।	15
इकाई– 4	**<u>निगमीय व्यक्तित्व</u> –** संचालक – अर्थ, नियुक्ति, पारिश्रमिक एवं कर्तव्य, प्रबंध संचालक, महिला संचालक, पूर्णकालिक संचालक। कंपनी सचिव – नियुक्ति, वैधानिक स्थिति एवं योग्यताएं, अधिकार, कर्तव्य एवं उत्तरदायित्व, पेशेवर कदाचार।	15
इकाई– 5	**कंपनी की सभाऐं एवं कंपनी सचिव** – कंपनी की सभाएं प्रकार, सूचना गणपूर्ति, कार्यसूची, मताधिकार, प्रतिपुरूष, प्रस्ताव, सूक्ष्म। कंपनी की सभाओं में कंपनी सचिव की भूमिका – सूचना, कार्यसूची, सूक्ष्म, प्रस्ताव के मसौदे तैयार करना। कंपनी का समापन – समापन की विधियां। निस्तारक– नियुक्ति, कर्तव्य, दायित्व एवं अधिकार पारिश्रमिक।	15
Case study/Skill based activities/field work/project work etc. (for extra credit)		

पाठ्यक्रम अध्ययन की परिलब्धियां	1. कंपनी अधिनियम 2013 के प्रावधानों एवं परिवर्तनों को समझेंगें। 2. कंपनियों में पार्षद सीमानियम, पार्षद अंतर्नियम एवं प्रविवरण की उपयोगिता को समझेंगें। 3. निगमीय समस्याओं का मूल्यांकन करने, उचित कानूनी दायित्वों, कर्तव्यों, अधिकारों और उपायों की पहचान करने में सक्षम बनेंगें। 4. नियमीय अधिनियम में सुधार की आवश्यकता एवं उसकी सार्थकता की अभिव्यक्ति में सक्षम होंगें।

Suggested Readings:

1. Sing Avatar; Company Law; Eastern Book Company Lucknow,
2. Dr SM Shukla Sahitya Bhawan Agra,
3. Dr. R. C. Agrawal Sahitya Bhavan Agra
4. Kapoor Andy, Company Law Incorporating the Provisions of the Companies Amendment Act, 2013 Chand & Sons, New Delhi

सदस्यों के नाम एवं हस्ताक्षर

Chairman		HOD PG Department		HOD UG Department		Subject Expert	
1	Saroj Asiv	1	07/06/22	1		1	G.A Bhatta
2	07/06/22	2		2	K. S. Pusam	2	
3		3	Sandhya Pant	3		3	A.H.KHAN
4		4		4		4	
5		5		5		5	
6							

CENTRAL BOARD OF STUDIES-COMMERCE-PROPOSED SYLLABUS		
Class Name:	**B.Com. Part- 2** (DCC-2023)	
Paper Code/ Paper No.:	Paper - 5 (DC – 2303)	
Title of Subject:	**Cost Accounting**	
Objectives:	**Course outcomes**: The course aims to develop understanding among learners about contemporary cost concept and rational approach toward cost system and cost ascertainment. The course also aims to provide knowledge about various methods of cost determination under specific situations and to acquire the ability to use information determined through cost accounting for decision making purpose.	
Max Marks: 75+25	Min Marks 25+10	
Credit Points	5	
Detailed Syllabus		
Units	**Content of the Syllabus**	**No. of Lectures**
Unit- 1	**Concept and Nature of Cost Accounting** Concept of cost and costing , Importance and features of costing , Cost classification , Concept of cost unit, Cost center, Establishment of an Idle cost accounting system , Application of IT in Cost Accounting. **Material Cost** Direct and indirect material, Valuation of material, Principal of valuation of material as per AS-2/Ind AS-2, CAS- VI, Material control, Purchases, Objective and functions of purchase department, Inventory control- Meaning and techniques including latest techniques likes Just in Time (JIT) , Inventory Management , Kanban, Kaizen, Determination of Economic Order Quantity (EOQ), Treatment of waste, scrap, spoilage, defective and obsolesce	**15**
Unit- 2	**Employee Cost and Overheads** Meaning and classification of employee cost, Requisite of a good wage and incentive system, Time and piece rate plans, Profit sharing, Employee productivity and cost. Labour cost control-techniques, Employee turnover, Remuneration and Incentive schemes (Rowan and Halsey Plan only) **Overheads** – Definition and classification, Production overheads -allocation and apportionment of cost, Meaning and Methods of cost absorption, Treatment of over - absorption & under-absorption of overheads, Administration and selling & distribution overheads -Methods of ascertainment, Treatment of Research & Development cost in Cost Accounting	**15**
Unit- 3	**Unit Output Costing** -Concept and Need for Unit Output Costing, Preparation of Cost Sheet & Cost Statement and Tender Price, **Reconciliation of cost and financial accounts.**	**15**
Unit- 4	**Methods of Costing:** **Contract Costing-** Methods of cost determination in contract costing, Escalation clause and cost- plus contract, Job Costing- Meaning of Job Cost, Preparation of Job Cost Sheet , Batch Costing- Meaning of Batch Cost and its application in today's Industry. **Process Costing** -Meaning and application of process costing, Methods of determination of cost in process costing, Normal and abnormal loss and gain, Costing of Joint-product and by-product	**15**

Unit- 5	**Operating Costing /service costing-** Ascertainment of services cost like Transport, Hospital, Canteen, Hotel, Education institution, IT industry, Cinema **Activity Based Costing (ABC)** -Concept, significant and silent features, stages and flow of cost in ABC, basic components of ABC-resource drivers and cost drivers, application of ABC in a manufacturing organization and service industry.	**15**
Case study/Skill based activities/field work/project work etc.as applicable (for extra credit)		

Learning Out comes:	1	Determine various types of cost of production
	2	Compute unit cost and total cost of production and prepare cost statement
	3	Compute employee cost , employee productivity and employee turnover
	4	Determine cost under job costing, batch costing ,process costing, contract costing and service costing
	5	Apply activity -based costing for cost determination

Suggested Reading:

1. Maheshwari S.N.: Advanced Problems and Solutions in Cost Accounting ; Sultan Chand, New Delhi
2. Jain S.P. and Narang K.L.: Cost Accounting ; Kalyani New Delhi
3. Arora M.N.; Cost Accounting -Principles and Practice , Vikas ,New Delhi
4. JawaharLal ; Cost Accounting : McGraw Hill Education
5. M.L. Agrawal; Sahitya Bhawan Agra
6. Banarjee, B. Cost Accounting – Theory and Practice New Delhi
7. Taxman's Cost Accounting ,New Delhi

Name and Signature of Member

Chairman		HOD PG Department		HOD UG Department		Subject Expert	
1	Sawjasi	1		1		1	Bhatta (G.A. Bhatta)
2	27/06/22	2		2	A.S. Pusam	2	
3		3		3	Dr. R.K. Kirkare	3	A.H. KHAN
4		4		4		4	
5		5		5		5	
6							

CENTRAL BOARD OF STUDIES-COMMERCE-PROPOSED SYLLABUS	
Class Name	बी.कॉम. भाग– 2 (DCC-2023)
Paper Code	प्रश्न पत्र– 5 (DC–2303)
Title of Subject	लागत लेखांकन
Objective	पाठ्यक्रम का उद्देश्य समकालीन लागत अवधारणा एवं लागत प्रणाली तथा लागत निर्धारण के प्रति विद्यार्थियों में तर्कसंगत समझ एवं दृष्टिकोण विकसित करना है। पाठ्यक्रम का उद्देश्य विशिष्ट परिस्थितियों में लागत निर्धारण के विभिन्न विधियों के बारे में ज्ञान प्रदान करना और लागत लेखांकन के माध्यम से युवाओं में निर्णय लेने की क्षमता विकसित करना है।
Max Marks – 75+25	Min. Marks: 25+10
Credit Value	5

Detailed Syllabus

Units	Content of the syllabus	No. of lectures
इकाई– 1	**लागत लेखांकन की अवधारणा और प्रकृति –** परिव्यय एवं परिव्ययांकन की अवधारणा, परिव्ययांकन का महत्व और विशेषताएं, लागत वर्गीकरण, लागत इकाई की अवधारणा, लागत केंद्र, एक आदर्श लागत लेखा प्रणाली की स्थापना, लागत लेखांकन में सूचना प्रौद्योगिकी का अनुप्रयोग। **सामग्री लागत –** प्रत्यक्ष और अप्रत्यक्ष सामग्री, सामग्री का मूल्यांकन, AS-2/Ind AS-2, CAS-VI के अनुसार सामग्री के मूल्यांकन का सिद्धांत , सामग्री नियंत्रण, क्रय ,क्रय विभाग के उद्देश्य एवं कार्य, स्कंध नियंत्रण – अर्थ और तकनीक नवीनतम तकनीकों जैसे जस्ट इन टाइम (JIT), स्कंध प्रबंध, कानबन, काइज़न, मितव्ययी आदेश मात्रा का निर्धारण (EOQ), सामग्री के क्षय, अवशेष, विकृति, दोषपूर्ण और अप्रचलन का लेखा।	15
इकाई– 2	**श्रम/कर्मचारी लागत और उपरिव्यय –** श्रम लागत का अर्थ और श्रम लागत का वर्गीकरण, एक आदर्श मजदूरी भुगतान पद्धति की विशेषताएँ और प्रेरणात्मक/ प्रोत्साहन प्रणाली की आवश्यकता, समय एवं कार्यभाग दर पद्धति, लाभ सहभागिता, कर्मचारी/श्रम उत्पादकता और लागत , श्रम लागत नियंत्रण – तकनीक, श्रम आवर्त, पारिश्रमिक एवं प्रेरणात्मक योजनाएं (रोवन एवं हाल्से योजना)। **उपरिव्यय** – परिभाषा एवं वर्गीकरण, उत्पादन उपरिव्यय – लागत का आबंटन एवं अविभाजन, लागत अवशोषण का आशय एवं विधियाँ , उपरिव्ययों का कम या अधिक अवशोषण का लेखा, प्रशासन विक्रय एवं वितरण उपरिव्यय निर्धारण की विधियां, लागत परिव्ययांकन में विकास एवं अनुसंधान लागतों का लेखा।	15
इकाई– 3	**इकाई एवं उत्पादन परिव्ययांकन –** उत्पादन उपरिव्ययांकन की अवधारणा एवं आवश्यकता , लागत पत्र एवं लागत विवरण पत्र तैयार करना, निविदा मूल्य की गणना। **परिव्यय लेखों का वित्तीय लेखों से समाधान।**	15
इकाई– 4	**परिव्ययांकन की विधि** **ठेका परिव्ययांकन** – ठेका परिव्ययांकन में लागत निर्धारण की विधियाँ , वृद्धि वाक्यांश,अतिरिक्त लाभ ठेका ,उपकार्य परिव्ययांकन – उपकार्य लागत का आशय, उपकार्य लागत पत्र तैयार करना , समूह परिव्ययांकन, समूह लागत का आशय एवं आधुनिक उद्योग में समूह लागत का प्रयोग, **प्रक्रिया अथवा विधिपरिव्ययांकन** – प्रक्रिया परिव्ययांकन का आशय एवं प्रयोग, प्रक्रिया परिव्ययांकन में लागत निर्धारण की विधियाँ , सामान्य क्षय , असामान्य क्षय एवं असामान्य बचत का लेखांकन, संयुक्त उत्पाद एवं उपोत्पाद का लेखांकन।	15

इकाई– 5	**परिचालन परिव्ययांकन / सेवा परिव्ययांकन**– सेवा परिव्ययांकन जैसे परिवहन ,शक्ति. गृह, अस्पताल , कैंटीन , होटल, शिक्षण संस्था , सिनेमा, संचार प्रौद्योगिकी जैसी सेवाओं का लागत निर्धारण। **क्रिया आधारित परिव्ययांकन** – अवधारणा , विशेषताएँ ,महत्व, क्रिया आधारित परिव्ययांकन में लागत का प्रवाह एवं चरण, क्रिया आधारित परिव्ययांकन के प्रमुख तत्व – संसाधन वाहक एवं लागत वाहक, निर्माणी संगठन एवं सेवा उद्योगों में क्रिया आधारित परिव्ययांकन का प्रयोग।	15
Case study/Skill based activities/field work/project work etc. (for extra credit)		
पाठ्यक्रम अध्ययन की परिलब्धियां	1. . उत्पादन की विभिन्न प्रकार के लागतों को निर्धारित करने में सक्षम होंगे। 2. इकाई लागत, उत्पादन की कुल लागत की गणना कर सकेंगें एवं लागत विवरण तैयार कर सकते है। 3. कर्मचारी लागत (श्रम लागत), कर्मचारी (श्रम) उत्पादकता और कर्मचारी (श्रम) आवर्त की गणना कर सकेंगे। 4. उपकार्य लागत, समूह लागत, प्रक्रिया लागत, ठेका लागत और सेवा लागत के तहत लागत निर्धारित कर सकेंगे। 5. लागत निर्धारण के लिए क्रिया–आधारित लागत परिव्ययांकन का अनुप्रयोग कर सकेंगे।	

Suggested Reading:

1. Maheshwari S.N.: Advanced Problems and Solutions in Cost Accounting ; Sultan Chand, New Delhi
2. Jain S.P. and Narang K.L.: Cost Accounting ; Kalyani New Delhi
3. Arora M.N.; Cost Accounting -Principles and Practice , Vikas ,New Delhi
4. JawaharLal ; Cost Accounting : McGraw Hill Education
5. M.L. Agrawal; Sahitya Bhawan Agra
6. Banarjee, B. Cost Accounting – Theory and Practice New Delhi
7. Taxman's Cost Accounting ,New Delhi
8. लागत लेखांकन, डॉ. बी. के. मेहता, संजय साहित्य भवन आगरा
9. लागत लेखांकन, डॉ. आर. एन. खंडेलवाल, राजीव साहित्य भवन आगरा

सदस्यों के नाम एवं हस्ताक्षर

Chairman		HOD PG Department		HOD UG Department		Subject Expert	
1	Saluja Sir	1		1		1	Bhatta (G.A. Bhatta)
2	07/06/22	2		2	K.S. Pusam	2	
3		3		3		3	A.H. KHAN
4		4		4		4	
5		5		5		5	
6							

CENTRAL BOARD OF STUDIES-COMMERCE-PROPOSED SYLLABUS	
Class Name	**B. Com Part- 2 (DCC - 2023)**
Paper Code/ Paper No.:	Paper- 6 (DC-2304)
Title of Subject:	**Fundamental of Entrepreneurship**
Objectives:	1. It Provides exposure to the students to the entrepreneurial culture and industrial growth so as to preparing them to set up and manage their own small units.
	2. To inculcate entrepreneurial behaviour among the students.
	3. To acquire in-depth knowledge of concepts in the area of entrepreneurship.
	4. To make students able to formulate and present a business Proposal/ Report.
Max Marks 75 + 25	**Minimum Marks 25 + 10**
Credit Point	05

Detailed Syllabus

Unit	Content of Syllabus	No. of Lecturers
Unit- 1	**Entrepreneurship:** Meaning, Definition, Origin and Development, Concepts, Characteristics, Importance, Theories of Entrepreneurship, Role of socio-economic environment, Emergence of Entrepreneurial Class, Intrapreneurship, Techno-preneurship, Netr-preneurship, Eco-preneurship. **Entrepreneur:** Meaning, Definition, Characteristics, Importance, Functions and Qualities. **Women Entrepreneur:** Motivational Factors, Opportunities, Problems and Challenges, Incentives for Women Entrepreneurs.	15
Unit- 2	**Promotion of a Venture:** Concepts of Business Venture, Stages for promotion of a Venture, External Environmental Analysis: Meaning, Factors & Techniques, Evaluation of Start-up Problem, Legal Requirements for Establishment of a New Unit, Raising of Funds: Fund Requirement, Types of Fund Requirement, Sources of Raising Funds, Venture Capital: Meaning, Sources and Documentation Required.	15
Unit- 3	**Entrepreneurial Behaviour:** Meaning, Features, Emergence of Entrepreneurial Behaviours. Tendencies of Entrepreneurial Behaviours. **Innovation and Entrepreneur:** Meaning, Characteristics, Types, Barriers, Stages and Process of Innovation, Strategies of Innovation. **Entrepreneur and Risk-Taking Capacity:** Meaning, Characteristics, Classification, Stages of Risk, Risk Management Process. **Entrepreneurial Skills:** Meaning & Basic Elements, Project Development or Technical Skills, Enterprise Management Skills, Enterprise Building Skills. **Social Responsibility of Entrepreneurship**	15

Unit- 4	**Entrepreneurial Development Programs (EDP):** Meaning, Objectives, Their Role, Relevance and Achievements, EDP in India, Role of Govt. in Organizing EDP, Critical Evaluation, Suggestion. **Initiatives of Government of India to Promote Entrepreneurship:** Start up India, Stand up India. Make in India, Digital India, Atal Innovation Mission, Pradhan Mantri Kaushal Vikas Yojna, National Skill Development Mission, Pradhan Mantri Mudra Yojna etc.	**15**
Unit- 5	**Initiatives for Entrepreneurship Development in Chhattisgarh:** Dimensions of Industrial Development in Chhattisgarh, Chhattisgarh State Industrial Development Corporation, District Trade and Industries Centre in Chhattisgarh, Industrial Policies of Chhattisgarh (Including Current Industrial Policy 2019-24). **Project Preparation & Reporting** : Meaning, Objectives of Project Report, Contents of Project Report, Different Aspects of Project Report, Process For Preparation of Project Report, Methods & Techniques of Reporting, Project Appraisal, Proforma of Project Report.	**15**
Case study/Skill based activities/field work/project work as applicable (for extra credit)		
Learning Out comes	1. To provide exposure to the students to the entrepreneurial culture and industrial growth so as to preparing them to set up and manage their own small units. 2. To motivate students to make their mind set for taking up entrepreneurship ascareer. 3. Know the government support available to entrepreneurship activities. 4. On successful completion of this course, the student should be well versed in concept relating to entrepreneur, knowledge in the financial institution, project report incentives and subsidies.	

Suggested Reading :

01. Hifrich, Manimala, Peters & Shephered , Entrepreneurship, McGraw Hill
02. Desai, Vasant, Dynamics of Entrepreneurial Development and Management, Himalaya Publishing House, New Delhi
03. Prasanna Chandra, Project Preparation, Appraisal & Implementation Tata McGraw Hill, New Delhi
04. Khankha S.S., Entrepreneurial Development, S. Chand & Company, Delhi,
05. Gupta Dr. O.P., Entrepreneurship SBPD Publishing House, Agra
06. Kothari, Mishra, Sahu, Entrepreneurship Development, Ramesh Book Depot, Jaipur
07. Arora Renu, Sood S.K., Udhyamikaran ke Mool Siddhant, Kalyani Publishers New Delhi

CENTRAL BOARD OF STUDIES-COMMERCE-PROPOSED SYLLABUS	
Class Name	बी.कॉम. भाग– 2 (DCC - 2023)
Paper Code	प्रश्न पत्र– 6 (DC-2304)
Title of Subject	उद्यमिता के मूलतत्व
Objective	1. यह छात्रों को उद्यमशीलता की संस्कृति और औद्योगिक विकास के लिए दिशा प्रदान करता है ताकि उन्हें अपनी छोटी इकाइयों को स्थापित करने और प्रबंधित करने के लिए तैयार किया जा सके। 2. छात्रों के बीच उद्यमशीलता के व्यवहार को विकसित करने के लिए। 3. उद्यमिता के क्षेत्र में अवधारणाओं का गहन ज्ञान प्राप्त करना। 4. छात्रों को एक व्यावसायिक प्रस्ताव/ रिपोर्ट तैयार करने और प्रस्तुत करने में सक्षम बनाना।
Max Marks – 75+25	Min. Marks: 25+10
Credit Value	5

Detailed Syllabus

Units	Content of the syllabus	No. of lectures
इकाई– 1	**उद्यमिता:** आशय, परिभाषा, उत्पत्ति एवं विकास, अवधारणाएं, विशेषताएं, महत्व, उद्यमिता की विचारधाराएं, सामाजिक–आर्थिक वातावरण की भूमिका, उद्यमी वर्ग का उद्भव, आंतरिक उद्यमिता, टेक्नो–प्रेन्योरशिप, नेट–प्रेन्योरशिप, इको–प्रेन्योरशिप **उद्यमी:** आशय, परिभाषा, विशेषताएं, महत्व, कार्य एवं गुण **महिला उद्यमी:** अभिप्रेरक तत्व, अवसर, समस्याएं एवं चुनौतियां, महिला उद्यमियों के लिए प्रोत्साहन	15
इकाई– 2	**उद्यम का प्रवर्तन:** व्यावसायिक उद्यम की अवधारणा, एक उद्यम के प्रवर्तन की अवस्थाएं, बाह्य पर्यावरणीय विश्लेषण: आशय, तत्व एवं तकनीकें, प्रारंभिक समस्याओं का मूल्यांकन, नवीन इकाई की स्थापना के लिए वैधानिक आवश्कताएं, कोषों को जुटाना: कोषों की आवश्यकता, कोषों की आवश्कताओं के प्रकार, कोषों को जुटाने के स्त्रोत, उद्यम पूंजी: आशय, स्त्रोत एवं आवश्यक प्रलेखीकरण	15
इकाई– 3	उद्यमीय व्यवहार: आशय, लक्षण, उद्यमी व्यवहारों का उद्भव, उद्यमी व्यवहारों की प्रवृत्तियां नवाचार एवं उद्यमी: नवाचार का आशय, विशेषताएं, प्रकार, बाधाएं, अवस्थाएं एवं प्रकिया, नवाचारों के लिए व्यूहरचनाएं उद्यमी एवं जोखिम वहन क्षमता: जोखिम का आशय, विशेषताएं, वर्गीकरण, जोखिमों की अवस्थाएं, जोखिम प्रबंधन प्रकिया उद्यमीय कौशल: अर्थ एवं मूल तत्व, परियोजना विकास अथवा तकनीकी कौशल, उपक्रम प्रबंध कौशल, उपक्रम निर्माण कौशल उद्यमिता का सामाजिक उत्तरदायित्व	15
इकाई– 4	उद्यमिता विकास कार्यक्रम: अर्थ, उद्देश्य, भूमिका, प्रासंगिकता, उपलब्धियां, भारत में उद्यमिता विकास कार्यक्रम, उद्यमिता विकास कार्यक्रम को संगठित करने में सरकार की भूमिका, आलोचनात्मक मूल्यांकन एवं सुझाव उद्यमिता के प्रोत्साहन हेतु भारत सरकार की पहल: स्टार्ट अप इंडिया, स्टैंड अप इंडिया, मेक इन इंडिया, डिजिटल इंडिया, अटल इनोवेशन मिशन, प्रधानमंत्री कौशल विकास योजना, नेशनल स्किल डेवलपमेंट मिशन, प्रधानमंत्री मुद्रा योजना आदि.	15

इकाई– 5	छत्तीसगढ़ में उद्यमिता विकास हेतु पहलः छत्तीसगढ़ में औद्योगिक विकास के आयाम, छत्तीसगढ़ राज्य औद्योगिक विकास निगम, जिला व्यापार उद्योग केन्द्र, छत्तीसगढ़ राज्य की औद्योगिक नीतियां (वर्तमान औद्योगिक नीति 2019–24 सहित) परियोजना निर्माण एवं प्रतिवेदनः परियोजना प्रतिवेदन का आशय एवं उद्देश्य, परियोजना प्रतिवेदन की विषयवस्तु, परियोजना प्रतिवेदन के विभिन्न पहलू, परियोजना प्रतिवेदन निर्माण प्रकिया, परियोजना प्रतिवेदन की विधियां एवं तकनीकें, परियोजना मूल्यांकन, परियोजना प्रतिवेदन का प्रारूप	15
Case study/Skill based activities/field work/project work etc. (for extra credit)		
पाठ्यक्रम अध्ययन की परिलब्धियां	1. छात्रों को उद्यमशीलता की संस्कृति और औद्योगिक विकास के लिए दिशा प्रदान करना ताकि उन्हें अपनी छोटी इकाइयों को स्थापित करने और प्रबंधित करने के लिए तैयार किया जा सके। 2. छात्रों को उद्यमिता को करियर के रूप में अपनाने के लिए अपना मन बनाने के लिए प्रेरित करना। 3. उद्यमिता गतिविधियों के लिए उपलब्ध सरकारी सहायता के बारे में जानने में। 4. इस पाठ्यक्रम के सफल समापन पर, छात्र को उद्यमी से संबंधित अवधारणा, वित्तीय संस्थान में ज्ञान, परियोजना रिपोर्ट प्रोत्साहन और सब्सिडी से अच्छी तरह वाकिफ होना चाहिए।	

Suggested Reading :

01. Hifrich, Manimala, Peters & Shephered , Entrepreneurship, McGraw Hill
02. Desai, Vasant, Dynamics of Entrepreneurial Development and Management, Himalaya Publishing House, New Delhi
03. Prasanna Chandra, Project Preparation, Appraisal & Implementation Tata McGraw Hill, New Delhi
04. Khankha S.S., Entrepreneurial Development, S. Chand & Company, Delhi,
05. Gupta Dr. O.P., Entrepreneurship SBPD Publishing House, Agra
06. Kothari, Mishra, Sahu, Entrepreneurship Development, Ramesh Book Depot, Jaipur
07. Arora Renu, Sood S.K., Udhyamikaran ke Mool Siddhant, Kalyani Publishers New Delh

सदस्यों के नाम एवं हस्ताक्षर

Chairman		HOD PG Department		HOD UG Department		Subject Expert	
1	Saloja SW	1	07/06/22	1	Shastri	1	Bhatta (C.G.A.Bhatta)
2	07/06/22	2		2	K.S. Pusam	2	
3		3		3		3	A.H.KHAN
4		4		4		4	
5		5		5		5	
6							

CENTRAL BOARD OF STUDIES-COMMERCE-PROPOSED SYLLABUS	
Class Name	B.Com. Part- 2 (DCC-2023)
Paper Code/Paper No.	Paper- 7 (DC – 2305)
Title of Subject:	Principles of Business Management
Objective:	The objective of this course is to help students to understand the concept of business management and its function.
Max. Marks: 75 + 25	Min Marks: 25 + 10
Credit Point	5

Detailed Syllabus

Units	Content of the Syllabus	No. Of Lectures
Unit- 1	**Management**, Introduction: Concept, Characteristics, Nature, Process and Significance of Management; Managerial Role (Mintzberg); An Overview of functional areas of Management; Development of Management Thought; Classical and Neo Classical System; Contingency Approach, System Approach.	15
Unit- 2	**Planning**: Concept, Characteristics, Process, Importance and Type, Criteria of effective planning. **Decision Making**: Concept, Process, Types and Importance Management by Objective, **Organization: Concept**, Nature, Process and Significance, Authority and Responsibility Relationships, Centralization and Decentralization, Departmentation, Organizational Structure- Forms.	15
Unit- 3	**Direction**: Meaning Characteristics, Concept and Techniques, Principle, Importance, **Coordination**: Meaning, Nature Characteristics, Principle, Importance, Advantage and Limitation. **Communication**- Nature, Process, Importance, Types, Networks and Barriers, Effective Communication, Feedback, **Staffing**: Concept of Staffing- Recruitment and Selection; Orientation; Training and Development; Carrier Development; Performance Appraisal with case study	15
Unit- 4	**Control**: Meaning, Characteristics Importance and Process, Effective Control System, Techniques of Control. **Motivation**- Concept, Types, Importance, Theories- Maslow. Herzberg, McGregor, Ouchi, Financial and Non-Financial Incentives, **Leaderships**: Meaning, Concept, Functions and Leadership Styles, Types, Qualities, Barrier, Likert's Four System of Leadership, Theories Importance with case study.	15
Unit- 5	**Office Management:** - Meaning, Process Scope, Principle, Systems and routine handling of office records, office equipment's machines, office environment office Manual, Work Simplification and Work measurement, Office service. Theory of Vedic Management and Leadership.	15

Case study/Skill based activities/field work/project work etc. as applicable (for extra credit)

CENTRAL BOARD OF STUDIES-COMMERCE-PROPOSED SYLLABUS

Class Name	बी.कॉम. भाग– 2 (DCC-2023)
Paper Code	प्रश्न पत्र– 7 (DC – 2305)
Title of Subject	व्यवसाय प्रबंध के सिद्धांत
Objective	इस पाठ्यक्रम का उद्देश्य विद्यार्थी को व्यवसाय प्रबंध की अवधारणा तथा इसके कार्यो के बारे में समझाना है।
Max Marks – 75+25	Min. Marks: 25+10
Credit Value	5

Detailed Syllabus

Units	Content of the syllabus	No. of lectures
इकाई– 1	<u>प्रबंध :–</u> परिचय, अवधारणा, विशेषताएँ, प्रकृति, प्रक्रिया तथा महत्त्व, प्रबंध की भूमिका (मिन्ट्जबर्ग), प्रबंध के कार्यात्मक क्षेत्रों का अवलोकन, प्रबंध विचारधारा का विकास, प्राचीन एवं नव प्राचीन प्रणाली, आकस्मिकता दृष्टिकोण, प्रणाली दृष्टिकोण	15
इकाई– 2	**नियोजन** :– अवधारणा, विशेषताएँ, प्रक्रिया, महत्व, प्रकार प्रभावी नियोजन के मापदंड <u>निर्णयन :–</u> अवधारणा, प्रक्रिया, प्रकार एवं महत्व, उद्देश्यो द्वारा प्रबंध <u>संगठन :–</u> अवधारणा, प्रकृति, प्रक्रिया, महत्व, अधिकार तथा उत्तरदायित्व संबंध, केन्द्रीयकरण तथा विकेन्द्रीकरण विभागीयकरण, संगठन संरचना– प्रारूप	15
इकाई– 3	<u>निर्देशन :–</u> अर्थ, विशेषताएँ, अवधारणा तथा तकनीक, सिद्धांत, महत्व, <u>समन्वय :–</u> अर्थ, विशेषताएँ, प्रकृति, सिद्धांत, महत्व, लाभ तथा सीमाएँ <u>सम्प्रेषण</u> – प्रकृति, प्रक्रिया, महत्व, प्रकार, नेटवर्क तथा बाधाऐं, प्रभावी सम्प्रेषण, प्रतिपुष्टि <u>नियुक्तियाँ:–</u> भर्ती की अवधारणा– भर्ती और चयन, उन्मुखीकरण, प्रशिक्षण तथा विकास, करियर (आजीविका) विकास, केस स्टडी के साथ प्रदर्शन मूल्यांकन।	15
इकाई– 4	<u>नियंत्रण :–</u> अर्थ, विशेषताएँ, महत्व, प्रक्रिया, प्रभावी नियंत्रण प्रणाली, नियंत्रण की तकनीक <u>अभिप्रेरण:–</u> अवधारणा, प्रकार, महत्व, विचारधाराएं :– मैस्लो, हर्जबर्ग, मैकग्रेगर, आउची, मौद्रिक तथा अमौद्रिक प्रोत्साहन अभिप्रेरण। <u>नेतृत्व :–</u> अर्थ, अवधारणा, कार्य तथा नेतृत्व शैली, प्रकार, गुण, बाधाएँ, लिकर्ट की चार नेतृत्व प्रणाली, केस स्टडी द्वारा विचारधारा का महत्व	15
इकाई– 5	<u>कार्यालय प्रबंध :–</u> अर्थ, प्रक्रिया, क्षेत्र, सिद्धांत, प्रणाली तथा कार्यालयीन अभिलेखों की प्रणाली एवं नियमित संचालन, कार्यालयीन उपकरण तथा मशीनें, कार्यालय वातावरण, कार्यालय नियमावली, कार्य सरलीकरण तथा कार्य मापन, कार्यालयीन सेवाएं। वैदिक प्रबंध का सिद्धांत और नेतृत्व	15

Case study/Skill based activities/field work/project work etc. (for extra credit)	
पाठ्यक्रम अध्ययन की परिलब्धियां	1. व्यवसाय प्रबंध के सामान्य नियमों, मापदंडो तथा अवधारणा को समझ पाने में सक्षम होगा । 2. व्यवसाय को करने में आने वाली व्यवहारिक समस्याओं को समझना तथा उन्हें नियंत्रित कर दूर करने में सक्षम होना । 3. व्यवसाय प्रबंध के विभिन्न समस्याओं के समाधान के लिए विभिन्न विधियों तथा तकनीकों की पहचान करना । 4. व्यवसाय तथा उद्योग से संबंधित समस्या को हल करने के लिए व्यवसाय प्रबंध के सिद्वांतों का प्रयोग करने में सक्षम होना । 5. नियोजन, संगठन, निर्देशन, अभिप्रेरण तथा नियंत्रण आदि के अवधारणा को समझने में सक्षम होना।

Suggested Reading :

1. व्यवसाय प्रबंध के सिद्वांत : डॉ.एस.सी. सक्सेना, साहित्य भवन पब्लिकेशनस।
2. व्यवसाय प्रबंध के सिद्वांत : प्रो. आर.सी. अग्रवाल, SBPD पब्लिसिंग हाउस, आगरा।
3. व्यवसाय प्रबंध के सिद्वांत : संजय गुप्ता, SBPD पब्लिसिंग
4. प्रबंध की आवश्यकता :– कूण्ट्ज – टाटा मैकग्रे हिल, नयी दिल्ली
5. व्यवसाय प्रबंध :– यादव, पंकज, नीलकमल प्रकाशन दिल्ली
6. प्रबंध की अवधारणाऐ एवं सिद्वांत – सुधीर शुक्ला
7. व्यवसाय संगठन तथा प्रबंध : जगदीश प्रकाश, किताब महल पब्लिशर

सदस्यों के नाम एवं हस्ताक्षर

Chairman		HOD PG Department		HOD UG Department		Subject Expert	
1	sulusasiy	1		1		1	Bhatta (G. A. Bhatta)
2	07/06/22	2		2	K. S. Pasam	2	
3		3		3	Dr. R. K. Thakur	3	A. H. KHAN
4		4		4		4	
5		5		5		5	
6						6.	Babita Mam

CENTRAL BOARD OF STUDIES-COMMERCE-PROPOSED SYLLABUS	
Class Name:	B.Com. Part- 2 (DCC 2023)
Paper Code/Paper No.:	Paper- 8 (DC-2306)
Title of Subject:	Business Statistics
Objectives:	Course outcomes: The purpose of this is to inculcate and analytical ability among the students.
Max. Marks: 75 + 25	Min. Passing Marks: 25 + 10
Credit Point:	5

Detailed Syllabus

Units	Content of the Syllabus	No. of Lectures
Unit- 1	Introduction to Statistics: Meaning, Scope, Importance and Limitation, Statistical Investigation: Planning and Organization, Statistical Units, Methods of Investigation, Census and Sampling Collection of Data: Primary and Secondary Data, Editing of Data, Classification of Data, Frequency Distribution and Statistical Series, Tabulation of Data, Diagrammatical and Graphical Presentation of Data	15
Unit- 2	Measures of Central tendency: Mean, Median, Mode, Geometric and Harmonic Mean; Dispersion: Range, Quartile, Percentile, Quartile Deviation, Standard Deviation and its Co-efficient, Co-efficient of Variations and Variance, Test of Skewness and Dispersion, Its Importance, Co-efficient of Skewness. Partition values.	15
Unit- 3	Correlation: Meaning, Application, Types and Degree of Correlation, Methods- Scatter Diagram, Karl Pearson's Coefficient of Correlation, Spearman's Rank Coefficient of Correlation. Regression Analysis: Meaning and Definition, Uses and Utility of Regression Analysis, Constructions of Regression Lines, Regression Coefficient, Determination of Coefficient of Correlation by Regression Coefficients, Properties of Regression Coefficient, Comparison of Correlation and Regression Analysis.	15
Unit- 4	Index Number: Meaning, Types and Uses, Method of Constructing Price Index Number, Fixed: Based Method, Chain-Base Method, Base conversion, Base Shifting Deflating and Splicing. Consumer Price Index Number, Fisher's Ideal Index Number, Reversibility Test Time and Factor; **Analysis of Time Series**: Meaning, Importance and Components of a Time Series. Decomposition of Time Series: Measurement of Square Trend.	15
Unit- 5	Forecasting and Methods: Fore casting concept, Types and Importance, General approach to Forecasting; Methods of Forecasting; demand: Industry VS Company sales Forecast; Factors affecting company sales. **Theory of Probability**: as a Concept, the three approaches to Defining Probability; Addition and Multiplication laws of Probability; Conditional Probability, Bayes' Theorem; Expectation and Variance of a random variable.	15

CENTRAL BOARD OF STUDIES-COMMERCE-PROPOSED SYLLABUS	
Class Name	बी.कॉम. भाग– 2 (DCC 2023)
Paper Code	प्रश्न पत्र– 8 (DC-2306)
Title of Subject	व्यावसायिक सांख्यिकी
Objective	इसका उद्देश्य छात्रो मे विश्लेषणात्मक क्षमता विकसित करना है।
Max Marks – 75+25	Min. Marks: 25+10
Credit Value	5

Detailed Syllabus

Units	Content of the syllabus	No. of lectures
इकाई– 1	सांख्यिकी का परिचय – अर्थ, क्षेत्र, महत्व और सीमाएं, सांख्यिकी अनुसंधानः योजना और संगठन, सांख्यिकीय इकाइयाँ, अनुसंधान की विधि, संगणना और प्रतिदर्श समंको का संकलन – प्राथमिक एवं द्वितीयक संमक, समंको का सम्पादन, समंको का वर्गीकरण, आवृत्ति वितरण और सांख्यिकीय श्रृंखला, संमकों का सारणीयन, समंको का आरेखीय और बिंदुरेखीय प्रस्तुतिकरण।	15
इकाई– 2	केन्द्रीय प्रवृत्ति की मापः – माध्य, माध्यिका और बहुलक, गुणोत्तर एवं हरात्मक माध्य अपकिरणः– विस्तार, चतुर्थक, शतमक, चतुर्थक विचलन, माध्य विचलन, प्रमाप विचलन एवं इसके गुणांक, विचरण एवं विचरण गुणांक, अपकिरण और विषमता की जांच एवं इसका महत्व, विषमता गुणांक, विभाजन मूल्य	15
इकाई– 3	सहसंबंधः – अर्थ, अनुप्रयोग, प्रकार एवं सहसंबंध के परिणाम, विधियाँ – निक्षेप चित्र अथवा बिंदु चित्र, कार्ल पियर्सन के सहसंबंध गुणांक, स्पियरमैन की कोटि क्रम सहसंबंध गुणांक प्रतीपगमन विश्लेषण– अर्थ एवं परिभाषा, प्रतीपगमन विश्लेषण की उपयोग और उपयोगिता, प्रतीपगमन रेखाओं का निर्माण, प्रतीपगमन गुणांक, प्रतीपगमन गुणांक द्वारा सह–संबंध गुणांक का निर्धारण, प्रतीपगमन गुणांको की विशेषताएँ, प्रतीपगमन विश्लेषण और सहसंबंध में तुलना	15
इकाई– 4	निर्देशांक – अर्थ, प्रकार और उपयोग, मूल्य निर्देशांक रचना की विधियाँ – स्थिर आधार विधि, श्रृंखला आधार विधि, आधार परिवर्तन, निर्देशांक की आधार वर्ष परिवर्तन, अपस्फीति एवं शिरोबंधन, उपभोक्ता मूल्य निर्देशांक, फिशर का आदर्श निर्देशांक, समय और तत्व उत्क्राम्यता परीक्षण काल श्रेणियों का विश्लेषण – काल श्रेणी का अर्थ, महत्व एवं संघटक, काल श्रेणी का विघटन, वर्ग प्रवृत्ति का मापन	15
इकाई– 5	पूर्वानुमान और विधियाँ – पूर्वानुमान अवधारणा, प्रकार एवं महत्व, पूर्वानुमान के लिए सामान्य दृष्टिकोण, पूर्वानुमान की विधियाँ, माँग, उद्योग बनाम कम्पनी बिक्री पूर्वानुमान, कम्पनी की विक्रय को प्रभावित करने वाले कारक, प्रायिकता के सिद्धांत – एक अवधारणा के रूप में, प्रायिकता को परिभाषित करने वाले तीन दृष्टिकोण, प्रायिकता का योग और गुणन नियम, प्रतिबंधित प्रायिकता, बेज (Bayes) प्रमेय, एक यादृच्छिक चर का विचरण और अपेक्षाएं	15
Case study/Skill based activities/field work/project work etc. (for extra credit)		

B.COM PART III

COMPULSORY CORE COURSE

TITLE OF PAPER - Group-I

PAPER – I - INCOME TAX

OBJECTIVE

It enables the students to know the basics of Income Tax Act and its implications.

M.M. 75

UNIT- I Basic Concepts: Income, agricultural Income, casual income, assessment year, previous year, gross total income, total income, person.
Basis of charge: Scope of total income, residence and tax liability, income whichdoes not form part of total income.

UNIT- II Heads of Income: Salaries; Income from house property.

UNIT- III Profit and gains of business or profession, including provisions relating to specific business; Capital gains, Income from other sources.

UNIT-IV Computation of Tax Liabilty: Set-off and carry forward of losses; Deduction from grosstotal income.Aggregation of income; Computation of total income and tax liability of individualand& HUF.

UNIT-V Tax Management: Tax deduction at source; Advance payment of tax; Assessmentprocedures; Tax planning for individuals.
Tax evasion, Tax Avoidance and Tax planning. Tax Administration: Authorities, appeals, penalties.
Preparation of return of income
-Manually and on line

Suggested Reading:

1. Singhania V.K.: Students Guide to Income Tax; Taxmann, Delhi.
2. Prasad, Bhagwati: Income Tax Law &Prectice; Wily Publication, New Delhi.
3. Mehrotra H.C.: Income Tax Law & Accounts: SahityaBhawan, Agra.
4. Girish Ahuja and Ravi Gupta: Systematic approach to income tax: Sahitya Bhawan Publications, New Delhi.
5. Chandra Mahesh and Shukla D.C.: Income Tax Law and Practice; Pragati Publications, New Delhi.
6. R.K. Jain: Income Tax & Law (Hindi & English) ShahityaBhavan, Publication, Agra.

B.COM PART III

COMPULSORY CORE COURSE

TITLE OF PAPER - Group-I

PAPER – II- AUDITING

M.M. 75

OBJECTIVE

This course aims at imparting knowlege about the principles and methods of auditingand their applications.

UNIT-I Introduction: Meaning and objectives of auditing; Types of audit; Internal audit. Audit Process: Audit programme; Audit note books; Working papers and evidences.

UNIT-II Internal Check System: Internal control.

Audit Procedure: Vouching: Verification of assets and liabilities.

UNIT-III Audit of Limited Companies:

a. Company auditor – Qualification, Appointment, powers, duties, Resignation and liabilities.
b. Divisible profits and dividend.
c. Auditor's report - standard report and qualified report.
d. Special audit of banking companies.
e. Audit of educational institutions.
f. Audit of Insurance companies.

UNIT-IV Investigation: Investigation; Audit of non profit companies,

a. Where fraud is suspected, and
b. When a running a business is proposed.
c. Varifications & Valuation of assets.

UNIT-V Recent Trends in Auditing: Nature and significance of cost audit; Tax audit;

Management audit.

Suggested Reading:

1. Gupta KaPal: Contemporary Auditing: Tata Mcgraw Hill, New Delhi.
2. Tandon B.N.: Principles of Auditing: S. Chand & Co., New Delhi.
3. Pagare Dinkar: Principles and Practice of Auditing: Sultan Chand, New Delhi.
4. Sharma T.R.: Auditing Principles and Problems, SahityaBhawan, Agra.
5. Shukla S.M.: Auditing - ShahityaBhavan, Agra, (Hindi)
6. Batliboy: Auditing.

B.COM PART III
COMPULSORY CORE COURSE
PAPER – II
Group-II -PAPER – I - INDIRECT TAXES WITH GST

OBJECTIVE

This course aims at imparting basic knowlege about GST and apply the provisions of GST law to various situations.

M.M. 75

UNIT-I Customs : Role of customs in international trade; Important terms and definitionsgoods; Duty; Exporter; Foreign going vessel; Aircraft goods; Import; Import Manifest;

Importer; Prohibited goods; Shipping bill; Store; Bill of lading; Export manifest; Letter of credit; Kinds of duties - basic, auxillary, additional or coutervailing; Basics of levyadvalorem,specific duties; Prohibition of export and import of goods, and provisions

regarding notified & specified goods; Import of goods - Free import and restrictedimport; Type of import - import of cargo, import of personal baggage, import ofstores.Clearance Procedure - For home consumption, for warehousing for re-export; Clearance procedure for import by post; Prohibited exports; Canalised exports; Export against licensing; Type of exports export of cargo, export of baggage; Export of cargo by land, sea, and air routes.

UNIT-II State Excise, CENVAT. Detail study of State Excise during calculation of Tax.

UNIT-III INTRODUCTION TO GOODS AND SERVICES TAX (GST) -Objectives and basic scheme of GST, Meaning – Salient features of GST – Subsuming of taxes –Benefits of implementing GST , Structure of GST (Dual Model) – Central GST – State / Union Territory GST – Integrated GST

GST Council: Structures Power and Functions. Provisions fro amendments.

UNIT-IV Registration under GST: Procedure for registration, Persons liable for registration, Persons not liable for registration, Compulsory registration. Exempted goods and services - Rates of GST.

Procedure relating to Levy: (CGST & SGST): Scope of supply, Tax liability on Mixed and Composite supply, Time of supply of goods and services, Value of taxable supply.

Eway-Billing

UNIT-V ASSESSMENT AND RETURNS -

Input tax Credit: Eligibility, Apportionment, Inputs on capital goods, Distribution of credit by Input Service Distributor (ISD)

Furnishing details of outward supplies and inward supplies, First return, Annual return and Final return.

Suggested Reading:

1. Deloitte: GST Era Beckons, Wolters Kluwer.
2. Madhukar N Hiregange: Goods and Services Tax, Wolters Kluwer.
3. All About GST: V.S Datey - Taxman's.
4. Guide to GST: CA. Rajat Mohan,
5. Goods & Services Tax – Indian Journey: N.K. Gupta &SunnaniaBatia, Barat's Publication
6. Goods & Services Tax – CA. Rajat Mohan,
7. Goods & Services Tax: Dr. Sanjiv Agrawal & CA. Sanjeev Malhotra.
8. GST - Law & Practice: Dr. B.G. Bhaskara, Manjunath. N & Naveen Kumar IM,
9. Understanding GST: Kamal Garg, Barat's Publication.

B.COM PART III
COMPULSORY CORE COURSE
TITLE OF PAPER -Group-II
PAPER – II -MANAGEMENT ACCOUNTING

OBJECTIVE
This course provides the students an understanding of the application of accounting techniques for management.

M.M. 75

UNIT-I Management Accounting : Meaning, nature, scope, and functions of managementAccounting; Role of managment accounting in decision making; Managementaccounting vs financial accounting; Tools and techniques of management accounting;Financial statement; Objectives and methods of financial statements analysis; Ratioanalysis; Classification of ratios - Profitability ratios, turnover ratios, liquidity ratios,turnover ratios; Advantages of ratio analysis; Limitations of accounting ratios.

UNIT-II Funds Flow Statement as per Indian Accounting Standard 3, cash flow statement.

UNIT-III Absorption and Marginal Costing: Marginal and differential costing as a tool fordecision making - make or buy; Change of product mix; Pricing, Break-even analysis;
Exploring new markets; Shutdown decisions.

UNIT-IV Budgeting for profit Planning and control: Meaning of budget and budgetary control; Objectives; Merits and limitations; Types of budgets; Fixed and flexible budgeting;
Control ratios; Zero base budgeting; Responsibility accounting;
Performance Budgeting.

UNIT-V Standard Costing and Variance Analysis: Meaning of standard cost and standardcosting; Advantages and application; Variance analysis - material; Labour and overhead (Two-way analysis); Variances.

B.COM PART III
OPTIONAL GROUP B (Marketing Area)
TITLE OF PAPER -PRINCIPLES OF MARKETING
PAPER – I

OBJECTIVE
The Objective of this course is to help students to understand the concept of marketing and its applications.

M.M. 75

UNIT-I Introduction: Nature and scope of marketing; Importnace of marketing as a business function, and in the economy; Marketing concepts - traditional and modern; Selling vs. Marketing; Marketing mix; Marketing environment.

UNIT-II Consumer Behaviour and Market Segmentation: Nature, scope, and significance ofconsumer behaviour; Market segmentation - concept and importance; Bases for market segmentation.

UNIT-III Product: Concept of product, consumer, and industrial goods; Product planning and development; Packaging role and functions; Brand name and trade mark; after sales service; Product life cycle concept. Price: Importance of price in the marketing mix; Factors affecting price of a product/service; Discounts and rebates.

UNIT-IV Distributions Channels and Physical Distribution; Distribution channels - Concept and role; Types of distribution channels. Factors affecting choice of a distribution channel; Retailer and holesaler; Physical distribution of goods; Transportation, Warehousing, Inverntory control; Order processing.

UNIT-V Promotion: Methods of promotion; Optimum promotion mix; Advertising media – the irralative merits and limitations; Characteristics of an effective advertisement; Personal selling; Selling as a career; Classification of successful sales person; Functions of sales man.
Recent development in marketing – social marketing, online marketing, direct marketing, Services marketing, Green marketing.

B.COM PART III

OPTIONAL GROUP B (Marketing Area)

TITLE OF PAPER -INTERNATIONAL MARKETING

PAPER – II

OBJECTIVE

This course aims at acquainting student with the operations of marketing in internation alenvironment.

M.M. 75

UNIT-I International Marketing: Nature, definiton, and scope of international marketing; Domestic marketing vs. International marketing; International environment externaland internal.

UNIT-II dentifying and Selecting Foreign Market: Foreign market entry mode decisions. Product Planning for international Market: Product designing; Standardization vs. adaptation; Branding and packaging; Labeling and quality issues; after sales service. International pricing: Factors Influenceing International price; Pricing process-processand methods; International price quotation and payment terms.

UNIT-III Promotion of Product/Services Abroad: Methods of international promotion; Direct mail and sales literature; Advertising; Personal selling; Trade fairs and exhibitions.

UNIT-IV International Distribution: Distribution channels and logistics decisions; Selection and appointment of foreign sales agents.

UNIT-V Export Policy and Practices in India: Exim policy - an overview; Trends in India's foreign trade; Steps in starting an export business; Product selection; Market Selection; Export pricing; Export finance; Documentation; Export procedures; Export Assistance and incentives. Marketing Control Process

FOUR YEAR UNDERGRADUATE PROGRAM(NEP–2020)

Program: Bachelor in Science

DISCIPLINE–CHEMISTRY

Session–2024-28

PO & PSO

PROGRAMME OUTCOMES (PO)

PO-1: B.Sc. Chemistry curriculum is so designed to provide the students a comprehensive understanding about the fundamentals of chemistry covering all the principles and perspectives.

PO-2: The branches of Chemistry such as Organic Chemistry, Inorganic Chemistry, Physical Chemistry and Analytical Chemistry expose the diversified aspects of chemistry where the students experience a broader outlook of the subject.

PO-3: The syllabi of the B.Sc. Chemistry course are discretely classified to give stepwise advancement of the subject knowledge right through the four years of the term.

PO-4: The practical exercises done in the laboratories impart the students the knowledge about various chemical reagents and reactions. They are also trained about the adverse effects of the obnoxious chemicals and the first aid treatment.

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO-1: The students will understand the existence of matter in the universe as solids, liquids, and gases which are composed of molecules, atoms and sub atomic particles.

PSO-2: Students will learn to estimate inorganic salt mixtures and organic compounds both qualitatively and quantitatively using the classical methods of analysis in practical classes.

PSO-3: Students will grasp the mechanisms of different types of reactions both organic and inorganic and will try to predict the products of unknown reactions.

PSO-4: Students will learn to synthesize the chemical compounds by maneuvering the addition of reagents under optimum reaction conditions

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Science *(Certificate / Diploma / Degree/Honors)*			**Semester - I**	Session: **2024-2025**
1	**Course Code**	**CHSC-01T**		
2	**Course Title**	**FUNDAMENTAL CHEMISTRY-I**		
3	**Course Type**	**DSC**		
4	**Pre-requisite** (if, any)	***As per Program***		
5	**Course Learning. Outcomes (CLO)**	➢ *To know the contributions of ancient Indian scientists, study atomic structure, and periodic properties.* ➢ *To explore the concept of chemical bonding, including ionic and covalent bonding, hybridization, molecular orbital theory and intermolecular interactions.* ➢ *To learn about reaction mechanisms of inorganic reactions and their stoichiometry.* ➢ *To understand basics principles of organic chemistry.*		
6	**Credit Value**	**3 Credits**	***Credit = 15 Hours - learning & Observation***	
7	**Total Marks**	**Max. Marks: 100**		**Min Passing Marks: 40**

PART -B: Content of the Course

Total No. of Teaching–learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	**A. Chemistry in Ancient India:** (a) Chemical techniques in ancient India: General Introduction (b) Contribution of ancient Indian scientists in chemistry, e.g., metallurgy, dyes, pigments, cosmetics, Ayurveda, Charak Sanhita. **Ancient Indian Chemist-** Their Contribution and Books- Rishi Kanad, Aacharya Nagarjuna, Vagbhatta, Govindacharya, Yashodhar, Ramchandra, Somadava, Gopalbhatta etc. Indian Chemist of 19th century- Aacharya Prafulla Chandra Ray- His Contribution and work for Indian Chemistry. **B. Atomic Structure and Periodic Properties:** (i) Review of Bohr's theory and its limitations. Dual nature of particles and waves, de Broglie's equation, Heisenberg's Uncertainty principle and its significance. (ii) Quantum numbers and their significance. Rules for filling electrons in various orbitals, Pauli's Exclusion Principle, Hund's rule of maximum multiplicity, Aufbau principle and its limitations, Electronic configurations of the atoms. Stability of half-filled and completely filled orbitals, concept of exchange energy. Relative energies of atomic orbitals. Anomalous electronic configurations. (iii)Effective nuclear charge (ENC), shielding or screening effect, Slater rules, Atomic and Ionic radii. Ionization energy and factors affecting ionization energy. Electron affinity, Electronegativity—Pauling's/Mulliken's electronegativity scales. Relation of electronegativity with hybridization.	11
II	**Chemical Bonding – I A) Ionic Bonding:** General characteristics of ionic bonding. **Ionic Bonding & Energy:** Lattice and solvation energies and their importance in the context of stability and solubility of ionic compounds. **Born-Haber Cycle and its Applications:** Covalent character in ionic compounds, polarizing power and polarizability. Fajan's rules. **B) Covalent Bonding:** Lewis structures, Valence Bond theory, Hybridization (concept and types with suitable examples), dipole moment and percentage ionic character. Valence shell electron pair repulsion theory (VSEPR) and structure of NH_3, H_2O, SF_4, ClF_3, PCl_5, SF_6, XeF_2, XeF_6, XeO_3, $XeOF_4$, XeF_4.	12

	Chemical Bonding - II **A) MO theory:** LCAO method-criteria of orbital overlapping, types of molecular orbitals-σ-, π- and, δ-MOs; formation of σ- and π-MOs and their, schematic illustration; qualitative MO energy level diagram of homo- (N_2 & O_2(including peroxide, superoxide)) and hetero-diatomic molecules (NO, CO), magnetic properties, bond order and stability of molecules and ions. **B)** Weak Chemical Forces: van der Waals forces, ion-dipole forces, dipole-dipole interactions, ion-induced dipole interactions, dipole-induced dipole interactions. Repulsive forces, Hydrogen bonding (theories of hydrogen bonding, valence bond treatment).	
III	**A. Chemical properties of s-block metals** Reaction with water, air, and nitrogen, Anomalous behavior of Li and Be, Compounds of s-block metals: Oxides, hydroxides, peroxides, and superoxides (preparation and properties) Complexes of s-block metals, Complexes with crown ethers **B. Chemistry of p-Block Elements** **Boron group:** Hydrides (classification of boranes), Diborane (preparation, properties, and structure elucidation), Borazine (preparation and structure) **Carbon group:** Carbides (salt-like carbides, interstitial carbides, covalent carbides), Silicates (classification, three-dimensional silicates - properties and structures) **Nitrogen group:** Hydrides of Nitrogen (hydrazine, hydroxylamine, hydrazoic acid) Structure of oxides of nitrogen (N_2O, NO, NO_2, N_2O_4, and N_2O_5), Structure of oxyacids of nitrogen (HNO_2, HNO_3, $H_2N_2O_7$,), Nitrides (classification, preparation, properties, and uses) Structure of Oxides and oxoacids of phosphorus: (P_2O_3, P_2O_5) H_3PO_2, H_3PO_3, H_3PO_4, $H_4P_2O_7$ **Halogen:** Hydrides, Oxides and oxyacids of halogens (structure only) – Inter halogen compounds and pseudo halogens	**11**
IV	**Electronic Effects in Organic Compounds** Bond Cleavage: Homolytic and heterolytic cleavages, bond energy, bond length, and bond angle. Electron Displacement Effects: Inductive, inductomeric, electromeric, mesomeric (resonance), hyperconjugation, and steric effects. Tautomerism (keto-enol, amido-imidol, and nitro-acinitro forms). Reaction Intermediates: Formation and stability of carbocations, carbanions, free radicals, carbenes, nitrene and benzyne. **B. Stereochemistry of Organic Compounds** **i) Optical Isomerism** Elements of symmetry, chirality, enantiomers, and optical activity, Chiral and achiral molecules with two stereogenic centers (Tartaric acid as an example),Erythro & Threo, Diastereomers and meso compounds, Inversion, retention, and racemization, Relative configuration (D/L), and absolute configuration (R/S nomenclature: sequence rules). **ii) Geometrical Isomerism** Geometric isomerism (cis-trans isomerism) in alkenes with examples (maleic acid, fumaric acid, and 2-butene), E/Z system of nomenclature.	**11**
Keywords	***Ancient Indian Chemistry, Atomic Structure, Periodic Properties, Chemical Bonding, s- &p-block elements, Electronic effects, Stereochemistry***	

Signature of Convener & Members (CBoS) :

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –
Text Books

1. Puri, B. R., Sharma, L. R., & Kalia, K. C. (2018). *Principles of Inorganic Chemistry*. Nagin Chand and Co., New Delhi.
2. Satyaprakash, G., Tuli, S. K., Basu, S. K., & Madan, R. D. (2017). *Advanced Inorganic Chemistry* (Vol. 1, 5th Ed.). S. Chand & Company.
3. Lee, J. D. (2010). *Concise Inorganic Chemistry* (5th Ed.). Blackwell Science.
4. Housecroft, C. E., & Sharpe, A. G. (2012). *Inorganic Chemistry* (4th Ed.). Pearson Education Limited.
5. Ray, Acharya Prafulla Charndra, ***History of Chemistry in Ancient And Medieval India***, Chowkhamba Krishnadas Academy (Reprint 2004).

Reference Books

1. Cotton, F. A., Wilkinson, G., & Gaus, P. L. (2002). *Basic Inorganic Chemistry* (3rd Ed.). John Wiley & Sons.
2. Douglas, B. E., Mcdaniel, D. T., & Alexander, J. J. (1994). *Concepts and Models Of Inorganic Chemistry* (3rd Ed.). John Wiley & Sons.
3. Huheey, J. E., Keiter, E. A., & Keiter, R. L. (1993). *Inorganic Chemistry* (4th Ed.). Harpercollins College Publishers.
4. Shriver, D. F., Atkins, P. W., & Langford, C. H. (2010). *Inorganic Chemistry* (5th Ed.). W. H. Freeman And Company.
5. Moeller, T. (1990). *Inorganic Chemistry: A Modern Introduction*. Wiley.

Online Resources–

- https://bit.ly/3AyV3mZ
- https://nptel.ac.in/courses/104/104/104104101/
- https://nptel.ac.in/courses/104/103/104103019/
- https://nptel.ac.in/courses/104/101/104101090/
- https://nptel.ac.in/courses/104/105/104105103/

Online Resources–

- **e-Resources / e-books and e-learning portals**

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Internal Assessment (CIA):	**30 Marks**
End Semester Exam (ESE):	**70 Marks**

Continuous Internal Assessment (CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **20** ÷ **20** Assignment / Seminar - **10** Total Marks - **30**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE):	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20 Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40 Marks**	

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Science *(Certificate / Diploma / Degree/Honors)*			**Semester-I**	Session: **2024-2025**
1	**Course Code**	**CHSC-01P**		
2	**Course Title**	**CHEMISTRY LAB. COURSE-I**		
3	**Course Type**	**DSC**		
4	**Pre-requisite** (if, any)	***As per Program***		
5	**Course Learning. Outcomes (CLO)**	➢ *Analyze mixtures for cations (NH_4^+, Pb^{2+}, etc.) & anions (CO_3^{2-}, S^{2-}, etc.) using H_2S or other methods.* ➢ *Perform titrimetric analysis (standardization, unknown conc. determination).* ➢ *Estimate the concentration of acetic acid in vinegar (using NaOH), alkali content in antacids (using HCl), and free alkali in soaps/detergents.* ➢ *Utilize complexometric titrations for calcium (Ca^{2+}), water hardness, Fe^{2+}/Fe^{3+}, and Cu^{2+}.*		
6	**Credit Value**	**1 Credits**	*Credit =30 Hours Laboratory or Field learning/Training*	
7	**Total Marks**	**Max. Marks: 50**		**Min Passing Marks: 20**

PART -B: Content of the Course		
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)		
Module	**Topics (Course contents)**	**No. of Period**
Lab./Field Training/ Experiment Contents of Course	**QUALITATIVE INORGANIC MIXTURE ANALYSIS:** Inorganic mixture analysis containing up to four ionic species (two cations and two anions) using H_2S (hydrogen sulfide) or other appropriate methods (Excluded are interfering and insoluble salts) Cations and anions that may be encountered include: **Cations:** NH_4^+, Pb^{2+}, Bi^{3+}, Cu^{2+}, Cd^{2+}, Fe^{2+}/Fe^{3+}, Al^{3+}, Co^{2+}, Ni^{2+}, Mn^{2+}, Zn^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, Na^+ **Anions:** CO_3^{2-}, S^{2-}, SO_4^{2-}, NO_3^-, CH_3COO^-, Cl^-, Br^-, I^-, NO_2^-, SO_3^{2-} (Spot tests may be used wherever feasible.) **TITRIMETRIC ANALYSIS** Standardize sodium hydroxide solution using a standard oxalic acid solution. Determine the concentration of hydrochloric acid (HCl) solution using standardized sodium hydroxide solution as an intermediate.	**30**
Keywords	*Qualitative Analysis (H_2S method, Cations (NH_4^+, Pb^{2+}, etc.), Anions (CO_3^{2-}, S^{2-}, etc.), Titrimetric Analysis, Standardization (NaOH solution), Concentration Determination (HCl solution)*	

Signature of Convener & Members (CBoS) :

Indira

PART–C: Learning Resources

Text Books, Reference Books and Others

Textbooks Recommended:

1. Gurtu, J. N., & Kapoor, R. (1987). *Experimental Chemistry*. S. Chand & Co.
2. Bajpai, D. N., Pandey, O. P., & Giri, S. (2013). *Practical Chemistry*. S. Chand & Co.
3. Ahluwalia, V. K., Dhingra, S., & Dhingram, S. (2005). *College Practical Chemistry*. Universities Press.
4. Kamboj, P. C. (2014). *Advanced University Practical Chemistry* (Part I). Vishal Publishing Co.
5. Fultariya, C., & Harsora, J. (2017). *Volumetric Analysis: Concepts and Experiments*.

Reference Books Recommended:

1. Mcpherson, P. A. (2015). *Practical Volumetric Analysis*. Royal Society Of Chemistry.
2. Shobha, R., & Banani, M. (2017). *Essentials of Analytical Chemistry*. Pearson.
3. Venkateswaran, V., Veeraswamy, R., & Kulandaivelu, A. R. (2004). *Basic Principles Of Practical Chemistry* (2nd Ed.). S. Chand Publications.
4. Sundaram, S., & Raghavan, K. (1996). *Practical Chemistry*. S. Viswanathan Co. Pvt.
5. Svehla, G. (2011). *Vogel's Textbook of Inorganic Qualitative Analysis* (7th Ed.). Pearson Education

Online Resources–

- https://bit.ly/3B7tOQV
- https://bit.ly/30V85ze
- https://bit.ly/3B5WOIQ
- https://bit.ly/3C9PXPS
- https://bit.ly/30Ip9rZ
- https://bit.ly/3BPnwqc

Online Resources–

- **e-Resources / e-books and e-learning portals**

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks
Continuous Internal Assessment (CIA): 15 Marks
End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Laboratory / Field Skill Performance: On spot Assessment** **A. Performed the Task based on lab. work - 20 Marks** **B. Spotting based on tools & technology (written) – 10 Marks** **C. Viva-voce (based on principle/technology) - 05 Marks**	**Managed by Course teacher as per lab. status**

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Science *(Certificate / Diploma / Degree/Honors)*			**Semester - II**	Session: **2024-2025**
1	**Course Code**	**CHSC-02T**		
2	**Course Title**	**FUNDAMENTAL CHEMISTRY-II**		
3	**Course Type**	**DSC**		
4	**Pre-requisite** (if, any)	***As per Program***		
5	**Course Learning. Outcomes (CLO)**	➢ *To understand different acid-base theories and solvent system .* ➢ *To learn the preparation, bonding, and reactions of C-C σ- & π- bonded compounds* ➢ *To understand the concept and chemistry of aromatic compounds and their reactions* ➢ *To learn the basic concepts of various states of matter &understand the basic concepts of surface chemistry and chemical kinetics*		
6	**Credit Value**	**3 Credits**	***Credit = 15 Hours - learning & Observation***	
7	**Total Marks**	**Max. Marks: 100**		**Min Passing Marks: 40**

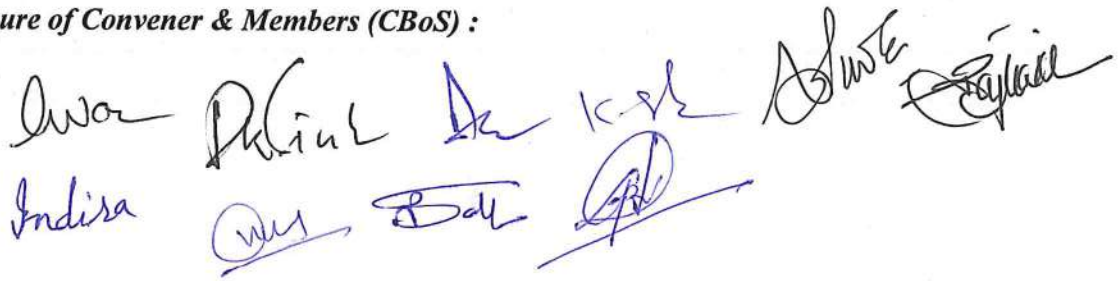
PART -B: Content of the Course

Total No. of Teaching–learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	**Acid, Base and Solvent System** **Theories of acids and bases**: Arrhenius, Bronsted-Lowry, conjugate acids and bases, relative strengths of acids and bases, the Lux-flood, solvent system and Lewis concepts of acids and bases. **HSAB concept**: Classification of Acids and Bases According to HSAB Theory (Hard, Borderline, Soft). Applications of HSAB Theory in Inorganic Reactions - Solubility, Selectivity, Redox Reactions Non-aqueous solvents: .Physical properties of a solvent, types of solvents and their general characteristics, Liquid ammonia as a solvent. Acid-base, precipitation and complex, formation reactions. Solutions of alkali and alkaline earth metals in ammonia-application)	11
II	**CHEMISTRY OF C-C σ–BONDING** Alkanes: Preparation (Wurtz reaction, reduction/hydrogenation of alkenes, Corey-House method). Reactions (mechanisms): halogenation, free radical substitution. Cycloalkanes: Preparation (Dieckmann's ring closure, reduction of aromatic hydrocarbons), Reactions (mechanisms): substitution and ring-opening reactions. Stability of cycloalkanes -Baeyer's strain theory, Sachse and Mohr predictions, Conformational structures of ethane, n-butane and cyclohexane. **CHEMISTRY OF C-C π–BONDING** Alkenes: Preparation methods (dehydration, dehydrohalogenation, dehydrogenation, Hoffmann and Saytzeff rules, cis and trans eliminations). Reactions (mechanisms): electrophilic and free radical addition (hydrogen, halogen, hydrogen halide, hydrogen bromide, water, hydroboration, ozonolysis, dihydroxylation with $KMnO_4$). Dienes: 1,2- and 1,4-additions, Diels-Alder reactions. Alkynes: Preparation (dehydrohalogenation, dehydrogenation), Reactions: Acidity, formation of acetylides, addition of water, hydrogen halides and halogens, oxidation,	12

	ozonolysis, hydroboration/oxidation. **Aromatic Hydrocarbons** Aromatic hydrocarbons: Aromaticity: Hückel's rule, aromatic character of arenes, cyclic carbocations/ carbanions and heterocyclic compounds with suitable examples. Electrophilic aromatic substitution: halogenation, nitration, sulphonation and Friedel-Craft's alkylation/acylation with their mechanism. Directive effects of the groups.	
III	**Behaviour of ideal gases:** Kinetic theory of gases – postulates and derivation of the equation, $PV = 1/3\ mnc^2$ and derivation of the gas laws- Maxwell's distribution of molecular velocities-effect of temperature-types of molecular velocities-degrees of freedom-Principle of equipartition of energy. **Behaviour of Real gases:** Deviation from ideal behaviour, derivation of van der Waals, equation of state and critical constants. **Liquid state chemistry:** structure of liquids(Eyring Theory), Properties of liquids, viscosity and surface tension. **Solid state chemistry:** Nature of the solid state, law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, Crystal defects.	**11**
IV	**A. Colloids and surface chemistry:** Classification, Optical, Kinetic and Electrical Properties of colloids, Coagulation, Hardy Schulze law, flocculation value, Protection, Gold number, Emulsion, micelles and types, Gel, Syneresis and thixotropy, Physical adsorption, chemisorption, **B. Chemical kinetics:** Rate of reaction, Factors influencing rate of reaction, rate law, rate constant, Order and molecularity of reactions, rate determining step, Zero, First and Second order reactions, Rate and Rate Law, methods of determining order of reaction, Chain reactions. Temperature dependence of reaction rate, Arrhenius theory, Physical significance of Activation energy, collision theory, demerits of collision theory, non-mathematical concept of transition state theory. **C. Catalysis:** Homogeneous and Heterogeneous Catalysis, types of catalyst, characteristics of catalyst, Enzyme catalyzed reactions, Industrial applications of catalysis.	**11**
Keywords	***Acid & Bases, Alkanes, Cycloalkanes, Alkenes, Dienes, Alkynes, Aromatic Hydrocarbons, Kinetic theory of gases, Real gases, Intermolecular forces, Crystal structure, Chemical kinetics***	

Signature of Convener & Members (CBoS) :



PART–C: Learning Resources

Text Books, Reference Books and Others

Textbooks Recommended:

1. *Bahl, A., & Bahl, B. S. (2014). Organic Chemistry (22nd Ed.). S. Chand & Sons.*
2. *Ahluwalia, V. K., & Goyal, M. (2001). A Textbook of Organic Chemistry. Narosa Publishing House.*
3. *Jain, M. K., & Sharma, S. C. (2017). Modern Organic Chemistry. Vishal Publishing Company.*
4. *Puri, B. R., Sharma, L. R., & Pathania, M. S. (2013). Principles of Physical Chemistry (46th Ed.). Shoban Lal Nagin Chand And Co.*
5. *Bahl, B. S. A., & Tuli, G. D. (2009). Essentials of Physical Chemistry (Multicolour Ed.). S. Chand & Company Pvt Ltd.*
6. *Puri, B. R., Sharma, L. R., & Kalia, K. C. (2018). Principles of Inorganic Chemistry. Nagin Chand and Co., New Delhi.*

Reference Books Recommended:

1. *Paula, B. Y. (2014). Organic Chemistry (7th Ed.). Pearson Education, Inc. (Singapore).*
2. *Solomons, T. W. G. (2017). Organic Chemistry (Global Ed.). John Wiley & Sons.*
3. *Morrison, R. T., & Boyd, R. N. (2010). Organic Chemistry (7th Ed.). Prentice-Hall Of India Limited.*
4. *Laidler, K. J., & Meiser, J. H. (2006). Physical Chemistry (2nd Indian Ed.). CBS Publishers.*
5. *Atkins, P. W., & De Paula, J. (2006). Physical Chemistry (8th Ed.). Oxford University Press.*
6. *Dogra, S., & Dogra, S. (2006). Physical Chemistry through Problems (2nd Ed.). New Age International.*
7. *Sangaranarayanan, M. V., & Mahadevan, V. (2011). Textbook of Physical Chemistry. University Press.*

Online Resources–

- https://bit.ly/3Gb99iy
- https://www.organic-chemistry.org/
- https://bit.ly/3GduvMi
- https://bit.ly/30TXm8d
- https://application.wiley-vch.de/books/sample/3527316728_c01.pdf
- https://www.ncbi.nlm.nih.gov/books/NBK547716/

Online Resources–

- **e-Resources / e-books and e-learning portals**

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Internal Assessment (CIA):	**30 Marks**
End Semester Exam (ESE):	**70 Marks**

Continuous Internal Assessment (CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **20** ~~/ 20~~ Assignment / Seminar - **10** Total Marks - **30**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks

End Semester Exam (ESE):	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20 Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40 Marks**

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Science *(Certificate / Diploma / Degree/Honors)*			**Semester- II**	Session: **2024-2025**
1	**Course Code**	**CHSC-02P**		
2	**Course Title**	**CHEMISTRY LAB. COURSE-II**		
3	**Course Type**	**DSC**		
4	**Pre-requisite** (if, any)	***As per Program***		
5	**Course Learning. Outcomes (CLO)**	➢ *Demonstrating and using common glassware for accurate measurements* ➢ *Studying the functional group analysis organic compounds* ➢ *Determining melting points to assess compound purity and employing distillation and sublimation techniques to establish boiling points* ➢ *Equipping with essential skills in measuring liquid surface tension and solution viscosity*		
6	**Credit Value**	**1 Credits**	*Credit =30 Hours Laboratory or Field learning/Training*	
7	**Total Marks**	**Max. Marks: 50**		**Min Passing Marks: 20**

PART -B: Content of the Course		
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)		
Module	**Topics (Course contents)**	**No. of Period**
Lab./Field Training/ Experiment Contents of Course	**Basic Laboratory Techniques** Demonstration of Laboratory Glassware and Equipment, Calibration of Thermometer : 80-82°C (Naphthalene), 113.5°-114°C (Acetanilide), 132.5°C - 133°C (Urea), 100°C (Distilled Water) **Functional group Analysis of Organic Compounds,** Detection of elements (N, S, and halogens) and functional groups **Physical chemistry** Surface tension measurements: Determine the surface tension by (i) drop number (ii) drop weight method. Surface tension composition curve for a binary liquid mixture. Viscosity measurement using Ostwald's viscometer, Determination of viscosity of aqueous solutions of (i) sugar (ii) ethanol at room temperature. Study of the variation of viscosity of sucrose solution with the concentration of solute. Viscosity Composition curve for a binary liquid mixture	**30**
Keywords	***Basic laboratory techniques, Equipments, Calibration, Melting points, Qualitative analysis, Physical chemistry, Surface tension, Viscosity***	

Signature of Convener & Members (CBoS) :

PART–C: Learning Resources

Text Books, Reference Books and Others

Textbooks Recommended:

1. *Ahluwalia, V. K., Dhingra, S., & Gulati, A. (N.D.). College Practical Chemistry. University Press.*
2. *Khosla, B. D., Garg, V. C., & Gulati, A. (2011). Senior Practical Physical Chemistry. S. Chand & Co.*

Reference Books Recommended:

3. *Garland, C. W., Nibler, J. W., & Shoemaker, D. P. (2003). Experiments in Physical Chemistry (8th Ed.). Mcgraw-Hill.*
4. *Mendham, J. (2009). Vogel's Quantitative Chemical Analysis (6th Ed.). Pearson Education.*
5. *Mann, F. G., & Saunders, B. C. (2009). Practical Organic Chemistry. Pearson Education.*
6. *Furniss, B. S., Hannaford, A. J., Smith, P. W. G., & Tatchell, A. R. (2012). Practical Organic Chemistry (5th Ed.). Pearson Education.*

Online Resources–

- http://heecontent.upsdc.gov.in/Home.aspx
- https://nptel.ac.in/courses/104/106/104106096/
- http://heecontent.upsdc.gov.in/Home.aspx
- https://nptel.ac.in/courses/104/106/104106096/
- https://www2.chemistry.msu.edu/faculty/reusch/VirtTxtml/introl.htm
- https://nptel.ac.in/courses/104/103/104103071/W

Online Resources–

- **e-Resources / e-books and e-learning portals**

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**50 Marks**
Continuous Internal Assessment (CIA):	**15 Marks**
End Semester Exam (ESE):	**35 Marks**

Continuous Internal Assessment (CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Laboratory / Field Skill Performance: On spot Assessment** **D. Performed the Task based on lab. work - 20 Marks** **E. Spotting based on tools & technology (written) – 10 Marks** **F. Viva-voce (based on principle/technology) - 05 Marks**	**Managed by Course teacher as per lab. status**

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (NEP- 2020)
PROGRAM: BACHELOR IN SCIENCE (2024 – 28)
DISCIPLINE – PHYSICS
SESSION - 2024 – 25

DSC- 01 to 08		DSE- 01 to 12		DGE- 01 to 02	
Code	Course Title	Code	Course Title	Code	Course Title
PHSC- 01 T	Mechanics	PHSE- 01	Introduction to Statistical Mechanics	PHGE- 01 T	Mechanics
PHSC- 01P	Lab Course			PHGE- 01 P	Lab Course
PHSC- 02 T	Electricity & Magnetism	PHSE- 02	Mathematical Physics-I	PHGE- 02 T	Electricity & Magnetism
PHSC- 02 P	Lab Course			PHGE- 02 P	Lab Course
PHSC- 03 T	Heat & Thermodynamics	PHSE- 03	Nuclear Physics		
PHSC- 03 P	Lab Course				
PHSC- 04 T	Waves & Optics	PHSE- 04 T	Numerical Methods &C Programming	VAC	
PHSC- 04 P	Lab Course	PHSE- 04 P	Lab Course		
PHSC- 05 T	Introduction to Quantum Mechanics	PHSE- 05	Mathematical Physics-II	PHVAC- 01	Renewable Energy and Energy Harvesting
PHSC- 05 P	Lab Course				
PHSC- 06 T	Solid State Physics &SolidStateDevices	PHSE- 06	Classical Electrodynamics & Electromagnetic theory	SEC	
PHSC- 06 P	Lab Course				
PHSC- 07	Classical Mechanics	PHSE- 07 T	Digital Electronics		
		PHSE- 07 P	Lab Course		
PHSC- 08	Quantum Mechanics	PHSE- 08 T	Operational Amplifier& Its Applications	PHSEC- 01	BasicElectrical Skill
		PHSE- 08 P	Lab Course		
		PHSE- 09 T	Solid State Physics		
		PHSE- 09 P	Lab Course		
		PHSE- 10	Atomic and Molecular Physics		
		PHSE- 11	Statistical Mechanics		
		PHSE- 12 T	Microprocessor		
		PHSE- 12 P	Lab Course		

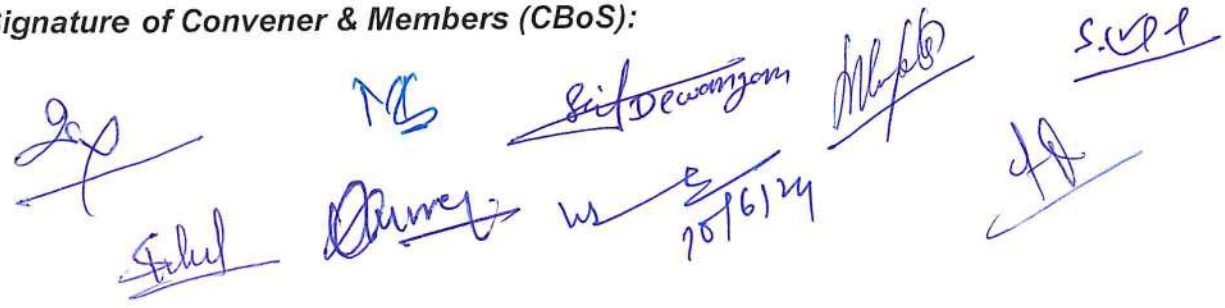
Signature of Convener & Members (CBoS):

Program Outcomes (PO):

The learning outcomes of the undergraduate degree course in physics are as follows:

- **In-depth disciplinary knowledge**: The student will acquire comprehensive knowledge and understanding of the fundamental concepts, theoretical principles and processes in the main and allied branches of physics.
- **Hands-on/ Laboratory Skills**: Comprehensive hands-on/ laboratory exercises will impart analytical, computational and instrumentation skills. The students will be able to demonstrate mature skills for the collation, evaluation, analysis and presentation of information, ideas, concepts as well as quantitative and/or qualitative data.
- **Role of Physics**: The students will develop awareness and appreciation for the significant role played by physics in current societal and global issues. They will be able to address and contribute to such issues through the skills and knowledge acquired during the programme
- **Communication and Skills**: Various DSCs, DSEs, SECs, and GEs have been designed to enhance student's ability to write methodical, logical and precise reports. The courses will, in addition, guide the student to communicate effectively through presentations, writing laboratory/ project reports and dissertations.
- **Critical and Lateral Thinking**: The programme will develop the ability to apply the underlying concepts and principles of physics and allied fields beyond the classrooms to real life applications, innovation and creativity.
- **Research skills**: The course provides an opportunity to students to hone their research and innovation skills through assignment/internship/dissertation. It will enable the students to demonstrate mature skills in literature survey, information management skills, data analysis and research ethics.

Signature of Convener & Members (CBoS):



FOUR YEARS UNDERGRADUATE PROGRAM (2024-28)
DEPARTMENT OF PHYSICS
COURSE CURRICULUM

PART – A: INTRODUCTION			
Program: Bachelor in Science (Certificate/ Diploma/ Degree/ Honors)		**Semester: I**	**Session: 2024-25**
1	**Course Code**	**PHSC-01T**	
2	**Course Title**	**Mechanics**	
3	**Course Type**	**Discipline Specific Course**	
4	**Pre-requisite (if any)**	**As per Program**	
5	**Course Learning Outcomes (CLO)**	*After going through the course, the student should be able to:* ➢ *Analyze and apply the laws of motion to various dynamical situations.* ➢ *Explain and demonstrate the principle of conservation of momentum and energy including their application in real-world scenario such as collision and energy transformation.* ➢ *Evaluate and calculate moment of inertia for objects of different shapes and analyze how these properties affect the motion of rotating bodies.* ➢ *Analyze flow of fluids.* ➢ *Describe special relativistic effects and their effects on the mass and energy of a moving object.*	
6	**Credit Value**	**03 Credits**	**1 Credit= 15 Hours for Learning &Observation**
7	**Total Marks**	**Maximum Marks: 100**	**Minimum Pass Marks: 40**

PART – B: CONTENT OF THE COURSE		
TotalNo.of Teaching–learning Periods (01 Hr. per period) - 45 Periods (45 Hours)		
Unit	**Topics (Course contents)**	**No. of Periods**
I	**Historical Background:** Contribution of Aryabhatta and Varahmihir to science and society, Brief biography of Vikram Sarabhai with his contribution.**Vectors:** Scalar and vector quantities &fields, Scalar & Vector products of two vectors, Derivatives of a vector, Gradient of scalar field and its physical significance.**Laws of Motion:** Review of Newton's Laws of motion, Dynamics of a system of particles, Concept of Center of Mass, Motion of center of mass, Conservation of linear momentum, Motion of Rocket.**Work and Energy:** Work-Energy theorem for conservative forces, Force as a gradient of Potential Energy, Conservation of energy, Elastic and in-elastic Collisions	12
II	**Rotational Dynamics**: Angular momentum, Torque, Conservation of angular momentum, Moment of Inertia, Theorem of parallel and perpendicular axes(statements only), Calculation of Moment of Inertia of discrete and continuous objects (Rectangular lamina, disc, solid cylinder, solid sphere).**Elasticity:** Stress & Strain, Hooke's law, Elastic constants, Poisson's Ratio,Relationship between various elastic modulii (without derivation), Work done in twisting a cylinder.**Fluid Dynamics**: Flow of fluids, Coefficient of viscosity,Derivation of Poiseulli's formula, Motion of a spherical body falling in a viscous fluid, Stoke's law, Expression for terminal velocity.	12
III	**Gravitation**: Newton's Law of Gravitation, Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant), Kepler's Laws (statements only), Satellite in circular orbit and applications, Geosynchronous orbits. **Oscillations**: Simple harmonic motion, Differential equation of SHM and its solutions, Kinetic and Potential Energy, Total Energy and their time averages, Compound pendulum, Differential equations of damped oscillations and forced oscillations (Conceptual only).	11
IV	**Special Theory of Relativity:** Frame of reference, Galilean Transformations, Inertial and Non-inertial frames, Outcomes of Michelson Morley's Experiment, Postulates of Special Theory of Relativity, Lorentz Transformation, Length contraction, Time dilation, Relativistic transformation of velocity, Relativistic variation of mass, Mass-energy equivalence, Transformation of Energy and Momentum.	10
Keywords:	Aryabhatta, Vectors, Newton's Laws, Angular Momentum, Elasticity, Gravitation, Oscillations, Relativity	

SignatureofConvener&Members (CBoS) :

FOUR YEARS UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF PHYSICS
COURSE CURRICULUM

PART – A: INTRODUCTION

Program:Bachelor in Science (Certificate/ Diploma/ Degree/ Honors)		Semester: I	Session: 2024-25
1	Course Code	PHSC- 01P	
2	Course Title	Mechanics	
3	Course Type	Discipline Specific Course	
4	Pre-requisite (if any)	As per Program	
5	Course Learning Outcomes (CLO)	After the completion of the course, Students are expected to understand working mechanism and laws of classical mechanics. The Students will be able to ➢ Assemble required parts/devices and arrange them to perform experiments. ➢ Record/ observe data as required by the experimental objectives. ➢ Analyze recorded data and formulate it to get desired results. ➢ Interpret results and check for attainment of proposed objectives related to laws of mechanics and its applications	
6	Credit Value	01 Credit	1 Credit = 30 HoursLaboratory Work
7	Total Marks	Maximum Marks: 50	Minimum Pass Marks: 20

PART – B: CONTENT OF THE COURSE

TotalNo.of learning-Training/performance Periods-30 Periods (30 Hours)

Sr. No.	Objects (At least 10 of the following or related Experiments)	No. of Period
1	Measurements of length (or diameter) using vernier caliper, screw gauge and travelling microscope.	30
2	To study the random error in observations.	
3	To study the motion of the spring and calculate (a) Spring constant and, (b) g.	
4	To determine the Moment of Inertia of a Flywheel.	
5	To determine g and velocity for a freely falling body using Digital Timing Technique.	
6	To determine Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method).	
7	To determine the Young's Modulus of a Wire by Optical Lever Method.	
8	To determine the Modulus of Rigidity of a Wire by Maxwell's needle.	
9	To determine the elastic constants of a wire by Searle's method	
10	To determine the value of g using Bar Pendulum.	
11	To determine the value of g using Kater's Pendulum.	
12	Study of bending of a beam/ cantilever	
13	To determine Moment of Inertia of an irregular body by Inertia Table	
Keywords	Moment of Inertia, Pendulum,VernierCallipers, Screw Gauge, Travelling microscope, Elastic Constant, Searle's Method, Stoke's Method, Cappilary Rise Method, Viscosity, Surface Tension	

SignatureofConvener&Members (CBoS) :

10/6/24

PART – C: LEARNING RESOURCES

Text Books, Reference Books Recommended and Others

Text Books Recommended-

1. Mechanics & Properties of matter, D.C. Tayal & P. Tayal, 2023, Pub. By Authors.
2. Unified Physics I –R.P.Goyal, Shivlal Agrawal Publication
3. Unified Physics I, Navbodh Publication

Reference Books Recommended-

1. Mechanics, Berkeley Physics, vol.1, C.Kittel, W.Knight, et.al. 2007, Tata McGraw-Hill.
2. Physics, Resnick, Halliday and Walker 8/e. 2008, Wiley.
3. Introduction to Special Relativity, R. Resnick, 2005, John Wiley and Sons.

Online Resources (e-books/ learning portals/ other e-resources)

1. All e-books of physics https://www.e-booksdirectory.com/listing.php?category=2
2. Free physics text book in PDF
3. https://www.motionmountain.net/?gclid=CjwKCAjwmq3kBRB_EiwAjkNDp5v8Yy6xK1s0Kma0VR0AWGlichRwFfCC0-vpZK1jrPoEOAnBq8fcqRoCILsQAvD_BwE
4. Cambridge University Books for Physics https://www.cambridgeindia.org/
5. Books for solving physics problems https://bookboon.com/en/physics-ebooks
6. NPTEL Online courses https://nptel.ac.in/courses/115105098; https://archive.nptel.ac.in/courses/115/106/115106123/;
7. BSc Lectures by Prof. H C Verma: https://bsc.hcverma.in/index.php/course/relativity; https://bsc.hcverma.in/index.php/course/cm1

PART – D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:
Maximum Marks: 100Marks
Continuous Internal Assessment (CIA):30 Marks
End Semester Examination (ESE): 70 Marks

Continuous Internal Assessment (CIA): (By course teacher)	Internal Test/ Quiz (2): **20~~+~~20** Assignment/ Seminar (1):**10** Total Marks: **30**	Better marks out of the two Test / Quiz **+** marks obtained in Assignment shall be considered against **30 Marks**
End Semester Exam (ESE):	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20Marks** Section B: Descriptive answer type,**1out of 2** from each unit-**4x10=40 Marks**	

Name and Signature of Convener & Members of CBoS:

10/6/24

PART – C: Learning Resources

Text Books, Reference Books and others

Text Books Recommended-

1. Advanced Practical Physics for students, B.L.Flint&H.T.Worsnop, 1971, Asia Publishing House.
2. Engineering Practical Physics, S.Panigrahi& B.Mallick,2015, Cengage Learning India Pvt. Ltd.
3. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.
4. Practical Physics B.Sc. I : R P Goyal, Shivlal Publications

Reference Books Recommended-

1. Advanced Practical Physics for Students by B.L. Worsnop and H.T. Flint
2. Practical Physics by G.L. Squires
3. An Introduction to Error Analysis: The Study of Uncertainties in Physical Measurements by John R. Taylor
4. Mechanics and Properties of Matter by J.C. Upadhyaya

Online Resources (e-books/ learning portals/ other e-resources)

1. Link for e-Books for Physics:Physics Practical:
   https://www.uou.ac.in/sites//default/files/slm/BSCPH-104.pdf
2. Virtual Lab :https://vlab.amrita.edu/?sub=1&brch=74
3. https://vlab.amrita.edu/?sub=1&brch=74&sim=571&cnt=1
4. https://www.ae.msstate.edu/vlsm/

PART – D : ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:
Maximum Marks: 50 Marks
Continuous Internal Assessment(CIA):15 Marks
EndSemester Exam(ESE):35 Marks

Continuous InternalAssessment(CIA): (By Course Teacher)	Internal Test / Quiz - (2): **10 & 10** Assignment/Seminar +Attendance –**05** Total Marks - **15**	Better marks out of the two Test/Quiz **+Marks** obtained in Assignment shall be considered against **15** Marks

End Semester Exam (ESE):	**Laboratory Performance: On spot Assessment** **Performed the Task based on lab. work -20 Marks** **Spotting based on tools & technology (written) – 10 Marks** **Viva-voce (based on principle/technology) - 05 Marks**	**Managed by Course teacher as per lab. status**

Name and Signature of Convener & Members of CBoS:

10/6/24

FOUR YEARS UNDERGRADUATE PROGRAM (2024-28)
DEPARTMENT OF PHYSICS
COURSE CURRICULUM

PART – A: INTRODUCTION

Program: Bachelor in Science (Certificate/ Diploma/ Degree/ Honors)		Semester: II	Session: 2024-25
1	**Course Code**	**PHSC-02T**	
2	**Course Title**	**ELECTRICITY AND MAGNETISM**	
3	**Course Type**	**Discipline Specific Course**	
4	**Pre-requisite (if any)**	**As per Program**	
5	**Course Learning Outcomes (CLO)**	After going through the course, the student should be able to: ➢ State various laws related with electrostatics, dielectric, electric current, magnetism and electromagnetic induction. ➢ Apply vector (electric fields, Coulomb's law) and scalar (electric potential, electric potential energy) formalisms of electrostatics. ➢ Compare rise and decay of current in LR, CR, LCR circuits. ➢ Apply Biot-Savart law for calculation of magnetic field in simple geographic situations. ➢ Derive and analyze Maxwell's equations.	
6	**Credit Value**	**03 Credits**	**1 Credit= 15 Hours for Learning &Observation**
7	**Total Marks**	**Maximum Marks: 100**	**Minimum Pass Marks: 40**

PART – B: CONTENT OF THE COURSE

TotalNo.of Teaching–learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Periods
I	**Power plants in Chhattisgarh:** An overview of thermal and hydroelectric power plants in Chhattisgarh. **Vector Analysis**: Divergence & Curl of Vector fields, Line, surface and volume integrals of Vector fields, Gauss-divergence theorem and Stoke's theorem of vectors and its application in electrostatics and magnetostatics.**Electrostatics field:** Electrostatic Field, electric flux, Gauss's theorem of electrostatics, Applications of Gauss theorem- Electric field due to point charge, infinite line of charge, plane charged sheet, charged conductor.	12
II	**Electrostatic potential:**Electric potential as line integral of electric field, potential due to a point charge, Calculation of electric field from potential, Capacitance of Parallel plate capacitor, Energy per unit volume in electrostatic field. **Dielectric & Electric Currents:** Dielectric medium, Polarisation, Displacement vector, Gauss's theorem in dielectrics, Parallel plate capacitor completely filled with dielectric.Steady current, current density J, non – steady current and Continuity equation, Rise and decay of current in LR, CR, LCR circuits.	13
III	**Magnetism:** Magnetostatics: Biot-Savart's law and its applications- straight conductor, circular coil, solenoid carrying current, Divergence and curl of magnetic field, Magnetic vector potential, Ampere's circuital law, Magnetic properties of materials: Magnetic intensity, magnetic induction, permeability, magnetic susceptibility, Brief introduction of dia, para and ferro-magnetic materials.	10
IV	**Electromagnetic Induction:** Faraday's laws of electromagnetic induction, Lenz's law, self and mutual inductance, L of single coil, M of two coils, Energy stored in magnetic field. **Maxwell`s equations and Electromagnetic wave propagation:** Equation of continuity of current, Displacement current, Maxwell's equations, Wave equation in free space.	10
Keywords:	Vector calculus, Electrostatics, Dielectrics and Electric Current, Magnetism, Electromagnetic Induction, Maxwell's Equation and Electromagnetic Wave Propagation	

SignatureofConvener&Members (CBoS) :

10/6/24

PART – C: LEARNING RESOURCES

Text Books, Reference Books and Others

Text Books

1. Electricity and Magnetism, D C Tayal, 1988, Himalaya Publishing House.
2. Unified Physics – Part II, R. P.Goyal, Shivlal Agrawal and Sons
3. Unified Physics – Navbodh Publications
4. Introduction to Electrodynamics and Electromagnetism, H.C.Verma,

Reference Books

1. Vector analysis – Schaum's Outline, M.R. Spiegel, S. Lipschutz, D. Spellman, 2nd Edn., 2009, McGraw- Hill Education.
2. University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.

Online Resources (e-books/ learning portals/ other e-resources)

1. *All e-books of physics* https://www.e-booksdirectory.com/listing.php?category=2
2. *Free physics text book in PDF* https://www.motionmountain.net/?gclid=CjwKCAjwmq3kBRB_EiwAjkNDp5v8Yy6xK1s0Kma0VR0AWGlichRwFfCC0-vpZK1jrPoEOAnBq8fcqRoCILsQAvD_BwE
3. *Cambridge University Books for Physics* https://www.cambridgeindia.org/
4. *Books for solving physics problems* https://bookboon.com/en/physics-ebooks
5. *NPTEL Online courses:* https://onlinecourses.nptel.ac.in/noc21_ph05/preview
6. https://archive.nptel.ac.in/courses/115/104/115104088/
7. *Classical Electromagnetism - 1 (Electrostatics)* https://bsc.hcverma.in/course/cee1
8. *Classical Electromagnetism - 2 (Electrostatics)* https://bsc.hcverma.in/course/cee2

PART – D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 100Marks
Continuous Internal Assessment (CIA):30 Marks
End Semester Examination (ESE): 70 Marks

Continuous Internal Assessment (CIA): (By course teacher)	Internal Test/ Quiz (2): **20+20**Assignment/ Seminar (1): **10** Total Marks: **30**	Better marks out of the two Test / Quiz + marks obtained in Assignment shall be considered against **30** Marks
End Semester Examination (ESE):	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20Marks** Section B: Descriptive answer type,**1out of 2** from each unit-**4x10=40 Marks**	

Name and Signature of Convener & Members of CBoS:

FOUR YEARS UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF PHYSICS
COURSE CURRICULUM

PART – A: INTRODUCTION

Program:Bachelor in Science (Certificate/ Diploma/ Degree/ Honors)	Semester: II	Session: 2024-25

1	Course Code	PHSC- 02P	
2	Course Title	Electricity & Magnetism	
3	Course Type	Discipline Specific Course	
4	Pre-requisite (if any)	As per program	
5	Course Learning Outcomes (CLO)	*After the completion of the course, Students are expected to understand working laws of Electricity, Magnetism and EMWs. The students will also be able to* ➢ *Verify various circuit laws, network theorems, using simple electric circuits. Assemble required parts/devices and arrange them to perform experiments.* ➢ *Verify various laws in electricity and magnetism such as Lenz's law, Faraday's law and learn about the construction, working of various measuring instruments* ➢ *Record/ observe data as required by the experimental objectives. Analyze recorded data and formulate it to get desired results.* ➢ *Interpret results and check for attainment of proposed objectives related to laws of Electricity, Magnetism and its applications*	
6	Credit Value	01 Credit	1 Credit = 30 Hours Laboratory Work
7	Total Marks	Maximum Marks: 50	Minimum Pass Marks: 20

PART – B: CONTENT OF THE COURSE

TotalNo.of learning-Training/performance Periods -30 Periods (30 Hours)

Sr. No.	Objects (At least 10 of the following or related Experiments)	No. of Periods
1	To use a Multimeter for measuring (a) Resistances, (b) AC and DCVoltages,(c) DC Current, and (d) checking electrical fuses.	30
2	To compare capacitances using De'Sauty's bridge.	
3	Measurement of field strength B and its variation in a Solenoid Determine (dB/dx).	
4	To study the Characteristics of a Series RC Circuit.	
5	To study a series LCR circuit and determine its (a) Resonant Frequency, (b) Quality Factor.	
6	To study a parallel LCR circuit and determine its (a) Anti-resonant frequency and(b) Quality factor Q.	
7	To determine a Low Resistance by Carey Foster's Bridge.	
8	To verify the Thevenin and Norton theorem.	
9	To verify the Superposition, and Maximum Power Transfer Theorem.	
10	To use a vibration magnetometer and study magnetic field.	
11	Study of magnetic field due to a current loop.	
12	Study of magnetic fields using Deflection Magnetometer	
13	Mini Project: Construction and Study of Solenoid and measurement of its magnetic field	

Keywords:	Multimeter, Capacitance Comparison, Magnetic Field, RC Circuit, Series LCR Circuit, Parallel LCR Circuit, Low Resistance Measurement, Electrical Theorems

SignatureofConvener&Members (CBoS) :

10/6/24

PART – C: LEARNING RESOURCES

Text Books, Reference Books and Others

Text Books Recommended-

1. Engineering Practical Physics, S.Panigrahi&B.Mallick,2015, Cengage Learning India Pvt. Ltd.
2. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.
3. Unified Practical Physics : R P Goyal, Shivlal Agrawal & Sons
4. Unified Practical Physics: YugbodhPrakashan
5. Unified Practical Physics: NavbodhPrakashan

Reference Books Recommended-

1. Basic Electrical and Electronics Engineering by S. K. Bhattacharya
2. A Textbook of Electrical Technology by B.L. Theraja and A.K. Theraja (Volumes 1 and 2)
3. Engineering Circuit Analysis by William H. Hayt, Jack E. Kemmerly, and Steven M. Durbin
4. Practical Physics by G.L. Squires

Online Resources (e-books/ learning portals/ other e-resources)

1. Link for e-Books for Physics: Physics Practical:
   https://www.uou.ac.in/sites//default/files/slm/BSCPH-104.pdf
2. Virtual Lab :https://vlab.amrita.edu/index.php?sub=1&brch=192
3. http://emv-au.vlabs.ac.in/#
4. https://www.ae.msstate.edu/vlsm/
5. https://nationalmaglab.org/magnet-academy/watch-play/interactive-tutorials
6. https://jigyasa-csir.in/cgcri/n12-t4-a3/

PART – D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:
Maximum Marks: 50 Marks
Continuous Internal Assessment(CIA):15 Marks
EndSemester Exam(ESE):35 Marks

Continuous InternalAssessment(CIA): (By Course Teacher)	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance –**05** Total Marks - **15**	Better marks out of the two Test / Quiz **+Marks** obtained in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Laboratory Performance: On spot Assessment** **Performed the Task based on lab. work - 20 Marks** **Spotting based on tools & technology (written) –10 Marks** **Viva-voce (based on principle/technology) - 05 Marks**	**Managed by Course teacher as per lab. status**

Name and Signature of Convener & Members of CBoS:

10/6/24

FOURTH YEAR UNDER GRADUATE PROGRAM(NEP–2020)

Program: Bachelor of Science (2024-28)

DISCIPLINE– MATHEMATICS

Session–2024- 25

DSC -01 to08		DSE-01to12		DGE-01&02	
Code	**Title**	**Code**	**Title**	**Code**	**Title**
MASC-01	Elementary Calculus	MASE-01	Advanced Calculus	MAGE-01	Elementary Calculus
MASC-02	Algebra	MASE-02	Mechanics	MAGE-02	Algebra
MASC-03	Differential Equations	MASE-03	Numerical Methods		
MASC-04	Abstract Algebra	MASE-04	Number Theory	SEC	
MASC-05	Real Analysis	MASE-05	Integral Transforms	MASEC-01	Introduction to Latex
MASC-06	Metric Spaces	MASE-06	Topology	MASEC-02	Python
MASC-07	Advanced Real Analysis	MASE-07	Complex Analysis - I		
MASC-08	Advanced Abstract Algebra	MASE-08	Discrete Mathematics	VAC	
		MASE-09	Measure Theory	MAVAC-01	Basic Mathematics and Logic
		MASE-10	General and Algebraic Topology		
		MASE-11	Complex Analysis - II		
		MASE-12	Graph Theory		

Program Outcomes(PO):

PO1: Ability to develop scientific temper and acquire in-depth knowledge of algebra, calculus, real analysis, complex analysis, topology and several other branches of mathematics. This program helps learners in building a solid foundation for higher studies in mathematics.

PO2: Utilize mathematics to solve theoretical and applied problems by critical thinking, understanding, analysis and synthesis.

PO3. The skills and knowledge gained has intrinsic beauty, which also leads to proficiency in analytical reasoning. This can be utilized in modeling and solving real life problems.

PO4. Ability to apply mathematical tools in Physics, Economics, Optimization and other subjects it will also develop understanding the architecture of curves and surfaces in plane and spaces etc.

PO5. This program will also enable the learners to join teaching profession in schools and this will help the students to enhance their employability for government jobs, jobs in banking insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.

FOUR YEAR UNDER GRADUATE PROGRAM (2024-28)
DEPARTMENT OF MATHEMATICS
COURSE CURRICULUM

Part A: Introduction

Program: Bachelor in Science (Certificate/Diploma/Degree/Honors)		Semester - I	Session:2024-2025
1	Course Code	MASC-01	
2	Course Title	Elementary Calculus	
3	Course Type	DSC	
4	Pre-requisite(if any)	Knowledge of basic Differential and Integral calculus	
5	Course Learning Outcome (CLO)	**This Course will enable the students to:** ➢ Know about ancient Indian Mathematicians and their contribution ➢ Calculate the limit and examine the continuity and understand the geometrical interpretation of differentiability. Apply various tests to determine convergence. ➢ Understand the consequences of various mean value theorems. ➢ Understand concepts of Curvature and Asymptotes . ➢ Draw curves in Cartesian and polar coordinate systems ➢ Understand the elementary integration of transcendental function and understand applications of reduction formulae.	
6	Credit Value	**4 C**	1Credit = 15 hours- Learning and observation
7	Total Marks	Maximum Marks : 100	Minimum Passing Marks:40

Part B: Content of the Course

Total no of teaching – learning period =60 Periods (60 Hours)

UNIT	Topics	No of Periods
I	**Contributions and Biography of Indian Mathematicians:** Bodhayan, Apasthamb, Katyayan, Mahaveeracharya, Brahmagupta and Bhaskarachaya in special context of Leelavati. **Sequences, Continuity and Differentiability** : Notion of convergence of sequences and series of real numbers, Definition of limit and continuity of a real valued function; Differentiability and its geometrical interpretation. Elementary Differentiation.	15
II	**Expansion of Functions:** Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem and their geometrical interpretations, Successive differentiation and Leibnitz theorem, Maclaurin's and Taylor's theorems for expansion of a function.	15
III	**Curvature, Asymptotes , Curve Tracing:** Curvature; Asymptotes of general algebraic curves, Parallel asymptotes, Asymptotes parallel to axes; Symmetry, Concavity and convexity, Points of inflection, Tangents at origin, Multiple points, Position and nature of double points; Tracing of Cartesian, polar and parametric curves.	15

(Dr. S. Dashpute) Dr. Omkar Kolshirvastava Dr. Madhu Shirke

(Dr. P. K. Sahu) Dr. S. Kishan

IV	**Integration:** Elementary integration, Integration of Transcendental function, Reduction formulae, Definite integral.	**15**

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Text Books Recommended-

1. Howard Anton, I. Bivens& Stephan Davis (2016). Calculus (10th edition). Wiley India.
2. Gabriel Klambauer (1986). Aspects of Calculus. Springer-Verlag.
3. Wieslaw Krawcewicz & BindhyachalRai (2003). Calculus with Maple Labs. Narosa.
4. Gorakh Prasad (2016). Differential Calculus (19th edition). Pothishala Pvt. Ltd.

Reference Books Recommended-

5. George B. Thomas Jr., Joel Hass, Christopher Heil& Maurice D. Weir (2018). Thomas' Calculus (14th edition). Pearson Education.
6. Jerrold Marsden, Anthony J. Tromba& Alan Weinstein (2009). Basic Multivariable Calculus, Springer India Pvt. Limited.
7. James Stewart (2012). Multivariable Calculus (7th edition). Brooks/Cole. Cengage.
8. Monty J. Strauss, Gerald L. Bradley & Karl J. Smith (2011). Calculus (3rd edition). Pearson Education. Dorling Kindersley (India) Pvt. Ltd.

E-resources: https://onlinecourses.nptel.ac.in
https://epqp.inflibnet.aci.in
https://swayam.gov.in
https://www.mooc.org

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: **100 Marks**

Continuous Internal Assessment (CIA): **30 Marks**

End Semester Examination (ESE): **70 Marks**

Continuous Internal Assessment (CIA) (Conducted by course teacher)	Test /Quiz – 20+20 Marks Assignment/Seminar- 10 Marks	Better marks out of two test/quiz + obtained marks in Assignment shall be considered against 30 marks
End Semester Examination (ESE)	**Two Section**-A&B Section-A: Q1.Objective- 10x1=10 marks Q2. Short answer type question-5x4=20marks Section-B: Descriptive answer type question, 1 out of 2 from each unit- 10x4= 40 Marks	

Name and signature of convener & members of CBOS-

(Dr. S. Dashputre)

(Dr. P. K. Sahu)

Dr. Omkar Nath Shivastava

Dr. S. Khan

FOUR YEAR UNDER GRADUATE PROGRAM(2024-28)

DEPARTMENT OF MATHEMATICS

COURSE CURRICULUM

Part A: Introduction			
Program: Bachelor in Science (Certificate/Diploma/Degree/Honors)		**Semester - II**	**Session:2024-2025**
1	Course Code	**MASC-02**	
2	Course Title	**Algebra**	
3	Course Type	**Discipline Specific Course (DSC)**	
4	Pre requisite	Knowledge of basic algebra , determinants and matrices.	
5	Course Learning Outcome (CLO)	**This Course will enable the students to:** ➢ Learn about the Matrix algebra. ➢ Understand Set theory, Function and Relation ➢ Learn about the theory of equations. ➢ Learn about the fundamental concepts of groups, Subgroups. ➢ Understand cosets and normal subgroups	
6	Credit Value	**4 C**	1Credit = 15 hours- Learning and Observation
7	Total Marks	Maximum Marks : 100	Minimum Passing Marks:40

Part B: Content of the Course		
Total no of teaching – learning period =60 Periods (60 Hours)		
UNIT	**Topics**	**No of Periods**
I	**Matrix Algebra :** Introduction, elementary operations of matrices, Inverse of a matrix. Special types of matrices: Transpose of a matrix, Symmetric and Skew symmetric matrices, Hermitian and Skew Hermitian matrix, Rank of a matrix, Echelon form of a matrix, Normal form, Application of matrices to a system of linear (both homogeneous and non-homogeneous) equations , Theorems on consistency of a system of linear equations.Eigen values and Eigen vectors, relation between Eigen values and Eigen vectors. Process of finding Eigen values and Eigen vectors, Cayley Hamilton theorem, and its use in finding inverse of a matrix.	**15**
II	**Sets Theory & Functions:**Sets, subsets Set operations and the laws of set theory and Venn diagrams. Examples of finite and infinite sets. Finite sets and counting principle. Empty set, properties of empty set. Standard set operations. Classes of a set. Power set of a set. Difference and symmetric difference of two sets. Set identities, Generalized union and intersection. **Relations and Functions:** Product set, Composition of relations, Types of relations, Partitions, Equivalence Relations with example of congruence modulo relation, Partial ordering relations. Function, Types of Function, Inverse Function, Composite of functions, Modular arithmetic and basic properties of congruences	**15**

Dr. S. Dashpute

(Dr. P. K. Sahu)

III	**Theory of equations:**Symmetric functions of the roots of an equation Root of a multiplicity, Synthetic division, Greatest common Divisors, Relation between the roots and coefficients of general polynomial equations in one variable. Transformation of equations. Descarte's rule of signs. Solutions of cubic equations (Cardon method) , Biquadrate equation.	**15**
IV	**Group Theory:**Definition and properties of a group, Abelian groups, Examples of groups, Subgroups and examples, Cosets and their properties, Lagrange's theorem and its applications, Normal subgroups and their properties, Simple groups, Factors groups .	**15**

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Text Books Recommended-

1. RamjiLal (2017). *Algebra 1: Groups, Rings, Fields and Arithmetic*. Springer.
2. Nathan Jacobson (2009). *Basic Algebra* I (2nd edition). Dover Publications
3. John B. Fraleigh (2007). *A First Course in Abstract Algebra* (7th edition). Pearson

Reference Books Recommended-

4. Michael Artin (2014). *Algebra* (2nd edition). Pearson.
5. Stephen H. Friedberg, Arnold J.Insel& Lawrence E. Spence (2003). *Linear Algebra* (4thedition). Prentice-Hall of India Pvt. Lt
6. Joseph A. Gallian (2017). *Contemporary Abstract Algebra* (9th edition). Cengage.
7. Kenneth Hoffman & Ray Kunze (2015). *Linear Algebra* (2nd edition). Prentice-Hall.
8. I. N. Herstein (2006). *Topics in Algebra* (2nd edition). Wiley India.

E-resources: https://onlinecourses.nptel.ac.in
https://epgp.inflibnet.aci.in
https://swayam.gov.in
https://www.mooc.org

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Internal Assessment (CIA):	**30 Marks**
End Semester Examination (ESE):	**70 Marks**

Continuous Internal Assessment (CIA) (Conducted by course teacher)	Test /Quiz – 20+20 Marks Assignment/Seminar- 10 Marks	Better marks out of two test/quiz + obtained marks in Assignment shall be considered against 30 marks
End Semester Examination (ESE)	**Two Section**-A&B Section-A: Q1.Objective- 10x1=10 marks Q2. Short answer type question-5x4=20marks Section-B: Descriptive answer type question, 1 out of 2 from each unit- 10x4= 40 Marks	

Name and signature of convener & members of CBOS-

(Dr. S. Dashpute) (Dr. P. K. Sahu)

FOUR YEAR UNDERGRADUATE PROGRAM (NEP–2020)

Program: Bachelor in Life Science (2024 -28)

DISCIPLINE – BOTANY

Session – 2024 -25

DSC -01 to 08		DSE -01 to 12	
Code	**Title**	**Code**	**Title**
BOSC -01T	*Elementary Botany*	BOSE -01T	*Natural resources and management*
BOSC -01P	*Lab. Course -01 (Elementary Botany)*	BOSE -01P	*Lab. Course -01 (Natural resources and management)*
BOSC -02T	*Microbes and Thallophyta*	BOSE -02T	*Microbiology and Phytopathology*
BOSC -02P	*Lab. Course –02 (Microbes and Thallophyta)*	BOSE -02P	*Lab. Course -02 (Microbiology and Phytopathology)*
BOSC -03T	*Archegoniate and Fossils*	B OSE -03T	*Phytopaleontology and Evolutionary Botany*
BOSC -03P	*Lab. Course-03 (Archegoniate and Fossils)*	BOSE -03P	*Lab. Course -03 (Phytopaleontology and Evolutionary Botany)*
BOSC -04T	*Angiosperms*	BOSE -04T	*Ethnobotany and Medicinal plants*
BOSC -04P	*Lab. Course – 04 (Angiosperms)*	BOSE -04P	*Lab. Course-04 (Ethnobotany & Medicinal plants)*
BOSC -05T	*Cytology and Genetics*	B OSE -05T	*Biosystematics and Biodiversity*
BOSC -05P	*Lab. Course -05 (Cytology and Genetics)*	BOSE -05P	*Lab. Course -05 (Biosystematics and Biodiversity)*
BOSC -06T	*Plant Physiology and Economic Botany*	BOSE -06T	*Plant breeding and Seed technology*
B OSC -06P	*Lab. Course -06 (Plant Physiology and Economic Botany)*	BOSE -06P	*Lab. Course -06 (Plant breeding and Seed technology)*
BOSC -07T	*Ecology and Phytogeography*	BOSE -07T	*Instrumentation and biochemical technology*
BOSC -07P	*Lab. Course –07 (Ecology and Phytogeography)*	BOSE -07P	*Lab. Course -07 (Instrumentation and biochemical technology)*
BOSC -08T	*Molecular biology and Biostatistics*	BOSE -08T	*Growth and Stress Physiology*
BOSC -08P	*Lab. Course-08 (Molecular biology and Biostatics)*	BOSE -08P	*Lab. Course -08 (Growth and Stress Physiology)*
		BOSE -09T	*Plant biotechnology and crop improvement*
		BOSE -09P	*Lab. Course -09 (Plant biotechnology and crop improvement)*
		BOSE -10T	*Applied Botany and Intellectual property right (IPR)*
		BOSE -10P	*Lab. Course -10 (Applied Botany and IPR)*
		BOSE -11T	*Biochemistry and Enzymology*
		BOSE -11P	*Lab. Course -11 (Biochemistry and Enzymology)*
		BOSE -12T	*Bioinformatics and Gene Technology*
		BOSE -12P	*Lab. Course-12 (Bioinformatics & Gene Technology)*
GE -01 & 02		**VAC**	
BOGE -01T	*Elementary Botany*	BOVAC-01	*Herbal Plant & Human Health*
BOGE -01P	*Lab. Course -01 (Elementary Botany)*	**SEC**	
BOGE -02T	*Microbes and Thallophyta*	BOSEC-01	*Gardening and Floriculture*
BOGE -02P	*Lab. Course –02 (Microbes and Thallophyta)*		

Program Outcomes (PO):

1. Demonstrate and apply the fundamental knowledge of the basic principles of major fields of biology
2. Apply knowledge to solve the issues related to plant sciences with the help of computer technology
3. Apply knowledge for conservation of endemic and endangered plant species

Program Specific Outcomes (PSO):

1. Collaborate effectively on team-oriented projects in the field of life sciences.
2. Communicate scientific information in a clear and concise manner both orally and in writing
3. Explain Biodiversity, climate change and plant pathology.
4. Apply Biotechnology, Ecology, Genetics and Plant breeding techniques in plant sciences
5. Apply knowledge of Medicinal and Economic botany in day to day life.
6. Apply the knowledge to develop the sustainable and eco-friendly technology.

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF BOTANY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Sciences *(Certificate / Diploma / Degree/Honors)*			**Semester - I**	Session: **2024-2025**
1	**Course Code**	**BOSC -01 T**		
2	**Course Title**	**Elementary Botany**		
3	**Course Type**	**Discipline Specific course (DSC)**		
4	**Pre-requisite** (if, any)	***As per program***		
5	**Course Learning. Outcomes (CLO)**	At the end of this course, the students will be able to ➢ Understand the Basics of Botany and its branches. ➢ Get acquainted with complex interrelationship between organisms and environment. ➢ Develop a comprehensive understanding of the identification, cultivation, and processing of medicinal plants, and their chemical constituents. ➢ Utilize plants resources for livelihood.		
6	**Credit Value**	**3 Credits**	***Credit = 15 Hours - learning & Observation***	
7	**Total Marks**	**Max. Marks: 100**	**Min Passing Marks: 40**	

PART -B: Content of the Course

Total No. of Teaching–learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	**Basics of Plant Science**: Differences and resemblances between; living and nonliving plants and animals, plant and animal cell. Concept of prokaryotes and eukaryotes.Importan features of thallophyta, Bryophyta, Pteridophyta, Gymnosperm and Angiosperm.Structure an function of a typical flowering plant.	12
II	**Branches of botany:** General idea, features, and significance; Anatomy, Cytology, Economic Botany, Ethnobotany, Forestry, Genetics, Histology, Microbiology, Paleobotany, Phytochemistry, Phytopathology , Plant biotechnology, Plant breeding, Plant ecology, Plant morphology, Plant physiology, Plant Taxonomy, etc,	11
III	**Plants for human welfare:**Plant Resources for Rural livelihood – Mahua, Tendu patta, Bamboo and Firewood.Ethnobotany in India: Methods to study Ethnobotany, Applications of Ethnobotany, ethnomedicinal plants and ethnoecology. Application of plant products for certain diseases- Cough and cold, Jaundice, Infertility, Diabetes, Blood pressure and Skin diseases.	11
IV	**Ancient Indian Botany:**Indigenous Medicinal Sciences;Definition and Scope-Ayurveda: History, origin, panchamahabhutas, saptadhatu and tridosha concepts, Rasayana, plants used in ayurvedic treatments, Siddha: Origin of Siddha medicinal systems, Basis of Siddha system, plants used in Siddha medicine. Unani: History, concept. Charaksamhita. Ancient and modern Botanists and their contributions.-Charak, Jagdish Chandra Bose, B.P.Pal, Desikachary,K.C. Mehta M.S. Swaminathan etc.	11
Keywords	***Prokaryotes, Ethnobotany, Taxonomy, Ayurveda***	

Signature of Convener & Members (CBoS) :

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. College Botany Ganguli Kar and dutta , HIMALAYA Publishers
2. "Handbook of Medicinal Plants" by L.D. Kapoor
3. "Indian Medicinal Plants: An Illustrated Dictionary" by C.P. Khare
4. "Medicinal Plants in India: Conservation and Sustainable Utilization in the Emerging Global Scenario" edited by V.K. Gupta
5. "A Compendium of Medicinal Plants in India: An Introduction to Ayurveda" by S.L. Kochhar
6. A handbook of forest utilization by T. Mehta
7. Plants and human welfare by O.P.Sharma

Reference Books Recommended –

1. Charak Samhita
2. Medicinal Plants of India" by C.P. Khare

Online Resources–

- **e-books and e-learning portals**
- **www.swayam.ac.in**
- **www.ignou.ac.in**
- **www.egyankosh.ac.in**
- **www.iitm.ac.in**
- **www.eskillindia.org**
- **www.eshiksha.mp.gov.in**
- **www.vlab.co.in**
- **www.internshala.com**
- **www.ndl.iitkgp.ac.in**

Online Resources–

e-Resources / e-books and e-learning portals

- https://extension.oregonstate.edu/collection/botany-basics
- https://www.pbs.org/video/botany-basics-iuu2bl/
- https://efaidnbmnnnibpcajpcglclefindmkaj/https://www2.ca.uky.edu/agcomm/pubs/ho/ho96/ho96.pdf
- https://www.botanytoday.com/branches-of-botany/
- https://efaidnbmnnnibpcajpcglclefindmkaj/https://www.unanijournal.com/articles/94/3-1-11-206.pdf
- https://efaidnbmnnnibpcajpcglclefindmkaj/https://wgbis.ces.iisc.ac.in/biodiversity/sahyadri/documents/botany_history.pdf
- https://vedpuran.files.wordpress.com/2016/07/charaksamhitaatridevajigupt-vol-1.pdf
- https://egyankosh.ac.in/handle/123456789/89429

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks
Continuous Internal Assessment (CIA): 30 Marks
End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): 30 **(By Course Teacher)**	Internal Test / Quiz-(2): **20** +**20** Assignment / Seminar - **10** Total Marks - **30**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE): 70	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20 Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40 Marks**	

Name and Signature of Convener & Members of CBoS:

(1) R Diwan
(2)
(3)
(4)
(5)
(6)
(7)
(8)
(9)
(10)

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF BOTANY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Sciences *(Certificate / Diploma / Degree/ Honors)*		**Semester - I**	Session: **2024-2025**	
1	**Course Code**	**BOSC -01**		
2	**Course Title**	**Lab. Course -01 (Elementary Botany)**		
3	**Course Type**	**Laboratory course**		
4	**Pre-requisite** (if, any)	***As per program***		
5	**Course Learning. Outcomes (CLO)**	At the end of this course, the students will be able to ➢ Understand structure of plant cell, prokaryotic cell and eukaryotic cell. ➢ Identify pteridophytes of college campus. ➢ Learn about the different types of plant tissues. ➢ Learn about Ayurvedic system of medicine.		
6	**Credit Value**	**1 Credits**	***Credit =30 Hours Laboratory or Field learning/Training***	
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks: 20**	

PART -B: Content of the Course

Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)

Module	Topics (Course contents)	No. of Period
Lab./Field Training/ Experiment Contents of Course	**1.** Microscopic study of plant cell. **2.** Microscopic study of prokaryotic (Bacteria) and eukaryotic cell (algae and fungi). **3.** Study of thallus structure of *Riccia* and *Marchantia*. **4.** Identification of different plants growing in college campus. **5.** Study of a typical flowering plant and it's parts. **6.** Study of internal structure of root and stem. **7.** Study of parenchyma, collenchyma and sclerenchyma. **8.** Study of medicinal plants of college campus. **9.** Study of plants used to cure cough and cold, jaundice and skin diseases. **10.** Visit to any local ayurvedic hospital / practitioner to understand Ayurveda.	**30**
Keywords	***Prokaryotic, Parenchyma, Jaundice, Ayurveda.***	

Signature of Convener & Members (CBoS) :

(1) Rishwar
(2) Anurag
(3) Madhu
(4)
(5)
(6)
(7)
(8) Brief
(9) Plants
(10)

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

Text Books Recommended –

1. College Botany Ganguli Kar and dutta , HIMALAYA Publishers
2. "Handbook of Medicinal Plants" by L.D. Kapoor
3. "Indian Medicinal Plants: An Illustrated Dictionary" by C.P. Khare
4. "Medicinal Plants in India: Conservation and Sustainable Utilization in the Emerging Global Scenario" edited by V.K. Gupta
5. "A Compendium of Medicinal Plants in India: An Introduction to Ayurveda" by S.L. Kochhar
6. A handbook of forest utilization by T. Mehta
7. Plants and human welfare by O.P.Sharma

Reference Books Recommended –

1. Charak Samhita
2. Medicinal Plants of India" by C.P. Khare

Online Resources–

- **e-Resources / e-books and e-learning portals**
- **www.swayam.ac.in**
- **www.ignou.ac.in**
- **www.egyankosh.ac.in**
- **www.iitm.ac.in**
- **www.eskillindia.org**
- **www.eshiksha.mp.gov.in**
- **www.vlab.co.in**
- **www.internshala.com**
- **www.ndl.iitkgp.ac.in**

Online Resources–

- **e-Resources / e-books and e-learning portals**
- **https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5871155/**
- **https://cms.botany.org/home/careers-jobs/careers-in-botany/areas-of-specialization-in-botany.html**

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**50 Marks**
Continuous Internal Assessment (CIA):	**15 Marks**
End Semester Exam (ESE):	**35 Marks**

Continuous Internal Assessment (CIA): 15 **(By Course Teacher)**	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE): 35	**Laboratory / Field Skill Performance: On spot Assessment** **A. Performed the Task based on lab. work - 20 Marks** **B. Spotting based on tools & technology (written) – 10 Marks** **C. Viva-voce (based on principle/technology) - 05 Marks**	**Managed by Course teacher as per lab. status**

Name and Signature of Convener & Members of CBoS:

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10)

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF BOTANY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Sciences *(Certificate / Diploma / Degree/Honors)*			**Semester - II**	Session: **2024-2025**
1	**Course Code**	**BOSC -02 T**		
2	**Course Title**	**Microbes and Thallophyta**		
3	**Course Type**	**Discipline Specific course (DSC)**		
4	**Pre-requisite** (if, any)	***As per program***		
5	**Course Learning. Outcomes (CLO)**	At the end of this course, the students will be able to 1. Understand about the Microbes and their Importance. 2. Identify edible mushrooms and learn cultivation techniques. 3. Learn about bio-fertilizers and their uses. 4. Understand life cycles of different algae and fungi.		
6	**Credit Value**	**3 Credits**	***Credit = 15 Hours - learning & Observation***	
7	**Total Marks**	**Max. Marks: 100**	**Min Passing Marks: 40**	

PART -B: Content of the Course

Total No. of Teaching–learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	**Viruses**: - general characteristics,nature , structure and nomenclature, Bacteriophages and TMV; Lytic and Lysogenic cycles, transmission and replication of viruses, Symptoms of viral diseases on plants , important plant diseases, viroid, prions.Actinomycetes: general characteristics ,Structure, reproduction and economic importance. Mycoplasma, Phytoplasma,: general characteristics , structure, reproduction and their economic uses.	12
II	**Bacteria:** History, general character, classification and morphology, Gram positive and Gram-negative bacteria, structure of bacteria shape, size flagella and ultra structure of bacterial cell; Bacterial Growth curve, factors affecting growth of microbes; sporulation, reproduction, recombination in bacteria- Transformation Conjugation and Transduction, and Economic importance. Cyanobacteria : General characteristics, morphology,Heterocyst, cell structure of Cyanobacteria, reproduction and economic importance of Bacteria.	11
III	**Phycology:** General characteristic features of Algae. Algae in diversified habitat, Salient features, occurrence, classification and range of thallus organization.Prominent pigments found in Algae. Reproduction classification, general character and life cycle of –*Volvox, Oedogonium, Chara, Vaucheria,Ectocarpus*and*Polysiphonia*. Economic importance of algae - Role of algae in soil fertility, algae as biofertilizer , blue green algae and nitrogen fixation. Symbiosis ; algal products - Agar, biofuel	11
IV	**Mycology, Mushroom Cultivation, Lichenology &Mycorrhiza:** General characteristic features of Fungi, Economic importance and Classification of Fungi, Nutrition, Heterothallism, Physiological specialization, Heterokaryosis &Parasexuality in Fungi. Fungi as biocontrol agent. Classification, general character and life cycle of -*Mucor*, Phytophthora*Penicillium, Peziza. Ustilago, Puccinia, Agaricus*; *Colletotrichum*, *Alternaria*. Edible Mushroom- Button and Oyster mushroom and their cultivation. General account of lichens. General account of Myccorrhiza.	11
Keywords	***Mycoplasma, Transduction, Biofertilizer, Parasexuality.***	

Signature of Convener & Members (CBoS) :

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West. Press Pvt. Ltd. Delhi. 2nd edition.
2. Tortora, G.J., Funke, B.R., Case, C.L. (2010). Microbiology: An Introduction, Pearson Benjamin Cummings, U.S.A. 10th edition.
3. Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi & Their Allies, MacMillan Publishers Pvt. Ltd., Delhi.
4. Aggarwal, S. K. 2009. Foundation Course in Biology, A one books Pvt. Ltd., New Delhi.
5. Aneja, K. R. 1993. Experiments in Microbiology, Pathology and Tissue Culture, VishwaPrakashan, NewDelhi.
6. Annie Ragland, 2012. Algae and Bryophytes, Saras Publication, Kanyakumari, India.
7. Basu, A. N. 1993. Essentials of Plant Viruses, Vectors and Plant diseases, New Age International, New Delhi.
8. Chopra. G. L. 1984. A text book of Algae, Rastogi publications, Meerut,India.
9. Dubey, R. C. and Maheshwari. D.K. 2012. Practical Microbiology, S. Chand & Company, Pvt. Ltd., NewDelhi.
10. Fritsch, R. E. 1977. Structure and Reproduction of Algae, Cambridge University Press, London.
11. Sharma, P.D. (2011). Plant Pathology. Meerut, U.P.: Rastogi Publication.
12. Pandey B.P. 2001. College Botany Volume 1, S Chand & Company Pvt.Ltd, New Delhi.

Reference books:

1. Webster, J., Weber, R. (2007). Introduction to Fungi, 3rd edition. Cambridge, U.K.: Cambridge University Press.
2. Pelzar, 1963. Microbiology, Tata McGraw Hill, New Delhi
3. Rangaswamy, G. 2009, Disease of Crop Plants in India, Prientice Hall of India, New Delhi.
4. Microbiology Fundamental and Applications (hindi) (pb) 9. ISBN: 9788188826230 Edition: 03Year : 2016Author : Dr. Purohit SS , Dr. Deo Publisher : Student Edition Language : Hindi
5. Modern Microbiology (hindi) (hb) ISBN: 9788177543599Edition : 1Year : 2018Author : Dr. Purohit SS , Dr. Singh T Publisher : Agrobios (India)
6. Plant pathology by R.S. Mehrotra, Tata McGraw-Hill Publication

Online Resources–

- **e-Resources / e-learning portals**
- **www.swayam.ac.in**
- **www.ignou.ac.in**
- **www.egyankosh.ac.in**
- **www.iitm.ac.in**
- **www.eskillindia.org**
- **www.eshiksha.mp.gov.in**
- **www.vlab.co.in**
- **www.internshala.com**
- **www.ndl.iitkgp.ac.in**

Online Resources–

- **e-Resources / e-books and e-learning portals**

1. https://www.classcentral.com/tag/microbiology
2. https://www.edx.org/learn/microbiology
3. https://www.mooc-list.com/tags/microbiology
4. https://www.udemy.com/topic/microbiology/
5. https://ucmp.berkeley.edu/bacteria/bacteria.html
6. https://www.livescience.com/53272-what-is-a-virus.html
7. https://gclambathach.in/lms/Economic%20importance%20of%20Algae.pdf
8. https://www.slideshare.net/sardar1109/algae-notes-1
9. https://www.onlinebiologynotes.com/algae-general-characteristics-classification/
10. https://www.sciencedirect.com/topics/immunology-and-microbiology/fungus
11. https://ucmp.berkeley.edu/fungi/fungi.html
12. https://agrimoon.com/wp-content/uploads/Mashroom-culture.pdf
13. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=11293
14. http://www.jnkvv.org/PDF/11042020102651plant_pathology.pdf
15. https://www.apsnet.org/edcenter/disimpactmngmnt/topc/EpidemiologyTemporal/Pages/ManagementStrategies.aspx
16. https://www.agrilcareer.com/6-easy-steps-for-mushroom-cultivation/

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA):30 (By Course Teacher)	Internal Test / Quiz-(2): **20 +20** Assignment / Seminar - **10** Total Marks - **30**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE): 70	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20 Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40 Marks**	

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF BOTANY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Sciences *(Certificate / Diploma / Degree/Honors)*			**Semester - II**	Session: **2024-2025**
1	**Course Code**	**BOSC- 02**		
2	**Course Title**	**Lab. Course –02 (Microbes and Thallophyta)**		
3	**Course Type**	**Laboratory course**		
4	**Pre-requisite** (if, any)	***As per program***		
5	**Course Learning. Outcomes (CLO)**	1. Understand the Viruses, Bacteria, Phycology, Mycology and Plant pathology 2. Learn microbial techniques which will be beneficial for agriculture and industry. 3. Learn life cycles of selected genera of different groups 4. Understand etiology of plant diseases 5. Apply their knowledge in the crop fields to eradicate or avoid the diseases		
6	**Credit Value**	**1 Credits**	***Credit =30 Hours Laboratory or Field learning/Training***	
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks: 20**	

PART -B: Content of the Course		
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)		
Module	**Topics (Course contents)**	**No. of Period**
Lab./Field Training/ Experiment Contents of Course	**1.** Collection of viral/ Bactrial /fungal infected plants **2.** Study of plant disease symptoms caused by viral/ Bactrial /fungal/ Mycoplasma **3. BACTERIAL IDENTIFICATION:** Isolation of bacteria Staining techniques: Gram's, staining **4.** Study / Slide preparation of available Cyanobacteria **5. PHYCOLOGY:** Study / Slide preparation and Staining of algae –*Volvox, Oedogonium* and *Chara; Vaucheria;Ectocarpus Polysiphonia* **6. MYCOLOGY:** Study/ Slide preparation and . Staining of fungi. *Mucor,Phytophthora, Penicillium, Peziza, Ustilago, Puccinia; Agaricus, colletotrichum, Alternaria.*: Study of Button and Oyster Mushroom Lichens: crustose, foliose and fruticose specimens. Study of VAM fungi	**30**
Keywords	infected plants, VAM, algae, fungi	

Signature of Convener & Members (CBoS) :

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Practical Botany (Part I) ISBN #:81-301-0008-8 Sunil D Purohit, Gotam K Kukda & Anamika Singhvi Edition:2013 Apex Publishing House Durga Nursery Road, Udaipur, Rajasthan (bilingual).
2. Pandey S.K. (2012). Quick Concept of Botany. Publisher LAP LAMBERT Academic Publishing GmbH & Co. KG, Germany (ISBN: 978-3-8484-3104-5).
3. Dubey, R. C. and Maheshwari. D.K. 2012. Practical Microbiology, S. Chand & Company, Pvt. Ltd., New Delhi.
4. Pandey. B.P. 2014 Modern Practical Botany, (Vol-I) S. Chand and Company Pvt. Ltd., New Delhi.

Online Resources–

- **e-Resources / e-books and e-learning portals**
- **www.swayam.ac.in**
- **www.ignou.ac.in**
- **www.egyankosh.ac.in**
- **www.iitm.ac.in**
- **www.eskillindia.org**
- **www.eshiksha.mp.gov.in**
- **www.vlab.co.in**
- **www.internshala.com**
- **www.ndl.iitkgp.ac.in**

Online Resources–

- **e-Resources / e-books and e-learning portals**

1. https://community.plantae.org/tags/moocfuturelearn.com/courses/teaching-biology-inspiring-students-with-plants-in-science
2. https://microbiologysociety.org/publication/education-outreach-resources/basic-practical-microbiology-a-manual.html
3. https://microbiologyonline.org/file/7926d7789d8a2f7b2075109f68c3175e.pdf
4. http://allaboutalgae.com/benefits/
5. https://repository.cimmyt.org/xmlui/bitstream/handle/10883/3219/64331.pdf
6. https://www.mooc-list.com/tags/microbiology\
7. http://www.agrifs.ir/sites/default/files/A%20text%20book%20of%20practical%20botany%201%20%7BAshok%20Bendre%7D%20%5B8
8. https://171339239%5D%20%281984%29.pdf

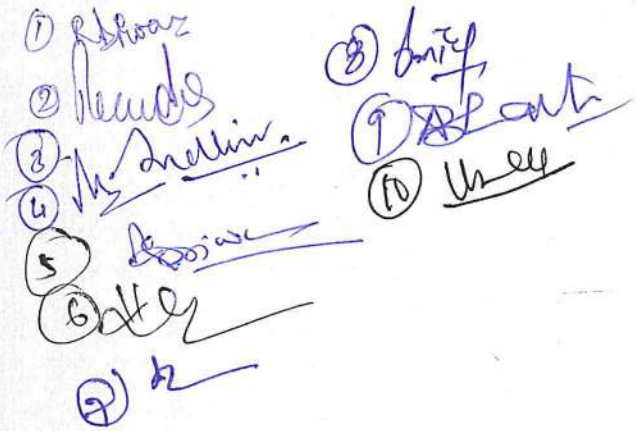
PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks
Continuous Internal Assessment (CIA): 15 Marks
End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): 15 (By Course Teacher)	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE): 35	**Laboratory / Field Skill Performance: On spot Assessment** **A. Performed the Task based on lab. work - 20 Marks** **B. Spotting based on tools & technology (written) – 10 Marks** **C. Viva-voce (based on principle/technology) - 05 Marks**	**Managed by Course teacher as per lab. status**

Name and Signature of Convener & Members of CBoS:



NEP 2020

FOUR YEAR UNDERGRADUATE PROGRAM (NEP–2020)

Program: Bachelor in Science (2024 -28)

DISCIPLINE – ZOOLOGY

FOUR YEAR UNDERGRADUATE PROGRAM (NEP–2020)
Program: Bachelor in Science (2024 -28)
DISCIPLINE – ZOOLOGY
Session – 2024 -25

DSC -01 to 08		DSE -01 to 12	
Code	**Title**	**Code**	**Title**
ZOSC -01T	Life on Earth and Unique Attributes of Animal Kingdom	ZOSE -01T	Parasitology
ZOSC -01P	Life on Earth and Unique Attributes of Animal Kingdom	ZOSE -01P	Parasitology
ZOSC -02T	Cell Biology and Histology	ZOSE -02T	Ecology and Wild life Conservation & Management
ZOSC -02P	Cell Biology and Histology	ZOSE -02P	Ecology and Wild life Conservation & Management
ZOSC -03T	Diversity of Invertebrates	ZOSE -03T	Biochemistry
ZOSC -03P	Diversity of Invertebrates	ZOSE -03P	Biochemistry
ZOSC -04T	Diversity of Chordates and Comparative Anatomy	ZOSE -04T	Evolutionary Biology
ZOSC -04P	Diversity of Chordates and Comparative Anatomy	ZOSE -04P	Evolutionary Biology
ZOSC -05T	Vertebrate Physiology	ZOSE -05T	Endocrinology
ZOSC -05P	Vertebrate Physiology	ZOSE -05P	Endocrinology
ZOSC -06T	Genetics	ZOSE -06T	Immunology
ZOSC -06P	Genetics	ZOSE -06P	Immunology
ZOSC -07T	Biosystematics and Taxonomy	ZOSE -07T	Biotechnology and Genetic Engineering
ZOSC -07P	Biosystematics and Taxonomy	ZOSE -07P	Biotechnology and Genetic Engineering
ZOSC -08T	Biotechniques	ZOSE -08T	Applied Zoology
ZOSC -08P	Biotechniques	ZOSE -08P	Applied Zoology
		ZOSE -09T	Basics of Computer & Biostatistics
		ZOSE -09P	Basics of Computer & Biostatistics
		ZOSE -10T	Behaviour & Chronobiology
		ZOSE -10P	Behaviour & Chronobiology
		ZOSE -11T	Developmental Biology
		ZOSE -11P	Developmental Biology
		ZOSE -12T	Molecular Biology
		ZOSE -12P	Molecular Biology
GE -01 & 02		**VAC**	
ZOGE -01T	Life on Earth and Unique Attributes of Animal Kingdom	ZOVAC-01	Public health and Hygiene
ZOGE -01P	Life on Earth and Unique Attributes of Animal Kingdom	**SEC**	
ZOGE -02T	Cell Biology and Histology	ZOSEC-01	Vermiculture
ZOGE -02P	Cell Biology and Histology		

Program Outcomes (PO):

- Demonstrate and apply the fundamental knowledge of the basic principles of major fields of Zoology and Modern tools and techniques
- Analyse complex interactions among the various animals of different phyla, their distribution and their relationship with the environment.
- Gain knowledge of small scale industries like sericulture, fish farming, bee keeping, aquaculture, animal husbandry, poultry farm.
- Apply the knowledge and understanding of Zoology to one's own life and work.
- Develops empathy and love towards the animals and consciousness for wild life conservation

Program Specific Outcomes (PSO):

- Perform procedures as per laboratory standards in the areas of Taxonomy, Physiology, Ecology, Cell biology, Genetics, Applied Zoology, Behaviour, Endocrinology, Immunology, Biostatistics, Parasitology, Biochemistry, Evolution, Developmental Biology, Animal biotechnology, Tools and Techniques of Zoology.
- Understand the applications of biological sciences in Apiculture, Aquaculture, Sericulture, Animal Husbandry, Poultry Farm.
- Understand the applications of Zoology in Medicine and daily life
- Contributes the knowledge for Nation building and sustainable development

Dr. Shubhada Rahalkar 10.06.2024 Dr. Shobha Ram Yadav Dr. Nazma Ansari Dr. Ajit Hemant Dr. R.K. Pandey Dr. Rajesh Tiwari Dr. Lata Meshram

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF ZOOLOGY
Course Curriculum

PART- A: Introduction				
Program: Bachelor in Life Science *(Certificate / Diploma / Degree/Honors)*		**Semester - I**		Session: **2024-2025**
1	**Course Code**	**ZOSC-01T**		
2	**Course Title**	**Life on Earth and Unique Attributes of Animal Kingdom**		
3	**Course Type**	**Discipline Specific Course**		
4	**Pre-requisite** (if, any)	*As per program*		
5	**Course Learning. Outcomes (CLO)**	**After successfully completing this course, the students will be able to-** ➢ Develop an understanding of concepts, mechanisms, evolutionary significance and relevance of Origin of life. ➢ Understand General Idea about Invertebrate and Vertebrate animals with special reference and their specific qualities. ➢ Understand and appreciate diversity of life forms. ➢ Apply the knowledge about animals Sciences in daily life.		
6	**Credit Value**	**3 Credits**	***Credit = 15 Hours - learning & Observation***	
7	**Total Marks**	**Max. Marks: 100**		**Min Passing Marks: 40**

PART -B: Content of the Course

Total No. of Teaching–learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	**Origin of life: Theories of Origin of life:** **Ancient Theory** Theory of Special Creation (Mythological approach),Theory of Panspermia or Cosmozoic Theory, Theory of Directed Panspermia, Theory of Catastrophism, Theory of Spontaneous Generation (Abiogenesis or Autogenesis), Theory of Biogenesis: Redi's Experiment and Pasture's Experiment. **Modern Theory: Origin of Universe:** Big Bang Hypothesis in Brief, **Origin of Solar System and The Earth:** Nebular hypothesis, **Atomosphere and Eneargy Sources on Primitive Earth, Biochemical Origin of Life:** Oparin and Haldane Theory, **Chemogeny:** Formation of simple and complex organic compounds (Stanely Miller and Ure's Experiment), Formation of Coacervates, Nucleic Acids. **Biogeny:** Origin of primitive prokaryotic cell. **Evolution of modes of Nutrition:** Chemohetertrophs, Anaerobic and Aerobic Photoautotrophs. Evolution of Eukaryotes.	12
II	**Systematics & Unique attributes of Invertebrate and Vertebrate animals with special reference to Coelentrata, Mollusca and Pisces:** Definition and difference between Invertebrate and Vertebrate. **Nomenclature:** Binomial and Trinomial Nomenclature and International code of Nomenclature **Corals:** Meaning of Coral, Structure of Coral polyp, Coral Skeleton, Types of corals: Hydrozoan Coral, Example- Millipora, Octocorallian Coral, Example- Alcyonium, Hexacorallian Corals, Example- Gorgonia. **Torsion in Mollusca:** Definition, Mechanism of Torsion, Effects of Torsion, Significance of Torsion. **Pisces: Migration in fishes**: Catadromous: Eel fish and Anadromous: Salmon fish and **Parental care in fishes:** By nest formation, Coiling round eggs, Attachment to body, Integumentary cups, Shelter in mouth, Brood pouch, Mermaids purses, Viviparity.	11
III	**Unique attributes of Vertebrate animals with special reference to Amphibia & Reptilia:** **Parental care in Amphibia:** by Nest, by Nursery or Shelter and by Parents **Neoteny in Amphibia**: Definition, Partial and Total Neotony, Factors Affecting Neotony, Examples- Axolotal larva, Necturus and Siren. **Reptilia: Venomous & Non-venomous Snakes:** Identification, Poison apparatus: Poison Glands, Poison ducts and Fangs, Biting Mechanism.	11
IV	**Unique attributes of Vertebrate animals with special reference to Aves and Mammals:** **Birds:** Flight Adaptation, Migration and Perching Mechanism, Flightless Birds (Morphology and Special Characters of Emu, Ostrich and Penguins), Discuss-Birds are glorified reptiles: Archaeopteryx. **Monotremes or Egg laying mammals:** Morphology and Special Characters of Echidna and Duck bill platypus. **Aquatic Mammals:** Morphology and Special Characters of Whale and Dolphin. **Mammals: Flying Mammals:** Morphology and Special Characters of Bat.	11
Keywords	*Origin of life, Invertebrate, Vertebrate, Corals, Torsion, parental care, Neotony, Fangs, Aves, Mammals*	

Signature of Convener & Members (CBoS) :

PART–C: Learning Resources

Text Books Recommended

- E. J. W. Barrington , Invertebrate structure and function, English Language Book Society UK
- Robert Barnes, Invertebrate Zoology, Robert Barnes IVth edition Holt Saunders International Edition Japan
- Park Haswell, Marshall and Williams, A textbook on Zoology Invertebrate, AITBS Publishing and Distributers, Delhi
- Park Haswell, Marshall and Williams, A textbook on Zoology Vertebrate, AITBS Publishing and Distributers, Delhi

Reference Books Recommended

- Prof R. L. Kotpal, Protozoa to Echinodermata, Rastogi Publication Meerut
- E.L. Jordan, Dr. P. S. Verma,Invertebrate Zoology , S. Chand Publications, New Delhi
- N. Arumugam, N. C. Nair S. - Invertebrate Zoology, Saras Publication.
- N. Arumugam, N. C. Nair S. - vertebrate Zoology, Saras Publication.
- Barrington E. J. W., Invertebrate Structure and Function, Nelson London
- Barnes, R. D., Invertebrate Zoology –Saunders Philadelphia
- R. L. Kotpal, Invertebrate, Rastogi Publications
- R. L. Kotpal, Vertebrate, Rastogi Publications
- H. S. Bhampah, KavitaJuneja, Recent trends in vertebrates vol 1 – 9, Anmol Publication
- S. N. Prasad, Life of invertebrates, Vikash Publication House Pvt Ltd New Delhi
- G. S. Sandhu, HarshwardhanBhagskar – Advanced invertebrate zoology –Campus books international

Online Resources–

- **https://www.coursera.org/lecture/emergence-of-life/4-5-invertebrates-successes-of-life-without-a-backbone-WQHqS**
- **https://www.shiksha.com/online-courses/introduction-to-biology-biodiversity-course-courl5385**
- **https://www.youtube.com/watch?v=k121Qv6loBA**
- **https://www.youtube.com/watch?v=uK-Xx_OCYcI**
- **https://www.youtube.com/watch?v=vybbBil5Elk**
- **https://www.youtube.com/watch?v=WxMSckEeio4**

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Internal Assessment (CIA):	**30 Marks**
End Semester Exam (ESE):	**70 Marks**

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): **20 +20** Assignment / Seminar - **10** Total Marks - **30**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE):	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20 Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40 Marks**	

Signature of Convener & Members (CBoS) :

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DPARTMENT OF ZOOLOGY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Science *(Certificate / Diploma / Degree / Honors)*		**Semester - I**	Session: **2024-2025**	
1	**Course Code**	**ZOSC-01P**		
2	**Course Title**	**Life on Earth and Unique Attributes of Animal Kingdom**		
3	**Course Type**	**Discipline Specific Lab Course**		
4	**Pre-requisite** (if, any)	***As per Program***		
5	**Course Learning Outcomes (CLO)**	**After successfully completing this course, the students will be able to-** ➢ *To demonstrate comprehensive understanding of the current theories and hypotheses regarding the origin of life on Earth,* ➢ *Understand diversity of life forms* ➢ *Identify some distinctive invertebrate and vertebrate animals* ➢ *Apply this Understanding to broader context of life*		
6	**Credit Value**	**1 Credits**	***Credit =30 Hours Laboratory or Field learning/Training***	
7	**Total Marks**	**Max. Marks: 50**		**Min Passing Marks: 20**

PART -B: Content of the Course

Total No. of learning-Training / performance Periods: 30 Periods (30 Hours)

Module	Topics (Course Contents)	No. of Period
Lab./Field Training/ Experiment Contents of Course	➢ Study of origin of life through chart and models ➢ Study of different Invertebrates and Vertebrates animals through models and museum specimens in the laboratory with details of biogeography and diagnostic features: Millipora, Alcyonium, Gorgonia, Hippocampus, Ichthyophis (Female), Alytes (Male), Axolotal larva, Necturus, Siren, Cobra, Viper (pit & Pitless), Sea Snake, Rattle Snake, Archaeopteryx, Emu, Ostrich and Penguins, Echidna and Duck bill platypus, Whale, Dolphin, Bat. ➢ Preparation and Demonstration of Key for Identification of Venomous and Non-venomous snakes. ➢ Study of Coral Reefs through Models, Photographs ➢ Study of Fossils through chart/ Models ➢ An "**Animal album or Practical Record**" containing sketches, photographs, cut outs, with appropriate write up about the above mentioned taxa. ➢ Study of some videos to develop understanding and acquired knowledge on the animals salient features as mentioned above. ➢ Group discussion/Viva or Seminar presentation on related topics mentioned in Theory paper.	**30**
Keywords	*Museum specimens, Invertebrates, Vertebrates, Venomous and Non-venomous, Seminar*	

Name and Signature of Convener & Members of CBoS:

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- S.S. Lal, Practical Zoology, Invertebrate. 12th Edition Rastogi Publications, Meerut,
  - New Delhi.
- A manual of practical Zoology. Dr. P.S Verma, S. Chand Publication, New Delhi

Reference *Books Recommended –*

- Park Haswell, Marshall and Williams, A textbook on Zoology Invertebrate, AITBS Publishing and Distributers, Delhi
- Park Haswell, Marshall and Williams, A textbook on Zoology Vertebrate, AITBS Publishing and Distributers, Delhi

Online Resources–

- **http://ndl.iitkgp.ac.in/he_document/swayamprabha/swayam_prabha/gc5ua6m873i?e=3|*|||**
- **https://www.youtube.com/watch?v=JUdp3U6A1EA**

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**50 Marks**
Continuous Internal Assessment (CIA):	**15 Marks**
End Semester Exam (ESE):	**35 Marks**

Continuous Internal Assessment (CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Laboratory / Field Skill Performance: On spot Assessment** **A. Performed the Task based on lab. work - 20 Marks** **B. Spotting based on tools & technology (written) – 10 Marks** **C. Viva-voce (based on principle/technology) - 05 Marks**	**Managed by Course teacher as per lab. status**

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF ZOOLOGY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Science *(Certificate / Diploma / Degree / Honors)*		**Semester - II**	Session: **2024-2025**	
1	**Course Code**	**ZOSC- 02T**		
2	**Course Title**	**Cell Biology and Histology**		
3	**Course Type**	**Discipline Specific Course**		
4	**Pre-requisite** (if, any)	***As per Program***		
5	**Course Learning Outcomes (CLO)**	**After successfully completing this course, the students will be able to-** ➢ Acquire knowledge of Cell membrane and function ➢ Understand the functioning of nucleus and extra nuclear organelles and understand the intricate cellular mechanisms involved. ➢ Gain Knowledge of key processes like cell division, ➢ Learn about various tissues of body their structural significance		
6	**Credit Value**	**3 Credits**	***Credit = 15 Hours - learning & Observation***	
7	**Total Marks**	**Max. Marks: 100**		**Min Passing Marks: 40**

PART -B: Content of the Course

Total No. of Teaching–learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	**Cell Structure, Cell Membrane and Extra Nuclear Cell Organelles:** General structure of Prokaryotes and Eukaryotes. **Cell membrane organization: Origin,** structure (Lipid-Lipid Bilayer Model, Dannelli & Davson Model, Unit Membrane Model and Fluid mosaic model), chemical composition and function of cell membrane, Specialization of cell membrane: microvilli desmosomes, Hemidesmosome, Septate Desmosome, plasmodesmata, tight and gap junction. **Extra Nuclear Cell Organelles:** Ultra structure and functions of Endoplasmic reticulum and Golgi apparatus.	11
II	**Extra Nuclear Cell Organelles:** Ultra structure and functions of Ribosome, Lysosome, Peroxisomes, Mitochondria: Origin, structure and function.	11
III	**Nuclear Organization and Cell Division:** Size, shape, structure and functions of interphase nucleus. Ultra structure of nuclear membrane and pore complex. Nucleolus: general organization, chemical composition and functions, Chromosome Morphology, Cell cycle, Cell division- Mitosis and Meiosis. Cell division checks points and their regulation. Programmed cell death (Apoptosis).	12
IV	**Introduction to tissues.** Epithelial tissue: types, structure and characteristics. surface modifications. Basement membrane: structure and characteristics. Connective tissue cells. Structure and function of loose, dense and adipose tissue. Cartilage and bone: classification, and fine structure. Blood: plasma, blood cells, lymph– their structure and function. Bone marrow and haemopoesis. Structure and function of spleen. Muscular tissue: ultrastructure of smooth, skeletal and cardiac muscles. Muscle-tendon attachment. Structure and classification of neurons.	11
Keywords	*Cell Biology, Cell Membrane, Cell organelle, Nucleus, endoplasmic reticulum and Golgi apparatus, ribosome, lysosome, peroxisomes, Mitochondria, tissues.*	

Name and Signature of Convener & Members of CBoS:

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1.Gupta P.K. Cell and Molecular Biology, Himalaya Publication
2. Arumugam.N, Cell biology and Molecular Biology, Saras Publication
3. Rastogi V.B. Cell Biology, Rastogi Publication
4. Verma P.S. and Agrawal Cell Biology, S. Chand Publication

Reference Books Recommended –

5. Karp, G. (2010) Cell and Molecular Biology: Concepts and Experiments (6th edition) John Wiley & Sons. Inc.
6. De Robertis, E.D.P. and De Robertis, E.M.F. (2006) Cell and Molecular Biology (8th edition) Lippincott Williams and Wilkins, Philadelphia.
7. Cooper, G.M. and Hausman, R.E. (2009) The Cell: A Molecular Approach. (5th edition) ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
8. Becker, W.M.; Kleinsmith, L.J.; Hardin. J. and Bertoni, G. P. (2009) The World of the Cell. (7th edition) Pearson Benjamin Cummings Publishing, San Francisco. Practical

Online Resources–

1. National digital Library.- http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvWmpzQ2loY0poaUVtYlByc1BZNXk3TnZMWVFzQXpZNjhhQUplR1BTOERHelZXZUp5Nw
2. http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvWmpzQ2loZFJyVGFmaDFwbXpBS0kwNi9tbi91UGYxaFl6OC9Sb25QWUlXLzF1V3NUZw
3. https://www.youtube.com/watch?v=GYY627IeAKg
4. E-PG Pathshala. https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=2rAs1Puvga4LW93zMe83aA==

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Internal Assessment (CIA):	**30 Marks**
End Semester Exam (ESE):	**70 Marks**

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): **20 +20** Assignment / Seminar - **10** Total Marks - **30**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE):	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20 Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40 Marks**	

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
Department of ZOOLOGY
Course Curriculum

PART- A: Introduction				
Program: Bachelor in Life Science *(Certificate / Diploma / Degree / Honors)*			**Semester - II**	Session: **2024-2025**
1	**Course Code**	**ZOSC-02P**		
2	**Course Title**	**Cell Biology and Histology**		
3	**Course Type**	**Discipline Specific Lab Course**		
4	**Pre-requisite** (if, any)	***As per Program***		
5	**Course Learning Outcomes (CLO)**	**After successfully completing this course, the students will be able to-** ➢ Understand ultra structure of prokaryote and Eukaryote cell, undertake microscopic study to gain knowledge ➢ learn to identify cell organelles ➢ Explain and demonstrate mitosis and meiosis division in onion root tip, Grass hopper testis, etc ➢ Gain knowledge of Microtomy		
6	**Credit Value**	**1 Credits**	***Credit =30 Hours Laboratory or Field learning/Training***	
7	**Total Marks**	**Max. Marks: 50**		**Min Passing Marks: 20**

PART -B: Content of the Course

Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)

Module	Topics (Course contents)	No. of Period
Lab./Field Training/ Experiment Contents of Course	1. Study of prokaryotic and eukaryotic cell types with the help of chart, slide and video. 2. Separation and isolation of cells by sedimentation velocity in unit gravity. 3. Disruption of cells, isolation and identification of subcellular components, isolation of nuclei. 4. Isolation of mitochondria by differential centrifugation and identification of succinic dehydrogenase in the mitochondrial pellet. 5. Chromosome segregation in mitosis and meiosis. 6. Preparation of chromosome squashes from Onion Root tip for observation of stages of Mitosis 7. Preparation of chromosome squashes from grasshopper/cockroach testes for the observation of stages of meiosis. 8. Isolation and estimation of DNA. 9. Study of types of tissue through permanent slides: epithelial, connective, muscular, Nervous etc. 10. Preparation of Practical Record 11. Group discussion/Viva or Seminar presentation on related topics mentioned in Theory paper	**30**
Keywords	*Prokaryote, Eukaryote, cell division, Mitosis, Meiosis, DNA Separation, Histology of Tissue, Microtomy.*	

Signature of Convener & Members (CBoS) :

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Debarati Das Essential Practical Handbook of Cell Biology & Genetics, Biometry & Microbiology, A Laboratory Manual, Academic Publishers.
2. Mohan P Arora Cytogenetics:, Himalayan Publishing House

Reference Books Recommended –

3. Karp, G. (2010) Cell and Molecular Biology: Concepts and Experiments (6th edition) John Wiley & Sons. Inc.

Online Resources– National Digital Library

- **http://ndl.iitkgp.ac.in/he_document/inflibnet_epgp/inflibnet_epgp/IN_I_e_P_P_1_Z_51296_P_1_P_o_e_51600_M_0_P_g_51604_51605?e=13|*|||**

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**50 Marks**
Continuous Internal Assessment (CIA):	**15 Marks**
End Semester Exam (ESE):	**35 Marks**

Continuous Internal Assessment (CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Laboratory / Field Skill Performance: On spot Assessment** **A. Performed the Task based on lab. work - 20 Marks** **B. Spotting based on tools & technology (written) – 10 Marks** **C. Viva-voce (based on principle/technology) - 05 Marks**	**Managed by Course teacher as per lab. status**

Name and Signature of Convener & Members of BoS :

हेमचंद यादव विश्वविद्यालय, दुर्ग (छ.ग.)

(पूर्व नाम- दुर्ग विश्वविद्यालय, दुर्ग)
रायपुर नाका, दुर्ग (छ.ग.)-491001
ई मेल : academic@durguniversity.ac.inवेब साइट : www.durguniversity.ac.in दूरभाष : 0788-2359400

क्र. 1626 /अका./2024 दुर्ग, दिनांक : 01/07/2024

प्राचार्य,
समस्त संबद्ध महाविद्यालय,
हेमचंद यादव विश्वविद्यालय,
दुर्ग (छ.ग.)

विषयः– स्नातक स्तर के नवीन पाठ्यक्रम के भाग–दो को सत्र 2024–25 से विश्वविद्यालय में लागू करने विषयक।
संदर्भः– अपर संचालक, उच्च शिक्षा संचालनालय, नवा रायपुर, अटल नगर का पत्र क्र. 3985/237/आउशि/2023, दिनांक 13.06.2023।

——00——

विषयांतर्गत लेख है कि संदर्भित पत्र के माध्यम से प्राप्त स्नातक स्तर भाग–दो के निम्नलिखित कक्षा/विषयों के परिवर्तित/संशोधित पाठ्यक्रम शिक्षा सत्र 2024–25 से लागू किये जाते हैंः–

1.	बी.ए.	–	आधार पाठ्यक्रम–हिन्दी भाषा, अंग्रेजी भाषा, हिन्दी साहित्य, अंग्रेजी साहित्य, राजनीतिशास्त्र, अर्थशास्त्र, नृत्य, दर्शनशास्त्र, समाजशास्त्र, इतिहास, संस्कृत, मानवविज्ञान, भूगोल, मनोविज्ञान, कम्प्यूटर।
2.	बी.एस–सी.	–	आधार पाठ्यक्रम–हिन्दी भाषा, अंग्रेजी भाषा, जीव विज्ञान, मानवविज्ञान, गणित, बायोटेक्नोलॉजी, कम्प्यूटर साईंस, भौतिकी, प्राणीशास्त्र, भूविज्ञान, आई.टी., सूक्ष्मजीवविज्ञान, वनस्पतिशास्त्र, इलेक्ट्रॉनिक्स, रसायन शास्त्र, भूगोल।
3.	बी.एस–सी. (गृह विज्ञान)	–	आधार पाठ्यक्रम – हिन्दी भाषा, अंग्रेजी भाषा एवं गृह विज्ञान।
4.	बी.कॉम.	–	आधार पाठ्यक्रम – हिन्दी भाषा, अंग्रेजी भाषा एवं वाणिज्य।
5.	विधि	–	एल.एल.बी., बी.ए.एल.एल.बी
6.	प्रबंध	–	बी.बी.ए.
7.	कम्प्यूटर	–	बी.सी.ए.
8.	शिक्षा	–	बी.एड.
9.	लाईब्रेरी साईंस	–	बी.लिब.

उपरोक्त विषयों को शिक्षा सत्र 2024–25 से संशोधित रूप में स्नातक स्तर भाग–दो के लिए लागू किया जाता है स्नातक स्तर भाग तीन के पाठ्यक्रम यथावत रहेंगे।

अतः आपसे अनुरोध है कि पाठ्यक्रम परिवर्तन/संशोधन से महाविद्यालय के शिक्षकों एवं छात्र–छात्राओं को अवगत कराने का कष्ट करेंगे।

टीप :– परिवर्तित/संशोधित पाठ्यक्रम विश्वविद्यालय की वेबसाईट पर उपलब्ध है।

संलग्न : उपरोक्तानुसार।

कुलसचिव

क्र. 1627 /अका./2024 दुर्ग, दिनांक 01/07/2024

प्रतिलिपिः–

1. अपर संचालक, उच्च शिक्षा संचालनालय, नवा रायपुर, अटल नगर का पत्र क्र. 3985/237/आउशि/2023, दिनांक 13.06.2023 के परिपेक्ष्य में सूचनार्थ।
2. कुलपति के निज सहायक एवं कुलसचिव के निज सहायक, हेमचंद यादव विश्वविद्यालय, दुर्ग।
3. उपकुलसचिव, परीक्षा विभाग एवं उपकुलसचिव, गोपनीय विभाग हेमचंद यादव विश्वविद्यालय, दुर्ग।

सहा. कुलसचिव (अका.)

REVISED ORDINANCE NO. 21

BACHELOR OF SCIENCE

1. The three year course has been broken up into three Parts. Part-I known as B.Sc. Part-I examination at the end of the first year, Part-II known as B.Sc. Part-Ii examination at the end of the second year and Part-III known as B.Sc. Part-III examination at the end of the thirdyear.

2. A candidate who after passing (10+2) Higher Secondary or Intermediate examination of C.G. Board of Secondary Education Bhopal or any other Examination recognised by the University or C.G. Board of Secondary Education as equivalent thereto, has attended a regular course of study in an affiliated College or in the Teaching Department of the University for one academic year shall be eligible for appearing at the B.Sc. Part-Iexamination.

3. A candidate who, after passing the B.Sc.-I examination of the University or any other examination recognised by the University as equivalent thereto, has attended a regular course of study for one academic year in an affiliated college or in the Teaching Department of the University shall be eligible for appearing at the B.Sc. Part-IIexamination.

4. A candidate who, after passing the B.Sc. Part-Ii examination of the University, has completed a regular course of study for one academic year in an affiliated college or in the Teaching Department of the University shall be eligible for appearing at the B.Sc. Part-IIIexamination.

5. Besides regular students, subject to their compliance with this Ordinance ex-student and non-collegiate candidates shall be permitted to offer only such subjects/papers as are taught to the regular student at any of the University Teaching Department orCollege.

6. Every candidate appearing in B.Sc. Part-I, Part-II and Part-III examination shall be examined in-

   (i) Foundation Course:

   (ii) Any one of the following combinations of three subjects:-

      1. Physics, Chemistry &Mathematics.
      2. Chemistry, Botany &Zoology.
      3. Chemistry, Physics &Geology.
      4. Chemistry, Botany &Geology.
      5. Chemistry, Zoology &Geology.
      6. Geology, Physics &Mathematics.
      7. Chemistry, Mathematics &Geology.
      8. Chemistry, Botany & DefenceStudies.
      9. Chemistry, Zoology & DefenceStudies
      10. Physics, Mathematics & DefenceStudies.
      11. Chemistry, Geology & DefenceStudies

12. Physics, Mathematics &Statistics
13. Physics, Chemistry &Statistics
14. Chemistry, Mathematics &Statistics.
15. Chemistry, Zoology &Anthropology.
16. Chemistry, Botany &Anthropology.
17. Chemistry, Geology &Anthropology.
18. Chemistry, Mathematics &Statistics.
19. Chemistry, Anthropology & DefenceStudies.
20. Geology, Mathematics &Statistics.
21. Mathematics, Defence Studies &Statistics
22. Anthropology, Mathematics &Statistics
23. Chemistry, Anthropology & AppliedStatistics
24. Zoology, Botany &Anthropology
25. Physics, Mathematics &Electronics.
26. Physics, Mathematics & ComputerApplication
27. Chemistry, Mathematics & ComputerApplication
28. Chemistry, Bio-Chemistry &Pharmacy
29. Chemistry, Zoology &Fisheries.
30. Chemistry, Zoology &Agriculture
31. Chemistry, Zoology &Sericulture
32. Chemistry, Botany & EnvironmentalBiology
33. Chemistry, Botany &Microbiology
34. Chemistry, Zoology &Microbiology
35. Chemistry, Industrial Chemistry &Mathematics
36. Chemistry, Industrial Chemistry &Zoology
37. Chemistry, Biochemistry,Botany
38. Chemistry, Biochemistry,Zoology
39. Chemistry, Biochemistry,Microbiology
40. Chemistry, Biotechnology,Botany
41. Chemistry, Biotechnology,Zoology
42. Geology, Chemistry &Geography
43. Geology, Mathematics &Geography
44. Mathematics, Physics &Geography
45. Chemistry, Botany &Geography

(iii) Practical in case prescribed for coresubjects.

7. Any candidate who has passed the B.Sc. examination of the University shall be allowed to present himself for examination in any of the additional subjects prescribed for the B.Sc. examination and not taken by him at the degree examination. Such candidate will have to first appear and pass the B.Sc. Part-I examination in the subjects which he proposes to offer and then the B.Sc. Part-II and Part-III examination in the same subject. Successful candidates will be given a certificate to thateffect.

8. In order to pass at any part of the three year degree course examination an examinee must obtain not less than 33% of the total marks in each subject/ group of subjects. In subject/ group of subjects where both theory and practical examination are provided an examinee must pass in both theory and practical parts of the examinationseparately.

9. Candidate will have to pass separately at the Part-I, Part-II and Part-III examinations. No division shall be assigned on the result of the Part-I and Part-II examination. In determining the division of the final examination, total marks obtained by the examinees in their Part-I, Part-II and Part-III examination in the aggregate shall be taken in to account. Provided in case of candidate who has passed the examination through supplementary examination having failed in one subject/ group only, the total aggregate marks being carried over for determining the division shall include actual marks obtained in the subject/ group in which he appeared at the supplementaryexamination.

10. Successful examinee at the Part-III examination obtaining 60% or more marks shall be places in the First Division, those obtaining less than 60% but not less than 45% marks in the Second Division and other successful examinees in the ThirdDivision.

= = =

SCHEME OF EXAMINATION

	Subject	Paper	Max. Marks	Total Marks	Min. Marks
C	Environmental Studies		75	100	33
	Fild Work		25		
Foundation Course					
	Hindi Language		75	75	26
	English Language		75	75	26

नोटः– प्रत्येक में से 02 (दो) प्रश्न करने होगें । सभी प्रश्न समान अंक के होगें।

Three Elective Subject :

1.	Physics	I	50	100	33
		II	50		
		Practical		50	17
2.	Chemistry	I	33		
		II	33	100	33
		III	34		
		Practical		50	17
3.	Mathematics	I	50		
		II	50	150	50
		III	50		
4.	Botany	I	50	100	33
		II	50		
		Practical		50	17
5.	Zoology	I	50	100	33
		II	50		
		Practical		50	17
6.	Geology	I	50	100	33
		II	50		
		Practical	50		17
7.	Statistics	I	50	100	33
		II	50		
		Practical		50	17
8.	Anthropology	I	50	100	50
		II	50		
		Practical		50	17

Subject	Paper	Max. Marks	Total Marks	Min. Marks
CompulsorySubject–FoundationCourse:				
9. DefenseStudies	I	50	100	33
	II	50		
	Practical		50	17
10. MicroBiology	I	50	100	33
	II	50		
	Practical		50	17
11. ComputerSciences	I	50	100	33
	II	50		
	Practical		50	17
12. Information Technology	I	50	100	33
	II	50		
	Practical		50	17
13.IndustrialChemistry	I	34		
	II	33	100	33
	III	33		
	Practical		50	17
14. BioChemistry	I	50		
	II	50	100	33
15.BioTechnology	Practical	50	50	17
	I			
	II	50	100	33
	Practical		50	17

USE OF CALCULATORS

The Students of Degree/P.G. Classes will be permitted to use of Calculators in the examination hall from annual 1986 examnination on the following conditions as per decision of the standing committee of the Academic Council at its meeting held on 31-1-1986.

1. Student will bring their own Calculators.
2. Calculators will not be provided either by the University or examination centres.
3. Calculators with, memoty and following variables be permitted +, -, x, ¸ square, reciprocal, expotentials log, square root, trignometric functions, wize, sine, cosine, tangent etc. factiorial summation, xy, yx and in the light of objective approval of merits and demerits of the viva only will be allowed.

- - - - -

	1. Detection of elements (X, N, S). 2. Qualitative analysis of unknown organic compounds containing simple functional groups (alcohols, carboxylic acids, phenols, nitro, amine, amide, and carbonyl compounds, carbohydrates) Preparation of Organic Compounds: (i) m-dinitrobenzene, (ii) Acetanilide, (iii) Bromo/Nitro-acetanilide, (iv) Oxidation of primary alcohols-Benzoic acid from benzylacohol, (v) azo dye.	
	Physical chemistry **Transition Temperature** Determination of the transition temperature of the given substance by thermometric/ dialometric method (e.g. $MnCl_2.4H_2O/SrBr_2.2H_2O$). **Thermochemistry** 1. Determination of heat capacity of a calorimeter for different volumes using change of enthalpy data of a known system (method of back calculation of heat capacity of calorimeter from known enthalpy of solution or enthalpy of neutralization). 2. Determination of heat capacity of the calorimeter and enthalpy of neutralization of hydrochloric acid with sodium hydroxide. 3. To determine the solubility of benzoic acid at different temperature and to determine ΔH of the dissolution process. 4. To determine the enthalpy of neutralization of a weak acid/ weak base versus strong base/ strong acid and determine the enthalpy of ionization of the weak acid/ weak base. 5. To determine the enthalpy of solution of solid calcium chloride and calculate the lattice energy of calcium chloride from its enthalpy data using Born Haber cycle. **Phase Equilibrium** 6. To study the effect of a solute (e.g. NaCl, Succinic acid) on the critical solution temperature of two partially miscible liquids (e.g. phenol-water system) and to determine the concentration of that solute in the given phenol-water system. 7. To construct the phase diagram of two component system (e.g. diphenylamine– benzophenone) by cooling curve method. 8. Distribution of acetic/ benzoic acid between water and cyclohexane. 9. Study the equilibrium of at least one of the following reactions by the distribution method: (i) $I_2(aq) + I^- \rightarrow I_3\ (aq)^{2+}$ (ii) $Cu^{2+}(aq) + nNH_3 \rightarrow Cu(NH_3)n$ **Molecular Weight Determination** 10. Determination of molecular weight by Rast Camphor and Landsburger method.	**10**
Keywords: Qualitative semimicro analysis. Paper chromatographic Water Analysis. Transition Temperature Thermochemistry Molecular Weight.		

Part C: Learning Resource

Suggested Readings :

1. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson, 2009.
2. Ahluwalia, V. K., Dhingra, S. and Gulati, A. College practical Chemistry, University Press.
3. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009).
4. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)
5. Khosla, B. D.; Garg, V. C. & Gulati, A. Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011).

6. Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. Experiments in Physical Chemistry 8th Ed.; McGraw-Hill: New York (2003).
7. Halpern, A. M. & McBane, G. C. Experimental Physical Chemistry 3rd Ed.; W.H. Freeman & Co.: New York (2003).
8. Sidhwani, I.T., Saini, G., Chowdhury, S., Garg, D., Malovika, Garg, N. Wealth from waste: 8.A green method to produce biodiesel from waste cooking oil and generation of useful products from waste further generated "A Social Awareness Project", Delhi University Journal of Undergraduate Research and Innovation.
9. Carpenter, William Lant; Leask, Henry (1895). A treatise on the manufacture of soap and candles, lubricants and glycerin. Free ebook at Google Books.

E- Learning Resources:

1. http://heecontent.upsdc.gov.in/Home.aspx
2. https://nptel.ac.in/courses/104/106/104106096/
3. http://heecontent.upsdc.gov.in/Home.aspx
4. https://nptel.ac.in/courses/104/106/104106096/
5. https://www2.chemistry.msu.edu/faculty/reusch/VirtTxtJml/intro1.htm
6. https://nptel.ac.in/courses/104/103/104103071/#

Fundamental Chemistry related topics on SWAYAM platform and E-pathshala

Part D: Assessment and Evaluation

Maximum Marks: 50

PRACTICAL EXAMINATION **B. Sc. – II**	**05 Hrs.** **M.M. 50**
Three Experiments are to be performed. **1.** Inorganic – Qualitative semimicro analysis of mixtures (5 radicals) including interfering/insoluble radicals. **OR** One experiment from synthesis and analysis by preparing the standard solution. **OR** • Determine chemical oxygen demand (COD) of given Water sample . • Determine Dissolved oxygen (DO) of given Water Sample.	12 marks
2. Organic (a) Identification of the given organic compound & determine its M.Pt./B.Pt.	6 marks
(b) Determination of Rf value and identification of metal ions/organic compounds by paper chromatography.	6 marks
3. Any one physical experiment that can be completed in two hours including calculations.	12 marks
4. Viva	10 marks
5. Sessional	04 marks
In case of Ex-Students one marks will be added to each of the experiment.	

DECLARATION

This is to certify that the syllabus is framed by the Central Board of Studies (Chemistry) as per the guidelines (TOR) of the Department of Higher Education, Raipur Chhattisgarh.

1. Dr. Alka Shrivastav, - Chairman
   Assistant Professor,
   Govt. E.V.P.G. College, Korba
2. Smt. Priyanka Tiwari, - Member

Assistant Professor,
Govt. J.P. Verma P.G. College, Bilaspur (C.G.)

3. Mr. Vijay Kumar Lahare, - Member
Assistant Professor,
Govt. Lahiri P.G. College Chirimiri(C.G.)

4. Dr. Rajmani Patel, - Member
Assistant Professor,
Hemchand Yadav University, Durg (C.G.)

5. Dr. A.K. Singh, - Member
Professor,
Govt. V.Y.T. P.G. College Durg (C.G.)

6. Dr. P.K. Singh, - Member
Assistant Professor,
Govt. T.C.L. P.G. College Janjgir(C.G.)

7. Dr. P.K. Agnihotri, - Member
Professor,
Govt. Yuganandam Chhattisgarh College Raipur(C.G.)

8. Dr. B.D. Diwan, - Member
Professor,
Govt. M.M.R. P.G. College Champa(C.G.)

9. Dr. Sandhya Patre, - Member
Assistant Professor,
Sant Shiromani Guru Ravidas Govt. College Sargaon,
Mungeli(C.G.)

10. Mrs. Mousami Lahare, - Member
Assistant Professor,
Govt. G.N.A. P.G. College Bhatapara, (C.G.)

11. Dr. Alka Shukla, - Member
Assistant Professor,
Mohan Lal Jain(Mohan Bhaiya) Govt. College Khursipar,
Bhilai(C.G.)

12. Dr. Arti Gupta, - Member
Professor, Govt. Dr. W.W.P. Girl's P.G. College Durg (C.G.)

13. Dr. Deepti Tikariha, - Member
Assistant Professor, APSGMNS Govt. P.G. College
Kawardha(C.G.)

14. Dr. Seema Negi, - Member
Assistant Professor, Govt. J.M.P. College, Takhatpur (C.G.)

15. Dr. Vikesh Kumar Jha, - Member
Assistant Professor, Govt. R.R.M. P.G. College Surajpur
(C.G.)

16. Dr. Ashish Tiwari, - Member
Assistant Professor,
Dr. Bhimrao Ambedkar Govt. College Pamgarh(C.G.)

17. Mr. Laxmi Chand Manwani, - Member
Assistant Professor,
Government Vivekand PG College Manendragarh(C.G.)

18. Dr. K. Indira - Member
Professor,
Government K. PG College Jagadalpur (C.G.)

Part A: Introduction				
Program: **Diploma Course**		Class: **B.Sc. II Year**	Year: **2023**	Session:**2023-24**
1.	Course Code	CHEM-2P		
2.	Course Title	Lab. 2 : General Chemistry-2		
3.	Course Type	Practical		
4.	Pre-requisite (if any)	To Study this course our students must have had the subject chemistry in class B.Sc. I Year/ Certificate Course or equivalent.		
5.	Course Learning. Outcomes (CLO)	By the end of this course students will learn the following aspects of Laboratory exercises in Chemistry : • To analyze the given mixture for anions (acid radicals) and cations (basic radicals). • Titrations • Qualitative Analysis • Transition Temperature. • Thermochemistry. • Water Analysis. • Phase Equilibrium		
6.	Credit Value	Practical: **2**		
7.	Total Marks	**Max. Marks: 50**	**Min Passing Marks: 17**	

Part B: Content of the Course		
Total No. of Lecturers: **30**		
	LABORATORY COURSE	**No. of Lectures**
Tentative list of practical	**Inorganic chemistry :** Qualitative semimicro analysis of mixtures containing 5 radicals. Emphasis should be given to the understanding of the chemistry of different reactions. The following radicals are suggested: CO_3^{2-}, NO^{2-}, S^{2-}, SO_3^{2-}, $S_2O_3^{2-}$, CH_3COO^-, F^-, Cl^-, Br^-, I^-, NO_3^-, BO_3^{3-}, $C_2O_4^{2-}$, PO_4^{3-}, NH_4^+, K^+, Pb^{2+}, Cu^{2+}, Cd^{2+}, Bi^{3+}, Sn^{2+}, Sb^{3+}, Fe^{3+}, Al^{3+}, Cr^{3+}, Zn^{2+}, Mn^{2+}, Co^{2+}, Ni^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, Mg^{2+}. Mixtures should preferably contain one interfering anion, or insoluble component ($BaSO_4$, $SrSO_4$, $PbSO_4$, CaF_2 or Al_2O_3) or combination of anions e.g. CO_3^{2-} and SO_3^{2-}, NO_2^- and NO_3^-, Cl^-, Br^-, and I^-.	**10**
	Volumetric analysis 1. Determination of acetic acid in commercial vinegar using NaOH. 2. Determination of alkali content-antacid tablet using HCl. 3. Estimation of calcium content in chalk as calcium oxalate by permanganometry. 4. Estimation of hardness of water by EDTA. 5. Estimation of ferrous & ferric by dichromate method. 6. Estimation of copper using thiosulphate. **Chromatographic separations** Paper chromatographic separation of following metal ions: a) Ni (II) and Co (II) b) Fe (III) and Al (III) Paper chromatographic separation of mixture of dyes **Water Analysis** 1. Determine chemical oxygen demand (COD) of given Water sample. 2. Determine Dissolved oxygen (DO) of given Water Sample. **Organic chemistry**	**10**

Part A: Introduction				
Program: **Diploma Course**		Class: **B.Sc. II Year**	Year: **2023**	Session:**2023-24**
1.	Course Code	CHEM-3T		
2.	Course Title	Inorganic and Physical Chemistry		
3.	Course Type	Theory		
4.	Pre-requisite (if any)	To Study this course our students must have had the subject chemistry in class B.Sc. I Year/ Certificate Course or equivalent		
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to learn the following aspects of Chemistry • Understand the general characteristics of transition elements. • Explain the chemistry of Coordination Compounds. • Analyze water and coal. • Basic concepts of thermodynamics. • Basic concepts of Chemical and Ionic Equilibrium		
6.	Credit Value	Theory: **4**		
7.	Total Marks	**Max. Marks: 50**	**Min. Passing Marks: 17**	

Part B: Content of the Course		
Total No. of Lecturers: **90**		
Unit	**Topics**	**No. of Lectures**
I	**Chemistry of transition series elements:** Transition elements- Position in periodic table, electronic configuration, General characteristics, *viz.*, atomic and ionic radii, variable oxidation states, ability to form complexes, formation of colored ions, magnetic moment μ_{so} (spin only) and μ_{eff} and catalytic behaviour. General comparative treatment of 4*d* and 5*d* elements with their 3*d* analogues with respect to ionic radii, oxidation states and magnetic properties. **Chemistry of lanthanides and actinides:** Electronic structure, oxidation states and ionic radii and lanthanide and actinide contraction, complex formation. Chemistry of separation of Np, Pu, and Am from Uranium. Later actinides and later lanthanides.	**15**
II	**Concepts of acids and bases**: Arrhenius theory, Bronsted–Lowry concepts, conjugate acids and bases, relative strength of acids and bases, Lewis concepts of acids and bases, **Hard and soft acids and bases (HSAB):** Classification of acids and bases as hard and soft. Pearson's HSAB concept, acid-base strength, hardness and softness. Symbiosis, Applications of HSAB principle. **Non- aqueous solvents:** Physical properties of a solvent, types of solvents and their general characteristics, reaction in non-aqueous solvents with reference to liquid ammonia, liquid sulphur dioxide, sulphuric acid, liquid HF, ionic liquids.	**15**
III	**Coordination chemistry:** Werner's theory and its experimental verification, IUPAC nomenclature of coordination compounds, Chelates, polynuclear complexes, Isomerism in coordination compound, stereochemistry of complexes 4 & 6 coordination compounds.	**15**

	Valence bond theory (inner and outer orbital complexes) : Limitations of valence bond theory, electroneutrality principle and back bonding. Crystal field theory, Crystal field splitting and stabilization energy, measurement of 10 Dq (Δ_o), CFSE in weak and strong fields, pairing energies, factors affecting the magnitude of 10 Dq (Δ_o, Δ_t). Octahedral vs. tetrahedral coordination.	
IV	**Chemistry of water analysis:** Water quality parameters and its determination – Acidity and alkalinity of water, Total dissolved solid (TDS), Hardness of water, Chloride, Phosphate, Fluoride, Dissolved Oxygen, Chemical oxygen demand, Biological oxygen demand. **Coal analysis:** Classification of coal, Proximate and Ultimate analysis of coal, Carbonization of coal, Coal gas-composition and uses.	**15**
V	**Thermodynamics:** Basics of Thermodynamics, brief review of zeroth and first law of thermodynamics. Concept of heat capacity, Relation between heat capacities, Joule-Thomson expansion, inversion temperature of gases, Joule Thomson coefficient of ideal and real gases. **Second law of thermodynamics:** Spontaneous process, second law, Statement of Carnot cycle and efficiency of heat engine, Carnot's theorem, thermodynamic state of temperature. Concept of entropy: Entropy change in a reversible and irreversible process, entropy change in isothermal reversible expansion of an ideal gas, entropy change in isothermal mixing of ideal gases, physical significance of entropy, Molecular and statistical interpretation of entropy, Gibbs and Helmholtz free energy, variation of G and A with pressure, volume, temperature, Gibbs-Helmholtz equation, Maxwell relations, Nernst heat theorem, Elementary idea of Third law of Thermodynamics, concept of residual entropy, calculation of absolute entropy of molecule.	**15**
VI	**Chemical equilibrium:** Criteria of thermodynamic equilibrium, degree of advancement of reaction, chemical equilibria in ideal gases. Concept of Fugacity, Thermodynamic derivation of relation between Gibbs free energy of reaction and reaction quotient. Concept of activity, activity coefficient and ionic strength, Equilibrium constants and their quantitative dependence on temperature, pressure and concentration. Thermodynamic derivation of relations between the various equilibrium constants K_p and K_c. Le-Chatelier's principle (quantitative treatment). Equilibrium between ideal gas and a pure condensed phase. **Ionic equilibrium:** Ionization of weak acids and bases, pH scale, common ion effect; dissociation constants of mono protonic acids (exact treatment). Salt hydrolysis- calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions; derivation of Henderson equation and its applications. Solubility, solubility product of sparingly soluble salts and its applications.	**15**
Keywords: Transition Elements, Lanthanides and Actinides, Coordination Compounds, Redox potential, Water Analysis, Coal Analysis, Non-aqueous solvents, Carnot's theorem, Fugacity, Salt hydrolysis .		

Part C : Learning Resources
Text Books, Reference Books, Other Resources
Suggested Readings : 1. Basic Inorganic Chemistry, Cotton F.A, G. Wilkinson and P. L. Gaus, Wiley, 2. Concise Inorganic Chemistry, J. D. Lee, ELBS, 3. Concepts of Models of Inorganic Chemistry, B. Douglas, D. Mc Daniel and J. Alexander,John Wiley. 4. Inorganic Chemistry, D. E. Shriver, P. W. Atkins and C. H. Langford, Oxford.

5. Inorganic Chemistry, W. W. Porterfield, Addison – Wiley.
6. Inorganic Chemistry, A. G. Sharp, ELBS.
7. Inorganic Chemistry, G. L. Miessler and D. A. Tarr, Prentice Hall.
8. Advanced Inorganic Chemistry, Satya Prakash.
9. Advanced Inorganic Chemistry, Agrawal and Agrawal
10. Advanced Inorganic Chemistry, B.R. Puri, L. R. Sharma, S. Chand Publication
11. Inorganic Chemistry, R. D. Madan, S. Chand Publication.
12. Aadhunik Akarbanic Rasayan, A. K. Shrivastav & P. C. Jain, Goel Pub
13. Uchchattar Akarbanic Rasayan, Satya Prakash & G. D. Tuli, Shyamal Prakashan
14. Uchchattar Akarbanic Rasayan, B. R. Puri & L. R. Sharma
15. Selected topic in Inorganic Chemistry by R. D. Madan, M. Malik & G. R. Tuli, S. Chand Publication.
16. Environmental Chemistry, A. K. De, New Age International Publishers
17. Physical Chemistry, G.M. Barrow, International Student Edition, McGraw Hill.
18. University General Chemistry, C.N.R. Rao, Macmillan.
19. Physical Chemistry, R.A. Alberty, Willey Eastern.
20. The Elements of Physical Chemistry, Willey Eastern.
21. Physical Chemistry through problems, S.K. Dogra, Willey Eastern.
22. Physical Chemistry, B.D. Khosla.
23. Physical Chemistry, B.R. Puri and L. R. Sharma.
24. Physical Chemistry, R.L. Kapoor, Vol. I-IV.

E- Learning Resources:

1. http://heecontent.upsdc.gov.in/Home.aspx
2. https://nptel.ac.in/courses/104/106/104106096/
3. http://heecontent.upsdc.gov.in/Home.aspx
4. https://nptel.ac.in/courses/104/106/104106096/
5. https://www2.chemistry.msu.edu/faculty/reusch/VirtTxtJml/intro1.htm
6. https://nptel.ac.in/courses/104/103/104103071/#

Fundamental Chemistry related topics on SWAYAM platform and E-pathshala

Part D: Assessment and Evaluation

Maximum Marks: 50

DECLARATION

This is to certify that the syllabus is framed by the Central Board of Studies (Chemistry) as per the guidelines (TOR) of the Department of Higher Education, Raipur Chhattisgarh.

1. Dr. Alka Shrivastav, - Chairman
   Assistant Professor,
   Govt. E.V.P.G. College, Korba
2. Smt. Priyanka Tiwari, - Member
   Assistant Professor,
   Govt. J.P. Verma P.G. College, Bilaspur (C.G.)
3. Mr. Vijay Kumar Lahare, - Member
   Assistant Professor,
   Govt. Lahiri P.G. College Chirimiri(C.G.)
4. Dr. Rajmani Patel, - Member
   Assistant Professor,
   Hemchand Yadav University, Durg (C.G.)
5. Dr. A.K. Singh, - Member
   Professor,
   Govt. V.Y.T. P.G. College Durg (C.G.)

6. Dr. P.K. Singh, - Member
Assistant Professor,
Govt. T.C.L. P.G. College Janjgir(C.G.)
7. Dr. P.K. Agnihotri, - Member
Professor,
Govt. Yuganandam Chhattisgarh College Raipur(C.G.)
8. Dr. B.D. Diwan, - Member
Professor,
Govt. M.M.R. P.G. College Champa(C.G.)
9. Dr. Sandhya Patre, - Member
Assistant Professor,
Sant Shiromani Guru Ravidas Govt. College Sargaon,
Mungeli(C.G.)
10. Mrs. Mousami Lahare, - Member
Assistant Professor,
Govt. G.N.A. P.G. College Bhatapara, (C.G.)
11. Dr. Alka Shukla, - Member
Assistant Professor,
Mohan Lal Jain(Mohan Bhaiya) Govt. College Khursipar,
Bhilai(C.G.)
12. Dr. Arti Gupta, - Member
Professor, Govt. Dr. W.W.P. Girl's P.G. College Durg (C.G.)
13. Dr. Deepti Tikariha, - Member
Assistant Professor, APSGMNS Govt. P.G. College
Kawardha(C.G.)
14. Dr. Seema Negi, - Member
Assistant Professor, Govt. J.M.P. College, Takhatpur (C.G.)
15. Dr. Vikesh Kumar Jha, - Member
Assistant Professor, Govt. R.R.M. P.G. College Surajpur
(C.G.)
16. Dr. Ashish Tiwari, - Member
Assistant Professor,
Dr. Bhimrao Ambedkar Govt. College Pamgarh(C.G.)
17. Mr. Laxmi Chand Manwani, - Member
Assistant Professor,
Government Vivekand PG College Manendragarh(C.G.)
18. Dr. K. Indira - Member
Professor,
Government K. PG College Jagadalpur (C.G.)

Part A: Introduction				
Program: **Diploma Course**		Class: **B.Sc. II Year**	Year: **2023**	Session:**2023-24**
1.	Course Code	CHEM-4T		
2.	Course Title	Organic and Physical Chemistry		
3.	Course Type	Theory		
4.	Pre-requisite (if any)	To Study this course our students must have had the subject chemistry in class B.Sc. I Year/ Certificate Course or equivalent		
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to learn the following aspects of Chemistry: • Reactions of the alcohols and phenols. • Reactivity of carbonyl compounds • Carboxylic acid and its derivatives • Organic compounds containing nitrogen • Phase Equilibrium • Electrochemistry		
6.	Credit Value	Theory: **4**		
7.	Total Marks	**Max. Marks: 50**	**Min. Passing Marks: 17**	

Part B: Content of the Course		
Total No. of Lecturers: **90**		
Unit	**Topics**	**No. of Lectures**
I	**Chemistry of organic halides: Alkyl halides**: Methods of preparation, nucleophilic substitution reactions – S_N1, S_N2 and S_Ni mechanisms with stereochemical aspects and effect of solvent etc.; nucleophilic substitution, elimination reactions. **Aryl halides:** Preparation, including preparation from diazonium salts, Nucleophilic Aromatic Substitution; S_NAr, Benzyne mechanism. Relative reactivity of alkyl, allyl/benzyl, vinyl and aryl halides towards nucleophilic substitution reactions. **Alcohols:** Dihydric alcohols – methods of formation, chemical reactions of vicinal glycols, oxidative cleavage [$Pb(OAc)_4$ and HIO_4] and pinacol-pinacolone rearrangement. Trihydric alcohols - Nomenclature, methods of formation, chemical reactions of glycerol. **Phenols:** Structure and bonding in phenols, physical properties and acidic character, Comparative acidic strength of alcohols and phenols, acylation and carboxylation. Mechanism of Claisen rearrangement, Gatterman synthesis and Reimer-Tiemann reaction.	**15**
II	**Aldehydes and ketones :** Nomenclature, structure and reactivity of carbonyl group. General methods of preparation of aldehydes and ketones. Mechanism of nucleophilic addition to carbonyl groups: Benzoin and Aldol condensation. Wittig reaction, Mannich reaction and Benzil- Benzilic rearrangement. Use of acetal as protecting group, Oxidation of aldehydes, Baeyer-Villiger oxidation of Ketones, Clemmensen reduction, Wolf-Kishner reaction, $LiAlH_4$ and $NaBH_4$ reduction. Halogenation of enolizable	**15**

	ketones, An introduction to α, β-unsaturated aldehydes and Ketones. (Michael Addition reaction)	
III	**Carboxylic acids :** Preparation, Structure and bonding, Physical and chemical properties including, acidity of carboxylic acids, effects of substituents on acid strength, Reduction of carboxylic groups, Mechanism of decarboxylation. **Dicarboxylic acids:** Methods of formation and effect of heat and dehydrating agents, Hydroxyacids. **Carboxylic acid derivatives :** Structure of acid chlorides, esters, amides and acid anhydrides, Relative stability of acyl derivatives. Physical properties, inter-conversion of acid derivatives by nucleophilic acyl substitution. Reaction with Grignard reagents, Organo-copper and Organo-lithium compound.	15
IV	**Organic compounds of nitrogen :** Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes. Mechanism of nucleophilic substitution in nitroarenes and their reduction in acidic, neutral and alkaline medium. Reactivity, structure and nomenclature of amines, physical properties. Separation of mixture of primary, secondary and tertiary amines. Structural features affecting basicity of amines. Preparation of alkyl and aryl amines (reduction of nitro compounds and nitriles), reductive amination of aldehydic and ketonic compounds. Gabriel-Phthalimide reaction, Hofmann- Bromamide reaction, Reactions of amines, electrophilic aromatic substitution of aryl amines, Reaction of amines with nitrous acid. Synthetic transformations of aryl diazonium salts, Azo coupling.	15
V	**Phase equilibrium :** Phase rule, phase, component and degree of freedom, derivation of Gibbs phase rule, Clausius-Clayperon equation and its applications to solid-liquid, liquid-vapor and solid-vapor, limitations of phase rule, applications of phase rule to one component system: water system and sulphur system. Application of phase rule to two component system: Pb-Ag system, desilverization of lead, eutectic point. Zn-Mg system, ferric chloride-water system, sodium chloride-water system, congruent and incongruent melting point and freezing mixture	15
VI	**Electrochemistry :** Ostwald dilution law and its limitations, Elementary ideas of Debye-Huckel-Onsager's theory for strong electrolytes, relaxation and electrophoretic effects. Migration of ions: Transport number, Determination by Hittorf method and moving boundary method. Electrochemical cell–reversible and irreversible cells, conventional representation of electrochemical cells, Types of electrodes-metal-metal ion, metal-salt ion, gas, amalgam, redox electrodes. Electrode potential, Standard Redox potential, electrochemical series and its applications, derivation of Nernst equation and expression of Nernst equation for different electrodes. Calculation of ΔG, and equilibrium constant. Conductometric, pH metric and potentiometric titration.	15
Keywords: Alkyl and aryl halides, Alcohols and Phenols, Carboxylic Acid and its derivatives, Carbonyl Compounds, Organic Compounds of Nitrogen, Phase Equilibrium, Phase Rule, Phase, Component and Degree of Freedom, Gibbs phase rule, Clausius-Clayperon Equation, One Component System, Two Component System, Electrochemistry, Ostwald dilution law, Debye-Huckel-Onsager's theory, Electrochemical Cells, Electrode Potential, Nernst Equation, Conductometric Titration, pH Metric Titration, Potentiometric Titration.		

Part C : Learning Resources
Text Books, Reference Books, Other Resources
Suggested Readings : 1. Organic Chemistry, Morrison R.N. and Boyd R.N., Dorling Kindersley (India) Pvt. Ltd.(Pearson Education).

Acad

2. Organic Chemistry, Finar I.L. Dorling Kindersley (India) Pvt. Ltd. (Pearson Education) Vol I.
3. Organic Chemistry, Paula Y. Bruice, 2nd Edition, Prentice-Hall, International Edition (1998).
4. Organic Chemistry, Mukherjee S.M., Singh S.P. and Kapoor R.P., Wiley Easters (New Age) Vol I, II, III.
8. Fundamentals of Organic Chemistry, Solomons T. W. G., John Wiley & Sons.
6. Organic Chemistry Carey, F.A, McGraw Hill.
7. A Guide Book of Reaction Mechanism by Peter Sykes.
9. Organic Chemistry, J. Clayden, N. Greeves, S. Warren
10. Modern Methods of Organic Synthesis, William Carruthers, Iain Coldham
11. Fundamental of Organic Chemistry, Jahn E. Mc Murry
12. Organic Chemistry Principal and Mechanism, Joel Karty
13. Reaction, rearrangements and reagents, S. N. Sanyal
14. Physical Chemistry, Puri and Sharma.
15. Bhautik Rasayan, Puri, Sharma and Pathaniya, Vishal Publishing Company.
16. P. Atkins & Julio De Paula, Physical Chemistry Oxford university Press
17. R. G. Mortimer , Physical Chemistry, 3rd ed. Elsevier
18. G. W. Castalen, Physical Chemistry, 4th Ed. Narosa.

Suggested online links:

1. https://www2.chemistry.msu.edu/faculty/reusch/virtTxtJml/intro1.htm
2. https://nptel.ac.in/courses/104/103/104103071/#

Fundamental Chemistry related topics on SWAYAM platform and E-pathshala

Part D: Assessment and Evaluation

Maximum Marks: 50

DECLARATION

This is to certify that the syllabus is framed by the Central Board of Studies (Chemistry) as per the guidelines (TOR) of the Department of Higher Education, Raipur Chhattisgarh.

1. Dr. Alka Shrivastav, Assistant Professor, Govt. E.V.P.G. College, Korba - Chairman
2. Smt. Priyanka Tiwari, Assistant Professor, Govt. J.P. Verma P.G. College, Bilaspur (C.G.) - Member
3. Mr. Vijay Kumar Lahare, Assistant Professor, Govt. Lahiri P.G. College Chirimiri(C.G.) - Member
4. Dr. Rajmani Patel, Assistant Professor, Hemchand Yadav University, Durg (C.G.) - Member
5. Dr. A.K. Singh, Professor, Govt. V.Y.T. P.G. College Durg (C.G.) - Member
6. Dr. P.K. Singh, Assistant Professor, Govt. T.C.L. P.G. College Janjgir(C.G.) - Member
7. Dr. P.K. Agnihotri, Professor, Govt. Yuganandam Chhattisgarh College Raipur(C.G.) - Member
8. Dr. B.D. Diwan, Professor, Govt. M.M.R. P.G. College Champa(C.G.) - Member

9. Dr. Sandhya Patre, - Member
Assistant Professor,
Sant Shiromani Guru Ravidas Govt. College Sargaon,
Mungeli(C.G.)

10. Mrs. Mousami Lahare, - Member
Assistant Professor,
Govt. G.N.A. P.G. College Bhatapara, (C.G.)

11. Dr. Alka Shukla, - Member
Assistant Professor,
Mohan Lal Jain(Mohan Bhaiya) Govt. College Khursipar,
Bhilai(C.G.)

12. Dr. Arti Gupta, - Member
Professor, Govt. Dr. W.W.P. Girl's P.G. College Durg (C.G.)

13. Dr. Deepti Tikariha, - Member
Assistant Professor, APSGMNS Govt. P.G. College
Kawardha(C.G.)

14. Dr. Seema Negi, - Member
Assistant Professor, Govt. J.M.P. College, Takhatpur (C.G.)

15. Dr. Vikesh Kumar Jha, - Member
Assistant Professor, Govt. R.R.M. P.G. College Surajpur
(C.G.)

16. Dr. Ashish Tiwari, - Member
Assistant Professor,
Dr. Bhimrao Ambedkar Govt. College Pamgarh(C.G.)

17. Mr. Laxmi Chand Manwani, - Member
Assistant Professor,
Government Vivekand PG College Manendragarh(C.G.)

18. Dr. K. Indira - Member
Professor,
Government K. PG College Jagadalpur (C.G.)

Part A: Introduction				
Program: **Diploma**		Class: **B.Sc.**	Year: **Second**	Session: **2022-2023**
1	Course Code	**PHY – 3T**		
2	Course Title	**THERMAL PHYSICS AND STATISTICAL MECHANICS**		
3	Course Type	**Theory**		
4	Pre-requisite (if any)	No		
5	Course Learning Outcomes (CLO)	**After completion of the course students will be able to :** • Understand the relations between heat, work, temperature, and energy. • Understand how the thermal energy in a system change and perform useful work on its surroundings. • Understand the interrelationship between thermodynamic functions and ability to use such relationships to solve practical problems. • Get the understanding about black body radiation. • Get the introductory knowledge of statistical mechanics • Solve numerical problems based on entire syllabus		
6	**Credit Value**	**4**		
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks: 17**	

Part B: Content of the Course		
Total number of Periods: 60		
Unit	Topic	Number of Periods
I	**Laws of Thermodynamics:** **Thermodynamic Description of system**: Zeroth Law of thermodynamics and temperature. First law and internal energy, conversion of heat into work, various Thermodynamical Processes, Work Done during Isothermal and Adiabatic Processes, Reversible & irreversible processes. Second law of thermodynamics & Entropy, Carnot's cycle, Carnot's theorem, Entropy changes in reversible & irreversible processes, Entropy-temperature diagrams, Third law of thermodynamics.	12
II	**Thermodynamic Potentials:** Internal Energy, Enthalpy, Helmholtz Free Energy and Gibbs function. Maxwell's relations & applications, Clausius- Clapeyron Equation, Expression for $(C_P - C_V)$, C_P/C_V, TdS equations, Thermodynamic energy equation- change in internal energy of an ideal and Vander Waal's gas, Joule-Thompson Effect, Cooling by adiabatic demagnetization	12
III	**Kinetic Theory of Gases:** Maxwellian distribution of speeds in an ideal gas: distribution of speeds and velocities, experimental verification, distinction between mean, rms and most probable speed values, Moleculer Collision and Mean Free Path ,Transport Phenomena in gases: Viscosity, Conduction and Diffusion, Law of equipartition of energy.	12
IV	**Theory of Radiation:** Blackbody radiation, Spectral distribution, Concept of Energy Density, Stefan Boltzmann Law, Newton's law of cooling from Stefan Boltzmann's law. Wien's displacement law and Rayleigh-Jeans Law (Only qualitative).Planck's radiation Law, Deduction of Wien's distribution law and Rayleigh- Jeans Law from Planck's law. Experimental verification	12

	of Planck's radiation law.	
V	**Statistical Mechanics:** Introductory Idea, Phase space, Macro-state and Microstate, Entropy andThermodynamic probability, fundamental postulates of statistical mechanics. Boltzmann's Canonical Distribution Law. Maxwell-Boltzmann distribution law, Quantum statistics - Fermi-Dirac distribution law and its application for Fermi Levels and Fermi Energy, Bose-Einstein distribution law and its application for Liquid Helium, comparison of three statistics.	12

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Reference Books:

1. Heat and Thermodynamics, M.W.Zemasky and R. Dittman, 1981, McGraw Hill
2. Heat and Thermodynamics, Enrico Fermi, 1956, Courier Dover Publications.
3. Heat and Thermodynamics: Singhal, Agrawal and Satya Prakash, Pragati Prakashan 1984
4. A Treatise on Heat, Meghnad Saha, and B.N. Srivastava, 1969, Indian Press.
5. Physics (Part-2): Editor, Prof. B.P.Chandra, M.P. Hindi Granth Academy
6. Thermodynamics, Kinetic theory & Statistical thermodynamics, F.W.Sears & G.L.Salinger. 1988, Narosa
7. Introduction to Statistical Mechanics: B.B.laud, New age International Publications Second Edition
8. Statistical Mechanics : R.K. Pathria and Paul D.Beale, ELSEVIER ,Fourth Edition,

Link for e-resources:

1. Basics of thermodynamics ***https://www.youtube.com/watch?v=9GMBpZZtjXM&list=PLD8E646BAB3366BC8***
2. Thermodynamics ***https://www.youtube.com/watch?v=E9cOAMhFUz0***
3. Second law of thermodynamics ***https://www.youtube.com/watch?v=F_flGosPY8o***
4. Introduction of statistical mechanics ***https://www.youtube.com/watch?v=N7ykXugu3D0&list=PLZbgNdSTyWDYtZXp9DN9mGP1sNAjPNGgO***
5. Basic of statistical mechnics ***https://www.youtube.com/watch?v=M4nvGS30b-s&list=PLuBpI7LKkMlGolbgdfvtzMTR2l4hdQv-r***
6. Classical Statistical Mechanics https://youtu.be/XIXQ38JnF0k
7. Bose-Einstein Statistics https://youtu.be/1aHFG7VLr-g

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50

Continuous Comprehensive Evaluation (CCE): As per University Guideline

University Exam (UE): 50 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	As per University Guideline

DECLARATION

This is to certify that the syllabus is framed by the Central Board of studies (Physics) as per the guidelines (TOR) of The Department of Higher Education, Raipur, Chhattisgarh

01/ Dr.S.K.Gupta, Govt. E.R.R. P.G Science College, Bilaspur - Chairman

02/ Dr. Jagjeet Kaur Saluja, Govt. V Y T P.G. College, Durg - Member

03/ Dr.Meera Gupta, Govt. Dr. W.W.Patankar Girls P.G. College, Durg, - Member

04/ Dr.S.J. Dhoble, R.T.M Nagpur University Nagpur - Member

05/ Dr.D.P.Bisen, Pt.R.S.U. Raipur - Member

06/ Dr.R.S. Kher, Principal, Govt.M.L.S. College Seepat - Member

07/ Dr. Anjali Oudhia, Govt. N.P.G. College of Science Raipur - Member 8/6/22

08/ Dr.Smriti Agrawal, Govt. College ,Vaishali nagar, bhilai - Member 8/6/22

09/ Dr.S.K.Shrivastava, Govt.P.G. College, Ambikapur - Member

10/ Dr.Kamal K.Prasad Govt.N.E.S.College, Jaspur - Member

11/ Dr. A.P.Goswami, Govt.Bilasa Girls P.G. College, Bilaspur - Member

12/ Dr. V.K. Dubey, Govt.N.P.G. Science College, Raipur - Member

13/ Dr. Anil Kumar Panigrahi, Kirodimal Govt. Arts/Science College, Raigarh - Member

14/ Dr. Ugendra Kumar Kurrey, Govt.C.L.C Arts & Science College, Patan, Durg, - Member

15/ Dr.Dipti Jha , Dr. Radhabai Govt. Navin Kanya Mahavidyalya, Raipur, - Member

16/ Dr.Shashi Kant Rathor,Dr. B.R. Ambedkar Govt.College,Baloda,Dist-Janjgir-Champa- Member

17/ Dr. Vikas Gulhare, Govt. G.N.A. P.G. College, Bhathapara - Member

Part A: Introduction				
Program: **Diploma**		Class: **B.Sc.**	Year: **Second**	Session: **2022-2023**
1	Course Code	**PHY – 4T**		
2	Course Title	**WAVE AND OPTICS**		
3	Course Type	**Theory**		
4	Pre-requisite (if any)	No		
5	Course Learning Outcomes (CLO)	On successful completion of this course students will: • Solve wave equation and understand significance of transverse waves • Acquire skills to identify and apply formulas of optics and wave physics • Understand the properties of light like interference, diffraction and polarization • Understand the applications of interference in design and working of interferometers. • Understand the resolving power of grating • Get knowledge about laser and its application. • Solve numerical problems based on entire syllabus		
6	**Credit Value**	**Theory: 4**		
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks: 17**	

Part B: Content of the Course		
Total number of Periods: 60		
Unit	Topics	Number of Periods
1	**Waves in Medium:** Speed of transverse waves on uniform string, speed of longitudinal waves in a fluid, energy density and energy transmission in waves. Group velocity and phase velocity and relationship between them. Reflection, refraction and diffraction of sound: Acoustic impedance of a medium, percentage reflection & refraction at a boundary, diffraction of sound, principle of a sonar system.	12
2	**Interference:** Interference: Division of amplitude and division of wavefront. Young's Double Slit experiment. Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: measurement of wavelength and refractive index. Michelson's Interferometer: Formation of fringes, Determination of wavelength, Wavelength difference.	12
3	**Diffraction:** Fresnel Diffraction: Half-period zones. Zone plate. Fresnel Diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis. Fraunhofer diffraction: Single slit, Double slit. Multiple slits &Plane	12

	Diffraction Grating, Resolving Power of Grating.	
4	**Polarization:** Polarized light and its mathematical representation, Electromagnetic theory of double refraction, Nicol Prism, Double image prism, Polaroid, Phase retardation plates, Circular and elliptical polarization. Polarization by double refraction and Huygens's theory, Rotation of plane of polarization, Biquartz polarimeter.	12
5	**LASER:** Basic properties of LASERs, coherence length and coherence time, spatial coherence of a source, Einstein's A and B coefficients, Spontaneous and induced emissions, conditions for laser action, population inversion. Types of Laser: Ruby, He-Ne Laser and Semiconductor Laser, Application of Laser in communication and Holography. .	12

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Reference Books:

1. Fundamentals of Optics, F A Jenkins and H E White, 1976, McGraw-Hill
2. Principles of Optics, B.K. Mathur, 1995, Gopal Printing
3. Fundamentals of Optics, H.R. Gulati and D.R. Khanna, 1991, S. Chand Publication
4. University Physics. FW Sears, MW Zemansky and HD Young 13/e, 1986. Addison-Wesley
5. Physical Optics , A.K. Ghatak
6. Berkely Physics Course: Vol.-III, 'Waves and Oscillations'

Link for e-resources:

1. Wave an introduction https://youtu.be/SuQE7eUEriU
2. Interference https://youtu.be/hvpYKPyT-vc
3. Diffraction https://youtu.be/3RZZQvEVrEA
4. Polarization https://youtu.be/nELYaf_N528
5. Laser and application https://youtu.be/EK4yFAGHSFc

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50

Continuous Comprehensive Evaluation (CCE): As per University Guideline

University Exam(UE): 50 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	As per University Guideline

DECLARATION

This is to certify that the syllabus is framed by the Central Board of studies (Physics) as per the guidelines (TOR) of The Department of Higher Education, Raipur, Chhattisgarh

01/ Dr.S.K.Gupta, Govt. E.R.R. P.G Science College, Bilaspur - Chairman

02/ Dr. Jagjeet Kaur Saluja, Govt. V Y T P.G. College, Durg - Member

03/ Dr.Meera Gupta, Govt. Dr. W.W.Patankar Girls P.G. College, Durg, - Member

04/ Dr.S.J. Dhoble, R.T.M Nagpur University Nagpur - Member

05/ Dr.D.P.Bisen, Pt.R.S.U. Raipur - Member

06/ Dr.R.S. Kher, Principal, Govt.M.L.S. College Seepat - Member

07/ Dr. Anjali Oudhia, Govt. N.P.G. College of Science Raipur - Member 8/6/22

08/ Dr.Smriti Agrawal, Govt. College ,Vaishali nagar, bhilai - Member 8/6/22

09/ Dr.S.K.Shrivastava, Govt.P.G. College, Ambikapur - Member

10/ Dr.Kamal K.Prasad Govt.N.E.S.College, Jaspur - Member

11/ Dr. A.P.Goswami, Govt.Bilasa Girls P.G. College, Bilaspur - Member

12/ Dr. V.K. Dubey, Govt.N.P.G. Science College, Raipur - Member

13/ Dr. Anil Kumar Panigrahi, Kirodimal Govt. Arts/Science College, Raigarh - Member

14/ Dr. Ugendra Kumar Kurrey, Govt.C.L.C Arts & Science College, Patan, Durg, - Member

15/ Dr.Dipti Jha , Dr. Radhabai Govt. Navin Kanya Mahavidyalya, Raipur, - Member 8.6.22

16/ Dr.Shashi Kant Rathor,Dr. B.R. Ambedkar Govt.College,Baloda,Dist-Janjgir-Champa- Member

17/ Dr. Vikas Gulhare, Govt. G.N.A. P.G. College, Bhathapara - Member

Part A: Introduction				
Program: **Practical Course**		Class: **B.Sc.**	Year: **Second**	Session: **2022-2023**
1	Course Code	**PHY – 2P**		
2	Course Title	LAB 2: Thermal Physics, Statistical Mechanics, Waves and Optics		
3	Course Type	**Practical**		
4	Pre-requisite (if any)	No		
5	Course Learning Outcomes (CLO)	**Expected Outcomes: -** • Students able to get working knowledge of laws and methods of thermodynamics and elementary statistical mechanics and to use this knowledge students can explore various application related to physics of condensed matter. • Students experience experimental evidence of laws of wave optics and how light has wave nature is confirmed through experiment.		
6	**Credit Value**	**2**		
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks : 17**	

Part B: Content of the Course	
Total Lectures: 30	
Tentative Practical List	Any 14 practical from the following 1. To determine the thermal conductivity of a non-conducting material by Lee's disc method. 2. To determine the specific rotation of sugar solution with the help of polarimeter. 3. To verify Newton's law of cooling. 4. To study binomial distribution law of probability using 4 coins. 5. To determin e the frequency of electric generator by Melde's experiment. 6. To determine the coefficient of thermal conductivity(k) by rubber tubing method. 7. To study the heat efficiency of an electric kettle with varying voltage. 8. To determine the frequency of A.C. mains using sonometer. 9. To determine the ratio of specific heat at constant pressure and constant volume ($\gamma=C_p/C_v$) of air Clement and Desorme's method. 10. To study the variation of thermos-Emf of thermos couple with Difference of Temperature of its Two Junctions. 11. To determine the refractive index of the material of the prism with the help of spectrometer. 12. To determine the radius of curvature of a plano-convex lens by Newton's circular ring method. 13. To find out wavelength of monochromatic light source with the help of Newton's Ring. 14. To determine the wavelength of laser light by diffraction grating. 15. To determine the resolving power of a telescope. 16. To determine the resolving power of a plane diffraction grating. 17. To determine the wavelength of monochromatic light source by

	single slit diffraction. 18. To determine the dispersive power of the prism with the help of spectrometer. 19. To determine the refractive index of ordinary and extra-ordinary rays for the calcite prism using spectrometer. 20. To determine the refractive index of water using laser light and photocell.

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Reference Books:

1. Advanced Practical Physics for students, B.L.Flint & H.T.Worsnop, 1971, AsiaPublishing House.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition,2011, Kitab Mahal, New Delhi.
4. A Laboratory Manual of Physics for Undergraduate Classes, D.P. Khandelwal,1985, Vani Publication.

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50

Continuous Comprehensive Evaluation (CCE): As per University Guideline

University Exam(UE): 50 Marks

Internal Assessment: Continuous Comprehensive Evaluation(CCE)	Class Test/Assignment/Presentation	As per University Guideline

DECLARATION

This is to certify that the syllabus is framed by the Central Board of studies (Physics) as per the guidelines (TOR) of The Department of Higher Education, Raipur, Chhattisgarh

01/ Dr.S.K.Gupta, Govt. E.R.R. P.G Science College, Bilaspur - Chairman

02/ Dr. Jagjeet Kaur Saluja, Govt. V Y T P.G. College, Durg - Member

03/ Dr.Meera Gupta, Govt. Dr. W.W.Patankar Girls P.G. College, Durg, - Member

04/ Dr.S.J. Dhoble, R.T.M Nagpur University Nagpur - Member

05/ Dr.D.P.Bisen, Pt.R.S.U. Raipur - Member

06/ Dr.R.S. Kher, Principal, Govt.M.L.S. College Seepat - Member

07/ Dr. Anjali Oudhia, Govt. N.P.G. College of Science Raipur - Member

08/ Dr.Smriti Agrawal, Govt. College ,Vaishali nagar, bhilai - Member

09/ Dr.S.K.Shrivastava, Govt.P.G. College, Ambikapur - Member

10/ Dr.Kamal K.Prasad Govt.N.E.S.College, Jaspur - Member

11/ Dr. A.P.Goswami, Govt.Bilasa Girls P.G. College, Bilaspur - Member

12/ Dr. V.K. Dubey, Govt.N.P.G. Science College, Raipur - Member

13/ Dr. Anil Kumar Panigrahi, Kirodimal Govt. Arts/Science College, Raigarh - Member

14/ Dr. Ugendra Kumar Kurrey, Govt.C.L.C Arts & Science College, Patan, Durg, - Member

15/ Dr.Dipti Jha , Dr. Radhabai Govt. Navin Kanya Mahavidyalya, Raipur, - Member

16/ Dr.Shashi Kant Rathor,Dr. B.R. Ambedkar Govt.College,Baloda,Dist-Janjgir-Champa- Member

17/ Dr. Vikas Gulhare, Govt. G.N.A. P.G. College, Bhathapara - Member

Part A: Introduction				
Program: **Diploma Course**		Class: **B.A/ B.Sc. II Year**	Year: **2022**	Session: **2023-2024**
1	Course Code	**MATH-2P (I)**		
2	Course Title	I - Lab 02 - Differential Equations and Real Analysis		
3	Course Type	**Practical**		
4	Pre-requisite (if any)	No		
5	Course Learning Outcomes (CLO)	This course will enable the students to • Learn Free and Open Source Software (FOSS) tools for computer programming • Solve problem on differential equations and real analysis theory studied in Mathematics Paper 1 and 2 by using FOSS software's. • Acquire knowledge of applications of Differential Equations and Real Analysisthrough FOSS.		
6	**Credit Value**	**2**		
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks : 17**	

Part B: **Content of the Course**	
Total Periods: 30	
Tentative Practical List	Mathematics practical with Free and Open Source Software (FOSS) tools for computer programs, such as GeoGebra/Maxima/Scilab/ Octave /Python/R. **Course Objectives:** • To learn Free and Open Source Software (FOSS) tool for computerprogramming • Acquire knowledge of applications of differential equations and real analysisthrough FOSS **List of Practicals**: (At least 10 practicals) • Solution of differential equation and plotting the graph of the solution:Variable separable. • Solution of differential equation and plotting the graph of the solutionHomogeneous equations. • Solution of differential equation and plotting the graph of the solution:Linear differential equations.

	• Solution of differential equation and plotting the solution: Bernoulli'sequations • Solution of second and higher order ordinary differential equations withconstant coefficients • Solution of second order ordinary differential equations with variable coefficients by i) Method of variation of parameters ii) When the equationis exact. • Finding complementary function and particular integral of constantcoefficient second and higher order ordinary differential equations. • Solving second order linear partial differential equations in two variableswith constant coefficient. • Solutions to the problems on total and simultaneous differential equations. • Solutions to the problems on different types of Partial differentialequations. • Illustration of convergent, divergent and oscillatory sequences. • Using Cauchy's criterion to determine convergence of a sequence(simple examples). • Illustration of convergent, divergent and oscillatory series. • Programs to find the sum of the series and its radius of convergence. • Using Cauchy's criterion on the sequence of partial sums of the series todetermine convergence of series. • Testing the convergence of binomial, exponential and logarithmic seriesand finding the sum. • To verify the given function is Riemann integrable or not over arbitraryclosed interval [a, b].

Part C - Learning Resource		
Text Books, Reference Books, Other Resources		
SUPPORT FROM THE GOVT FOR STUDENTS AND TEACHERS IN UNDERSTANDING AND LEARNING FOSS TOOLS: As a national level initiative towards learning FOSS tools, IIT Bombay for MHRD, government of India is giving free training to teachers interested in learning open source software's like scilab, maxima, octave, geogebra and others. (Website: http://spoken-tutorial.org;) (email: info@spokentutorial.org; contact@spoken-tutorial.org)		
Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 50 Continuous Comprehensive Evaluation (CCE): Not Applicable University Exam(UE): 50 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable

Declaration

This is to certify that the syllabus is framed by the Central Board of Studies (Mathematics) as per the guidelines (TOR) of the Department of Higher Education, Raipur Chhattisgarh.

1. Dr. Premlata Verma - Chairman
   Asst. Prof.
   Govt. Bilasa Girls PG College, Bilaspur
2. Prof. R.R. Sahu - Member
   Asst. Prof.
   Govt. MMR PG College, Champa
3. Mr. Yetendra Upadhyay - Member
   Asst. Prof.
   Govt. N.K. College, Kota
4. Ram Lakhan Pandey - Member
   Asst. Prof.
   Dr. B.R. Ambedkar Govt. College, Baloda
5. Dr. Arun Kumar Mishra - Member
   Professor

Govt. DT PG College, Utai

6. Dr. Shabnam Khan - Member
   Professor
   Govt. Digvijay PG College, Rajnandgaon
7. Dr. Padmavati - Member
   Professor
   Govt. VYT PG Auto. College, Durg
8. Dr. Anjali Chandravanshi - Member
   Asst. Prof.
   Govt. J.Y. Chhattisgarh College, Raipur
9. Manisha Gupta - Member
   Asst. Prof.
   GNA Govt. PG College, Bhatapara, Raipur
10. Mrs. Sangeeta Pandey - Member
    Asst. Prof.
    R.G. Govt. PG College, Ambikapur
11. Dr. S.K. Bohre - Member
    Asst. Prof.
    I.G. Govt. PG College, Vaishalinagar, Bhilai
12. Dr. Samir Dashputre - Member
    Asst. Prof.
    Govt. College, Arjunda, Balod
13. Dr. Chandrajeet Singh Rathore - Member
    Asst. Prof.
    Govt. Jajwalyadev Naveen Girls PG College, Janjgir
14. Dr. Shri Nath Gupta - Member
    K. Govt. Arts & Science College, Raigarh
15. Dr. Raghu Nandan Patel - Member
    Asst. Prof.
    Govt. MLS College, Seepat

Part A: Introduction				
Program: **Diploma Course**		Class: **B.A./ B.Sc. II Year**	Year: **2022**	Session: **2023-2024**
1	Course Code	**MATH-2P (II)**		
2	Course Title	II - Project 02 - History of Mathematician		
3	Course Type	**Project**		
4	Pre-requisite (if any)	No		
5	Course Learning Outcomes (CLO)	Studying history of mathematicians help students: • Develop a deeper understanding of the mathematics they hare already studied by seeing how it was developed over time and in various places. • Know the rich intellectual heritage of the country. • Develop an appreciation of mathematics and build positive attitude towards mathematics increasing student's motivation decreasing anxiety related the subject. • To acquire knowledge about development of mathematics in ancient , medieval and modern period of history.		
6	**Credit Value**	**2**		
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks : 17**	

Part B: Content of the Course	
Total Periods: 30	
Project List	**Course Objectives:** An elective course designed to acquire special / advance knowledge, such as supplement study / support study to a project work and a candidate study such a course on his own with an advisory support by a teacher / faculty member. **Project** Contributions and biographies of Indian Mathematicians Aryabhatta , Varahmihir , and Bhaskar I ,Shreedharacharya , Shreepati and Parmeshwar and contribution involved in contents of the paper of Differential Equations and Real Analysis. (Any 10 Mathematicians)

Part C - Learning Resource		
Text Books, Reference Books, Other Resources		
Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 50 Continuous Comprehensive Evaluation (CCE): Not Applicable University Exam(UE): 50 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable

Declaration

This is to certify that the syllabus is framed by the Central Board of Studies (Mathematics) as per the guidelines (TOR) of the Department of Higher Education, Raipur Chhattisgarh.

1. Dr. Premlata Verma - Chairman
   Asst. Prof.
   Govt. Bilasa Girls PG College, Bilaspur
2. Prof. R.R. Sahu - Member
   Asst. Prof.
   Govt. MMR PG College, Champa
3. Mr. Yetendra Upadhyay - Member
   Asst. Prof.
   Govt. N.K. College, Kota
4. Ram Lakhan Pandey - Member
   Asst. Prof.
   Dr. B.R. Ambedkar Govt. College, Baloda
5. Dr. Arun Kumar Mishra - Member
   Professor
   Govt. DT PG College, Utai
6. Dr. Shabnam Khan - Member
   Professor
   Govt. Digvijay PG College, Rajnandgaon
7. Dr. Padmavati - Member
   Professor
   Govt. VYT PG Auto. College, Durg
8. Dr. Anjali Chandravanshi - Member
   Asst. Prof.
   Govt. J.Y. Chhattisgarh College, Raipur
9. Manisha Gupta - Member
   Asst. Prof.

GNA Govt. PG College, Bhatapara, Raipur

10. Mrs. Sangeeta Pandey - Member
    Asst. Prof.
    R.G. Govt. PG College, Ambikapur
11. Dr. S.K. Bohre - Member
    Asst. Prof.
    I.G. Govt. PG College, Vaishalinagar, Bhilai
12. Dr. Samir Dashputre - Member
    Asst. Prof.
    Govt. College, Arjunda, Balod
13. Dr. Chandrajeet Singh Rathore - Member
    Asst. Prof.
    Govt. Jajwalyadev Naveen Girls PG College, Janjgir
14. Dr. Shri Nath Gupta - Member
    K. Govt. Arts & Science College, Raigarh
15. Dr. Raghu Nandan Patel - Member
    Asst. Prof.
    Govt. MLS College, Seepat

Part A: Introduction				
Program: Diploma Course		Class: B. A / B.Sc. Part II	Year: 2022	Session:2023-2024
1	Course Code	Paper – MATH-3T		
2	Course Title	Differential Equations		
3	Course Type	Theory		
4	Pre-requisite (if any)	No		
5	Course Learning Outcome (CLO)	**This Course will enable the students to:** • Understand the genesis of ordinary as well as partial differential equations. • Learn various techniques of getting exact solutions of certain solvable first order differential equations and linear differential equations of second order. • Know Picard's method of obtaining successive approximations of solutions of first order ordinary differential equations, passing through a given point in the plane. • Learn about solution of first order linear partial differential equations using Lagrange's method. • Know how to solve second order linear partial differential equations with constant coefficients. • Formulate mathematical models in the form of ordinary and partial differential equations to problems arising in physical, chemical and biological disciplines.		
6	Credit Value	4		
7	Total Marks	Maximum Marks : 50	Minimum Passing Marks :	

Part B: Content of the Course Total Periods: 60		
Unit	Topics	No. of Periods
I	**First Order Differential Equations:** Basic concepts and genesis of ordinary differential equations, Order and degree of a differential equation, Differential equations of first order and first degree, Equations in which variables are separable, Homogeneous equations, Linear differential equations and equations reducible to linear form, Exact differential equations, Integrating factor, First order higher degree equations solvable for x, y and p, Clairaut's form and singular solutions; Picard's	12

	method of successive approximations and the statement of Picard's theorem for the existence and uniqueness of the solutions of the first order differential equations.	
II	**Second Order Linear Differential Equations:** Statement of existence and uniqueness theorem for the solution of linear differential equations, General theory of linear differential equations of second order with variable coefficients, Solutions of homogeneous linear ordinary differential equations of second order with constant coefficients, Method of variation of parameters and method of undetermined coefficients, Reduction of order, Euler-Cauchy equations, Coupled linear differential equations with constant coefficients.	12
III	**First Order Partial Differential Equations:** Genesis of Partial differential equations (PDE), Concept of linear and non-linear PDEs, Methods of solution of Simultaneous differential equations of the form: $dx/P(x,y,z) = dy/Q(x,y,z) = dz/R(x,y,z)$, Lagrange's method for PDEs of the form: $P(x,y,z)p+Q(x,y,z)q=R(x,y,z)$, where $p=\partial z/\partial x$ and $q=\partial z/\partial y$; Solutions passing through a given curve.	12
IV	**Second order Partial differential equations:** Principle of superposition for homogeneous linear PDEs, Relation between solution sets of non-homogeneous linear PDEs and their corresponding homogeneous equations, Reducible and irreducible homogeneous equations and their solutions in various possible cases, Solution of non-homogeneous reducible equations using Lagrange's method for first order equations.	12
V	**Applications:** Orthogonal trajectories of one-parameter families of curves in a plane, Minimum velocity of escape from Earth's gravitational field, Newton's law of cooling, Malthusian and logistic population models, Radioactive decay, Free and forced mechanical oscillations of a spring suspended vertically carrying a mass at its lowest tip, Phenomena of resonance, LCR circuits, Surfaces orthogonal to a given system of surfaces.	12

Part C - Learning Resource

Text Books and Reference Books:

1. Erwin Kreyszig . *Advanced Engineering Mathematics* (10th edition). J. Wiley &Sons 2011
2. B. Rai & D. P. Choudhury. *Ordinary Differential Equations - An Introduction*.Narosa Publishing House Pvt. Ltd. New Delhi. 2006
3. Shepley L. Ross. *Differential Equations* (3rd edition). Wiley. 2007
4. George F. Simmons. *Differential Equations with Applications and HistoricalNotes* (3rd edition). CRC Press. Taylor & Francis. 2017

5. Ian N. Sneddon. *Elements of Partial Differential Equations*. Dover Publications. 2006

E-Resources:

1. Suggested Equivalent **online courses:** Web link NPTEL/ SWAYAM/ MOOCs
2. Differential equation
   https://www.youtube.com/watch?v=NBcGLLU90fM&list=PLbMVogVj5nJSGlf9sluucwobyr_zz6glD
3. Partial Differential equation
   https://www.youtube.com/watch?v=Kk5SEzASkZU&list=PL9m2Lkh6odgKbfY03TFRhwjOqW79UdzK8

Part D: Assessment and Evaluation	
Suggested Continuous Evaluation Methods:	
Maximum Marks:	50 Marks

Declaration

This is to certify that the syllabus is framed by the Central Board of Studies (Mathematics) as per the guidelines (TOR) of the Department of Higher Education, Raipur Chhattisgarh.

1. Dr. Premlata Verma - Chairman
   Asst. Prof.
   Govt. Bilasa Girls PG College, Bilaspur
2. Prof. R.R. Sahu - Member
   Asst. Prof.
   Govt. MMR PG College, Champa
3. Mr. Yetendra Upadhyay - Member
   Asst. Prof.
   Govt. N.K. College, Kota
4. Ram Lakhan Pandey - Member
   Asst. Prof.
   Dr. B.R. Ambedkar Govt. College, Baloda
5. Dr. Arun Kumar Mishra - Member
   Professor
   Govt. DT PG College, Utai
6. Dr. Shabnam Khan - Member
   Professor
   Govt. Digvijay PG College, Rajnandgaon
7. Dr. Padmavati - Member
   Professor
   Govt. VYT PG Auto. College, Durg

8. Dr. Anjali Chandravanshi - Member
   Asst. Prof.
   Govt. J.Y. Chhattisgarh College, Raipur
9. Manisha Gupta - Member
   Asst. Prof.
   GNA Govt. PG College, Bhatapara, Raipur
10. Mrs. Sangeeta Pandey - Member
    Asst. Prof.
    R.G. Govt. PG College, Ambikapur
11. Dr. S.K. Bohre - Member
    Asst. Prof.
    I.G. Govt. PG College, Vaishalinagar, Bhilai
12. Dr. Samir Dashputre - Member
    Asst. Prof.
    Govt. College, Arjunda, Balod
13. Dr. Chandrajeet Singh Rathore - Member
    Asst. Prof.
    Govt. Jajwalyadev Naveen Girls PG College, Janjgir
14. Dr. Shri Nath Gupta - Member
    K. Govt. Arts & Science College, Raigarh
15. Dr. Raghu Nandan Patel - Member
    Asst. Prof.
    Govt. MLS College, Seepat

Part A: Introduction				
Program: Diploma Course		Class: B. A. / B.Sc. Part II	Year: 2022	Session:2023-2024
1	Course Code	Paper – MATH-4T		
2	Course Title	Real Analysis		
3	Course Type	Theory		
4	Pre-requisite (if any)	No		
5	Course Learning Outcome (CLO)	**This Course will enable the students to:** • Understand basic properties of real number system such as least upper bound propertyand order property. • Realize importance of bounded, convergent, Cauchy and monotonic sequences of real l numbers, find their limit superior and limit inferior. • Apply various tests to determine convergence and absolute convergence of a series of real numbers. • Learn about Riemann integrability of bounded functions and algebra of R- integrable functions. • Determine various applications of the fundamental theorem of integral calculus. • Relate concepts of uniform continuity, differentiation, integration and uniformconvergence.		
6	Credit Value	4		
7	Total Marks	Maximum Marks : 50	Minimum Passing Marks :	

Part B: Content of the Course Total Periods: 60		
Unit	Topics	No. of Periods
I	**Real Numbers:** The set of real numbers $\mathbb{R}$ as an ordered field, Least upper bound properties of $\mathbb{R}$, Metric property and completeness of $\mathbb{R}$, Archimedean property of $\mathbb{R}$, Dense subsets of $\mathbb{R}$, Nested intervals property; Neighbourhood of a point in $\mathbb{R}$, Open sets, limit point of a set, closed and perfect sets in $\mathbb{R}$, connected and compact subsets of $\mathbb{R}$, Heine-Borel theorem.	12
II	**Convergence of Sequences in $\mathbb{R}$:** Bounded and monotonic sequences, Convergent sequence and its limit, Limit theorems, Monotone convergence	12

	theorem, Subsequences, Bolzano-Weierstrass theorem, Limit superior and limit inferior, Cauchy sequence, Cauchy's convergence criterion.	
III	**Infinite Series:** Convergence of a series of positive real numbers, Necessary condition for convergence, Cauchy criterion for convergence; Tests for convergence: Comparison test, Limit comparison test, D'Alembert's ratio test, Cauchy's n^{th} root test, Abel's test, Integral test; Alternating series, Absolute and conditional convergence, Leibniz theorem, Rearrangements of series, Riemann's rearrangement theorem.	12
IV	**Riemann Integration:** Riemann integrability of bounded functions, Examples of R-integrable and non-integrable functions, Algebra of Riemann integrable functions, Integrability of continuous and monotonic functions, Darboux theorems, Fundamental theorem of integral calculus, First mean value theorem and second mean value theorems (Bonnet and Weierstrass forms). Necessary and sufficient condition for Riemann integrable function (Statement only).	12
V	**Uniform Convergence, Continuity and Improper Integrals:** Pointwise and uniform convergence of sequence and series of functions, Uniform continuity, Weierstrass's M-test, Uniform convergence and continuity, Uniform convergence and differentiability, Improper integrals and tests for improper integrals, Beta and Gamma functions.	12

Part C - Learning Resource

Text Books, Reference Books:

1. T. M. Apostol. *Mathematical Analysis: A Modern Approach to AdvancedCalculus*. Pearson Education. 2008
2. Charalambos D. Aliprantis &) Owen Burkinshaw. *Principles of Real Analysis* (3rd edition). Academic Press. 1998
3. Robert G. Bartle & Donald R. Sherbert. *Introduction to Real Analysis* (4thedition).Wiley India. 2015
4. Gerald G. Bilodeau, Paul R. Thie & G. E. Keough. *An Introduction to Analysis* (2nd edition), Jones and Bartlett India Pvt. Ltd. 2015
5. E. Hewitt & K. Stromberg (2013). *Real and Abstract Analysis.* Springer-Verlag.
6. K. A. Ross. *Elementary Analysis*: *The Theory of Calculus* (2nd edition).Springer. 2013

7 Walter Rudin. *Principles of Mathematical Analysis* (3rd edition), Tata McGraw Hill.

E-Resources:

1. Suggested Equivalent **online courses:** Web link NPTEL/ SWAYAM/ MOOCs
2. https://www.youtube.com/watch?v=Bef8QjIjCy0&list=PLbMVogVj5nJQ1UXrOm7KqTg9UKk6eXRp_
3. https://www.youtube.com/watch?v=C2qIoHkhEuM&list=PLOzRYVm0a65cpVtcdj_5SBEh6VQvC_BvR

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 50 Marks

Declaration

This is to certify that the syllabus is framed by the Central Board of Studies (Mathematics) as per the guidelines (TOR) of the Department of Higher Education, Raipur Chhattisgarh.

1. Dr. Premlata Verma - Chairman
   Asst. Prof.
   Govt. Bilasa Girls PG College, Bilaspur
2. Prof. R.R. Sahu - Member
   Asst. Prof.
   Govt. MMR PG College, Champa
3. Mr. Yetendra Upadhyay - Member
   Asst. Prof.
   Govt. N.K. College, Kota
4. Ram Lakhan Pandey - Member
   Asst. Prof.
   Dr. B.R. Ambedkar Govt. College, Baloda
5. Dr. Arun Kumar Mishra - Member
   Professor
   Govt. DT PG College, Utai
6. Dr. Shabnam Khan - Member
   Professor
   Govt. Digvijay PG College, Rajnandgaon
7. Dr. Padmavati - Member
   Professor
   Govt. VYT PG Auto. College, Durg

8. Dr. Anjali Chandravanshi - Member
   Asst. Prof.
   Govt. J.Y. Chhattisgarh College, Raipur
9. Manisha Gupta - Member
   Asst. Prof.
   GNA Govt. PG College, Bhatapara, Raipur
10. Mrs. Sangeeta Pandey - Member
    Asst. Prof.
    R.G. Govt. PG College, Ambikapur
11. Dr. S.K. Bohre - Member
    Asst. Prof.
    I.G. Govt. PG College, Vaishalinagar, Bhilai
12. Dr. Samir Dashputre - Member
    Asst. Prof.
    Govt. College, Arjunda, Balod
13. Dr. Chandrajeet Singh Rathore - Member
    Asst. Prof.
    Govt. Jajwalyadev Naveen Girls PG College, Janjgir
14. Dr. Shri Nath Gupta - Member
    K. Govt. Arts & Science College, Raigarh
15. Dr. Raghu Nandan Patel - Member
    Asst. Prof.
    Govt. MLS College, Seepat

Part A : Introduction				
Programme: Certificate		**Class B.Sc.-II**	**Year: 2022**	**Session: 2022-23**
1.	Course Code	**BOT-2P**		
2.	Course Title	**Plant Identification and Embryology**		
3.	Course Type	**Practical**		
4.	Pre-requisite (if any)	No		
5.	Course outcomes:	**Course outcomes:** After the completion of the course the students will be able: • To learn how plant specimens are collected, documented, and curated for a permanent record. • To observe, record, and employ plant morphological variation and the accompanying descriptive terminology. • To gain experience with the various tools and means available to identify plants. • To develop observational skills and field experience. • To identify a taxonomically diverse array of native plants. • To recognize common and major plant families. • Comprehend the concepts of plant taxonomy and classification of Angiosperms.		
6.	Credit Value	2		
7.	Total Marks	Max. Marks: 50	Min. Passing Marks:17	

Part B : Content of the Course

Total No. of Periods - 30

Tentative Practical List	**Topic*** ***(Topic * (Minimum Any three from each unit depending on facilities and syllabus. 20% for spotting, 10% each for viva and sessional and rest 60 % marks equally in each unit.)**
	Herbarium: Plant collection, Preservation and Documentation: Stepwise Practicing Herbarium techniques: 1. FIELD EQUIPMENTS, Collection of any wild 25 plant specimens 2. Learn to handle Herbarium making tools 3. Pressing and Drying of collected plant specimens 4. Special treatments for all varied groups of plants 5. Mount on standard herbarium sheets 6. Label them using Standard methods
	Arrange the prepapared herbarium according to Bentham and Hookers system of classification- 1.herb, shrub and trees 2. annual, biannual and perennial 3. cereals, pulses, vegetables and medicinal 4. ethanobotanical importance

for Members 13.6.22

	Taxonomic Identification of angiospermic plants: Description of plants belonging to following families in semitechnical language and identification up to family level: Brassicaceae, Malvaceae, Fabaceae, Cucurbitaceae, Asteraceae, Apocyanaceae, Ascleapiadaceae, ,Solanaceae, Euphorbiaceae, Papaveraceae, Apiaceae Acanthaceae, Labiatae (Lamiaceae), Rubiaceae. Liliaceae, Musaceae, Poaceae. **Identification during field visits:** Field identification of common wild plants from families included in the theory syllabus.
	a) **Documentation of Ethnobotanical wisdom of area** b) **Study of economically valuable plants:** Medicinal plants, oil yielding plants, cereals, sugarcane, beverages etc.
	1. **Anatomy of:** Dicot root, stem and leaf 2. Monocot root, stem and leaf 3. Plants showing primary anomaly and anomalous secondary growth **a) Study of an angiospermic flower** **b) Dissection of Ladys finger /Tridax/citrus seeds for study of embryo**

Part C - Learning Resource
Text Books, Reference Books, Other Resources
Suggested Readings: 1. Bole, P. V. and Vaghani, Y. (1986) Field guide to the common trees of India. Oxford University Press; Bombay. 2. Womersley, J. S. 1981. Plant collecting and herbarium development: A manual.S.K. Pandey (2012). Quick Concept of Botany. Publisher LAP LAMBERT Academic Publishing GmbH & Co. KG, Germany (ISBN: 978-3-8484-3104-5). 3. Pandey S.K. (2012). Quick Concept of Botany. Publisher LAP LAMBERT Academic Publishing GmbH & Co. KG, Germany (ISBN: 978-3-8484-3104-5). 4. Manilal, K. S. and M. S. Muktesh Kumar (ed.) (1998) A Hand book of Taxonomy Training, DST,N. Delhi 5. Dhopte, A.M. (2003) Principles and Techniques for Plant Scientists. - Agrobios,Jodhpur, India. 6. Jain, S.K. & R.R. Rao. 1977. A handbook of field and herbarium methods. Today & Tomorrow's Printers and Publishers, New Delhi. **E-learning Resources:** 1. http://egyankosh.ac.in/bitstream/123456789/13096/1/Unit-5.pdf 2. https://www.for.gov.bc.ca/hfd/pubs/docs/wp/wp18.pdf 3.https://www.researchgate.net/publication/267510854_The_Flowering_Plants_Handbook

for 13.6.22

Part D – Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 50 Continuous Comprehensive Evaluation (CCE): Not Applicable University Exam(UE): 50 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable

for Chairman
13.6.22

Declaration

This is to certify that the syllabus is framed by the Central Board of Studies (Botany) as per the guidelines (TOR) of the Department of Higher Education, Raipur Chhattisgarh.

1. Shri Prabhat Pandey
   Asst. Prof.
   Gramya Bharti Vidyapith, Hardibazar - Chairman
2. Dr. A.N. Bahadur - Member
   Professor
   Govt. E.R.R. P.G. Science College, Bilaspur
3. Dr. Prashant Kumar Singh - Member
   Asst. Prof.
   Govt. V.B. Singh Dev Girls College, Jashpur
4. Dr. Awadhesh Kumar Shrivastava - Member
   Asst. Prof.
   Govt. D.T. P.G. College, Utai, Durg
5. Dr. Ashok Kumar Bharti - Member
   Asst. Prof.
   Kirodimal Govt. Arts & Science College, Raigarh
6. Dr. Smriti Chakravarty - Member
   Professor
   Govt. J.Y. Chhattisgarh College, Raipur
7. Dr. Rupinder Diwan - Member
   Professor
   Govt. Nagarjun P.G. College of Science, Raipur
8. Dr. Usha Chandel - Member
   Asst. Prof.
   Govt. Dr. W.W. Patankar Girls P.G. College, Durg
9. Mr. Kaushal Kishor - Member
   Asst. Prof.
   Govt. Pt. Shyamacharan Shukla College, Dharsiwa, Raipur
10. Manisha Gupta - Member

for 13.6.22

Part A: Introduction				
Program: **Diploma in Plant Identification and plant preservation**		Class: B. Sc. **II Year**	Year: **2023**	Session:**2023-2024**
1.	Course Code	**BOT-3T**		
2.	Course Title	**Plant Systematics, Economic Botany and Ethnobotany**		
3.	Course Type	**Theory**		
4.	Pre-requisite (if any)	NO		
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to • Understand the Plant Taxonomy • Learn the characteristics of families included • Learn economic importance of different plants of the concerned families • Understand the traditional knowledge about the plants and possible application of this knowledge		
6.	**Credit Value**	**Theory: 4**		
7.	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks: 17**	

Part B: Content of the Course		
Total Periods: 60		
Unit	**Topics**	**No. ofPeriod**
I	**Taxonomic Resources & Nomenclature:** Components of taxonomy (identification, nomenclature, classification); Taxonomic resources: Herbarium- functions & important herbaria, Botanical gardens, Flora, Keys- single access and multi-access. Principles and rules of Botanical Nomenclature according to ICBN	12
II	**Types of classification & Evidences:** Artificial, natural and phylogenetic. Bentham and Hooker (upto series), Engler and Prantl (upto series) and Hutchinson classification. Introduction to taxonomic evidences from palynology, cytology and phytochemistry	12
III	**Families:** A study of the following families (Following Bentham & Hooker's system) with economic importance: Ranunculaceae, Brassicaceae, Malvaceae, Rutaceae, Fabaceae, Myrtaceae, Cucurbitaceae, Rubiaceae, Asteraceae, Apocynaceae, Acanthaceae, Asclepiadaceae, Solanaceae, Amaranthaceae, Euphorbiaceae, Papaveraceae, Apiaceae, Lamiaceae, Orchidaceae, Liliaceae, Musaceae and Poaceae.	12
IV	**Economically valuable plants:** Centre of origin and domestication of crop plants; Botanical name, family, part used and uses of oil yielding plants, fibre yielding plants, Rubber, Dyes, Timber, Sugar and beverages	12
V	**Ethnobotany:** Concept of Ethnobotany, Documentation, Conservation and application of Traditional Knowledge, Sacred grooves, Role of AYUSH, CIMAP and NMPB **Role of important medicinal plants in Traditional therapeutic practices:** *Aegle marmelos, Asparagus racemosus, Andrographis paniculata, Ocimum sanctum, Aloe vera, Nyctanthes arbor-tristis* etc. Conservation of medicinal plants and ethnomedicinal knowledge. Plants in primary healthcare: *Tinospora cordifolia, Ocimum sanctum, Aloe vera, Azadirachta indica* etc.	12

13.6.22

Keywords: Taxonomy, classification, Families ,ethnobotany

Part C -Learning Resources

Suggested Readings:

1. Plant Systematics. Arun K. Pandey & Shruti Kansana. 2020. Jaya Publishing House.
2. Bole, P. V. and Vaghani, Y. (1986) Field guide to the common trees of India. Oxford University Press; Bombay.
3. Brandis, D. (1906) Indian Trees (London, 5th edition. 1971). International Book Distributors; Dehra Dun.
4. Dallwitz, M. J., Paine, T. A. and Zurcher, E. J. (2003). Principles of interactive keys. http://delta-intkey.com
5. https://www.naace.co.uk/school-improvement/ict-mark/
6. Pandey, B.P. 2007. Botany for Degree Students: Diversity of Seed Plants and their Systematics, Structure, Development and Reproduction in Flowering Plants. S. Chand & Company Ltd,New Delhi.
7. Singh, G. 1999. Plant Systematics: Theory and Practice. Oxford and IBH, New Delhi.
8. Dutta A.C. 2016. Botany for Degree Students. Oxford University Press.
9. Randhawa, G.S. and Mukhopadhyay, A. 1986. Floriculture in India. Allied Publishers
10. Kochhar, S.L. (2011). Economic Botany in the Tropics, MacMillan Publishers India Ltd., New Delhi. 4th edition.
11. Sambamurthy, AVSS & Subrahmanyam, NS (2000). Economic Botany of Crop Plants. Asiatech Publishers. New Delhi.
12. Singh, D.K and K.V. Peter. 2014. Protected cultivation of horticultural crops. New India Publishing Agency, India.
13. Reddy P. Parvatha. 2016. Sustainable crop protection under protected cultivation. Springer, Singapore.
14. Amit Deogirikar. 2019. A Text Book on Protected Cultivation and Secondary Agriculture. Rajlaxmi Prakashan, Aurangabad, India.
15. Singh, B., B. Singh, N. Sabir and M Hasan. 2014. Advances in protected cultivation. New India Publishing Agency, India.
16. Sharma, OP. 1996. Hill's Economic Botany (Late Dr. AF Hill, adopted by OP Sharma). Tata McGraw Hill Co. Ltd., New Delhi.

Suggested equivalent online courses:

1. https://www.easybiologyclass.com/topic-botany/
2. http://egyankosh.ac.in/handle/123456789/53530
3. https://www.delta-intkey.com/www/desc.htm
4. https://milneorchid.weebly.com/plant-id-for-beginners.html
5. https://plants.usda.gov/classification.html
6. https://www.senecahs.org/pages/uploaded_files/Plant%20Classification.pdf
7. https://www.ladykeanecollege.edu.in/files/userfiles/file/Dr_%20S_%20Nongbri%20III%20Sem%20ppt.pdf
8. https://www.brainkart.com/article/Bentham-and-Hooker-s-classification-of-plants---Dicotyledonae,- Gymnospermae-and-Monocotyledonae_1000/
9. https://libguides.rutgers.edu/c.php?g=336690&p=2267037
   https://www.delta-intkey.com/

Part D: Assessment andEvaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50

Continuous Comprehensive Evaluation (CCE):As per rule

University Exam(UE): 50Marks

for 13.6.22

Declaration

This is to certify that the syllabus is framed by the Central Board of Studies (Botany) as per the guidelines (TOR) of the Department of Higher Education, Raipur Chhattisgarh.

1. Shri Prabhat Pandey
   Asst. Prof.
   Gramya Bharti Vidyapith, Hardibazar - Chairman
2. Dr. A.N. Bahadur - Member
   Professor
   Govt. E.R.R. P.G. Science College, Bilaspur
3. Dr. Prashant Kumar Singh - Member
   Asst. Prof.
   Govt. V.B. Singh Dev Girls College, Jashpur
4. Dr. Awadhesh Kumar Shrivastava - Member
   Asst. Prof.
   Govt. D.T. P.G. College, Utai, Durg
5. Dr. Ashok Kumar Bharti - Member
   Asst. Prof.
   Kirodimal Govt. Arts & Science College, Raigarh
6. Dr. Smriti Chakravarty - Member
   Professor
   Govt. J.Y. Chhattisgarh College, Raipur
7. Dr. Rupinder Diwan - Member
   Professor
   Govt. Nagarjun P.G. College of Science, Raipur
8. Dr. Usha Chandel - Member
   Asst. Prof.
   Govt. Dr. W.W. Patankar Girls P.G. College, Durg
9. Mr. Kaushal Kishor - Member
   Asst. Prof.
   Govt. Pt. Shyamacharan Shukla College, Dharsiwa, Raipur
10. Manisha Gupta - Member

for 13.6.22

Part A: Introduction				
Program: **Diploma in Plant Identification and plant preservation**		Class: B.Sc. **II Year**	Year: **2023**	Session:**2023-2024**
1.	Course Code	**BOT-4 T**		
2.	Course Title	**Plant Anatomy, Embryology and Plant Breeding**		
3.	Course Type	**Theory**		
4.	Pre-requisite (if any)	NO		
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to 1. Understand the internal structure of root, stem and leaves 2. learn about the anomalous secondary growth of some plants 3. understand the life cycle of angiospermic plants with details of microsporogenesis, megasporogenesis, fertilization and other developmental details up to embryogenesis 4. understand concept of plant breeding and its application		
6.	**Credit Value**	**Theory: 4**		
7.	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks: 17**	

Part B: Content of the Course		
Total Period: 60		
Unit	**Topics**	**No. ofPeriod**
I	**Meristems and related theories**: Meristematic and permanent tissues, Root meristem, Stem meristem and Leaf meristem. Theories of apical organization: Apical Cell Theory, Histogen Theory and Tunica Carpus Theory	12
II	**Anatomy and Secondary growth:** Anatomy of Root, Stem and Leaves of both Dicots and Monocots. Secondary growth in Dicots, Anomalous secondary growth in *Bignonia, Boerhaavia, Dracaena and Nycthanthes*	12
III	**Plant Embryology:** Flower: Structure and types (Complete, Incomplete, Perfect and Imperfect flower), Microsporangium and Microsporogenesis, Ovule: Structure and types, Megasporogenesis, Development of female gametophyte (Embryo sac), Types of Embryo sac, Pollination, Pollen-pistil interaction, Fertilization, Double fertilization, Endosperm and its types, Embryogenesis, Apomixis and Polyembryony	12
IV	**Plant Breeding**: Plant Introduction, Agencies of plant introduction in India, Procedure of introduction- Acclimatization- Achievements, Selection- mass selection, pure line selection and clonal selection. Genetic basis of selection methods	12
V	**Hybridization**: Procedure of hybridization, inter-generic, inter-specific and inter-varietal hybridization. Composite and synthetic varieties, Heterosis, Mutation and Molecular breeding (use of DNA markers in plant breeding). Role of hybrization in agriculture, horticulture and forestry	12
Keywords: Meristems, Anomalous secondary growth. Pure line selection. Hybridization.		

for
13.6.22

heterosis

Part C -Learning Resources

Text Books, Reference Books, Other Resources

1. M K Raxdan An Introduction to Plant Tissue Culture –; Oxfird& IBH Publishing Co.Pvt. Ltd.,New Delhi
2. Allard RW (1960) Principles of Plant Breeding. John willey and Sons. Inc. New York
3. BD Singh (2003) Plant Breeding. Kalyani Publishers
4. Sharma JR (1994) Principles and Practices of Plant Breeding. Tata McGraw-Hill Pub. Co. New Delhi
5. Pandey BP (2010) College Botany Vol II, S. Chand and Company, New Delhi.
6. Maheshwari P (1971). An Introduction to Embryology of Angiosperms, McGraw Hill Book Co., London
7. Bhojwani SS and Bhatnagar SP (2000). The Embryology of Angiosperms (4th Ed.), Vikas Publishing House
8. Evert RF (2006). Esau's Plant Anatomy: Meristems, Cells and Tissues of the Plant body: Their Structure, Function and Development, John Willey and Sons, Inc
9. Pandey BP .Plant Anatomy, S. Chand Publishers, New Delhi
10. Srivastava HN (2006). Plant Anatomy, Pradeep Publications, Jalandhar

Suggested equivalent online resourses:

1. https://www.pnas.org/content/104/suppl_1/8641
2. https://www.journals.uchicago.edu/doi/pdfplus/10.1086/659998
3. https://bsi.gov.in/page/en/ethnobotany
4. http://www.legalserviceindia.com/article/l98-Intellectual-Property-and-Traditional-knowledge.html
5. https://www.brainkart.com/article/Economic-importance-Plants---Food,-Rice,-Oil,-Fibre,-Timber-yielding-plant_1095/
6. https://www.loc.gov/rr/scitech/tracer-bullets/economic-botanytb.html
7. http://nsdl.niscair.res.in/bitstream/123456789/127/1/Fibre%20crops%2C%20bamboo%2C%20timber%20-%20Final.pdf
8. https://www2.palomar.edu/users/warmstrong/econpls.htm
9. https://www.longdom.org/proceedings/phytochemistry-and-phytoconstituents-of-herbal-drugs-and-formulations-1668.html

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50

Continuous Comprehensive Evaluation (CCE):As per rule

University Exam(UE): 50Marks

13.6.22

Declaration

This is to certify that the syllabus is framed by the Central Board of Studies (Botany) as per the guidelines (TOR) of the Department of Higher Education, Raipur Chhattisgarh.

1. Shri Prabhat Pandey
   Asst. Prof.
   Gramya Bharti Vidyapith, Hardibazar - Chairman
2. Dr. A.N. Bahadur - Member
   Professor
   Govt. E.R.R. P.G. Science College, Bilaspur
3. Dr. Prashant Kumar Singh - Member
   Asst. Prof.
   Govt. V.B. Singh Dev Girls College, Jashpur
4. Dr. Awadhesh Kumar Shrivastava - Member
   Asst. Prof.
   Govt. D.T. P.G. College, Utai, Durg
5. Dr. Ashok Kumar Bharti - Member
   Asst. Prof.
   Kirodimal Govt. Arts & Science College, Raigarh
6. Dr. Smriti Chakravarty - Member
   Professor
   Govt. J.Y. Chhattisgarh College, Raipur
7. Dr. Rupinder Diwan - Member
   Professor
   Govt. Nagarjun P.G. College of Science, Raipur
8. Dr. Usha Chandel - Member
   Asst. Prof.
   Govt. Dr. W.W. Patankar Girls P.G. College, Durg
9. Mr. Kaushal Kishor - Member
   Asst. Prof.
   Govt. Pt. Shyamacharan Shukla College, Dharsiwa, Raipur
10. Manisha Gupta - Member

for 13.6.22

Part A: Introduction				
Program: **Certificate Course**		Class: **B.Sc. II Year**	Year: **2023**	Session:**2023-2024**
1	Course Code	ZOOL-2P		
2	Course Title	Lab Course - 2		
3	Course Type	Practical		
4	Pre-requisite (if any)	No		
5	Course Learning . Outcomes (CLO)	After completion of practical work the outcome will be : • Able to understand and explain Mendel's Law of Inheritance • Capable to analyze inheritance of gene by pedigree analysis. • Able to know laboratory culture of Drosophila. • Able to understand cytological, histological and osteological configuration for animal life. • Capable to understand Human keryotype and Numerical alteration in chromosomes • Capable to explain Evolution and evidences • Capable of performing tests for identification of biological macromolecules • Able to estimate nucleic acids and Isolation of DNA		
6	Credit Value	2		
7	Total Marks	Max. Marks: 50	Min Passing Marks : 17	

13.6.2022

Part B
Total No. of Lecturer (one hour per week)

Total Periods: 30

	Contents	No. of period
	Tentative list of practical/exercise: 1. Application of probability in the law of segregation with coin tossing. 2. Study of mode of inheritance of the following traits by pedigree charts – attached ear lobe, widow's peak. 3. Familiarization with techniques of handling *Drosophila*, identifying males and females; observing wild type and mutant (white eye, wing less) flies, and setting up cultures. 4. Study of human karyotypes and numerical alterations (Down syndrome, Klinefelter syndrome and Turner syndrome). 5. Types of eggs based on quantity and distribution of yolk: sea urchin, insect, frog, Chick. 6. Comparative study of cleavage patterns in Frog and Amphioxus models. 7. How do cells move, change shape and size during morphogenetic movement of Blastulation, Gastrulation in Frog, Amphioxus, Chick 8. Study of development of chick embryo through incubated chick eggs up to 96 h. 9. Extra embryonic membranes of chick through permanent slides. 10. Some videos to develop understanding on the process of development. 11. Study of adaptive radiations in feet of birds and mouth parts of insects. 12. Understanding embryological evidence of evolution (through charts and videos). 13. Study of types of fossils. 14. Analogy and homology (wings of birds and insects, forelimbs of bat and rabbit). 15. Preparation of models of amino acids and dipeptides. 16. Ninhydrin test for α-amino acids. 17. Determination of pK and pI values of glycine. 18. Benedict's test for reducing sugars. 19. Iodine test for starch. 20. Determination of acid value of oil 21. Preparation of ball and stick model for B-DNA molecule (A=T and G=C base pairs). 22. Estimation of DNA by DPA method. 23. Estimation of RNA by Orcinol method. 24. Isolation of genomic DNA by ethanol precipitation method.	30

Keywords: Genetics, Mendel's law, Interaction of Gene, Embryology, Regeneration, Evolution.

Part C - **Learning Resource**
Text Books, Reference Books, Other Resources

Suggested Readings:

Text Books:

1. Practical Hand Book of Genetics: Vikas Pali Kalyani Publication
3. Essential Practical Handbook of Cell Biology & Genetics, Biometry & Microbiology, A Laboratory Manual Debarati Das, Academic Publishers.
4. Cytogenetics:Mohan P Arora, Himalayan Publishing House
5. Modern Experimental Biochemistry by Rodney F. Boyer
6. Molecular Cloning: A Laboratory Manual by Joe Sambrook
7. Practical Manual for Biochemistry : By GG Kaushik, CBS Publication

E-Resources:

1. https://onlinecourses.nptel.ac.in/noc22_cy32/preview
2. https://www.classcentral.com/course/swayam-experimental-biochemistry-12909
3. https://jru.edu.in/studentcorner/lab-manual/bpharm/Lab%20Manual%20-%20Biochemistry.pdf
4. Fundamentals of Genetics.pdf (jru.edu.in)

Part D: **Assessment and Evaluation**
Practical Exam(UE): Maximum Marks: 50 Marks

DECLARATION

This is to certify that the syllabus is framed by the central board of study (Zoology) as per the guidelines of the department of higher education, Chhattisgarh government.

1. Dr. K. R. Sahu - Chairman -
   Assistant Professor, Govt. Pandit Madhav Rao Sapre Collfge, Pendra Road 13.6.2022
2. Dr. Ajit Hundet - Member -
   Professor, Govt. D. B. Girls College, Raipur
3. Dr. Prem Prakash Singh - Member - Prem Prakash Singh 13/06/2022
   Professor, Govt. College, Kusmi, Balrampur
4. Dr. Shubhada Rahalkar - Member - S Rahalkar 13.6.2022
   Professor, Govt. Bilasa Girls P. G. College, Bilaspur
5. Dr. Anil Kumar Shrivastava - Member -
   Professor, Govt. V. Y. T. P. G. Autonomous College, Durg

6. Dr. R. K. Tamboli - Member -
Assistant Professor, Kirodimal Govt. Arts & Science College, Raigarh

7. Dr. Parmita Dubey - Member -
Assistant Professor, Govt. J. Y. Chhattisgarh College, Raipur

8. Dr. Shashi Gupta - Member -
Assistant Professor, Govt. Nagarjuna P. G. College of Science, Raipur

9. Dr. L. P. Miri - Member -
Assistant Professor, Govt. J.P. Verma P. G. Arts & Commerce College, Bilaspur

10. Dr. Rajesh Kumar Rai - Member -
Assistant Professor, Govt. Mahamaya College, Ratanpur, Bilaspur

11. Dr. Hema Kulkarni - Member -
Assistant Professor, Shahid Domeshwar Sahu Govt. College, Jamgaon (R), Durg

Date: 13.06.2022.

Part A: Introduction				
Program: **Certificate Course**		Class: **B.Sc. II Year**	Year: **2023**	Session:**2023-2024**
1	Course Code	**ZOOL - 3T**		
2	Course Title	**Genetics, Developmental Biology & Evolution**		
3	Course Type	Theory		
4	Pre-requisite (if any)	NO		
5	Course Outcome	After successfully completing this course, the students will be able to: • Apply the principles of Mendelian inheritance on interaction of genes. • Various methods of sex determination in animal kingdom. • Understand the cause and effect of alterations in chromosome number and structure. • Know the Recent Assisted Reproductive Techniques • Develop critical understanding how a single-celled fertilized egg becomes an embryo and then a fully formed adult by going through three important processes of cell division, cell differentiation and morphogenesis. • Understand the general patterns and sequential developmental stages during embryogenesis and understand how the developmental processes lead to establishment of body plan of multicellular organisms. • Understand evolution through natural selection, and other forces.		
6	Credit Value	Theory : 4		
7	Total Marks: 50	Max. Marks: 50	Min Passing Marks : 17	

Part B : Content of Course		
Total No. of Periods : 60		
Unit	**Topics**	**No. of Period**
I	**Concept of Genes and The recombination and interaction of Genes :** Elements of heredity and variation - Classical and Modern concept of Gene (Cistron, muton, recon), Alleles. Mendel's laws of inheritance - Incomplete dominance, Codominance, Multiple alleles. Interaction of Genes - Lethal alleles, Pleiotropy, Epistasis, Supplementary Gene, Complementary genes, Polygenic inheritance. Linkage and crossing over, Linkage Map. Extra chromosomal and Maternal Inheritance. Sex Chromosomes and sex-linkage. Sex Determination	12
II	**Regulation of Gene expression & Human Population Genetics :** Gene Expressions and regulation - One gene-one enzyme hypothesis /one polypeptide hypothesis. Concept of Operon - Concept of Operon of bacteria and bacteriophages. Bacterial transposons. Transformation, transfection and transduction. Utility of the model organisms - *Escherichia coli*, & *Drosophila melanogaster*. Structural and numerical alterations of chromosomes - meiotic consequences in structural heterozygotes. Genetic disorders - Chromosomal Aneuploidy, Chromosome Translocation and Deletion, Single gene Disorders, Epigenetics, Pedigree analysis. Genetic counselling.	12

13.6.2022

III	**Developmental Biology :** Gametogenesis, Structure of Gametes and Types of Eggs. Fertilization - external and internal. Structural and biochemical changes in gametes during and after fertilization block to polyspermy, causes of Infertility. Establishment of the major embryonic axis, polarity. Cleavage - Types and patterns. Body plan and symmetries. Development of frog and Chick up to formation of three germ layers. Tubulation. Morphogenesis, Fate maps. Organogenesis - formation of gut, heart, kidney and muscles. Inhibition, induction, and recruitment. Concept of competence, determination and differentiation and growth, Pleuropotency.	12
IV	**Biology of development and Recent Techniques :** Parthenogenesis. Regeneration - epimorphosis, morphollaxis and compensatory regeneration. Extra embryonic membranes. Amniocentesis. Placenta - Types structure and functions. Recent Assisted Reproductive Techniques (ART) – Stem cell (Types and their uses), Gene bank, Sperm Bank, Superovulation, Cryopreservation, Invitro fertilization (IVF), Embryo transfer (ET).	12
V	**Evolution :** Origin of Life on Earth, Early life on Earth - Indirect evidences & direct evidence of early life. Evidences of Organic evolution. Theories of Organic evolution. Sources of variation - Mutation, recombination, Isolation, Genetic drift, Neutral and Artificial evolution. Evolution of Human.	12

Keywords: Genetics, Mendel's law, Interaction of Gene, Sex Linkage, Sex Determination, Gametogenesis, Fertilization, Cleavage, Embryology, Regeneration, Parthenogenesis, Extra embryonic membrane, Placenta, Evolution,

Part C - **Learning Resource**

Text Books, Reference Books, Other Resources

Suggested Readings:

Text Books:

1. Gardner, E.J. *et al.* (2006) Principles of Genetics (John Wiley).
2. Russell, P.J. (2010) Genetics (Benjamin Cumm ings).
3. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). Principles of Genetics. (VIII edition) Wiley India.
4. Snustad, D.P. and Simmons, M.J. (2009). Principles of Genetics. (V edition) John Wiley and Sons Inc.
5. Klug, W.S., Cummings, M.R. and Spencer, C.A. (2012). Concepts of Genetics. (X edition) Benjamin Cummings.
6. Carroll S.B.; Doebley J.; Griffiths, A.J.F. and Wessler, S.R. (2018) An Introduction to Genetic Analysis. W. H. Freeman and Co. Ltd.
7. Gerhart, J. et al. (1997) Cells, Embryos and Evolution. Blackwell Science
8. Gilbert, S.F. (2010) Developmental Biology (9th edition).
9. Sinauer Wolpert, L. (2007) Principles of Developmental Biology (3rd edition). Oxford University Press.
10. Campbell, N. and Reece, J. (2014) Biology (10th edition). Benjamin Cummings
11. Ridley, M. (2004). Evolution. III Edition. Blackwell Publishing.
12. Barton, N. H., Briggs, D. E. G., Eisen, J. A., Goldstein, D. B. and Patel, N. H. (2007). Evolution. Cold Spring, Harbour Laboratory Press.
13. Hall, B. K. and Hallgrimsson, B. (2008). Evolution. IV Edition. Jones and Bartlett

Online Resources –

1. National digital Library.-

http://ndl.iitkgp.ac.in/document/Rm5qb3lqRngwWDZ2Tnl6UXl4VU9YR201R0cwYXJHV25HSHFacGxtS1h3REZGd1ByL28xcmlleEFFZU5najlCZ1lHdXBBTzBleTBVRGlDSFhkMEtuUkE9PQ

2. E-PG Pathshala.
   https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=2rAs1Puvga4LW93zMe83aA
3. eGyankosh- Genetics and Evolutionary Biology
4. eGyanKosh: BZYCT-137 Genetics and Evolutionary Biology

Part D: Assessment and Evaluation	
University Exam(UE): Maximum Marks:	50 Marks

DECLARATION

This is to certify that the syllabus is framed by the central board of study (Zoology) as per the guidelines of the department of higher education, Chhattisgarh government.

1. Dr. K. R. Sahu - Chairman -
   Assistant Professor, Govt. Pandit Madhav Rao Sapre Collfge, Pendra Road
2. Dr. Ajit Hundet - Member -
   Professor, Govt. D. B. Girls College, Raipur
3. Dr. Prem Prakash Singh - Member - Prem Prakash Singh 13/06/2022
   Professor, Govt. College, Kusmi, Balrampur
4. Dr. Shubhada Rahalkar - Member - Rahalkar 13.6.2022
   Professor, Govt. Bilasa Girls P. G. College, Bilaspur
5. Dr. Anil Kumar Shrivastava - Member -
   Professor, Govt. V. Y. T. P. G. Autonomous College, Durg
6. Dr. R. K. Tamboli - Member - 13/6/22
   Assistant Professor, Kirodimal Govt. Arts & Science College, Raigarh
7. Dr. Parmita Dubey - Member - Parmita 13.6.22
   Assistant Professor, Govt. J. Y. Chhattisgarh College, Raipur
8. Dr. Shashi Gupta - Member - 13.06.22
   Assistant Professor, Govt. Nagarjuna P. G. College of Science, Raipur
9. Dr. L. P. Miri - Member -
   Assistant Professor, Govt. J.P. Verma P. G. Arts & Commerce College, Bilaspur
10. Dr. Rajesh Kumar Rai - Member - 13.6.2022
    Assistant Professor, Govt. Mahamaya College, Ratanpur, Bilaspur
11. Dr. Hema Kulkarni - Member -
    Assistant Professor, Shahid Domeshwar Sahu Govt. College, Jamgaon R. Dist -Durg

Date : 13.06.2022.

Part A:Introduction				
Program: **Certificate Course**		Class: **B.Sc. II Year**	Year: **2023**	Session:**2023- 2024**
1	Course Code	**ZOOL- 4T**		
2	Course Title	**Biochemistry and Molecular Biology**		
3	Course Type	**Theory**		
4	Pre-requisite (if any)	No		
5	**Course Learning Outcomes (CLO)**	At the end of this course, the students will be able • Understand the structure and biological significance of carbohydrates, amino acids, proteins, lipids and nucleic acids. • Understand the concept of enzyme, its mechanism of action and regulation. • Learn the preparation of models of peptides and nucleotides. • Learn biochemical tests for amino acids, carbohydrates, proteins and nucleic acids. • Develop an understanding of concepts, mechanisms and evolutionary significance and relevance of molecular biology in the current scenario. • Understand the process of DNA replication, transcription and translation.		
6	Credit Value	4		
7	Total Marks	Max. Marks: 50	Min Passing Marks: 17	

Part B: Content of the Course		
Total No. of Periods: 60		
Unit	Topics	No. of Peroid
I	**Biomolecules:** Amino Acids, Peptides, and Proteins- structure of amino acids, peptide bond, Primary, secondary, tertiary and quaternary structure of proteins and their biological functions. Carbohydrates- Biological roles of carbohydrates, Structure of monosacharides- Hexoses and pentoses. Disacharides-Sucrose, lactose, maltose. Storage and structural polysaccharides-Glycogen, starch and cellulose. Lipids- Role of lipids in cellular architecture and functions. Definition and classification of lipids. Structure and function of fatty acids, triacylglycerols, phospholipids and sterols. Nucleic Acids- Role of nucleic acids in living system. Composition of nucleic acids-the purine and pyrimidine bases.	12
II	**Enzymes and Metabolic Pathways:** Enzyme - Nomenclature and classification, general properties, specificity, cofactors, isozymes and mechanism of enzyme action. Protein metabolism- Transamination and deamination, Urea cycle. Carbohydrate metabolism- Glycolysis, gluconeogenesis, Cori-cycle, TCA cycle, HMP shunt, glycogenolysis & glycogenesis (Glycogen synthesis) . Lipid Metabolism- Mobilization of triglycerides, metabolism of glycerol, β-oxidation of fatty acids, Ketogenesis and significance.	12

13.6.2022

III	**Structure of chromosomes, Nucleic acids and DNA replication:** Structure of nucleic acids- Structure of DNA, forms of DNA, supercoiling of DNA, Nucleosomes, Histones, Structure of chromatin, chromosomes, packaging of DNA in the nucleus. Structure of RNA- Ribosomal RNA (rRNA), Transfer RNA (tRNA), Messenger RNA (mRNA), Noncoding RNA. DNA replication- Chemistry of DNA replication, enzymes involved, Unit of replication, replication origin and replication fork, accuracy during flow of genetic information, proof reading activity; Comparison of replication in prokaryotes and eukaryotes.	12
IV	**Central dogma, RNA transcription, RNA processing:** Central Dogma of Molecular Biology. Trancription (RNA Synthesis) - DNA-dependent RNA polymerases, sigma factor, bacterial promoters, the three stages of RNA synthesis- initiation, elongation and termination, rho dependent and rho-independent termination. Transcription in eukaryotes. RNA processing-splicing of hnRNA into mRNA, 5'-capping and 3'-polyadenylation of mRNA, differential RNA Processing, rRNA and tRNA modifications and processing.	12
V	**Ribosomes and Translation (Protein Synthesis):** Structure and types of Ribosome. Genetic Code- triplet codons, Wobble base, synonymous codons, degeneracy of codons, missense-, nonsense- and frame shift mutations. Translation- protein synthesis in *Prokaryote and its comparison with* eukaryote., Aminoacylation of tRNA, initiation, elongation, peptide bond formation, translocation, termination, recycling of ribosome. Regulation of protein synthesis and codon bias - Post-translational modifications and processing of proteins.	12
Keywords: Biomolecules, biochemical pathways, Metabolism, Central dogma, Nucleic acids, chromosome, DNA replication, RNA Synthesis (Transcription), Protein Synthesis (Translation), Genetic code.		

Part C - **Learning Resource**
Text Books, Reference Books, Other Resources

Suggested Readings:

Text Books:

1. Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W.H. Freeman & Company (New York), ISBN: 13: 978-1-4292-3414-6 / ISBN:10-14641-0962-1.
2. Berg, J.M.; Tymoczko, J.L. and Stryer, L. (2012) Biochemistry (7th edition) Freeman.
3. Conn, E.E.; Stumpf, P.K.; Bruening, G. and Doi, R.H. (2006) Principles of Biochemistry (5th edition) Wiley.
4. Stryer, Lubert (1981) Biochemistry, 2nd Edition. W. H. Freeman and Company, New York.
5. Watson, J.D. *et al.* (2013) Molecular Biology of the Gene (7th edition) CSHL Press Pearson.
6. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition, John Wiley & Sons. Inc.
7. Walter, P. (2007) Molecular Biology of the Cell (5th edition) Garland Science.
8. Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, and Peter Walter(2002) Molecular Biology of the Cell, 4th edition. New York: Garland Science.
9. Harvey Lodish, Arnold Berk, Paul Matsudaira, Chris A. Kaiser, Monty Krieger,

Freeman(2003) Molecular Cell Biology, 5th edition. W. H. & Company.

Online resources (Try to include similar course available on SWAYAM/NPTEL/CEC etc.)

https://onlinecourses.nptel.ac.in/noc20_cy10/preview
https://www.classcentral.com/course/swayam-biochemistry-iitm-22920
https://onlinecourses.swayam2.ac.in/cec20_ma13/preview
https://www.classcentral.com/course/swayam-molecular-biology-19952

Part D: Assessment and Evaluation
University Exam (UE) : Maximum Marks: 50

DECLARATION

This is to certify that the syllabus is framed by the central board of study (Zoology) as per the guidelines of the department of higher education, Chhattisgarh government.

1. Dr. K. R. Sahu - Chairman -
   Assistant Professor, Govt. Pandit Madhav Rao Sapre College, Pendra Road
2. Dr. Ajit Hundet - Member -
   Professor, Govt. D. B. Girls College, Raipur
3. Dr. Prem Prakash Singh - Member -
   Professor, Govt. College, Kusmi, Balrampur
4. Dr. Shubhada Rahalkar - Member -
   Professor, Govt. Bilasa Girls P. G. College, Bilaspur
5. Dr. Anil Kumar Shrivastava - Member -
   Professor, Govt. V. Y. T. P. G. Autonomous College, Durg
6. Dr. R. K. Tamboli - Member -
   Assistant Professor, Kirodimal Govt. Arts & Science College, Raigarh
7. Dr. Parmita Dubey - Member -
   Assistant Professor, Govt. J. Y. Chhattisgarh College, Raipur
8. Dr. Shashi Gupta - Member -
   Assistant Professor, Govt. Nagarjuna P. G. College of Science, Raipur
9. Dr. L. P. Miri - Member -
   Assistant Professor, Govt. J.P. Verma P. G. Arts & Commerce College, Bilaspur
10. Dr. Rajesh Kumar Rai - Member -
    Assistant Professor, Govt. Mahamaya College, Ratanpur, Bilaspur
11. Dr. Hema Kulkarni - Member -
    Assistant Professor, Shahid Domeshwar Sahu Govt. College, Jamgaon R. Dist -Durg

Date : 13.06.2022.

Part A: Introduction

Program: *Diploma Course*		Class: **B. Sc. Part - II**	Year: **2023**	Session: 2023-2024
1	Course Code	**MICRO - 2P**		
2	Course Title	**Bacterial cell, Biochemistry & Molecular Biology**		
3	Course Type	Laboratory course		
4	Pre-requisite (if, any)	As per Govt. norms		
5	Course Learning. Outcomes (**CLO**)	At the end of this course, the students will be able to • - ***understand the microscopy, cytometry and relevant biochemical techniques*** • - ***handle the instruments / equipments applied for biochemical & molecular experiments*** • - ***perform the exercise /experiments of molecular biology***		
6	Credit Value	**02**		
7	Total Marks	Max. Marks: **50**	Min Passing Marks : **17**	

PART B: Content of the Course

Total No. of Teaching Hours - 20 / Periods -30

L. C.	Topics (Course contents)	No. of Period/Hours
A	1. Study of cell morphology – Prokaryotic & Eukaryotic cell 2. Study of cell division stages using Onion root tip. 3. Determination of antibiotic resistance by plating method. 4. Assaying of microbial enzymes; Catalase, Amylase 5. Separation of mixtures by paper / thin layer chromatography. 6. Demonstration of column packing in any form of column chromatography. 7. Separation of protein mixtures by any form of chromatography. 8. Determination of pH of various water and soil sample. 9. Testing of Lambert beer's law. 9. Production of any metabolite using batch fermentation.	**15 / 10**
B	1. Isolation of genomic DNA from *E. coli* 2. Isolation of DNA from plant cell (Onion/Mustard/Banana) 3. Transformation of E. coli – Preparation of competent cell 4. Conjugation in E. coli using plate method 5. Estimation of RNA using colorimeter or UV spectrophotometer 6. Resolution and visualization of DNA by Agarose Gel Electrophoresis. 7. Study survival curve of bacteria after exposure to ultraviolet (UV) light 8. Isolation of Plasmid DNA from *E. coli* 9. Separation of protein mixtures by Polyacrylamide Gel Electrophoresis (PAGE)	**15 / 10**
Keywords	***Biochemical techniques, Chromatography, DNA isolation, RNA estimation, Plasmid***	

PART – C

Learning Resources: Text Books, Reference Books and Others

Suggested Readings:

Text Books Recommended –

1.Aneja K. R., Laboratory Manual Of Microbiology And Biotechnology, Medtech; 1st edition, 2017 2 Text books and Laboratory manuals as mentioned in MICRO – 3T and 4T

Online Resources –

https://thebookee.net/

http://site.iugaza.edu.ps/mwhindi/files/Laboratory_Manual_And_Workbook_In_Microbiology.pdf

http://site.iugaza.edu.ps/ydahdouh/files/General-Microbiology-Laboratory-pdf.pdf

Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: Continuous Comprehensive Evaluation (CCE): Annual /University Exam(UE):		50 Marks NA 50 Marks
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment /Field work	NA

Dr. Rachana Choudhary
Subject Expert
H.O.D Microbiology
S.S.M.V. Junwani, Bhilai

Dr. DK Shrivastava
Member
HOD Microbiology
GovtERR PG Sc. College.
Bilaspur

Dr. Shubhraja Pandey
Chancellor Nominated
Chairperson
HOD, Microbiology
D.P Vipra College
Bilaspur (C.G)

Rashmi
Dr. Rashmi Parihar
Subject expert
Dept. of Microbiology
Govt. E.R.R.P.G. Science
College, Bilaspur.

Dr. Richa Mishra
member
H.O.D. Microbiology
APSCMNS Govt. P.G. College
Kawardha (C.G.)

Dr. K.K. Patel
Govt. T.C.L
P.G. College
Janjgir

Dr. Seema Anil Beloskar
Microbiology & Bioinformatics
ABVV, Bilaspur.

Dr. D.K. Chandraker
COS chairperson
Head Microbiology
UTD ASVV, Bhopal

Dr. Sadhana Jaiswal (Member)
Govt. Nagarjuna PG.
College of Science, Raipur

Dr. Swetlana Nagpal
HOD Microbiology
Govt. M.K.G.C Mahasamund

Part - A: Introduction

Program: *Diploma Course*	Class: **B. Sc. Part - II**	Year:**2023**	Session:2023-2024

1	Course Code	**MICRO -3T**	
2	Course Title	**Cell biology, Biochemistry and Bioinstrumentation**	
3	Course Type	**Core course**	
4	Pre-requisite (if, any)	As per Government norms	
5	Course Learning. Outcomes **(CLO)**	At the end of this course, the students will be able to -- • ***- clarify the basic concept of feature, types, function and importance of living cell as a structural & functional unit of living body*** • ***- get acquaintance of the knowledge about biochemical reactions and cellular mechanism to provide bio energy for living activities*** • ***- know about basic principle, procedure and application of various instruments and techniques to explore the biological system*** • ***- exercise the various experiments and perform fundamental biological techniques operating the concern instruments***	
6	Credit Value	**04**	
7	Total Marks	Max. Marks: **50**	Min Passing Marks: **17**

PART B: Content of the Course

Total No. of Teaching Hours – 40 / Periods - 60

Unit	Topics (Course contents)	No. of Period / Hour
I	**Structure and organization of Cell** Cell Organization –Plant and animal cells: Plasma membrane: Structure and functions, Cell Wall: Eukaryotic cell wall. Cell-Cell Interactions - adhesion junctions, tight junctions, gap junctions, and plasmodesmata (only structural aspects). Mitochondria, endoplasmic reticulum, Golgibody, Ribosomes, Lysosomes, Chloroplasts and Peroxisomes.	12 / 08
II	**Biomolecules - Structure, classification, function and properties** Carbohydrates Monosaccharide, Oligosaccharides (Disaccharides) and Polysaccharides. Protein - Amino acids, peptides and Proteins structural organisation. Lipids Saturated and unsaturated.	12 / 08
III	**Metabolism** Glycolysis, TCA cycleand Oxidative Phosphorylation. Anaerobic catabolism of glucose; Fat Biosynthesis,alpha and beta oxidation of fatty acids, Decarboxylation, Deamination, trasns-amination and Urea cycle.	12 / 08

IV	**Bioinstrumentation - I: Principle, Instrumentation and applications** pH Meter, Microscopy (Light compound, Phase-contrast microscope & Electron microscope), Colorimeter, Spectrophotometer, Turbidometer, Centrifuge - differential & density gradient centrifugation techniques	12 / 08
V	**Bioinstrumentation –II: Principle, Instrumentation and applications** Electrophoresis - types, Gel electrophoresis, Chromatography - Paper Chromatography, Thin Layer Chromatography, Column Chromatography Ion Exchange Chromatography, High Pressure Liquid Chromatography and Gas Chromatography	12 / 08
Keywords	***cell biology, bio-molecules, metabolism, bioinstrumentation***	

PART - C

Learning Resources: Text Books, Reference Books and Others

Suggested Readings:

Text Books Recommended -

1. Watson JD, Baker TA, Bell SP, Gann A, Levine M and Losick R (2008) Molecular Biology of the
2. De Robertis EDP and De Robertis EMF (2006) Cell and Molecular Biology, 8th edition. Lippincott
3. Williams and Wilkins, Philadelphia
4. Karp G (2010) Cell and Molecular Biology: Concepts and Experiments, 6th edition, John Wiley &Sons. Inc.
5. Sambrook J and Russell DW. (2001). Molecular Cloning: A Laboratory Manual. 4th Edition, ColdSpring Harbour Laboratory press.
6. Krebs J, Goldstein E, Kilpatrick S (2013). Lewin's Essential Genes, 3rd Ed., Jones and Bartlett Learning
7. Wiley JM, Sherwood LM and Woolverton CJ. (2008). Prescott, Harley and Klein's Microbiology. McGraw Hill Higher Education
8. Wilson K and Walker J. (2010). Principles and Techniques of Biochemistry and Molecular Biology. 7th Ed., Cambridge University Press.
9. Nelson DL and Cox MM. (2008). Lehninger Principles of Biochemistry, 5th Ed., W.H. Freema and Company.

Online Resources –

- **e-Resources / e-books and e-learning portals**
- **Use of following sites**

1. **https://nptel.ac.in/courses/102103015**
2. **https://onlinecourses.swayam2.ac.in/cec19_bt11/preview**
3. **https://www.britannica.com**

Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks:		50 Marks
Continuous Comprehensive Evaluation (CCE):		NA
Annual /University Exam(UE):		50 Marks
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment /Field work	NA

DR. K K Patel
Govt. T.C.L. P.G. College
Jagdalpur

Dr. Rachana Choudhary
Subject Expert
H.O.D. Microbiology
S.S. M.V. Junwani, Bhilai

Dr. PK Srivastava
Member
HOD Microbiology
GGVERR PG Sc.
College Bilaspur

Sadhana

Dr. Sadhana Jaiswal
(Member)
HOD - Microbiology
Govt. N.P.G. college of
Science, Raipur

Dr. Richa Mishra
member
H.O.D. Microbiology
APSAMNS Govt P.G.
College Kawardha (C.G.)

NAGAL

Ds. Swetlana Nagal
HOD Microbiology
Govt. M.K.G.C
Mahasamund.

Rashmi

Dr. Rashmi Parihar
Subject expert
Dept. of microbiology
Govt. E.R.R. PG. Science
College, Bilaspur.

Dr. Shubhraj Pandey
Chancellor Nominated
Chairperson
HOD, Microbiology
D. P Vipra College
Bilaspur (C.G.)

Dr. Seema Belorkar
Subject Expert-
MBBT, ABVV
Bilaspur.

Prof. DSVCAU Lecturer
CBOS chairperson
Head Microbiology Bilaspur
UTD, ABVV, Bilaspur

Part - A: Introduction

Program: *Diploma Course*	Class: **B. Sc. Part - II**	Year:**2023**	Session:2023-2024

1	Course Code	**MICRO - 4T**	
2	Course Title	**Microbial Genetics, Molecular Biology & Genetic Engineering**	
3	Course Type	**Core course**	
4	Pre-requisite (if, any)	As per Government norms	
5	Course Learning. Outcomes **(CLO)**	At the end of this course, the students will be able to -- • - ***clarify the basic concept of Genetics, Microbial genetics, mode of recombination microbes as basis of sexuality in living beings*** • - ***get acquaintance of the knowledge about the Gene expression & regulation with concept of central dogma of Molecular biology*** • - ***know about basic principle, procedure and application of Recombinant DNA Technology***	
6	Credit Value	**04**	
7	Total Marks	Max. Marks: **50**	Min Passing Marks: **17**

PART B: Content of the Course

Total No. of Teaching Hours – 40 / Periods - 60

Unit	Topics (Course contents)	No. of Period / Hour
I	**Microbial Genetics:** Mechanisms of Genetic Exchange Transformation, Conjugation and Transduction. Types of plasmids – F plasmid, R Plasmids, colicinogenic plasmids, Ti plasmids, linear plasmids. Plasmid replication and partitioning. Prokaryotic transposable elements – Insertion Sequences, Replicative and Non replicative transposition, composite and non-composite transposons, Mutations and mutagenesis.	12 / 08
II	**Genetic material:** Miescher to Watson and Crick- historic perspective, DNA structure, Types of DNA, Organization of DNA Prokaryotes, Viruses, and Eukaryotes. RNA Structure, Organelle DNA-mitochondria and chloroplast DNA. Replication of DNA (Prokaryotes). DNA Repair system and its types.	12 / 08
III	**Fundamentals of Molecular genetics:** Central dogma of Molecular biology. Transcription, Translation in Prokaryotes, Post Translational Processing. Regulation of gene Expression in Prokaryotes. Principles of transcriptional regulation, regulation at initiation with examples from lac- and trp- operons.	12 / 08

IV	**Introduction to Genetic Engineering:** Molecular Cloning- Tools; Restriction modification systems: Types I, II and III. Mode of action, nomenclature, DNA modifying enzymes and their applications. Cloning Vectors: Definition and Properties Plasmid vectors: pBR and pUC series. Bacteriophage lambda and M13 based vectors. Cosmids, BACs, YACs. Expression vectors: E.coli lac and T7 promoter-based vectors, SV40-based expression vectors.	12 / 08
V	**Molecular Cloning and Transformation:** Methods in Molecular Cloning and Transformation of DNA: Chemical method, Electroporation, Gene delivery: Microinjection, electroporation, DNA, RNA and Protein analysis: Agarose gel electrophoresis, Southern - and Northern - blotting techniques, dot blot, DNA microarray analysis, SDS-PAGE and Western blotting. Applications of Recombinant DNA Technology	12 / 08
Keywords	***Genetics, Microbial genetics, Nucleic acid, Central dogma, Gene, Gene expression***	

PART - C

Learning Resources: Text Books, Reference Books and Others

Suggested Readings:

Text Books Recommended -

1. Genetics by P. K. Gupta, Rastogi Publication, New Delhi
2. Watson JD, Baker TA, Bell SP, Gann A, Levine M and Losick R (2008) Molecular Biology
3. De Robertis EDP and De Robertis EMF (2006) Cell and Molecular Biology, 8th edition. Lippincott
4. Karp G (2010) Cell and Molecular Biology: Concepts and Experiments, 6th edition, John Wiley & Sons.
5. Sambrook J and Russell DW. (2001). Molecular Cloning: A Laboratory Manual. 4th Edition, Cold Spring Harbour Laboratory press.
6. Wiley JM, Sherwood LM and Woolverton CJ. (2008). Prescott, Harley and Klein's Microbiology McGraw Hill Higher Education
7. Wilson K and Walker J. (2010). Principles and Techniques of Biochemistry and Molecular Biology. 7th Ed., Cambridge University Press.
8. Nelson DL and Cox MM. (2008). Lehninger Principles of Biochemistry, 5th Ed., W.H. Freeman and Company.

Online Resources –

- **e-Resources / e-books and e-learning portals**
- **Use of following sites**
  1. **https://nptel.ac.in/courses/102103015**
  2. **https://onlinecourses.swayam2.ac.in/cec19_bt11/preview**
  3. **https://www.britannica.com**

Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: Continuous Comprehensive Evaluation (CCE): Annual /University Exam(UE):		50 Marks NA 50 Marks
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment /Field work	NA

Dr. Rachana Choudhary
Subject Expert
H.O.D. Microbiology
S.S.M.V. Junwani

Dr. D. K. Shrivastava
Member
HOD, Microbiology
Govt ERR PG Sc. College
Bilaspur (C.G.)

Rashmi
Dr. Rashmi Parihar
member, Subject expert
Dept. of microbiology
Govt. E.R.R. PG. Sc. college
Bilaspur (C.G.)

Dr. Seema A. Beloskar
Member, Subject Expert
Dept. of Microbiology & Bioinformatics
Atal Bihari Vajpayee University,
Bilaspur.

Dr. Shubhraja Pandey
Member
HOD. Microbiology
D.P Vipra College
Bilaspur

DR. K K Patel
Member
Head Dept of Microbiology
Govt T.C.L.P.G. College
Janjgir C.G.)

Dr. Sadhana Jaiswal
Member-Subject expert
HOD - Microbiology
Govt. N. P. G. college of
Science, Raipur

Dr. Richa Mishra
member
HOD. Microbiology
APSCMNS Govt. P.G.
College Kawardha

Dr. Swetlana Nagal
HOD Microbiology
Govt. M.K.G College
Mahasamund.

Prof Divakar Goldar
CBOS chairperson
Head, Microbiology & Biotech,
UTD ASVV, Bhopal

Part A Introduction				
Program: **DiplomaCourse**		Class: **B.Sc. IIYear**	Year: **2022**	Session:**2023-2024**
S.No.				
1	Course Code	GEOL-2 P		
2	Course Title	Petrology & Structural Geology (Practical)		
3	Course Type	Practical		
4	Pre-requisite (if any)	This practical Course is related to theory course Geology Paper I& II.		
5	Course Learning Outcomes (CLO)	On completion of Course, the students should be able to - • Identify the igneous, Sedimentary and metamorphic rocks in hand specimens and thin sections. • Use of Clinometer compass and Brunton compass. • Recognize the folds, faults , unconformities and joints in specimens and models. • Completion of outcrops and preparation of Geological cross section and interpretation of geological history.		
6	Credit Value	Practical : 2		
7	Total Marks	Maximum Marks: 50	Minimum Passing Marks : 17	

Part B1 Content of the Course	
Petrology	
Topics	**No. of Periods**
Diagrammatic representation of various forms of igneous, sedimentary & Metamorphic rocks	3
Diagrammatic representation of various structures of igneous, sedimentary & Metamorphic rocks	3
Megascopic studies of various sedimentary, metamorphic & igneous rocks.	3
Microscopic studies of various sedimentary, metamorphic & igneous rocks.	3
Diagrammatic representation of petrographic provinces of India in outline map of India.	3

Part B2 Content of the Course	
Structural Geology	
Topics	**Number of Periods**
Study of Natural Structures in specimens.	03
Study of structures models.	03
Completion of outcrops.	03
Preparation of geological section from simple to complex geological maps and its interpretation.	03
Introductory idea of stereographic projection in structural geology.	03
Field work of three days is compulsory for the students.	

Part C
Learning Resource

Suggested Readings:

Text Books :

(1) शैलिकी के सिद्धान्त–डॉ.अंबिकाप्रसादअग्रवाल
(2) शैलिकी के सिद्धान्त– ए.जी. झिंगरन
(3) Principles of petrology - G.W. Tyrell
(4) Petrology - H.William, F.J. Turner & E.M. Gilbert
(5) Petrology of igneous & metamorphic rocks of India- S.C. Chattarjee
(6) A text book of sedimentary petrology - Verma& Prasad
(7) Metamorphism & Metamorphic rocks of India -S.Ray
(8) Sedimentary rocks - F.J. Pettijohn
(9) Introduction of sedimentolog - S.Sengupta
(10) Sedimentary environment-H.G. Readings
(11) संरचनात्मकभूविज्ञान–डॉ.डी.के. श्रीवास्तव
(12) भूवैज्ञानिकसंरचनाएँ–डॉ. भरत सिंह राठौर
(13) प्रायोगिकभूविज्ञान (भाग–2) –आर.पी. मांजरेकर
(14) Structural Geology. - M.P. Billings.
(15) Theory of Structural Geology; Gokhale, N.W. CBS
(16) Exercises on Geological maps and dip-Strike: Gokhale, N.W. CBS.
(17) Outlines of structural Geology. E.S. Hills.
(18) Structural Geology- Hobbs. Means and Williams
(19) Geological maps- Chiplonkar and Pawar

E-resources

1. https://epgp.inflibnet.ac.in/Home
2. https://archive.org/details/in.ernet.dli.2015.233340/page/n15/mode/2up

3. https://egyankosh.ac.in/
4. https://sites.google.com/ignou.ac.in/bscgeology
5. SWAYAM – https://swayam.gov.in/explorer?searchtext
6. National digital library – https://ndl.iitkgp.ac.in
7. e-PG pathshala (MHRD) portal, https://egpg.inflibnet .ac.in

PartD **AssessmentandEvaluation**		
SuggestedContinuousEvaluationMethods: MaximumMarks:50 ContinuousComprehensiveEvaluation(CCE):NA UniversityExam(UE): 50 marks		
InternalAssessment: ContinuousComprehensive Evaluation(CCE)	Class Test Assignment/Presentation	NA

Declaration

This is to certify that the syllabus is framed by the Central Board of Studies in Geology as per the guidelines of the Department of Higher Education, Chhattisgarh. This meeting was held at AtalBihariBajpai University Bilaspur on 3rd June 2022.

S.No.	Name	College	Designation	Signature
1	Prof. MahfoozArif	Govt.E.RaghvendraRao Science college, Bilaspur(C.G.)	Chairman	
2	Prof.Ramesh Joshi	Govt.Kaktiya PG College, Jagdalpur, Bastar (C.G.)	Member	
3	Prof.Pradeep Singh Gour	BhanuPratapDeoGovt.PG.College, Kanker(C.G.)	Member	
4	Dr.Shailendra Singh Bhadauria	Govt.Nagarjuna Science College, Raipur (C.G.)	Member	
5	Dr.S.D.Deshmukh	Govt.V.Y.T PG Autonomous College,Durg (C.G.)	Member	3.6.22
6	Prof.AmitanshuShekharJha	Govt.Kaktiya PG College, Jagdalpur, Bastar (C.G.)	Member	
7	Prof.SunilA.K.Kerketta	Rajiv Gandhi Govt.PG College, Ambikapur (C.G.)	Member	Present online
8	Dr. NinadBodhankar	Prof. & Head Department of Geology & WRM SOS in Geology, Pt. RS University Raipur	Member	Present online
9	Dr. SandeepVansutre	Govt.Nagarjuna Science College, Raipur (C.G.)	Member	Present online
10	Pro A.K.Sandilaya	Prof., Department of Applied Geology, Dr. HS Gour University Sagar, M.P.	Member	Present online
11	Dr. BhargavaAyangar	Department of Applied Geology,NIT Raipur	Member	Present online

Part A Introduction				
Program: **DiplomaCourse**		Class: **B.Sc. IIYear**	Year: **2022**	Session:**2023-2024**
S.No.				
1	Course Code	GEOL – 3 T		
2	Course Title	Petrology (Paper I)		
3	Course Type	Theory.		
4	Pre-requisite (if any)	To study this group, a student must have passed in the B.Sc. I Year Geology		
5	Course Learning Outcomes (CLO)	On completion of course, the students should be able to - • Discuss about the formation of igneous rocks, their texture and structures. • Explain about forms and classification of igneous rocks • Identify, describe and classify sedimentary rocks using hand specimens. • Describe the formation of sedimentary rocks, their textures and structures. • Explain about the formation of metamorphic rocks, their texture and structure. • Identify and classify various types of metamorphic rocks. • Explain the concept of metamorphic facies, ACF, AKF and AFM diagrams.		
6	Credit Value	Theory : 4		
7	Total Marks	Maximum Marks: 50	Minimum Passing Marks : 17	

Part B Content of the Course		
Total Periods: 60		
Unit	**Topics**	**No. of Periods**
I	**Igneous petrology :** Magma: definition, origin & composition, Bowen's reaction series, magmatic differentiation & assimilation, Introduction to crystallisation of Unicomponent (silica), Bicomponent (albite-anorthite and diposide-anorthite) and tricomponent magma(diopside-albite-anorthite),Texture, structures & forms of igneous rocks, Classification of igneous rocks: Mineralogical, Chemical &Tabular classification	12
II	**Igneous petrology :** Brief idea of the formation of igneous rocks in relation to Plate Tectonics, Introduction to petrology of Acid igneous rocks, Introduction to petrology of Alkaline igneous rocks, Introduction to petrology of Basic igneous rock, Introduction to petrology of Ultrabasic igneous rocks.	12

III	**Sedimentary petrology :** Origin, transportation & deposition of sediments, Sedimentary depositional environments - Aeolian, fluvial, coastal and abyssal environment, Introduction to sedimentary facies. Lithification&Diagenesis, Textures &structures of sedimentary rocks, Brief idea of the formation of sedimentary rocks in relation to Plate Tectonics	12
IV	**Sedimentary & metamorphic petrology:** Classification of sedimentary rocks-Clastic, non-clastic and biogenic rocks, Petrographic description of Breccia,Conglomerate, sandstone, shale, siltstone andlimestone, Metamorphism:Definition, agents, facies& grades, Textures, structures & classification of metamorphic rocks, Phase rule in metamorphism. Elementary idea about Paragenetic diagrams& projective analysis.	12
V	**Metamorphic petrology:** A.C.F& A.K.F. diagrams, Progressive metamorphism of Argillaceous rocks and thermal metamorphism of impure limestone, Progressive metamorphism of basic igneous rocks, Petrographic description of slate, phyllite, schist, gneiss, marble, quartzite, amphibolite, Khondalite, Gondite, Kodurite&Charnockite, Introduction to Paired Metamorphic Belts.	12

Part C
Learning Resource

Suggested Readings:

(1) शैलिकी के सिद्धान्त–डॉ.अंबिकाप्रसादअग्रवाल
(2) शैलिकी के सिद्धान्त– ए.जी. झिंगरन
(3) Principles of petrology - G.W. Tyrell
(4) Petrology - H.William, F.J. Turner & E.M. Gilbert
(5) Petrology of igneous & metamorphic rocks of India- S.C. Chattarjee
(6) A text book of sedimentary petrology -Verma& Prasad
(7) Metamorphism & Metamorphic rocks of India - S.Ray
(8) Sedimentary rocks -F.J. Pettijohn
(9) Introduction of sedimentology -S.Sengupta
(10) Sedimentary environment -H.G. Readings

E-resources

1. https://epgp.inflibnet.ac.in/Home
2. https://archive.org/details/in.ernet.dli.2015.233340/page/n15/mode/2up
3. https://egyankosh.ac.in/
4. https://sites.google.com/ignou.ac.in/bscgeology
5. SWAYAM – https://swayam.gov.in/explorer?searchtext
6. National digital library – https://ndl.iitkgp.ac.in
7. e-PG pathshala (MHRD) portal, https://egpg.inflibnet .ac.in

PartD AssessmentandEvaluation		
SuggestedContinuousEvaluationMethods: MaximumMarks:50 ContinuousComprehensiveEvaluation(CCE):NA UniversityExam(UE): 50 marks		
InternalAssessment: ContinuousComprehensive Evaluation(CCE)	Class Test Assignment/Presentation	NA

Declaration

This is to certify that the syllabus is framed by the Central Board of Studies in Geology as per the guidelines of the Department of Higher Education, Chhattisgarh. This meeting was held at AtalBihariBajpai University Bilaspur on 3rd June 2022.

S.No.	Name	College	Designation	Signature
1	Prof. MahfoozArif	Govt.E.RaghvendraRao Science college, Bilaspur(C.G.)	Chairman	
2	Prof.Ramesh Joshi	Govt.Kaktiya PG College, Jagdalpur, Bastar (C.G.)	Member	
3	Prof.Pradeep Singh Gour	BhanuPratapDeoGovt.PG.College, Kanker(C.G.)	Member	
4	Dr.Shailendra Singh Bhadauria	Govt.Nagarjuna Science College, Raipur (C.G.)	Member	
5	Dr.S.D.Deshmukh	Govt.V.Y.T PG Autonomous College,Durg (C.G.)	Member	3.6.22
6	Prof.AmitanshuShekharJha	Govt.Kaktiya PG College, Jagdalpur, Bastar (C.G.)	Member	
7	Prof.SunilA.K.Kerketta	Rajiv Gandhi Govt.PG College, Ambikapur (C.G.)	Member	Present online
8	Dr. NinadBodhankar	Prof. & Head Department of Geology & WRM SOS in Geology, Pt. RS University Raipur	Member	Present online
9	Dr. SandeepVansutre	Govt.Nagarjuna Science College, Raipur (C.G.)	Member	Present online
10	Pro A.K.Sandilaya	Prof., Department of Applied Geology, Dr. HS Gour University Sagar, M.P.	Member	Present online
11	Dr. BhargavaAyangar	Department of Applied Geology,NIT Raipur	Member	Present online

Part A Introduction				
Program: **DiplomaCourse**		Class: **B.Sc. IIYear**	Year: **2022**	Session:**2023-2024**
S.No.				
1	Course Code	GEOL – 4 T		
2	Course Title	Structural Geology (Paper II)		
3	Course Type	Theory.		
4	Pre-requisite (if any)	To study this group, a student must have passed in the B.Sc. Part I Geology		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be ableto - • Demonstrate the use of Clinometer compass and Brunton compass in measurement of attitude of rock bed. • Explain about parts of fold and classify various folds. • Recognize and classify the faults in the field and on geological map. • Identify and classify Unconformities. • Discuss about various types of Joints. • Explain various types of foliations and lineations. • Identify the top and bottom of rock beds in a series of rocks.		
6	Credit Value	Theory : 4		
7	Total Marks	Maximum Marks: 50	Minimum Passing Marks : 17	

Part B Content of the Course		
Total Periods: 60		
Unit	**Topics**	**No. of Periods**
I	**Attitude of rocks and unconformity :** Structural Geology: Definition and scope. Study of outcrops. Identification of bedding, Dip and strike: definition & measurement. Effects of Dip and slope on outcrops: Rule of 'Vs', Clinometer and Brunton compass: Understanding and use in measuring attitude of rocks, Unconformity: Definition & types, Outlier and inlier. Overlap &offlap. Recogntion of unconformity.	12
II	**Fold :** Fold: Definition and morphology, Geometric and genetic classification of folds, Recognition of folds in the field and on geological maps, Effect of folds on outcrops, Elementary idea of mechanics of folding.	12

III	**Fault:** Fault: Definition and morphology, Geometric and genetic classification of faults, Recognition of faults in the field and on geological maps,Effect of faults on outcrops, Elementary idea of mechanics of faulting.	12
IV	**Joint, Foliation & Lineation :** Joint: Definition, geometric &genetic classification of joints. Significance of joints, Foliation: terminology, kinds, origin and relation to major structures, Lineation: terminology, Kinds, origin and relation to major structures, Plutons; tectonics & emplacement, Recognition of top and bottom of beds.	12
V	**Rock deformation and geological maps :** Concept of rock deformation, Stress and Stress Ellipsoids, Tectonic framework of India, Contours: Definition, patterns. Introduction to geological maps and their interpretation, Stereographic projection & it use in Structural geology.	12

PartC

LearningResources

SuggestedReadings

(1) संरचनात्मकभूविज्ञान–डॉ.डी.के. श्रीवास्तव
(2) भूवैज्ञानिकसंरचनाएँ–डॉ. भरत सिंह राठौर
(3) प्रायोगिकभूविज्ञान (भाग–2) –आर.पी. मांजरेकर
(4) Structural Geology. M.P. Billings.
(5) Theory of Structural Geology; Gokhale, N.W. CBS
(6) Exercises on Geological maps and dip-Strike: Gokhale, N.W. CBS.
(7) Outlines of structural Geology. E.S. Hills.
(8) Structural Geology- Hobbs. Means and Williams.
(9) Geological maps- Chiplonkar and Pawar.

E-resources :

1. https://epgp.inflibnet.ac.in/Home
2. https://archive.org/details/in.ernet.dli.2015.233340/page/n15/mode/2up
3. https://egyankosh.ac.in/
4. https://sites.google.com/ignou.ac.in/bscgeology
5. SWAYAM – https://swayam.gov.in/explorer?searchtext
6. National digital library – https://ndl.iitkgp.ac.in
7. e-PG pathshala (MHRD) portal, https://egpg.inflibnet .ac.in

PartD AssessmentandEvaluation		
SuggestedContinuousEvaluationMethods: MaximumMarks:50 ContinuousComprehensiveEvaluation(CCE):NA UniversityExam(UE): 50 marks		
InternalAssessment: ContinuousComprehensive Evaluation(CCE)	Class Test Assignment/Presentation	NA

Declaration

This is to certify that the syllabus is framed by the Central Board of Studies in Geology as per the guidelines of the Department of Higher Education, Chhattisgarh. This meeting was held at AtalBihariBajpai University Bilaspur on 3rd June 2022.

S.No.	Name	College	Designation	Signature
1	Prof. MahfoozArif	Govt.E.RaghvendraRao Science college, Bilaspur(C.G.)	Chairman	
2	Prof.Ramesh Joshi	Govt.Kaktiya PG College, Jagdalpur, Bastar (C.G.)	Member	
3	Prof.Pradeep Singh Gour	BhanuPratapDeoGovt.PG.College, Kanker(C.G.)	Member	
4	Dr.Shailendra Singh Bhadauria	Govt.Nagarjuna Science College, Raipur (C.G.)	Member	
5	Dr.S.D.Deshmukh	Govt.V.Y.T PG Autonomous College,Durg (C.G.)	Member	
6	Prof.AmitanshuShekharJha	Govt.Kaktiya PG College, Jagdalpur, Bastar (C.G.)	Member	
7	Prof.SunilA.K.Kerketta	Rajiv Gandhi Govt.PG College, Ambikapur (C.G.)	Member	Present online
8	Dr. NinadBodhankar	Prof. & Head Department of Geology & WRM SOS in Geology, Pt. RS University Raipur	Member	Present online
9	Dr. SandeepVansutre	Govt.Nagarjuna Science College, Raipur (C.G.)	Member	Present online
10	Pro A.K.Sandilaya	Prof., Department of Applied Geology, Dr. HS Gour University Sagar, M.P.	Member	Present online
11	Dr. BhargavaAyangar	Department of Applied Geology,NIT Raipur	Member	Present online

Part A : Introduction

Programme Diploma Course	Class B.A./B.Sc. 2nd Year	Year 2023	Session

1. Course Code : **ANTH-03T**
2. Course Title : **ARCHAEOLOGICAL ANTHROPOLOGY**
3. Course Type : **THEORY**
4. Course Objective : Archaeology is sub discipline of Anthropology. The course examines the major methods, theories and aims of archaeology by studying a board survey of famous sites and discoveries around the world. Student taking this course will achieve a good understanding of how archaeologists interpret the past through the material record and will be prepared for higher level courses in archaeology.
5. Course Learning Outcome :
   - Use the knowledge of archaeological research methods to make an original argument about past human cultures.
   - Understand the relationship between archeological data and interpretation.
   - Identify some of the major global cultures, sites and archaeological discoveries.
   - Understand the role of anthropological inquiry in archaeology.
   - Have a better idea of a region or specialty for student to continue to focus on advance archaeological studies.

1. Credit Value : Theory-04
2. Total Marks : Maximum Marks 50 Minimum Marks 17

Part B : Content of the Course

1. Total Units : 05
2. Total Lectures : 60

Unit	Topics	No. of Lectures
Units I, II, III, IV & V	Syllabus	12 Lectures each unit

UNIT-I

- Definition and scope of Archaeological Anthropology.
- Relation of archaeology with Life science, Physical Science and humanities.
- Types of Archaeology : Classical Archaeology, Prehistoric Archaeology, Historic Archaeology Ethno Archaeology
- Development of Indian Archaeology

UNIT – II

- Geo-Chronological Methods of Archaeology Study : Geological Time Scale, glacial Period, Pluvial period and their evidences
- Absolute & Relative dating method

UNIT – III

- Techniques of manufacturing stone tools.
- Type of stone tools : Core tools, Flake tools, Blade tools, Microliths & Grinding Polishing tools & their uses.
- Classification of human culture based on Stone Age and metal Age.

UNIT – IV

- Distribution of Paleolithic culture in Europe-Characters, distribution and interpretation of habitat
- lower Paleolithic culture, Middle Paleolithic culture, Upper Paleolithic culture & Mesolothic Culture
- Paleolithic Art in Europe – Characters, distribution, interpretation and chronology

UNIT – V

- Stone Age culture in India – Characters, distribution and interpretation of habitat and economy of Lower Paleolithic Culture, Middle Paleolithic Culture, Upper Paleolithic Culture & Neolithic Culture.
- Metal age culture in India – Characters, distribution and interpretation of habitat and economy of Chalcolithic culture, Bronze age civilization &, Iron age culture.
- Archaeological sites in Chhattisgarh – Sirpur, Deepadih & Karkabhatha.

Part C : Learning Resources

1. A grawal, D.P. & M.G. Yadava. 1995. Dating the human past.
2. Bhattacharya, D.K. 1977. Palaeolithic Europe.
3. Bordes,F. 1968. The Old Stone age. Weidenfeld and Nicolson.
4. Burkitt, M.C. 1969. Old Stone Age: Study of Palaeolithic Times.
5. Oakley, K.P. 1972. Man the tool maker
6. Roe, Derek 1970. Prehistory: An introduction.
7. Sankalia, H.D. 1964. Stone age tools: their techniques, names and probable functions, Pune, Deccan College.
8. Sankalia, H.D. 1974. Prehistory and Protohistory of Early India and Pakistan.
9. Allchin and Allchin, 1982. The rise of civilization in India and Pakistan, Select Book Service Syndicate, New Delhi.
10. Zeuner, F.E. Pleistocene Period.
11. Agrawal, D.P. The Archaeology of India, Curzon Press.
12. Sakalia, H.D., New Archaeology – Its Scope and Application to India, Ethnographic and Folk Culture Society.

Part D : Assessment and Evaluation

University Exam. (UE) : Max. Marks : 50 Marks

Part A : Introduction

Programme Diploma Course	Class B.A./B.Sc. 2nd Year	Year 2023	Session

1. Course Code : **ANTH-04T**
2. Course Title : **TRIBAL CULTURE OF INDIA**
3. Course Type : **THEORY**
4. Course Objective : Adequate understanding of the concept of tribe : the nuances of defining tribe in India. The course seeks to explore various policies formulated for the welfare of the tribes to understand changes in the social structure of tribes in India due to development, migration etc.
5. Course Learning Outcome :

- The students will learn about various concepts of tribes and the importance of studying them.
- They will learn about the difficulties of differentiating between tribe and caste in India.
- They will also learn about classification of tribes based on religion, economy, occupation,race, etc.
- From the practical component they will learn about distribution of various categories of tribes in India and how to write an annotate and social structure of one of them.
- They should be able to evaluate, plan and implement any project work in rural and tribal areas.

1. Credit Value : Theory-04
2. Total Marks : Maximum Marks 50 Minimum Marks 17

Part B : Content of the Course

1. Total Units : 05
2. Total Lectures : 60

Unit	Topics	No. of Lectures
Units I, II, III, IV & V	Syllabus	12 Lectures Each Unit

UNIT – I

- Define tribe and scheduled tribe
- Distribution and classification of Indian tribes : Geographical, racial, linguistic
- Contribution of Anthropology in the study of Indian tribes.
- Sacred complex, Universalisation and parochialisation, Sanskritisation, Westernization and

Dominant caste.

UNIT – II

- Tribes of Chhattisgarh and their problems.
- PVTGs - 1.Kamar 2. Birhor 3. Hill Korwa 4. Abujhmaria 5.Baiga.
- Denotified & Nomedic Tribes.

UNIT – III

- Social organization's of Indian tribes: Family, marriage, Lineage and clan.
- Youth dormitory : Type, organizationand functions.
- Political organization of Indian tribes: Distinction between state and stateless society.
- Law and justice in primitive society.
- Tribal religion : Origin, function, animistic & totemistic.
- Concept and practices : Magic, witchcraft, shamanism & head hunting.

UNIT – IV

- Stages of tribal economy : Hunting, food gathering, fishing, shifting and settledagriculture.
- Concept of property and ownership in tribal societies,
- New Economics Anthropology : Exchange-Gift, Barter, Trade, Ceremonial exchange and market economy.

UNIT – V

- Tribal Problems: Culture contact, urbanization, industrialization. land alienation, bonded labour, indebtedness, shifting,cultivation, irrigation, Unemployment, Agricultural labour.
- Tribal development : History of tribal development.
- Constitutional safeguards for thescheduled tribes.
- Policies, plan and programmes of tribal development and their implementation.
- Tribal revolts in India.
- The role of anthropology in tribal development.

Part C : Learning Resources

1. Bose, N.K. : Tribal life of India.
2. Dube S.C. : Indain village.
3. Elwin, V. : A new deal of Tribal India.
4. Furer-Haimendorf C.V. : The Naked Nagas.
5. Ghurye, G.S. : The schedule tribes.
6. Mamvria : Tribal demography
7. Majumdar D.N. : Affairs of tribes.

8. Nathan D. : Tribe –Caste.
9. Nadim hasnain : Janjatiy bharat.
10. Srivastava V.K. : The Concept of tribe in Draft Tribal

Part D : Assessment and Evaluation

University Exam. (UE) : Max. Marks : 50 Marks

Part A : Introduction

Programme Diploma Course	Class B.A./B.Sc. 2nd Year	Year 2023	Session

1. Course Code : **ANTH- 02P**
2. Course Title : **PRACTICAL IN MATERIAL CULTURE**
3. Course Type : **PRACTICAL**
4. Course Objective : The objective of this practical course is to introduce the student with the primitive material culture and technology used by primitive man and the students introduce with various techniques of tools making of ancient man. This will be helpful for students to understand the use and making technique of material culture of different human communities in the field of research.
1. Credit Value : Practical-02
2. Total Marks : Maximum Marks 50 Minimum Marks 17

Part B : Content of the Course

1. Total Units :
2. Total Lectures : 30

Unit	Topics	No. of Lectures
-	Syllabus	30 Lectures

Part – I : Material Culture of Tribe
Identification and technological Description of the Following -

- Tools of food gathering, hunting, fishing and agriculture.
- Fire making implements.
- Types of habitation
- Land and water transport

Part – II : Archaeological tools
Sketching, identification and the description of Stone Age tools -

- Paleolithic tools
- Mesolithic tools

- Neolithic tools

(It is essential that students should draw at least five tools of each age)

Part – III : Research tools in Anthropology

- Construction of Schedule, Genealogy and Questionnaire.
- Each student will be required to maintain practical records of all work done in the practical class.

Part C : Learning Resources

1. Prayogic Manav Vigyan Bhag. I Mitashree Mitra & Ramesh Chouby Madhy Pradesh Hindi Granth Acadmi
2. Bhoutik Sanskriti Kalpana Saini Modhya.

Part D : Assessment and Evaluation

University Exam. (UE) : Max. Marks : 50 Marks

Paper III
प्रयोगात्मक (प्रश्नपत्र I तथा II पर आधारित)
Practical (Based on papers I and II)

1 केन्द्रीय प्रवृत्ति की मापें, फैलाव, विषमता एवं कुकुदता की गणना ।
Calculation of Measures of Central Tendency, dispersion , skewness and kurtosis.

2 गुणन आघूर्ण सहसंबंध गुणांक एवं सहसंबंध अनुपात की गणना ।
Calculation of Product Moment Correlation and Correlation Ratio.

3 न्यूनतम वर्ग विधि द्वारा वक्रों का आसंजन ।
fitting of curve by least square method.

4 दो चरों के लिए समाश्रयण समीकरण का आकलन करना ।
Fitting of Curves by the least square method.

5 स्पियरमैन कोटि सहसंबंध की गणना ।
Calculation of Spearman's Rank correlation Coefficient.

6 तीन चरों के लिए बहुआयामी समाश्रयण की गणना ।
Calculation of Multiple regression for three variables.

7 तीन चरों के लिए बहुआयामी एवं आंशिक सहसंबंध की गणना ।
Calculation of Multiple correlation and partial correlation for three variables.

8 गणितीय प्रत्याशाओं की गणना। प्रत्याशा की सहायता से माध्य, प्रसरण विषमता और कुकुदता की गणना करना ।
Calculation of mathematical expectations. Using Expectation find mean, variance, skewness and kurtosis.

9 द्विपद, प्वॉसों और प्रसामान्य बंटनों का आसंजन।
Fitting of Binomial, Poisson and Normal distribution.

B.A. / B.Sc. II Year
Subject-Statistics

Paper-I
Statistical Methods

उद्देश्य :– यह पाठ्यक्रम आकडों के सारांश और विश्लेषण मे उपयोग की जाने वाली विभिन्न तकनीकों के साथ छात्रों के लिये उपयोगी है। फोकस सैद्धांतिक और व्यवहारिक दोनो पहलुओं पर होगा। यह अनुसंधान पद्धति और केस स्टडी अत्यधिक उपयोगी है । कोर्स जॉब ओरिएंटेड है।

Outcome: This course is useful for the students conversant with various techniques used inn summarization and analysis of data. The focus will be both on theoretical as well as practical

aspects. This is highly useful in research methodology and case study. The course is job oriented.

Unit I

बंटन से प्रतिचयन :– यादृच्छिक प्रतिदर्श की परिभाषा, मानक बंटनों (द्विपद,प्वॉसों और प्रसामान्य) का यादृच्छिक प्रतिचयन, यादृच्छिक चरों के फलन के बंटन की अवधारणा, सांख्यिकीय अवधारणा और इसका प्रतिचय बंटन, प्राचल का बिंदु आकलन, अच्छे आकलन की विशेषताए, किसी आंकलन के पक्षपात एवं मानक त्रुटि की अवधारणा, प्रतिदर्श माध्य तथा प्रतिदर्श अनुपात की मानक त्रुटि, द्विपद चरो,प्वासों चरों तथा प्रसामान्य बंटन के माध्य के योग का प्रतिचयन बंटन, प्रसामान्य बंटन में यादृच्छिक प्रतिचयन के प्रतिचय माध्य तथा प्रसरण की स्वतंत्रता ।

Sampling from a distribution : Definition of a random sample ,simulating random sample from standard distributions(uniform, Normal, Exponential) ,concept of derived distributions of a functions of random variables, concept of a statistic and its sampling distribution. Point estimate of a parameter. Properties of a good estimator, Concept of bias and standard error of an estimate .Standard errors of sample mean, sample proportion. Sampling distribution of sum of Binomial, Poisson and mean of Normal distributions. Independence of sample mean and variance in random sampling from a Normal distribution (without derivation).

Unit II

सांख्यिकीय परीक्षण एवं अंतराल आकलन : शून्य एवं वैकल्पिक परिकल्पना, त्रुटियों के प्रकार, सार्थकता स्तर, पी.मान, एकता एवं द्वि पूँछ परीक्षण, परिकल्पना परीक्षण की विधि,काई वर्ग परीक्षण, स्टुडेंट टी परीक्षण एवं एफ परीक्षण का कथन, एकल प्रसामान्य बंटन के एक माध्य तथा प्रसरण का परीक्षण, एकल प्रसामान्य वंटन मे प्राप्त द्विमाध्य एवं प्रसरण के समानता का परीक्षण,संबंधित विश्वसनीयता अंतराल, द्विचर प्रसामान्य बंटन से प्राप्त प्रतिदर्श सहसंबंध के सार्थकता की जॉच एवं द्विचर प्रसामान्य बंटन से प्रतिचयित माध्यों एवं प्रसरणों के समानता का परीक्षण ।

Statistical tests and interval estimation: Null and alternative hypothesis. Types of errors, level of significance, p values, one and two tailed tests, Procedure for testing of hypothesis. Statement of chi-squares, Student's t and F statistics. Testing for the single mean and variance of a univariate normal distribution, testing the equality of two means and testing for the equality of two variances of two univariate normal distributions. Related confidence intervals. Testing for the significance of sample correlation in sampling from bi-variate normal distribution and for equality of means and equality of variances in sampling from bivariate normal populations.

Unit III

बृहद प्रतिदर्श परीक्षण : परीक्षण के लिये केन्द्रीय सीमान्त प्रमेय का उपयोग। एकल माध्य एवं एकल अनुपात, दो माध्यों का अन्तर तथा द्विअनुपात की विश्वसनियता आकलन । फिशर का जेड परिवर्तन एवं उसका उपयोग। गुडनेस आफ फिट तथा मानक बंटनों के एकरूपता के लिए कोई परीक्षण । अनुसंगिकता सारणी मे स्वतंत्रता परीक्षण।

Large sample tests: use of central limit theorem for testing and interval estimation of a single mean and a single proportion and difference of two means and two proportions, Fisher's Z transformation and its uses. Pearson's chi-square test for goodness of fit and for homogeneity for standard distributions. Contingency table and test of independence in a contingency table.

Unit IV

अप्राचलिक परीक्षण : कोटि सांख्यिकी की परिभाषा एवं उनका बंटन, अप्राचलिक परीक्षण, एकल तथा द्वि बंटनो के लिये ज्या परीक्षण, विलकॉक्सन परीक्षण, मैन व्हिटिनी परीक्षण, रण परीक्षण, माध्यिका परीक्षण तथा स्पीयरमैन कोटि सहसंबंध परीक्षण

Nonparametric tests: Definition of order statistics and their distributions, Non-parametric tests, Sign test for univariate and bivariate distributions, Wilcoxon test, Mann-Whitney test, Run test, median test and Spearman's rank correlation test.

Unit V

चार संक्षिप्त टिप्पणी, प्रत्येक इकाई से एक पूछा जाएगा। छात्रों को किन्हीं दो का उत्तर देना है।

Four short notes, one from each unit will be asked. Students have to answer anytwo.

REFERENCES

1. Frund J.E.(2001)Mathematical Statistics, Prentice Hall of India.
2.Goon A.M., Gupta M.K., Das Gupta.B. (1991):Fundamentals of Statistics, Vol.I, World Press, Culcutta.
3. Gupta and Kapoor: Fundamentals of Mathematical Statistics S.Chand & Sons.
4.Hodges, J.L. and Lehman E.L. (1964): Basic Concepts of Probability and Statistics, Holden Day.
5.Mood A.M, Graybill F.A and Boes D.C. (1974): Introduction to the Theory of Statistics, McGraw Hill.

ADDITIONAL REFERENCES

1..Bhat B.R., Shrivenkatramana T and Rao Madhava K.S. (1997): A Beginner's Text, Vol. II, New age International (P) Ltd.
2. Rohatgi, V.K. (1967): An Introduction to Probability Theory and Mathematical Statistics, John Wiley & Sons.
3. Snedecor, G.W. and Cochran W.G. (1967): Statistical Methods. Lowa State University Press.

Paper-II
प्रतिचयन सिद्धांत और प्रयोगों की अभिकल्पना
Sampling Theory and Design of Experiments

उद्देश्य– छात्र प्राप्त करेंगे

(अ) पूर्ण गणनाऔर प्रतिदर्श, प्रतिदर्श फ्रेम, प्रतिदर्श बंटन, प्रतिचयन और गैर प्रतिचयन त्रुटियों का बुनियादी ज्ञान, प्रतिदर्श सर्वेक्षण मे प्रमुखचरण प्रतिचयन की सीमाएं आदि।
(ब) विभिन्न सांख्यिकीय प्रतिचयन योजनाओं जैसे सरल,स्तरीकृत और व्यवस्थित प्रतिचयन के पेश किया गया ।
(स) प्रतिदर्श सर्वेक्षण आयोजित करने और उपयुक्त प्रतिदर्श तकनीक का चयन करने का विचार ।
(द) विभिन्न प्रतिचयन तकनीकों की तुलना करने के बारे मे ज्ञान।
(य) विचरण का एक तरफा और दो तरफा विश्लेषण करना ।
(र) प्रयोगों के अभिकल्पना में प्रयुक्त मूल शब्दो को समझे ।
(ल) प्रयोगात्मक आंकडे का विश्लेषण करने के लिये उपयुक्त प्रयोगात्मक अभिकल्पनाओं का उपयोग करें ।
(व) मल्टीपल रेंज टेस्ट, मल्टीपल टी–टेस्ट लागू करें ।

Outcome: The students shall get

(a) basic knowledge of complete enumeration and sample, sampling frame, sampling distribution, sampling and non-sampling errors, principal steps in sample surveys, limitations of sampling etc.,
(b) introduced to various statistical sampling schemes such as simple, stratified and

systematic sampling.

(c) an idea of conducting the sample surveys and selecting appropriate sampling techniques,
(d) knowledge about comparing various sampling techniques.
(e) carry out one way and two way Analysis of Variance.
(f) understand the basic terms used in design of experiments,
(g) use appropriate experimental designs to analyze the experimental data,
(h) apply Multiple range tests, the multiple t–test.

UNIT-I

प्रतिदर्श सर्वेक्षण का अभिकल्पना, प्राचल और सांख्यिकी प्रतिदर्श सर्वेक्षण मे सिद्धांत चरण, प्रतिदर्श सर्वेक्षण का सिद्धांत, प्रतिचयन और गैर प्रतिचयन त्रुटियां, पूर्ण जनगणना पर प्रतिदर्श का लाभ, प्रतिदर्श की सीमाएं । प्रतिचयन के प्रकार : व्यक्तिपरक या निर्णय प्रतिचयन, प्रायिकता प्रतिचयन, मिश्रित प्रतिचयन।
सामान्य यादृच्छिक प्रतिचयन (प्रतिस्थापन के साथ और बिना) , सामान्य यादृच्छिक प्रतिचयन के गुण और सीमाएं।
साधारण यादृच्छिक प्रतिदर्श के चयन की विधियाँ, लॉटरी विधि, यादृच्छिक संख्याओं के आधार पर विधि। निदर्श माध्य/ कुल का आकलन और उनकी भिन्नताएं और मानक त्रुटियां, प्रतिदर्श आकार का निर्धारण, विशेषताओं के लिये सामान्य यादृच्छिक प्रतिचयन ।

Design of Sample Surveys, parameter and Statistics, principle step in sample survey, inciple ofsample survey, sampling and non-sampling errors advantage of sampling over complete ensus, limitations of sampling. Types of Sampling: Subjective or Judgement sampling, Probability sampling, mixed sampling. Simple random sampling (with and without eplacement), Merits and limitations of Simple random sampling. Methods of selecting imple random sample, lottery method, method based onrandom numbers. Estimation of population mean/total and their variances and standard errors, determination of sample size, simple random sampling for attributes.

UNIT-II

स्तरीकृत यादृच्छिक प्रतिचयनः स्तरीकरण के सिद्धांत, संकेतन, निदर्श माध्य और भिन्नता का आकलन, लागत फलन, आवंटन तकनीक, आनुपातिक और इष्टतम आवंटन , सामान्य यादृच्छिक प्रतिचयन के साथ स्तरीकृत प्रतिचयन की तुलना ।

Stratified random sampling: principles of stratification, notations, estimation of population mean and variances, cost function, allocation techniques, proportional and optimum allocations, comparison of stratified sampling with simple random sampling.

UNIT-III

विचरण का विश्लेषण (एनोवा) : परिभाषा , एनोवा परीक्षण के लिए अवधारणा, निश्चित प्रभाव मॉडल के लिय गणितीय मॉडल और प्रति प्रकोष्ट एकल अवलोकन का एक आयामि और द्विआयामि वर्गीकरण में प्रसरण का विश्लेषण। टकी परीक्षण ।
प्रयोगों के अभिकल्पना का परिचयः शब्दावली, प्रयोग, निरूपण , प्रयागिक इकाई, ब्लॉक, प्रयागिक त्रुटि, प्रतिरूप, परिशुद्धता एवं यथार्थता। प्रयोगो के अभिकल्पना की आवश्यकता, भूखंडों और ब्लॉकों के आकार और आकार, प्रयोगों के अभिकल्पना के मौलिक सिद्धांतः यादृच्छिककरण ,प्रातिकृति और स्थानीय नियंत्रण ।

Analysis of variance (ANOVA): Definition, assumption for ANOVA test, Mathematical model and Analysis of variance in one way and two way classifications for fixed effect model with one observation per cell. Tukey test.
Introduction to design of experiments: terminology, experiment, treatment, experimental Units, blocks, experimental error, replication, precision and accuracy, need for design of experiments, size and shape of plots and blocks, fundamental principles of design of experiments: Randomization, Replication and Local control.

UNIT-IV

पूर्ण यादृच्छिक अभिकल्पना (सीआरडी) यादृच्छिक ब्लाक अभिकल्पना (आर.बी.डी.),लैटिन वर्ग अभिकल्पना (एल एस डी) और उनका अभिन्यास और विश्लेषण, बहुआयामी सीमा परीक्षण। बहुआयामी टी–परीक्षण ।

Completely Randomized Design (CRD), Randomized Block Design (RBD), Latin Square Design(LSD) and their layout and analysis. Multiple range tests, the multiple t- test.

UNIT V

चार संक्षिप्त टिप्पणी, प्रत्येक इकाई से एक पूछा जाएगा। छात्रों को किन्हीं दो का उत्तर देना है।

Four short notes one from each Unit will be asked. Students have to answer any two.

REFERENCES

1. Cocran W.G. (1977): Sampling Techniques, John Wiley and Sons.
2.Des Raj (2000): Sample Survey Theory, Narosa Publishing House.
3.Murthy M.N(1967): Sampling Theory and Methods, Statistical Publishing Society, Calcutta.
4.Singh, D. and Chaudhary,F.S. (1986): Theory and analysis of Sample Survey Designs. New Age International Publisher.
5.Sukhatme P.V., Sukhatme B.V., Sukhatme S. and Ashok C.(1984), : Sample Survey Methods and Its Applications, Indian Society of Agricultural Statistics, New Delhi.
6. Das M.N. and Giri (1986) : Design and analysis of experiments,springer verlag.
7.Goon A.M.,Gupta M.K.,Das Gupta B. (1986): Fundamentals of Statistics, Vol.II, World Press, Culcutta.
8. Joshi,D.D.(1987):Linear Estimation and Design of Experiments,Wiley Eastern.
9. Kempthorne O.(1965) : The Design and Analysis of Experiments,Wiley Eastern.

Paper III

प्रयोगात्मक (प्रश्नपत्र I तथा II पर आधारित)

Practical (Based on papers I and II)

1. सामान्यीकृत एकल चर असतत एवं सतत बंटन से प्रतिदर्श का चयन जैसे की द्विपद, प्वॉसों, सामान्य, कॉशी और घातीय बंटन।
   drawing random samples from standard univariate discrete and continuous distributions such as Binomial, Poisson, Normal, Cauchy and Exponential.

2. स्टूडेंट टी , काईवर्ग ,एफ परीक्षण के आधार पर सार्थकता का परीक्षण। प्रतिदर्श सहसंबंध गुणांक के सार्थकता का परीक्षण। जेड रूपांतरण का उपयोग , द्विचर समान्य बंटन से प्रतिचयन मे माध्य और प्रसरण के सममितता का परीक्षण ।

   Tests of significance based on Student's t, Chi-square, F. Test of significance of sample correlation coefficient. Use of Z Transformation. Testing of equality of means and equality of variance in sampling from bivariate normal.

3. मध्य और समानुपात के लिए वृहद प्रतिदर्श परीक्षण, आकास्मिक तालिका में गुडनेस आफ फिट और चरो की स्वतंत्रता का परीक्षण।

   Large sample tests for means and proportions, tests of goodness of fit and independence of attributes in contingency tables.

4. गैर–प्राचलिक परीक्षण: ज्या रन, माध्यिका, विलकॉक्सन, मान–विटन परीक्षण।

Part A: Introduction				
Program: **Diploma Course**		Class: **B.Sc.-CS II Year**	Year: **2022**	Session:**2022-2023**
1.	Course Code	**COMP-3T**		
2.	Course Title	**Data Structure**		
3.	Course Type	**Theory**		
4.	Pre-requisite (if any)	No		
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Use different types of data structures, operations and algorithms. • Implement appropriate sorting/searching technique for any given problem. • Use stack, Queue, Lists, Trees and Graphs in problem solving. • Find suitable data structure during application development/ Problem Solving.		
6.	**Credit Value**	**Theory: 4**		
7.	**Total Marks**	**Max Marks: 50**	**Min Passing Marks: 17**	

Part B: Content of the Course		
Total Periods: 60		
Unit	**Topics**	**No. of Periods**
I	**Introduction and Basic Concepts of Data Structure:** Data types: primitive, non-primitive data types, ADT, Linear and nonlinear data structure. **Linear Data Structures**: Arrays: One dimensional, Multidimensional array, allocation methods, address calculations, sparse arrays. Linked List: Singly and Doubly Linear link lists, singly and doubly circular linked list: Definitions, operations (INSERT, DELETE, TRAVERSE) on these lists. (Insertion operation includes – insertion before a given element, insertion after a given element, insertion at given position, insertion in sorted linked list)	12
II	**Stack:** Stack: Definition, Operations PUSH, POP, TRAVERSE, implementations using array and linked list, Applications of stack: Infix, Prefix, Postfix representation and conversion using stack, Postfix expression evaluation using stack. **Queue:** Introduction, and Types of Queues: Priority Queue, Circular queue, Double Ended Queue, operations (INSERT, DELETE, TRAVERSE), implementation using array and linked list and applications	12
III	**Non-linear Data Structure:** Trees: Definition of trees and their types, Binary trees, Properties of Binary trees and Implementation operation (Insertion, deletion, searching and traversal algorithm: preorder, post order, in-order traversal), Binary Search Trees, Implementations, Threaded trees, AVL Trees.	12
IV.	**Graph:** Definition of Graph and their types, adjacency and incident (matrix & linked list) representation of graphs, Graph Traversal – Breadth first Traversal, Depth first Traversal, Connectivity of graphs; Weighted Graphs, Shortest path Algorithm, spanning tree, Minimum Spanning tree, Kruskal's and prim's algorithms. Static Hashing: Introduction, Hash table, Hash function.	12

V.	**Sorting Methods:** Types of sorting, Sequential Sort, Insertion Sort, Bubble Sort, Quick Sort, Merge Sort. **Searching**: Linear search, Binary search, Hashing, collision resolution methods, Comparison of Search trees.	12
Keywords: Linear Data Structure, Non-linear Data Structure, Searching, Sorting, Graph.		

Part C - Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings:

1. "Data Structures and Algorithms in C++", Michael T. Goodrich, Wiley, 2007
2. "Fundamentals of Data Structures", Horowitz and Sahani, Computer Science Press, 1978
3. "Data structures and Algorithms", Aefred V. Aho, Jhon E. Joperoft and J.E. Ullman.
4. "An Introduction to Data Structures with Applications", Jean Paul Trembley and Paul Sorenson, TMH, International Student Edition, 1985
5. "Data Structures and Program Design in C", R. Kurse, Leung &Tondo, 2nd Edition, PHI publication

E- Resources:

1. Introduction to Data Structure
   https://www.youtube.com/watch?v=zWg7U0OEAoE&list=PLBF3763AF2E1C572F&index=1
2. Stacks
   https://www.youtube.com/watch?v=g1USSZVWDsY&list=PLBF3763AF2E1C572F&index=2
3. Queues and linked list
   https://www.youtube.com/watch?v=PGWZUgzDMYI&list=PLBF3763AF2E1C572F&index=3
4. Trees
   https://www.youtube.com/watch?v=tORLeHHtazM&list=PLBF3763AF2E1C572F&index=6
5. Graphs
   https://www.youtube.com/watch?v=9zpSs845wf8&list=PLBF3763AF2E1C572F&index=24

Part D: **Assessment and Evaluation**

Maximum Marks: 50

Declaration

The syllabus of this subject is framed as per the TOR provided by the department of higher education, Chhattisgarh.

1. Dr. H.S. Hota - Chairman
   Prof. and Head, Dept. of Computer Science and Application
   Atal Bihari Vajpayee Vishwavidyalaya, Bilaspur
2. Dr. Sanjay Kumar - Member
   Prof. and Head, SoS in Computer Science,
   Pt. Ravishankar Shukla University, Raipur
3. Mr. Jitendra Kumar - Member
   Asst. Prof., Dept. of Computer Science and Application
   Atal Bihari Vajpayee Vishwavidyalaya, Bilaspur
4. Mr. H.S.P. Tonde - Member

Asst. Prof. and Head, Dept. of Computer Science,
Sant Gahira Guru University Sarguja, Ambikapur

5. Dr. Mamta Singh - Member
   Asst. Prof. and Head, Sai College, Bhilai
   Hemchand Yadav Vishwavidyalaya, Durg
6. Mr. Sushil Kumar Sahu - Member
   Asst. Prof. and Head, Christ College, Jagdalpur
   Shaheed Mahendra Karma Vishwavidyalaya, Bastar
7. Mr. Vikrant Gupta - Member
   Prof. and Head, Batmul Ashram College, Salheana
   Shaheed Nand Kumar Patel University, Raigarh
8. Mr. L.K. Gavel - Member
   Asst. Prof. and Head, Govt. Ghanshyam Singh Gupt, PG College, Balod
   Hemchand Yadav Vishwavidyalaya, Durg
9. Dr. Anil Kumar Sharma - Member
   Asst. Prof. and Head, A.P.S.G.M.N.S, Govt. PG College, Kawardha
   Hemchand Yadav Vishwavidyalaya, Durg
10. Mr. Vishwnath Tamrakar - Member
    Asst. Prof. and Head, Sant Guru Ghasidas Govt. PG College, Kurud,
    Pt. Ravishankar Shukla University, Raipur
11. Ms. Anjeeta Kujur - Member
    Asst. Prof. and Head, Govt. R.B.R.N.E.S. PG College, Jashpur
    Sant Gahira Guru University Sarguja, Ambikapur
12. Mr. Suresh Kumar Thakur - Member
    Asst. Prof. and Head, Indira Gandhi Govt. PG College, Vaishali Nagar
    Hemchand Yadav Vishwavidyalaya, Durg
13. Dr. Ugrasen Suman - Member (Present Online)
    Prof. and Head, Dept. of Computer Science
    Devi Ahila Vishwavidyalaya, Indore

Date: 03.06.2022

Part A: Introduction				
Program: **Diploma Course**		Class: **B.Sc.-CS II Year**	Year: **2022**	Session:**2022-2023**
1.	Course Code	**COMP-4T**		
2.	Course Title	**Web Technology and Java**		
3.	Course Type	**Theory**		
4.	Pre-requisite (if any)	Basic understanding of programming concepts and programming language		
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Create applications using HTML, CSS and Java Script. • Understand fundamental tools and technologies for web design. • Specify design rules in constructing web pages and sites. • Understand how web pages are designed and created. • Design console-based GUI based and web based application. • Front end designing using html, CSS, java script and bootstrap. • Develop server-side programs in the form of Servlet. • Designing web application by using JSP as a server-side programming. • Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's Create web pages using HTML and Cascading Styles sheets. • Analyze a web page and identify its elements and attributes Create dynamic web pages using JavaScript. • Build web applications using JSP and Servlet.		
6.	**Credit Value**	**Theory: 4**		
7.	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks : 17**	

Part B: Content of the Course		
Total Periods: 60		
Unit	**Topics**	**No. of Periods**
I	**Introduction:** Overview of WWW, Web page, Web browsers, HTTP, URL, Hypertext, Web server, Tools for web site development, hosting options and domain name registration. **Markup language:** Introduction, DTD, Creating Web pages, Headings, Paragraphs, Lists, Hyperlinks, Tables, Web forms, Input Types, Input Attributes, Inserting images, Frames, Basics of DHTML, XML , XHTML.	12

II	**Web Development:** CSS- Introduction, Syntax, measurement units, colors, Backgrounds, Font, Text, position, Align, Images, Link, Table, List, Padding. **JavaScript:** Overview, syntax, Variables, Operators, Decision control statement, Looping statement, JavaScript functions, Java script Events, Cookies, Page Redirect, and Validation. **Bootstrap:** Introduction, Grid system, typography, tables, images, dropdowns, jumbotron, them, template and forms. **PHP:** Introduction, syntax, variables, operators, functions, include, get method, post method, cookies, session, PHP form validation, exception.	12
III	**JAVA:** Primitive Data Types, Variables, Array, operators, control statements, classes and objects, Abstract Classes, Polymorphism, Inheritance, Method Over-writing, method overriding, constructor, super keyword, this keyword, final static, package and interface, Multi-threading and Exception Handling, Collection Framework. Introduction to applet.	12
IV.	**Java Server Page (JSP):** Basics of Servlet, writing simple program in Servlet, Introduction to Java Server Page (JSP), Embedding Java Code into HTML, Implicit JSP Objects, Overview of the JSP Tags, Directives, Declarations, Expressions, Deploying Servlet and JSP, JSTL, JSP Action elements: jsp:forward, jsp:include, JSP Request, JSP Response, JSP Config, JSP Session, Cookies, JSP Exception Handling.	12
V.	**Database Using JDBC:** Concept, JDBC Driver Types, JDBC package, establishing a database connection and executing SQL Statements.	12
Keywords: Web Designing, Collection Framework, Servlet, JSP, Database Connectivity.		

Part C: Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings:

1. The Complete Reference JAVA, Herbert Scheldt, Tata McGraw Hill publication, 5° Edition.
2. Advance JAVA, Gajendra Gupta, Firewall Media, 1" Edition, 2006.
3. JAVA network programming, Elliotte Rusty Harold, O'Reilly Publication, 3" Edition.
4. Core Java for Beginners, Rashmi Kanta Das, Vikas Publishing House Pvt. Ltd.
5. Internet and Internet Engineering, Daniel Minoli, TMH (Latest Edition)
6. Java Script, Gosslin, Vikas (Latest Edition)
7. HTML The Definite Guide, Chuck musiano& Bill Kenndy, O Reilly (Latest Edition).

E Resources:

1. Introduction to web-app
   https://www.youtube.com/watch?v=lZnp3tRRTzw&list=PLJ5C_6qdAvBEJ6-TBzKoa1Ov21lwDzJfM&index=22
2. Building web-app
   https://www.youtube.com/watch?v=kIEn4LqAQlE&list=PLJ5C_6qdAvBEJ6-TBzKoa1Ov21lwDzJfM&index=3
3. Introduction to Java Script
   https://www.youtube.com/watch?v=fRbP92oScp0&list=PLJ5C_6qdAvBEJ6-TBzKoa1Ov21lwDzJfM&index=10
4. Introduction to Database
   https://www.youtube.com/watch?v=mtc0HHrUKpI&list=PLJ5C_6qdAvBEJ6-TBzKoa1Ov21lwDzJfM&index=12
5. Introduction to SQL
   https://www.youtube.com/watch?v=ar2naKy0aPw&list=PLJ5C_6qdAvBEJ6-TBzKoa1Ov21lwDzJfM&index=16
6. Introduction to Java
   https://www.youtube.com/watch?v=OjdT2l-EZJA&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho&index=1

Part D: Assessment and Evaluation

Maximum Marks: 50

Declaration

The syllabus of this subject is frame as per the TOR of department of higher education, Chhattisgarh.

1. Dr. H.S. Hota - Chairman
   Prof. and Head, Dept. of Computer Science and Application
2. Dr. Sanjay Kumar - Member
   Prof. and Head, SoS in Computer Science, Pt. Ravishankar Shukla University, Raipur
3. Mr. Jitendra Kumar - Member
   Asst. Prof., Dept. of Computer Science and Application
   Atal Bihari Vajpayee Vishwavidyalaya, Bilaspur
4. Mr. H.S.P. Tonde - Member
   Asst. Prof. and Head, Dept. of Computer Science,
   Sant Gahira Guru University Sarguja, Ambikapur
5. Dr. Mamta Singh - Member
   Asst. Prof. and Head, Sai College, Bhilai
   Hemchand Yadav Vishwavidyalaya, Durg
6. Mr. Sushil Kumar Sahu - Member
   Asst. Prof. and Head, Christ College, Jagdalpur

Shaheed Mahendra Karma Vishwavidyalaya, Bastar

7. Mr. Vikrant Gupta - Member
   Prof. and Head, Batmul Ashram College, Salheana
   Shaheed Nand Kumar Patel University, Raigarh
8. Mr. L.K. Gavel - Member
   Asst. Prof. and Head, Govt. Ghanshyam Singh Gupt, PG College, Balod
   Hemchand Yadav Vishwavidyalaya, Durg
9. Dr. Anil Kumar Sharma - Member
   Asst. Prof. and Head, A.P.S.G.M.N.S, Govt. PG College, Kawardha
   Hemchand Yadav Vishwavidyalaya, Durg
10. Mr. Vishwnath Tamrakar - Member
    Asst. Prof. and Head, Sant Guru Ghasidas Govt. PG College, Kurud,
    Pt. Ravishankar Shukla University, Raipur
    Not agree because syllabus is lengthy
11. Ms. Anjeeta Kujur - Member
    Asst. Prof. and Head, Govt. R.B.R.N.E.S. PG College, Jashpur
    Sant Gahira Guru University Sarguja, Ambikapur
12. Mr. Suresh Kumar Thakur - Member
    Asst. Prof. and Head, Indira Gandhi Govt. PG College, Vaishali Nagar
    Hemchand Yadav Vishwavidyalaya, Durg
13. Dr. Ugrasen Suman - Member
    Prof. and Head, Dept. of Computer Science (Present Online)
    Devi Ahila Vishwavidyalaya, Indore

Date: 03.06.2022

Part A: Introduction				
Program: **Diploma Course**		Class: **B.Sc.-CS II Year**	Year: **2022**	Session: **2022-2023**
1	Course Code	**COMP-2P**		
2	Course Title	**LAB 2: Web Technology and JAVA**		
3	Course Type	**Practical**		
4	Pre-requisite (if any)	Theoretical knowledge of HTML, CSS, JavaScript and JAVA		
5	Course Learning Outcomes (CLO)	At the end of course, Students will be able to: • Develop web-based application. • Develop front end application using front end technologies. • Demonstrate the principles of object-oriented programming. • Create multi-threaded programs and event handling mechanisms • Develop simple GUI interfaces for a computer program to interact with users. • Use form validation on web page. • Develop server-based application using Servlet and JSP.		
6	**Credit Value**	**Practical: 2**		
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks : 17**	

Part B: Content of the Course	
Total Lecturer: 30	
Tentative Practical List	**Note:** This is tentative list; the teachers concern can add more program as per requirement. Developing Web based application based on the concept of Web design technologies and Java programming. 1. Design a Login Page by using HTML and CSS. 2. Write a program to perform validation on web page. 3. Design a web page to demonstrate registration form of student. 4. Design a from by using HTML and CSS who will take input from the user through Java-script Function and check weather it is integer or not. 5. Design a device friendly web page which should be able to resize the display depending on the device by using bootstrap. 6. Write a java program to create an abstract class named shape that contains two integers and an empty method named print Area () Provide three classes named Rectangle. Triangle and Circle such that each one of the classes extends the class shape. Each one of the class contains only the method print Area () that print the area of the given shape. 7. Write a Java program that implements a multithreaded program that has three threads. First thread generates a random integer every 1 second and if the value

	is odd the third thread will print the value of the cube of the number. 8. Write a java program which creates a list containing ice cream flavours. On selection of any flavour price should be displayed in a text field. 9. Write a JDBC program to create a table product (id number, name varchar. Price varchar). And insert a record in the table. 10. Write a program to execute a select query using JDBC. 11. Write a program to execute an Update query using JDBC. 12. Write a server program to return the square root of a number to the client using Socket. 13. Write a server program to return Date and time to clients using socket programming. 14. Write a JSP program for basic arithmetic functions. 15. Write a advance java program to implement registration of student by using JSP. 16. Write a program to design a web page for login form and connect to the database while using JSP and JDBC. 17. Write a program to design a simple calculator using (a) JavaScript (b) Servlet and (c) JSP. 18. A web application that lists all cookies stored in the browser on clicking "List Cookies" button. Add cookies if necessary. 19. Write a java program that connects to a database using JDBC and does add, deletes, modify and retrieve operations. 20. Develop an applet that displays a simple message.

Part C: Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings:

1. The Complete Reference JAVA, Herbert Scheldt, Tata McGraw Hill publication, 5° Edition.
2. Advance JAVA, Gajendra Gupta, Firewall Media, 1" Edition, 2006.
3. JAVA network programming, Elliotte Rusty Harold, O'Reilly Publication, 3" Edition.
4. Core Java for Beginners, Rashmi Kanta Das, Vikas Publishing House Pvt. Ltd.
5. Internet and Internet Engineering, Daniel Minoli, TMH (Latest Edition)
6. Java Script, Gosslin, Vikas (Latest Edition)
7. HTML The Definite Guide, Chuck musiano& Bill Kenndy, O Reilly (Latest Edition).

E Resources:

1. Introduction to web-app
   https://www.youtube.com/watch?v=lZnp3tRRTzw&list=PLJ5C_6qdAvBEJ6-TBzKoa1Ov21lwDzJfM&index=22

TBzKoa1Ov21lwDzJfM&index=22

- Building web-app
  https://www.youtube.com/watch?v=kIEn4LqAQlE&list=PLJ5C_6qdAvBEJ6-TBzKoa1Ov21lwDzJfM&index=3
- Introduction to Java Script
  https://www.youtube.com/watch?v=fRbP92oScp0&list=PLJ5C_6qdAvBEJ6-TBzKoa1Ov21lwDzJfM&index=10
- Introduction to Database
  https://www.youtube.com/watch?v=mtc0HHrUKpI&list=PLJ5C_6qdAvBEJ6-TBzKoa1Ov21lwDzJfM&index=12
- Introduction to SQL
  https://www.youtube.com/watch?v=ar2naKy0aPw&list=PLJ5C_6qdAvBEJ6-TBzKoa1Ov21lwDzJfM&index=16
- Introduction to Java
  https://www.youtube.com/watch?v=OjdT2l-EZJA&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho&index=1

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 50
Continuous Comprehensive Evaluation (CCE): Not Applicable
University Exam(UE): 50 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable

Declaration

The syllabus of this subject is frame as per the TOR of department of higher education, Chhattisgarh.

1. Dr. H.S. Hota
   Prof. and Head, Dept. of Computer Science and Application - Chairman
2. Dr. Sanjay Kumar
   Prof. and Head, SoS in Computer Science, Pt. Ravishankar Shukla University, Raipur - Member
3. Mr. Jitendra Kumar
   Asst. Prof., Dept. of Computer Science and Application
   Atal Bihari Vajpayee Vishwavidyalaya, Bilaspur - Member
4. Mr. H.S.P. Tonde
   Asst. Prof. and Head, Dept. of Computer Science,
   Sant Gahira Guru University Sarguja, Ambikapur - Member
5. Dr. Mamta Singh - Member

Asst. Prof. and Head, Sai College, Bhilai
Hemchand Yadav Vishwavidyalaya, Durg

6. Mr. Sushil Kumar Sahu - Member
Asst. Prof. and Head, Christ College, Jagdalpur
Shaheed Mahendra Karma Vishwavidyalaya, Bastar

7. Mr. Vikrant Gupta - Member
Prof. and Head, Batmul Ashram College, Salheana
Shaheed Nand Kumar Patel University, Raigarh

8. Mr. L.K. Gavel - Member
Asst. Prof. and Head, Govt. Ghanshyam Singh Gupt, PG College, Balod
Hemchand Yadav Vishwavidyalaya, Durg

9. Dr. Anil Kumar Sharma - Member
Asst. Prof. and Head, A.P.S.G.M.N.S, Govt. PG College, Kawardha
Hemchand Yadav Vishwavidyalaya, Durg

10. Mr. Vishwnath Tamrakar - Member
Asst. Prof. and Head, Sant Guru Ghasidas Govt. PG College, Kurud,
Pt. Ravishankar Shukla University, Raipur

11. Ms. Anjeeta Kujur - Member
Asst. Prof. and Head, Govt. R.B.R.N.E.S. PG College, Jashpur
Sant Gahira Guru University Sarguja, Ambikapur

12. Mr. Suresh Kumar Thakur - Member
Asst. Prof. and Head, Indira Gandhi Govt. PG College, Vaishali Nagar
Hemchand Yadav Vishwavidyalaya, Durg

13. Dr. Ugrasen Suman - Member
Prof. and Head, Dept. of Computer Science (Present Online)
Devi Ahila Vishwavidyalaya, Indore

Date: 03.06.2022

B. Sc. Part II

Paper I

ELD-201T: OPERATIONAL AMPLIFIERS

Theory:

Max. Marks : 50

Aims & Objectives

To learn the differential amplifier, basic Op-amp circuits, various parameters of Op-amp, applications of Op-amp namely summing and difference amplifiers, Multivibrator using Op-amp.

Course Learning Outcomes:

After the completion of the course, Students will be able to

1. Define the basic concepts related to Op-amp and explain the working of op-amp based circuits.
2. To understand the applications of Op-amp namely summing, difference, voltage to current converter etc.
3. To understand the IC regulation and multivibrator.

Unit-1

Differential Amplifiers: Dual input balanced and unbalanced output, constant current bias, current mirror, cascaded differential amplifier stages with concept of level translator.

Basic Operational Amplifier: block diagram of an operational amplifier (IC 741), Inverting and non-inverting input and virtual ground

Unit-2

Op-Amp Parameters: Input offset voltage, input offset current, input bias current, differential input resistance, input capacitance, offset voltage adjustment range, input voltage range, common mode rejection ratio, slew rate, supply voltage rejection ratio.

Op-Amp Circuits: Open and closed loop configuration, Frequency response of an op-amp in open loop and closed loop configurations, Inverting, Non-inverting,

Unit-3

Op- Amp Applications Summing and difference amplifier, Integrator, Differentiator, Voltage to current converter, Current to voltage converter.

Comparators: Basic comparator, Level detector, Voltage limiters, Schmitt Trigger.

Signal Generators: Phase shift oscillator, Wien bridge oscillator, Square wave generator, triangle wave generator, saw tooth wave generator, and Voltage controlled oscillator.

22.2.23 22.2.2023

Unit-4

Fixed and Variable IC Regulators: IC 78xx and IC 79xx -concepts only, IC LM317- output voltage equation

Signal Conditioning Circuits: Sample and hold systems, Active filters: First order low passand high pass butterworth filter, Second order filters, Band pass filter, Band reject filter, All pass filter, Log and antilog amplifiers.

Unit-5

Multivibrators Circuit using Op-Amp: Block diagram, Astable and monostable multivibrator circuit, Applications of Monostable and Astable multivibrators, Phase locked loops (PLL): Block diagram, phase detectors, IC565.

Reference Books:

1. R. A. Gayakward, Op-Amps and Linear IC's, Pearson Education (2003)
2. R.F. Coughlin and F.F. Driscoll, Operational amplifiers and Linear Integrated circuits, Pearson Education (2001)
3. J. Millman and C.C. Halkias, Integrated Electronics, Tata McGraw-Hill (2001)

22.2.23 22-2-2023

Paper II

ELD-202T: INDUSTRIAL ELECTRONICS

Theory: **Max. Marks :50**

Aims & Objectives

To understand the industrial electronics, related devices, applications of various devices, PCB fabrications.

Course Learning Outcomes:

After the completion of the course, Students will be able to

1. Student will be able to understand basic knowledge of Thyristor family.
2. Student will be able to understand phase control operation of different power electronic devices.
3. Student will be able to understand the controlled rectifications.
4. Student will be able to understand mechanism of inverters and choppers.
5. Student will be able to understand various types of PCBs and schematic design.

Unit-1

Thyristors: Principles and operations of SCR, Voltage amplifier gate characteristics of SCR, Characteristics of two transistor models, Thyristor construction, Rectifier circuit using SCR,GTO, Operation and characteristics of DIAC, TRIAC, Silicon Controlled Switch, Silicon Unilateral Switch, Silicon Bilateral Switch, and Light activated SCR. Turn ON/OFF Mechanism: Basics of turn on and turn off methods

Unit-2

Applications of SCR: Multiple connections of SCR, Series operation, Triggering of seriesconnected SCR, Parallel operation, Triggering of parallel connected SCR, SCR di/dtcalculation, Snubber circuit, dv/dt calculation across SCR, Types of converters, Full wave controlled rectifier with resistive load, FWCR with inductive load, FWCR with free wheeling diode .

Unit-3

Inverters: Types of inverters, Single phase bridge inverter, Mc Murray impulse communication inverter, Single phase half bridge voltage source inverter, Single phase fullbridge voltage inverter. Step down choppers, Step up choppers, Chopper classification.

Other Applications: Induction heating, Resistance welding, Over voltage protection, Zerovoltage switch, SMPS,UPS, DC circuit breaker, Battery charger, AC static switch, DC staticswitch, Time delay, Fan regulator using TRIAC .

22-2-2023 22-2-23 22-2-2023

Unit-4

PCB Fundamentals: PCB Advantages, components of PCB, Electronic components, IC's, Surface Mount Devices (SMD).Classification of PCB - single, double, multilayer and flexible boards, Manufacturing of PCB, PCB standards.

Schematic & Layout Design: Schematic diagram, General, Mechanical and Electricaldesign considerations, Placing and Mounting of components, Conductor spacing, routingguidelines, heat sinks and package density, Net list, creating components for library, Tracks,Pads, Vias, power plane, grounding, Lead cutting and Soldering Techniques, Testing and quality controls.PCB Technology Trends, Environmental concerns in PCB industry.

Unit-5

Analog/Digital Multimeter: Analog multimeter, AC and DC measurement, conversion of analog output to digital form (A/D), Dual ramp A/D converter, digital measuring system, multimeter block diagram, voltage, current and resistance measurements. Frequency counter: Elements of electronic counter, decade counting assembly temperature compensated crystal oscillator, universal counter, measurement modes; frequency measurement, period measurement, time interval measurement, measurement errors: gating errors, time base error, trigger level error.

Reference Books:

1. Ramamourthy " Thyristor and their applications" East-West Publishers, 2nd Edition
2. Shamir K Datta " Power Electronics and Controllers" PHI, 3rd Edition
3. Power Electronics: Devices, Circuits and Industrial Applications
4. V.R. MoorthyOxford University Press; First Edition edition
5. Printed circuit Board – Design & Technology by Walter C. Bosshart, Tata McGraw Hill.
6. Printed Circuit Board –Design, Fabrication, Assembly & Testing by R.S.Khandpur, TATA McGraw Hill Publisher
7. Electronics Instrumentation H.S.Kalsi McGraw Hill Education; 3 edition (1 July 2017)
8. Modern Electronic Instrumentation and Measurement Techniques Albert Helfrick and William D Cooper Prentice Hall India Learning Private Limited
9. Electronic Instrumentation and Measurements David A. Bell Oxford University Press India; Third edition (12 April 2013)

22-2-23 22-2-2023

ELECTRONICS LABORATORY

ELD-203P: Operational Amplifier and Industrial Electronics Lab

Min. Marks: 17 **Max. Marks 50**

A student is required to do at least 14 experiment in an academic year. The scheme of practical examination will be as follows-

The scheme of practical examination will be as follows-

Experiment	--	**30**
Viva	--	**10**
Sessional	--	**10**
Total	--	**50**

1. To design inverting amplifier using Op-amp 741 for DC voltage and calculate the voltage gain.
2. To design non-inverting amplifier using Op-amp 741 for DC voltage and calculate the voltage gain.
3. To investigate the use of an Op-amp as an Integrator.
4. To investigate the use of an Op-amp as a Differentiator.
5. Study of IC OP-AMP application, viz. adder, subtractor.
6. Study of IC OP-AMP application, viz. integrator, differentiator.
7. Study of OP Amp: Inverting and non-Inverting amplifiers of different gains.
8. To design inverting amplifier using Opamp 741 for DC voltage and calculate the voltage gain.
9. To design non-inverting amplifier using Op-amp 741 for DC voltage and calculate the voltage gain.
10. To investigate the use of an Op-amp as an Integrator.
11. To investigate the use of an Op-amp as an Differentiator.
12. Study of astable multivibrator using Op-amp.
13. Study of bistable multivibrator using Op-amp.
14. Study of function generator.
15. Study of A/D Converter
16. Study of D/A Converter.
17. Study of SCR characteristics.
18. Study of Diac and Triac characteristics.
19. Study of UJT characteristics.
20. Study of UJT as a relaxation oscillator.

22.2.23 22-2-2023

Design and Fabrication of Printed Circuit Boards

21. Design automation, Design Rule Checking; Exporting Drill and Gerber Files; Drills; Footprints and Libraries Adding and Editing Pins, copper clad laminates materials of copper clad laminates, properties of laminates (electrical & physical),

22. Study of soldering techniques. Film master preparation, Image transfer, photo printing, Screen Printing, Plating techniques etching techniques,

23. Study of Mechanical Machining operations, Lead cutting and Soldering Techniques, Testing and quality controls.

24. Study of Lead cutting and Soldering Techniques, Testing and quality controls.

Note:

1. Out of above mentioned twenty four experiments at least fourteen experiments should be done, use of bread board and soldering is expected for at least four experiment.
2. Other experiments of equal standard may also be set.

22.2.23 22-2-2023

Part A: Introduction				
Program: **Diploma Course**		Class: **B.Sc.-IT II Year**	Year: **2022**	Session: **2022-2023**
1.	Course Code	**BSCIT-2P**		
2.	Course Title	**LAB: Web Technology and JAVA**		
3.	Course Type	**Practical**		
4.	Pre-requisite (if any)	Theoretical knowledge of HTML, CSS, JavaScript and JAVA		
5.	Course Learning Outcomes (CLO)	At the end of course, Students will be able to: • Develop web-based application. • Develop front end application using front end technologies. • Demonstrate the principles of object-oriented programming. • Create multi-threaded programs and event handling mechanisms • Develop simple GUI interfaces for a computer program to interact with users. • Use form validation on web page. • Develop server-based application using Servlet and JSP.		
6.	**Credit Value**	**Practical: 2**		
7.	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks : 17**	

Part B: Content of the Course	
Total Periods: 30	
Tentative Practical List	**Note:** This is tentative list; the teachers concern can add more program as per requirement. Developing Web based application based on the concept of Web design technologies and Java programming. 1. Design a Login Page by using HTML and CSS. 2. Write a program to perform validation on web page. 3. Design a web page to demonstrate registration form of student. 4. Design a from by using HTML and CSS who will take input from the user through Java-script Function and check weather it is integer or not. 5. Design a device friendly web page which should be able to resize the display depending on the device by using bootstrap. 6. Write a java program to create an abstract class named shape that contains two integers and an empty method named print Area () Provide three classes named Rectangle. Triangle and Circle such that each one of the classes extends the class shape. Each one of the class contains only the method print Area () that print the area of the given shape. 7. Write a Java program that implements a multithreaded program that has three threads. First thread generates a random integer every 1 second and if the value

	is odd the third thread will print the value of the cube of the number. 8. Write a java program which creates a list containing ice cream flavours. On selection of any flavour price should be displayed in a text field. 9. Write a JDBC program to create a table product (id number, name varchar. Price varchar). And insert a record in the table. 10. Write a program to execute a select query using JDBC. 11. Write a program to execute an Update query using JDBC. 12. Write a server program to return the square root of a number to the client using Socket. 13. Write a server program to return Date and time to clients using socket programming. 14. Write a JSP program for basic arithmetic functions. 15. Write a advance java program to implement registration of student by using JSP. 16. Write a program to design a web page for login form and connect to the database while using JSP and JDBC. 17. Write a program to design a simple calculator using (a) JavaScript (b) Servlet and (c) JSP. 18. A web application that lists all cookies stored in the browser on clicking "List Cookies" button. Add cookies if necessary. 19. Write a java program that connects to a database using JDBC and does add, deletes, modify and retrieve operations. 20. Develop an applet that displays a simple message.

Part C: Learning Resources
Text Books, Reference Books, Other Resources
Suggested Readings: 1. The Complete Reference JAVA, Herbert Scheldt, Tata McGraw Hill publication, 5th Edition. 2. Advance JAVA, Gajendra Gupta, Firewall Media, 1" Edition, 2006. 3. JAVA network programming, Elliotte Rusty Harold, O'Reilly Publication, 3" Edition. 4. Core Java for Beginners, Rashmi Kanta Das, Vikas Publishing House Pvt. Ltd. 5. Internet and Internet Engineering, Daniel Minoli, TMH (Latest Edition) 6. Java Script, Gosslin, Vikas (Latest Edition) 7. HTML The Definite Guide, Chuck musiano& Bill Kenndy, O Reilly (Latest Edition). **E Resources:**

TBzKoa1Ov21lwDzJfM&index=22

- Building web-app
  https://www.youtube.com/watch?v=kIEn4LqAQlE&list=PLJ5C_6qdAvBEJ6-TBzKoa1Ov21lwDzJfM&index=3
- Introduction to Java Script
  https://www.youtube.com/watch?v=fRbP92oScp0&list=PLJ5C_6qdAvBEJ6-TBzKoa1Ov21lwDzJfM&index=10
- Introduction to Database
  https://www.youtube.com/watch?v=mtc0HHrUKpI&list=PLJ5C_6qdAvBEJ6-TBzKoa1Ov21lwDzJfM&index=12
- Introduction to SQL
  https://www.youtube.com/watch?v=ar2naKy0aPw&list=PLJ5C_6qdAvBEJ6-TBzKoa1Ov21lwDzJfM&index=16
- Introduction to Java
  https://www.youtube.com/watch?v=OjdT2l-EZJA&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho&index=1

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 50
Continuous Comprehensive Evaluation (CCE): Not Applicable
University Exam(UE): 50 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable

Declaration

The syllabus of this subject is frame as per the TOR of department of higher education, Chhattisgarh.

1. Dr. H.S. Hota - Chairman
   Prof. and Head, Dept. of Computer Science and Application
2. Dr. Sanjay Kumar - Member
   Prof. and Head, SoS in Computer Science, Pt. Ravishankar Shukla University, Raipur
3. Mr. Jitendra Kumar - Member
   Asst. Prof., Dept. of Computer Science and Application
   Atal Bihari Vajpayee Vishwavidyalaya, Bilaspur
4. Mr. H.S.P. Tonde - Member
   Asst. Prof. and Head, Dept. of Computer Science,
   Sant Gahira Guru University Sarguja, Ambikapur
5. Dr. Mamta Singh - Member

Asst. Prof. and Head, Sai College, Bhilai
Hemchand Yadav Vishwavidyalaya, Durg

6. Mr. Sushil Kumar Sahu - Member
Asst. Prof. and Head, Christ College, Jagdalpur
Shaheed Mahendra Karma Vishwavidyalaya, Bastar

7. Mr. Vikrant Gupta - Member
Prof. and Head, Batmul Ashram College, Salheana
Shaheed Nand Kumar Patel University, Raigarh

8. Mr. L.K. Gavel - Member
Asst. Prof. and Head, Govt. Ghanshyam Singh Gupt, PG College, Balod
Hemchand Yadav Vishwavidyalaya, Durg

9. Dr. Anil Kumar Sharma - Member
Asst. Prof. and Head, A.P.S.G.M.N.S, Govt. PG College, Kawardha
Hemchand Yadav Vishwavidyalaya, Durg

10. Mr. Vishwnath Tamrakar - Member
Asst. Prof. and Head, Sant Guru Ghasidas Govt. PG College, Kurud,
Pt. Ravishankar Shukla University, Raipur
Not agreed bcz syllabus is lengthy.

11. Ms. Anjeeta Kujur - Member
Asst. Prof. and Head, Govt. R.B.R.N.E.S. PG College, Jashpur
Sant Gahira Guru University Sarguja, Ambikapur

12. Mr. Suresh Kumar Thakur - Member
Asst. Prof. and Head, Indira Gandhi Govt. PG College, Vaishali Nagar
Hemchand Yadav Vishwavidyalaya, Durg

13. Dr. Ugrasen Suman - Member
Prof. and Head, Dept. of Computer Science (Present Online)
Devi Ahila Vishwavidyalaya, Indore

Date: 03.06.2022

Part A: Introduction				
Program: **Diploma Course**		Class: **B.Sc.-IT II Year**	Year: **2022**	Session:**2022-2023**
1.	Course Code	**BSCIT-3T**		
2.	Course Title	**Data Communication and Networking**		
3.	Course Type	**Theory**		
4.	Pre-requisite (if any)	No		
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Understand the basic computer network technology • Understand and explain the data communication system and its components. • Identify the different types of network topologies and protocols. • Understand the layers of the OSI model and TCP/IP. • Expose wireless and wired LANs.		
6.	**Credit Value**	**Theory: 5**		
7.	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks: 17**	

Part B: Content of the Course		
Total Periods: 60		
Unit	**Topics**	**No. of Periods**
I	**Overview of Data Communication and Networking:** Data Communications: components, data representation, direction of data flow (simplex, half duplex , full duplex; Networks : distributed processing, network criteria , physical structure (type of connection , topology), categories of network (LAN, MAN, WAN), Protocol and standards; Reference Models: OSI & TCP/IP reference model comparative study.	12
II	**Physical layer:** Analog and Digital Transmission: Transmission Impairments, Data Rates Limits, Digital to Digital Conversion, Digital to Analog conversion, Analog To Digital Conversion: Modulation, Transmission Modes, Parallel, Serials Asynchronous and Synchronous communication; Constellation Diagram, Analog to Analog conversion, Bandwidth Utilization, Transmission Media: Multiplexing: FDM, WDM AND TDM, Guided Media: Twisted Pair, Coaxial and Fiber Optic, Unguided Media : Wireless , Radio Waves, Microwaves and Infrared.	12
III	**Data Link Layer:** Flow control: Protocols: Stop & wait ARQ, Go-Back-N ARQ, Selective repeat ARQ, HDLC; Medium Access Sub-layer: Point to point protocol, LCP, NCP, FDDI, token bus, token ring; Multiple Access Protocols: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, FDMA,TDMA,CDMA; Traditional Ethernet, Fast Ethernet.	12
IV.	**Network Layer:** Internetworking Devices: Repeaters , Hubs , Bridges, Switches, Router , Gateway; Addressing: Internet address, classful address, subnetting, classless address; Routing: Techniques, static vs dynamic routing, and routing table for classful address; Routing Algorithms: Shortest path algorithm, flooding , distance vector routing , link state routing; Protocols: ARP, RARP, IP, ICMP, IPV6; Unicast and multicast routing protocols;	12

V.	**Transport Layer and Application Layer:** UDP,TCP; Congestion control algorithm: Leaky bucket algorithm, Token bucket algorithm, choke packets; Quality of service: techniques to improve Qos; DNS,SMTP, SNMP,FTP, HTTP, Firewalls; Modern Topics: Wireless LAN: IEEE 802.11;Introduction to Bluetooth,VLAN's, Cellular telephony & Satellite network.	12
Keywords: Networking Model, Communication Protocol, Transmission Media, Internetworking Devices.		

Part C: Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings:

1. Data Communications and Networking, B.A. Forouzan, TMH, (Latest Edition)
2. Computer Networks, A.S. Tanenbaum, 4th Edition, Pearson Education/PHI
3. Data and Computer Communication, W. Stallings, 5th Edition, PHI/Pearson Education
4. Computer Networking – A top down approach featuring the internet, Kurose and Rose, Pearson Education.
5. Communication Networks, Walrand, TMH (Latest Edition)

E Resources:

1. NPTEL URL link for Data Communication:
   https://nptel.ac.in/courses/106105082
   Topics From SWAYAM Portal
2. Introduction to Data Communication
   https://www.youtube.com/watch?v=swtH_okidQc&list=PLUtfVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=1
3. Layered Architecture
   https://www.youtube.com/watch?v=xHO6LjSHeo0&list=PLUtfVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=2
4. Data and Signal
   https://www.youtube.com/watch?v=6ZGVZ7gUccE&list=PLUtfVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=3
5. Guided Transmission Media
   https://www.youtube.com/watch?v=y7v3EAJsWXA&list=PLUtfVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=5
6. Unguided Transmission Media
   https://www.youtube.com/watch?v=hKq1tYlVxdQ&list=PLUtfVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=6

Part D: Assessment and Evaluation

Maximum Marks: 50

Declaration

The syllabus of this subject is frame as per the TOR of department of higher education, Chhattisgarh.

1. Dr. H.S. Hota - Chairman
   Prof. and Head, Dept. of Computer Science and Application
2. Dr. Sanjay Kumar - Member

08.06.2022

03-6-2022

Prof. and Head, SoS in Computer Science, Pt. Ravishankar Shukla University, Raipur

3. Mr. Jitendra Kumar - Member
   Asst. Prof., Dept. of Computer Science and Application
   Atal Bihari Vajpayee Vishwavidyalaya, Bilaspur
4. Mr. H.S.P. Tonde - Member
   Asst. Prof. and Head, Dept. of Computer Science,
   Sant Gahira Guru University Sarguja, Ambikapur
5. Dr. Mamta Singh - Member
   Asst. Prof. and Head, Sai College, Bhilai
   Hemchand Yadav Vishwavidyalaya, Durg
6. Mr. Sushil Kumar Sahu - Member
   Asst. Prof. and Head, Christ College, Jagdalpur
   Shaheed Mahendra Karma Vishwavidyalaya, Bastar
7. Mr. Vikrant Gupta - Member
   Prof. and Head, Batmul Ashram College, Salheana
   Shaheed Nand Kumar Patel University, Raigarh
8. Mr. L.K. Gavel - Member
   Asst. Prof. and Head, Govt. Ghanshyam Singh Gupt, PG College, Balod
   Hemchand Yadav Vishwavidyalaya, Durg
9. Dr. Anil Kumar Sharma - Member
   Asst. Prof. and Head, A.P.S.G.M.N.S, Govt. PG College, Kawardha
   Hemchand Yadav Vishwavidyalaya, Durg
10. Mr. Vishwnath Tamrakar - Member
    Asst. Prof. and Head, Sant Guru Ghasidas Govt. PG College, Kurud,
    Pt. Ravishankar Shukla University, Raipur
11. Ms. Anjeeta Kujur - Member
    Asst. Prof. and Head, Govt. R.B.R.N.E.S. PG College, Jashpur
    Sant Gahira Guru University Sarguja, Ambikapur
12. Mr. Suresh Kumar Thakur - Member
    Asst. Prof. and Head, Indira Gandhi Govt. PG College, Vaishali Nagar
    Hemchand Yadav Vishwavidyalaya, Durg
13. Dr. Ugrasen Suman - Member
    Prof. and Head, Dept. of Computer Science (Present Online)
    Devi Ahila Vishwavidyalaya, Indore

Date: 03.06.2022

Part A: Introduction				
Program: **Diploma Course**		Class: **B.Sc.-IT II Year**	Year: **2022**	Session:**2022-2023**
1.	Course Code	**BSCIT-4T**		
2.	Course Title	**Web Technology and Java**		
3.	Course Type	**Theory**		
4.	Pre-requisite (if any)	Basic understanding of programming concepts and programming language		
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Create applications using HTML, CSS and Java Script. • Understand fundamental tools and technologies for web design. • Specify design rules in constructing web pages and sites. • Understand how Web pages are designed and created. • Design console-based GUI based and Web based application. • Front end designing using html, CSS, java script and bootstrap. • Develop server-side programs in the form of Servlet. • Designing Web application by using JSP as a server-side programming. • Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's Create web pages using HTML and Cascading Styles sheets. • Analyze a web page and identify its elements and attributes Create dynamic web pages using JavaScript. • Build web applications using jsp and Servlet.		
6.	**Credit Value**	**Theory:4**		
7.	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks : 17**	

Part B: Content of the Course		
Total Periods: 60		
Unit	**Topics**	**No. of Periods**
I	**Introduction:** Overview of WWW, Web page, Web browsers, HTTP, URL, Hypertext, Web server, Tools for web site development, hosting options and domain name registration. **Markup language:** Introduction, DTD, Creating Web pages, Headings, Paragraphs, Lists, Hyperlinks, Tables, Web forms, Input Types, Input Attributes, Inserting images, Frames, Basics of DHTML, XML , XHTML.	12
II	**Web Development:** CSS-Introduction, Syntax, measurement units, colors, Backgrounds, Font, Text, position, Align, Images, Link, Table, List, Padding. **JavaScript:** Overview, syntax, Variables, Operators, Decision control statement, Looping statement, JavaScript functions, Java script Events, Cookies, Page Redirect, and Validation. **Bootstrap:** Introduction, Grid system, typography, tables, images, dropdowns, jumbotron, them, template and forms. **PHP:** Introduction, syntax, variables, operators, functions, include, get method, post method, cookies, session, PHP form validation, exception.	12

III	**JAVA:** Primitive Data Types, Variables, Array, operators, control statements, classes and objects, Abstract Classes, Polymorphism, Inheritance, Method Over-writing, method overriding, constructor, super keyword, this keyword, final static, package and interface, Multi-threading and Exception Handling, Collection Framework. Introduction to applet.	12
IV.	**Java Server Page (JSP):** Basics of Servlet, writing simple program in Servlet, Introduction to Java Server Page (JSP), Embedding Java Code into HTML, Implicit JSP Objects, Overview of the JSP Tags, Directives, Declarations, Expressions, Deploying Servlet and JSP, JSTL, JSP Action elements: jsp:forward, jsp:include, JSP Request, JSP Response, JSP Config, JSP Session, Cookies, JSP Exception Handling.	12
V.	**Database Using JDBC:** Concept, JDBC Driver Types, JDBC package, establishing a database connection and executing SQL Statements.	12
Keywords: Web Designing, Collection Framework, Servlet, JSP, JDBC, Database Connectivity.		

Part C: Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings:

1. The Complete Reference JAVA, Herbert Scheldt, Tata McGraw Hill publication, 5° Edition.
2. Advance JAVA, Gajendra Gupta, Firewall Media, 1" Edition, 2006.
3. JAVA network programming, Elliotte Rusty Harold, O'Reilly Publication, 3" Edition.
4. Core Java for Beginners, Rashmi Kanta Das, Vikas Publishing House Pvt. Ltd.
5. Internet and Internet Engineering, Daniel Minoli, TMH (Latest Edition)
6. Java Script, Gosslin, Vikas (Latest Edition)
7. HTML The Definite Guide, Chuck musiano& Bill Kenndy, O Reilly (Latest Edition).

E Resources:

1. Introduction to web-app
   https://www.youtube.com/watch?v=lZnp3tRRTzw&list=PLJ5C_6qdAvBEJ6-TBzKoa1Ov21lwDzJfM&index=22
2. Building web-app
   https://www.youtube.com/watch?v=kIEn4LqAQlE&list=PLJ5C_6qdAvBEJ6-TBzKoa1Ov21lwDzJfM&index=3
3. Introduction to Java Script
   https://www.youtube.com/watch?v=fRbP92oScp0&list=PLJ5C_6qdAvBEJ6-TBzKoa1Ov21lwDzJfM&index=10
4. Introduction to Database
   https://www.youtube.com/watch?v=mtc0HHrUKpI&list=PLJ5C_6qdAvBEJ6-TBzKoa1Ov21lwDzJfM&index=12
5. Introduction to SQL
   https://www.youtube.com/watch?v=ar2naKy0aPw&list=PLJ5C_6qdAvBEJ6-TBzKoa1Ov21lwDzJfM&index=16
6. Introduction to Java
   https://www.youtube.com/watch?v=OjdT2l-EZJA&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho&index=1
   https://www.w3schools.com/java/

7. Introduction to Web Technology: https://www.w3schools.com/
Part D:Assessment and Evaluation
Maximum Marks: 50

Declaration

The syllabus of this subject is frame as per the TOR of department of higher education, Chhattisgarh.

1. Dr. H.S. Hota - Chairman
   Prof. and Head, Dept. of Computer Science and Application
2. Dr. Sanjay Kumar - Member
   Prof. and Head, SoS in Computer Science, Pt. Ravishankar Shukla University, Raipur
3. Mr. Jitendra Kumar - Member
   Asst. Prof., Dept. of Computer Science and Application
   Atal Bihari Vajpayee Vishwavidyalaya, Bilaspur
4. Mr. H.S.P. Tonde - Member
   Asst. Prof. and Head, Dept. of Computer Science,
   Sant Gahira Guru University Sarguja, Ambikapur
5. Dr. Mamta Singh - Member
   Asst. Prof. and Head, Sai College, Bhilai
   Hemchand Yadav Vishwavidyalaya, Durg
6. Mr. Sushil Kumar Sahu - Member
   Asst. Prof. and Head, Christ College, Jagdalpur
   Shaheed Mahendra Karma Vishwavidyalaya, Bastar
7. Mr. Vikrant Gupta - Member
   Prof. and Head, Batmul Ashram College, Salheana
   Shaheed Nand Kumar Patel University, Raigarh
8. Mr. L.K. Gavel - Member
   Asst. Prof. and Head, Govt. Ghanshyam Singh Gupt, PG College, Balod
   Hemchand Yadav Vishwavidyalaya, Durg
9. Dr. Anil Kumar Sharma - Member
   Asst. Prof. and Head, A.P.S.G.M.N.S, Govt. PG College, Kawardha
   Hemchand Yadav Vishwavidyalaya, Durg
10. Mr. Vishwnath Tamrakar - Member
    Asst. Prof. and Head, Sant Guru Ghasidas Govt. PG College, Kurud,
    Pt. Ravishankar Shukla University, Raipur
11. Ms. Anjeeta Kujur - Member
    Asst. Prof. and Head, Govt. R.B.R.N.E.S. PG College, Jashpur
    Sant Gahira Guru University Sarguja, Ambikapur
12. Mr. Suresh Kumar Thakur - Member
    Asst. Prof. and Head, Indira Gandhi Govt. PG College, Vaishali Nagar
    Hemchand Yadav Vishwavidyalaya, Durg
13. Dr. Ugrasen Suman - Member (Present Online)
    Prof. and Head, Dept. of Computer Science
    Devi Ahila Vishwavidyalaya, Indore

Date: 03.06.2022

Part A: Introduction				
Program: **Diploma Course**		Class: **B.Sc. II Year**	Year: **2023**	Session: 2023-2024
1	Course Code	BIOT-2P		
2	Course Title	**LAB 2: Molecular Biology, Bioinstrumentation, and Genomics**		
3	Course Type	**Practical**		
4	Pre-requisite (if any)	As per Govt. norms.		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Understand on fundamentals of Recombinant DNA Technology. • Understand on estimation of DNA and RNA. • Understand on the concept of bioinformatics		
6	**Credit Value**	**Practical: 2**		
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks : 17**	

Part B: Content of the Course	
Total No. of Teaching Hours – 20 / 30 Periods	
Tentative Practical List	**Note:** This is tentative list; the teachers concern can add more program as per requirement. 1. Preparation of LB broth and agar 2. Isolation of DNA from Plant cell. 3. Estimation of DNA by DPA method. 4. Isolation RNA from yeast cells 5. Use of Centrifugation 6. Determination of glucose concentration using Spectrophotometer/Colorimeter 7. Electrophoresis, Agarose gel and SDS PAGE 8. Isolation of primary metabolites and Secondary metabolites from Paper chromatography/TLC 9. Retrieve DNA /Protein sequence from Biological Data Bases (NCBI). 10. Use of Bioinformatics tools studied 11. Primer designing 12. Study of similar sequence alignment using BLAST and Clustal W 13 Generating phylogenetic tree using MEGA 14. Tertiary structure prediction using SWISSMODEL
Keywords: DNA/RNA Isolation, NCBI, BLAST, Electrophoresis, TLC	

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

1. Lehninger: Principles of Biochemistry (2013) 6th ed., /Nelson, D.L. and Cox, M.M., W H Freeman and Company (New York), ISBN:13: 978-1-4641-0962-1 / ISBN:10:1-4292- 3414-8.
2. Devlin, T.M., Textbook of Biochemistry with Clinical Correlations (2011) 7th ed., John Wiley & Sons, Inc. (New York), ISBN: 978-0-470-28173-4 / BRV ISBN: 978-0-470- 60152-5.
3. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley& Sons. Inc.
4. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition. Lippincott Williams and Wilkins, Philadelphia.
5. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
6. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009 The World of the Cell 7th edition. Pearson Benjamin Cummings Publishing, San Francisco.
7. Donald, V. and Judith G.V., Biochemistry (2011) 4th ed., John Wiley & Sons Asia Pvt. Ltd. (New Jersey), ISBN:978-1180-25024.
8. Nicholas C.P. and Lewis S Fundamentals of Enzymology (1999) 3rd ed., Oxford University Press Inc. (New York), ISBN:0 19 850229 X.

9. Berg, J.M., Tymoczko, J.L. and Stryer L.,Biochemistry (2012) 7th ed., W.H. Freeman and Company (New York), ISBN:10:1-4292-2936-5, ISBN:13:978-1-4292-2936-4
10. Akanksha Jain, Sonia Bajaj, Sushma Solanki (2022) Text book of Biotechnology, Probecell Press

E-learning Resources:

https://ia600105.us.archive.org/30/items/FundamentalsBiochemistry4e_201802/FundamentalsBiochemistry4e.pdf
https://vlab.amrita.edu/?sub=3&brch=273
https://britannica.com
https://en.wikibooks.org/wiki/Biochemistry
https://nptel.ac.in
https://www.biointeractive.org/classroom-resources/bacterial-identification-virtual-lab
https://www.vlab.co.in/

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 50
Continuous Comprehensive Evaluation (CCE): Not Applicable
University Exam(UE): 50 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable
External assessment University Exam (UE)	As per Govt. norms.	

Declaration

Syllabus is framed as per the ToR

Name	Signature
Dr DSVGK Kaladhar, Prof & Chairperson CBoS Biotechnology, UTD ABVV	
Dr Pramod Kumar Mahish, Asst. Professor Govt. Digvijay College Rajnandgaon	
Dr Saumya Khare, Asst Prof, Kalyan PG. College Bhilai	
Dr Shubha Thakur, Asst Prof, St. Thomas College Bhilai	
Dr Akanksha Jain, Asst Prof. Shri Shankaracharya Mahavidyalaya, Bhilai	
Dr Arun Kumar Kashyap, Asst Professor, Govt. E raghavendra Rao PG. Science College Bilaspur	
Dr Tarun Kumar Patel, Asst Professor, Sant Guru Ghasidas PG. College Kurud	
Dr Neha Behar, Asst Prof. DLS PG. College Bilaspur	
Dr Sanjana Bhagat, Asst Prof. Govt Ngarjuna PG. Science College, Raipur	
Dr Kamlesh Shukla, PRSU, Raipur	
Dr Ashish Kumar, Sant Gahira Guru Vishwavidyalay Sarguja	

Part A: Introduction				
Program: **Diploma Course**		Class: **B.Sc. II Year**	Year: **2023**	Session:**2023-2024**
1	Course Code	BIOT-3T		
2	Course Title	**Molecular Biology and Biophysics**		
3	Course Type	Theory		
4	Pre-requisite (if any)	As per Govt. norms		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Understand on fundamentals of molecular biology and instrumentation • Understand the concept of tools applied in the study of biotechnology • Understand the expression of gene		
6	Credit Value	Theory: 4		
7	Total Marks	**Max. Marks:** 50	**Min Passing Marks:** 17	

Part B: Content of the Course		
Total No. of Teaching – Periods- 60 / Hours – 40		
Unit	**Topics**	No. of Period / Hour
1	1. Nucleic Acid: Bases, Nucleosides and Nucleotides, Structure, types and functions of DNA and RNA. 2. Structure, types and functions of Plasmids. 3. Transposons: Repetitive elements, Retro-transposons, LINEs & SINEs. Structure of Gene.	12 Periods / 08 Hours
2	1. DNA Replication: Enzymes involved and mechanism of DNA Replication in Prokaryotes. 2. Mutation: Molecular level of Mutation, Types of Mutagens, Spontaneous and Induced Mutation. 3. DNA Repair: Direct, NER, BER, Mismatch and Recombination.	12 Periods / 08 Hours
3	1. Transcription: Initiation, Elongation and Termination in prokaryotes. 2. Genetic Code: Features, Codon Assignment and Wobble hypothesis 3. Translation: Initiation, Elongation and Termination Translation machinery in Prokaryotes. 4. Operon- Concept of Operator, Regulator, Promoter gene, Inducer and Co-repressor.	12 Periods / 08 Hours
4	1. Biophysics : Introduction, Scope and Application 2. Principle, Types, Instrumentation and Functions of the following: a. Microscope b. Colorimeter and UV-VIS Spectrophotometer c. Electrophoresis (Agarose and PAGE) d. Centrifuge e. Chromatography (Paper, TLC and HPLC).	12 Periods / 08 Hours
5	1. Radioisotopes techniques: Radioactive decay, Measurement of radioactivity, Ionization Chambers, Geiger Muller and Scintillation Counter. 2. Autoradiography, DNA Fingerprinting, 3. Blotting techniques: Southern Northern and western blotting.	12 Periods / 08 Hours
Keywords: DNA, RNA, Replication, Transcription, Translation, Bioinstruments, Biophysics		

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

1. Gerald Karp - Cell and Molecular biology, 4th Edition (2005).
2. Lewis J.Klein Smith and Valerie M.Kish-Principles of cell and molecular biology-Third Edition (2002)
3. P.K. Gupta- Cell and molecular biology, Second Edition (2003), Rastogi publications.
4. Richard M-Twyaman-Advanced Molecular Biology, First South Asian Edition (1998), VivaBooks Pvt. Ltd.
5. K. Wilson and J. Walker (2012) Principle and Techniques of Biotechnology and Molecular Biotechnology.
6. DSVGK Kaladhar, Molecular Biochemistry (2018) RBSA Publishers ISBN 9788176117708.
7. Upadhya and Upadhya : Biophysical Chemistry.
8. David, I. Nelson and Michael M.Cox :Lehniger : Principal of Biochemistry 4th Edition. W.H. Freeman and Company, New York.
9. Buchanan, Gruissemen & Jones (2015) Biochemistry & Molecular Biology of Plant, 2nd edition.

E-learning Resources

https://ncert.nic.in/textbook/pdf/lech205.pdf
https://www.pdfdrive.com/biomolecules-books.html
https://swayam.gov.in/
https://www.edx.org/search?q=biomolecules&tab=course
https://britannica.com
https://en.wikibooks.org/wiki/Biochemistry
https://nptel.ac.in

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 50
Continuous Comprehensive Evaluation (CCE): Not Applicable
University Exam(UE): 50 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable
External assessment University Exam (UE) Time 3Hours		As per Govt. norms

Any remarks/ Suggestions: -

Declaration

Syllabus is framed as per the ToR

Name	Signature
Dr DSVGK Kaladhar, Prof & Chairperson CBoS Biotechnology, UTD ABVV	
Dr Pramod Kumar Mahish, Asst. Professor Govt. Digvijay College Rajnandgaon	
Dr Saumya Khare, Asst Prof, Kalyan PG. College Bhilai	
Dr Shubha Thakur, Asst Prof, St. Thomas College Bhilai	
Dr Akanksha Jain, Asst Prof. Shri Shankaracharya Mahavidyalaya, Bhilai	
Dr Arun Kumar Kashyap, Asst Professor, Govt. E raghavendra Rao PG. Science College Bilaspur	
Dr Tarun Kumar Patel, Asst Professor, Sant Guru Ghasidas PG. College Kurud	
Dr Neha Behar, Asst Prof. DLS PG. College Bilaspur	
Dr Sanjana Bhagat, Asst Prof. Govt Ngarjuna PG. Science College, Raipur	
Dr Kamlesh Shukla, PRSU, Raipur	
Dr Ashish Kumar, Sant Gahira Guru Vishwavidyalay Sarguja	

Part A: Introduction				
Program: Diploma **Course**		Class: **B.Sc. II Year**	Year: **2023**	Session:**2023-2024**
1	Course Code	BIOT-4T		
2	Course Title	RECOMBINANT DNA TECHNOLOGY AND GENOMICS		
3	Course Type	Theory		
4	Pre-requisite (if any)	As per Govt. norms		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Understand the fundamentals of Genetic engineering and biological databases • learn the basic techniques of RDT • Understand the concept of genomics		
6	Credit Value	Theory: 4		
7	Total Marks	**Max. Marks:** 50	**Min Passing Marks:** 17	

Part B: Content of the Course		
Total No. of Teaching – Periods- 60 / Hours – 40		
Unit	**Topics**	No. of **Period / Hour**
1	1. Recombinant DNA technology: General concept. Steps in gene cloning and application. 2. Restriction Modification System, Ligases and Polymerases, Klenow fragment, Taq, Pfu polymerase and Nuclease (Endo, Exo and restriction endonuclease). 3. Modification Enzyme (Kinase, Phosphates and terminal deoxynucleotidyl transferase). Reverse Transcriptase.	12 Periods / 08 Hours
2	1. Vectors: Plasmid, Bacteriophages, Cosmid, Phagemid, BAC, YAC and Expression vectors. 2. Gene Library: Genomic and cDNA library. 3. Selection and Screening of Recombinants: Genetic (Blue White Screening) and Hybridization methods- Colony hybridization and immunoblotting	12 Periods / 08 Hours
3	1. PCR: Types of PCR, Steps (Denaturation, Annealing and Extension); Applications, Advantages and Limitation of PCR. 2. Molecular Marker-RFLP, RAPD, AFLP, SSR SNP . 3. Site Directed Mutagenesis, Gene Silencing (siRNA, miRNA)	12 Periods / 08 Hours
4	1. Basic concept of Gene Transfer Methods: Microinjection, Electroporation, Lipofection. 2. Gene Therapy: In vivo and Ex vivo, Germ line and Somatic gene therapy. 3. Basic idea of Stem cell technology: Types of stems cell cultures and their Significance.	12 Periods / 08 Hours
5	1. Basic concept of Genomics: Structural and Functional Genomics 2. Shot Gun and Whole Genome Sequencing 3. Comparative Genomics: RT-PCR, SAGE, Microarray 4. Human Genome Project.	12 Periods / 08 Hours
Keywords: Genetic engineering, Gene therapy, Bioinformatics, Genomics, Molecular Markers, PCR		

Declaration

Syllabus is framed as per the ToR

Name	Signature
Dr DSVGK Kaladhar, Prof & Chairperson CBoS Biotechnology, UTD ABVV	
Dr Pramod Kumar Mahish, Asst. Professor Govt. Digvijay College Rajnandgaon	
Dr Saumya Khare, Asst Prof, Kalyan PG. College Bhilai	
Dr Shubha Thakur, Asst Prof, St. Thomas College Bhilai	
Dr Akanksha Jain, Asst Prof. Shri Shankaracharya Mahavidyalaya, Bhilai	
Dr Arun Kumar Kashyap, Asst Professor, Govt. E raghavendra Rao PG. Science College Bilaspur	
Dr Tarun Kumar Patel, Asst Professor, Sant Guru Ghasidas PG. College Kurud	
Dr Neha Behar, Asst Prof. DLS PG. College Bilaspur	
Dr Sanjana Bhagat, Asst Prof. Govt Ngarjuna PG. Science College, Raipur	
Dr Kamlesh Shukla, PRSU, Raipur	
Dr Ashish Kumar, Sant Gahira Guru Vishwavidyalay Sarguja	

बी.ए. / बी.एस–सी. / बी.कॉम. / बी.एच.एस.–सी.
भाग – तीन, आधार पाठ्यक्रम
प्रश्न पत्र – प्रथम (हिन्दी भाषा)

पूर्णांक– 75

इकाई–एक **(क)** भारत माता : सुमित्रानंदन पंत

(ख) कथन की शैलियॉ

1. विवरणात्मक शैली
2. मूल्यांकन शैली
3. व्याख्यात्मक शैली
4. विचारात्मक शैली

इकाई–दो **(क)** सूखी डाली : उपेन्द्रनाथ अश्क

(ख) विभिन्न संरचनाएँ

1. विनम्रता सूचक संरचना
2. विधि सूचक संरचना
3. निषेध परक संरचना
4. काल–बोधक संरचना
5. स्थान–बोधक संरचना
6. दिशा बोधक संरचना
7. कार्य–कारण सम्बन्ध संरचना
8. अनुक्रम संरचना

इकाई–तीन **(क)** वसीयत : मालती जोशी

(ख) कार्यालयीन पत्र और आलेख

1. परिपत्र
2. आदेश
3. अधिसूचना
4. ज्ञापन
5. अनुस्मारक
6. पृष्ठाकंन

इकाई–चार **(क)** योग की शक्ति : हरिवंश राय बच्चन

(ख) अनुवाद : स्वरूप एवं परिभाषा, उद्देश्य
स्त्रोत भाषा और लक्ष्य भाषा,
अच्छे अनुवाद की विशेषताएँ,
अनुवाद प्रक्रिया, अनुवादक

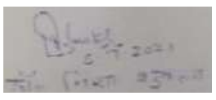
इकाई–पांच **(क)** संस्कृति और राष्ट्रीय एकीकरण : योगेश अटल

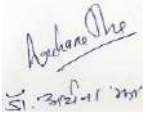
(ख) घटनाओं, समारोहों आदि का प्रतिवेदन, विभिन्न प्रकार के निमंत्रण पत्र

मूल्यांकन योजना : प्रत्येक इकाई से एक–एक प्रश्न पूछा जाएगा। प्रत्येक प्रश्न में आंतरित विकल्प होगा। प्रत्येक प्रश्न के 15 अंक होंगे। इसलिए प्रत्येक प्रश्न के दो भाग 'क' और 'ख' होंगे एवं अंक क्रमशः 8 एवं 7 अंक होंगे। प्रश्नपत्र का पूर्णांक 75 निर्धारित है।

5/7/2024

डॉ आशा दीवान





Foundation Course-III

English Language

B.A./B.Sc./B.Com./B.H.Sc./III

M.M. 75

The question paper for B.A./B.Sc./B.Com./B.H.Sc. III Foundation course, English Language and General Answers shall comprise the following items :

Five question to be attempted, each carrying 3 marks.

UNIT-I	Essay type answer in about 200 words. 5 essay type question to be asked three to be attempted.	15
UNIT-II	Essay writing	10
UNIT-III	Precise writing	10
UNIT-IV (a)	Reading comprehension of an unseen passage	05
(b)	Vocabulary based on text	10
UNIT-V	Grammar Advanced Exercises	25

Note: Question on unit I and IV (b) shall be asked from the prescribed text. Which will comprise of popular create writing and the following items. Minimum needs housing and transport Geo-economic profile of M.P. communication Educate and culture. Women and Worm in Empowerment Development, management of change, physical quality of life. War and human survival, the question of human social value survival, the question of human social value, new Economic Philosophy Recent Diberaliation Method) Demoration decentralization (with reference to 73, 74 constitutional Amendment.

Books Prescribed:

Aspects of English Language and Development - Published by M.P. Hindi Granth Academy, Bhopal.

HEMCHAND YADAV VISHWAVIDYALAYA, DURG (C.G.)

NEW CURRICULUM OF B.Sc. PART III

SESSION 2021-22

CHEMISTRY

The new curriculum will comprise of three papers of 33, 33 and 34 marks each and practical work of 50 marks. The Curriculum is to be completed in 180 working days as per UGC norms and conforming to the directives of Govt. of Chhattisgarh. The theory papers are of 60 hrs. Each duration and practical work of 180 hrs duration.

Paper – I

INORGANIC CHEMISTRY 60 Hrs., Max Marks 33

UNIT-I

METAL-LIGAND BONDING IN TRANSITION METAL COMPLEXES

(A) Limitations of valence bond theory, Limitation of Crystal Field Theory, Application of CFSE, tetragonal distortions from octahedral geometry, Jahn–Teller distortion, square planar geometry. Qualitative aspect of Ligand field and MO Theory.

(B) Thermodynamic and kinetic aspects of metal complexes. A brief outline of thermodynamic stability of metal complexes and factors affecting the stability, substitution reactions of square planar complexes, Trans- effect, theories of trans effect. Mechanism of substitution reactions of square planar complexes.

UNIT-II

MAGNETIC PROPERTIES OF TRANSITION METAL COMPLEXES

Types of magnetic behavior, methods of determining magnetic susceptibility, spin only formula, L-S coupling, correlation of $\mu_{so\ (spin\ only)}$ and $\mu_{eff.}$ values, orbital contribution to magnetic moments, application of magnetic moment data for 3d metal complexes.

Electronic spectra of Transition Metal Complexes.

Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, spectro-chemical series. Orgel-energy level diagram for d^1 and d^2 states, discussion of the electronic spectrum of $[Ti(H_2O)_6]^{3+}$ complex ion.

UNIT-III

ORGANOMETALLIC CHEMISTRY

Definition and classification of organometallic compounds on the basis of bond type. Concept of hapticity of organic ligands. Metal carbonyls: 18-electron rule, electron count of mononuclear, polynuclear and substituted metal carbonyls of 3d series. General methods of preparation (direct combination, reductive carbonylation, thermal and photochemical decomposition) of mono and binuclear carbonyls of 3d series.

Structures of mononuclear and binuclear carbonyls of Cr, Mn, Fe, Co and Ni using VBT. π-acceptor behavior of CO (MO diagram of CO to be discussed), Zeise's salt: Preparation and structure.

28.06.21 (Dr. Alka Tiwari) | 28.06.2021 (Dr. C. Bose) | 28.06.2021 (Dr. Rajmani Patel) | 28.6.2021 | 28.06.2021 Jagjit Kumar

Catalysis by Organometallic Compounds –

Study of the following industrial processes and their mechanism :

1. Alkene hydrogenation (Wilkinsons Catalyst)
2. Polymeration of ethane using Ziegler – Natta Catalyst

UNIT-IV

BIOINORGANIC CHEMISTRY

Essential and trace elements in biological processes, Excess and deficiency of some trace metals, Toxicity of some metal ions (Hg, Pb, Cd and As), metalloporphyrins with special reference to hemoglobin and myoglobin. Biological role of alkali and alkaline earth metals with special reference to Ca^{2+} and Mg^{2+}, nitrogen fixation.

UNIT-V

HARD AND SOFT ACIDS AND BASES (HSAB) Classification of acids and bases as hard and soft. Pearson's HSAB concept, acid-base strength and hardness and softness. Symbiosis, Applications of HSAB principle.

INORGANIC POLYMERS

Types of inorganic polymers, comparison with organic polymers, synthesis, structural aspects and applications of silicones. Silicates, phosphazenes and polyphosphate.

REFERENCE BOOKS

1. Basic Inorganic Chemistry, F. A. Cotton, G. Wilkinson and P. L. Gaus, Wiley.
2. Concise Inorganic Chemistry, J. D. Lee, ELBS.
3. Concepts of Models of Inorganic Chemistry, B. Douglas, D. Mc Daniel and J. Alexander, John Wiley.
4. Inorganic Chemistry, D. E. Shriver, P. W. Atkins and C. H. Langford, Oxford.
5. Inorganic Chemistry, W. W. Porterfield, Addison – Wiley.
6. Inorganic Chemistry, A. G. Sharp, ELBS.
7. Inorganic Chemistry, G. L. Miessler and D. A. Tarr, Prentice Hall.
8. Advanced Inorganic Chemistry, Satya Prakash.
9. Advanced Inorganic Chemistry, Agarwal and Agarwal.
10. Advanced Inorganic Chemistry, Puri, Sharma, S. Naginchand.
11. Inorganic Chemistry, Madan, S. Chand.
12. Aadhunik Akarbanic Rasayan, A. K. Shrivastav & P. C. Jain, Goel Pub.
13. Uchchattar Akarbanic Rasayan, satya Prakash & G. D. Tuli, Shyamal Prakashan.
14. Uchchattar Akarbanic Rasayan, Puri & Sharma.
15. Selected topic in Inorganic Chemistry by Madan Malik & Tuli, S. Chand.

28.06.21 (Dr. Alka Tiwari) 28.06.2021 (Dr. C. Bose) 28.06.2021 (Dr. Rajmani Patel) 28.6.2021 28.06.2021 Jagjit Kumar

Paper – II
ORGANIC CHEMISTRY 60 Hrs. Max Marks 33

UNIT-I
HETEROCYCLIC COMPOUNDS

Classification and nomenclature, Structure, aromaticity in 5-membered and 6-membered rings containing one heteroatom; Synthesis, reactions and mechanism of substitution reactions of: Furan, Pyrrole (Paal-Knorr synthesis, Knorr pyrrole synthesis, Hantzsch synthesis), Thiophene, Pyridine (Hantzsch synthesis), Indole (Fischer indole synthesis and Madelung synthesis), Quinoline and isoquinoline, (Skraup synthesis, Friedlander's synthesis, Knorr quinoline synthesis, Doebner- Miller synthesis, Bischler-Napieralski reaction, Pictet- Spengler reaction, Pomeranz-Fritsch reaction).

UNIT II

A. ORGANOMETALLIC REAGENT

Organomagnesium compounds: Grignard reagents formation, structure and chemical reactions.
Organozinc compounds: formation and chemical reactions.
Organolithium compounds: formation and chemical reactions.

B. ORGANIC SYNTHESIS VIA ENOLATES

Active methylene group, alkylation of diethylmalonate and ethyl acetoacetate, Synthesis of ethyl acetoacetate: The Claisen condensation. Keto-enol tautomerism of ethyl acetoacetate. Robbinson annulations reaction.

UNIT-III
BIOMOLECULES

A. CARBOHYDRATES

Occurrence, classification and their biological importance. Monosaccharides: relative and absolute configuration of glucose and fructose, epimers and anomers, mutarotation, determination of ring size of glucose and fructose, Haworth projections and conformational structures; Interconversions of aldoses and ketoses; Killiani Fischer synthesis and Ruff degradation; Disaccharides – Structural comparison of maltose, lactose and sucrose. Polysaccharides – Elementary treatment of starch and cellulose.

B. AMINO ACIDS, PROTEINS AND NUCLEIC ACIDS

Classification and Nomenclature of amino acids, Configuration and acid base properties of amino acids, Isoelectric Point, Peptide bonds, Protein structure, denaturation/ renaturation, Constituents of nucleic acid, DNA, RNA nucleoside, nucleotides, double helical structure of DNA.

28.06.21 (Dr. Alka Tiwari) 28.06.2021 (Dr. C. Bose) 28.06.2021 (Dr. Rajmani Patel) 28.6.2021 28.06.2021 Jagjit Kumar

UNIT-IV

SYNTHETIC POLYMERS

A. Addition or chain growth polymerization, Free radical vinyl polymerization, Ziegler-Natta polymerization, Condensation or Step growth polymerization, polyesters, polyamides, phenols- formaldehyde resins, urea-formaldehyde resins, epoxy resins and polyurethanes, natural and synthetic rubbers.

B. SYNTHETIC DYES

Colour and constitution (Electronic Concept). Classification of Dyes. Chemistry of dyes. Chemistry and synthesis of Methyl Orange, Congo Red, Malachite Green, Crystal Violet, phenolphthalein, fluorescein, Alizarine and Indigo.

UNIT-V

A. INFRA-RED SPECTROSCOPY

Basic principle, IR absorption Band their position and intensity, IR spectra of organic compounds.

B. UV-VISIBLE SPECTROSCOPY

Beer Lambert's law, effect of Conjugation, Types of electronic transitions λ_{max}, Chromophores and Auxochromes, Bathochromic and Hypsochromic shifts, Intensity of absorption Visible spectrum and colour.

C. NMR SPECTROSCOPY

Basic principles of Proton Magnetic Resonance, Tetramethyl silane (TMS) as internal standard, chemical shift and factors influencing it; Spin – Spin coupling and coupling constant (J); Anisotropic effects in alkene, alkyne, aldehydes and aromatics, Interpretation of NMR spectra of simple organic compounds. ^{13}CMR spectroscopy: Principle and applications.

REFERENCE BOOKS

1. Organic Chemistry, Morrison and Boyd, Prentice-Hall.
2. Organic Chemistry, L. G. Wade Jr. Prentice Hall.
3. Fundamentals of Organic Chemistry, Solomons, John Wiley.
4. Organic Chemistry, Vol I, II, III S. M. Mukherjee, S. P. Singh and R. P. Kapoor, Wiley Easters (New Age).
5. Organic Chemistry, F. A. Carey, McGraw Hill.
6. Introduction to Organic Chemistry, Struiweisser, Heathcock and Kosover, Macmillan.
7. Acheson, R.M. Introduction to the Chemistry of Heterocyclic compounds, John Wiley & Sons (1976).
8. Graham Solomons, T.W. Organic Chemistry, John Wiley & Sons, Inc.
9. McMurry, J.E. Fundamentals of Organic Chemistry, 7th Ed. Cengage Learning IndiaEdition, 2013.
10. Kalsi, P. S. Textbook of Organic Chemistry 1st Ed., New Age International (P) Ltd. Pub.
11. Clayden, J.; Greeves, N.; Warren, S.; Wothers, P.; Organic Chemistry, Oxford University Press.

28.06.21
(Dr. Alka Tiwari)

28.06.2021
(Dr. C. Bose)

28.06.2021
(Dr. Rajmani Patel)

28.6.2021

28.6.2021
Jagjit Kumar

Paper – III
PHYSICAL CHEMISTRY 60 Hrs., Max Marks 34

UNIT-I

QUANTUM MECHANICS–I

Black-body radiation, Planck's radiation law, photoelectric effect, Compton effect. Operator: Hamiltonian operator, angular momentum operator, Laplacian operator, postulate of quantum mechanics, eigen values, eigen function, Schrodinger time independent wave equation, physical significance of ψ & ψ^2, application of Schrodinger wave equation to particle in a one dimensional box, hydrogen atom (separation into three equations) radial and angular wave functions.

UNIT-II

A. QUANTUM MECHANICS–II

Quantum Mechanical approach of Molecular orbital theory, basic ideas-criteria for forming M.O. and A.O., LCAO approximation, formation of H_2^+ ion, calculation of energy levels from wave functions, bonding and antibonding wave functions, Concept of σ, σ^*, π, π^* orbitals and their characteristics, Hybrid orbitals-sp,sp^2,sp^3 Calculation of coefficients of A.O.'s used in these hybrid orbitals.

Introduction to valence bond model of H_2, comparison of M.O. and V.B. models. Huckel theory, application of Huckel theory to ethene, propene, etc.

UNIT III

SPECTROSCOPY

Introduction: Characterization of Electromagnetic radiation, regions of the spectrum, representation of spectra, width and intensity of spectral transition, Rotational Spectrum of Diatomic molecules. Energy levels of a rigid rotor, selection rules, determination of bond length, qualitative description of non-rigid rotator, isotopic effect.

Vibrational Spectroscopy: Fundamental vibration and their symmetry vibrating diatomic molecules, Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, determination of force constant, anharmonic oscillator

Raman spectrum: Concept of polarizability, quantum theory of Raman spectra, stokes and antistokes lines, pure rotational and pure vibrational Raman spectra. Applications of Raman Spectra.

Electronic Spectroscopy: Basic principles, Electronic Spectra of diatomic molecule, Franck-Condon principle, types of electronic transition, application of electronic spectra.

28.06.21 (Dr. Alka Tiwari) 28.06.2021 (Dr. C. Bose) 28.06.2021 (Dr. Rajmani Patel) 28.6.2021 28.06.2021 Jagjit Kumar

UNIT-IV

ELECTROCHEMISTRY-I

A. Electrolytic conductance: Specific and equivalent conductance, measurement of equivalent conductance, effect of dilution on conductance, Kohlrausch law, application of Kohlrausch law in determination of dissociation constant of weak electrolyte, solubility of sparingly soluble electrolyte, absolute velocity of ions, ionic product of water, conductometric titrations.

B. Theories of strong electrolyte: limitations of Ostwald's dilution law, weak and strong electrolytes, Elementary ideas of Debye – Huckel - Onsager's equation for strong electrolytes , relaxation and electrophoretic effects.

C. Migration of ions: Transport number, Determination by Hittorf method and moving boundary method, ionic strength.

UNIT-V

ELECTROCHEMISTRY-II

A. Electrochemical cell and Galvanic cells – reversible and irreversible cells, conventional representation of electrochemical cells, EMF of the cell and effect of temperature on EMF of the cell, Nernst equation Calculation of ΔG, ΔH and ΔS for cell reactions.

B. Single electrode potential : standard hydrogen electrode, calomel electrode, quinhydrone electrode, redox electrodes, electrochemical series

C. Concentration cell with and without transport, liquid - junction potential, application of concentration cells in determining of valency of ions , solubility product and activity coefficient

D. Corrosion-types , theories and prevention

REFERENCE BOOKS

1. Physical chemistry, G.M.Barrow. International Student Edition McGraw Hill.
2. University General Chemistry, CNR Rao, Macmillan.
3. Physical Chemistry R.A.Alberty, Wiley Eastrn.
4. The elements of Physical Chemistry P.W.Alkin,Oxford.
5. Physical Chemistry through problems, S.K.Dogra, Wiley Eastern.
6. Physical Chemistry B.D.Khosla.
7. Physical Chemistry, Puri & Sharma.
8. Bhoutic Rasayan, Puri & Sharma.
9. Bhoutic Rasayan, P.L.Soni.
10. Bhoutic Rasayan, Bahl & Tuli.
11. Physical Chemistry, R.L.Kapoor, Vol- I-IV.
12. Introduction to quantum chemistry,A.K.Chandra,Tata McGraw Hill.
13. Quantum Chemistry,Ira N.Levine, Prentice Hall.

28.06.21 (Dr. Alka Tiwari) | 28.06.2021 (Dr. C. Bose) | 28.06.2021 (Dr. Rajmani Patel) | 28.6.2021 | 28.06.2021 Jagjit Kumar

B.Sc. Part- III

PRACTICAL

Max. Marks-50

INORGANIC CHEMISTRY

Gravimetric analysis:

- Estimation of nickel (II) using Dimethylglyoxime (DMG).
- Estimation of copper as CuSCN
- Estimation of iron as Fe_2O_3 by precipitating iron as $Fe(OH)_3$.
- Estimation of Al (III) by precipitating with oxine and weighing as $Al(oxine)_3$ (aluminium oxinate).
- Estimation of Barium as $BaSO_4$

Inorganic Preparations:

- Tetraamminecopper (II) sulphate, $[Cu(NH_3)_4]SO_4.H_2O$
- Cis and trans $K[Cr(C_2O_4)_2.(H_2O)_2]$ Potassium dioxalatodiaquachromate(III)
- Tetraamminecarbonatocobalt (III) ion
- Potassium tris(oxalate)ferrate(III)/ Sodium tris(oxalate)ferrate(III)
- Cu(I) thiourea complex, Bis (2,4-pentanedionate) zinc hydrate; Double salts (Chrome alum/ Mohr's salt)

ORGANIC CHEMISTRY

1. Preparation of organic Compounds

- Acetylation of one of the following compounds: amines (aniline, o-, m-, p- toluidines and o-,m-, p-anisidine) and phenols (β-naphthol, vanillin, salicylic acid)
- Benzolyation of one of the following amines (aniline, o-, m-, p- toluidines and o-, m-, panisidine) and one of the following phenols (β-naphthol, resorcinol, p cresol) by Schotten-Baumann reaction.
- Bromination of any one of the following: a. Acetanilide by conventional methods b.Acetanilide using green approach (Bromate-bromide method)
- Nitration of any one of the following: a. Acetanilide/nitrobenzene by conventional method b. Salicylic acid by green approach (using ceric ammonium nitrate).
- Reduction of p-nitrobenzaldehyde by sodium borohydride.
- Hydrolysis of amides and esters.
- Semicarbazone of any one of the following compounds: acetone, ethyl methyl ketone, cyclohexanone, benzaldehyde.
- Benzylisothiouronium salt of one each of water soluble and water insoluble acids (benzoic acid, oxalic acid, phenyl acetic acid and phthalic acid).
- Aldol condensation using either conventional or green method.

28.06.21 (Dr. Alka Tiwari) 28.06.2021 (Dr. C. Bose) 28.06.2021 (Dr. Rajmani Patel) 28.6.2021 28.06.2021 Jagjit Kumar

- Benzil-Benzilic acid rearrangement.
- Preparation of sodium polyacrylate.
- Preparation of urea formaldehyde.
- Preparation of methyl orange.

The above derivatives should be prepared using 0.5-1g of the organic compound. The solid samples must be collected and may be used for recrystallization, melting point and TLC.

2. Qualitative Analysis Analysis of an organic mixture containing two solid components using water, $NaHCO_3$, NaOH for separation and preparation of suitable derivatives.
3. Extraction of caffeine from tea leaves.
4. Analysis of Carbohydrate: aldoses and ketoses, reducing and non-reducing sugars.
5. Identification of simple organic compounds by IR spectroscopy and NMR spectroscopy. (Spectra to be provided).
6. Estimation of glycine by Sorenson's formalin method.
7. Study of the titration curve of glycine.
8. Estimation of proteins by Lowry's method.
9. Study of the action of salivary amylase on starch at optimum conditions.
10. Effect of temperature on the action of salivary amylase.

PHYSICAL CHEMISTRY

Conductometry

- Determination of cell constant
- Determination of equivalent conductance, degree of dissociation and dissociation constant of a weak acid.
- Perform the following conductometric titrations:
    i. Strong acid vs. strong base
    ii. Weak acid vs. strong base
    iii. Mixture of strong acid and weak acid vs. strong base
    iv. Strong acid vs. weak base
- To determine the strength of the given acid conductometrically using standard alkali solution.
- To determine the solubility and solubility product of a sparingly soluble electrolyte conductometrically
- To study the saponification of ethyl acetate conductometrically.

Potentiometry/pH metry

Perform the following potentio/pH metric titrations:
i. Strong acid vs. strong base
ii. Weak acid vs. strong base
iii. Dibasic acid vs. strong base
iv. Potassium dichromate vs. Mohr's salt
v. Determination of pKa of monobasic acid

28.06.21 (Dr. Alka Tiwari) 28.06.2021 (Dr. C. Bose) 28.06.2021 (Dr. Rajmani Patel) 28.6.2021 28.6.2021 Jagjit Kumar

UV/ Visible spectroscopy

- Verify Lambert-Beer's law and determine the concentration of $CuSO_4$/$KMnO_4$/$K_2Cr_2O_7$ in a solution of unknown concentration
- Determine the concentrations of $KMnO_4$ and $K_2Cr_2O_7$ in a mixture.
- Study the kinetics of iodination of propanone in acidic medium.
- Determine the amount of iron present in a sample using 1,10-phenathroline.
- Determine the dissociation constant of an indicator (phenolphthalein).
- Study the kinetics of interaction of crystal violet/ phenolphthalein with sodium hydroxide.
- Study of pH-dependence of the UV-Vis spectrum (200-500 nm) of potassium dichromate.
- Spectral characteristics study (UV) of given compounds (acetone, acelaldehyde, acetic acid, etc.) in water.
- Absorption spectra of $KMnO_4$ and $K_2Cr_2O_7$ (in 0.1 M H_2SO_4) and determine λ_{max} values.

Note: **Experiments may be added/deleted subject to availability of time and facilities**

REFERENCE BOOKS:

1. Vogel, A.I. Quantitative Organic Analysis, Part 3, Pearson (2012).31
2. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
3. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)
4. Ahluwalia, V.K. & Aggarwal, R. Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, University Press (2000).
5. Ahluwalia, V.K. & Dhingra, S. Comprehensive Practical Organic Chemistry: Qualitative Analysis, University Press (2000)
6. Manual of Biochemistry Workshop, 2012, Department of Chemistry, University of Delhi.

28.06.21 (Dr. Alka Tiwari) | 28.06.2021 (Dr. C. Bose) | 28.06.2021 (Dr. Rajmani Patel) | 28.6.2021 | 28.06.2021 Jagjit Kumar

8 Hrs. **PRACTICAL EXAMINATION** **M.M.50**

Five experiments are to be performed.

1. **Inorganic** - Two experiments to be performed.
   - Gravimetric estimation compulsory **08 marks**. (Manipulation 3 marks)
   - Anyone experiment from synthesis and analysis **04 marks**.
2. **Organic -** Two experiments to be performed.
   - Qualitative analysis of organic mixture containing two solid components. Compulsory carrying **08 marks** (03 marks for each compound and two marks for Separation).
   - One experiment from synthesis of organic compound (Single step) **04 marks**.

3. Physical-One physical experiment **12 marks**.
4. Sessional **04 marks**.
5. Viva Voce **10 marks**.

In case of Ex-Students one mark each will be added to Gravimetric analysis and Qualitative analysis of organic mixture and two marks in Physical experiment.

28.06.21 (Dr. Alka Tiwari) | 28.06.2021 (Dr. C. Bose) | 28.06.2021 (Dr. Rajmani Patel) | 28.6.2021 | 28.06.2021 Jagjit Kumar

Session 2021-22
PHYSICS

OBJECTIVES OF THE COURSE

The undergraduate training in physics is aimed at providing the necessary inputs so as to set forth the task of bringing about new and innovative ideas/concepts so that the formulated model curricula in physics becomes in tune with the changing scenario and incorporate new and rapid advancements and multi-disciplinary skills, societal relevance, global interface, self-sustaining and supportive learning.

It is desired that undergraduate i.e. B.Sc. level besides grasping the basic concepts of physics should in addition have broader vision. Therefore, they should be exposed to societal interface of physics and role of physics in the development of technologies.

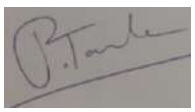
EXAMINATION SCHEME:

1. There shall be 2 theory papers of 3 hours duration each and one practical paper of 4 hours duration. Each paper shall carry 50 marks.
2. Numerical problems of at least 30% will compulsorily be asked in each theory paper.
3. In practical paper, each student has to perform two experiments one from each groups as listed in the list of experiments.
4. Practical examination will be of 4 hours duration- one experiment to be completed in 2 hours.

   The distribution practical marks as follows:

Experiment	:	15+15=30
Viva voce	:	10
Internal assessment	:	10
5. The external examiner should ensure that at least 16 experiments are in working order at the time of examination and submit a certificate to this effect.





B.Sc. Part-III

Paper-I

RELATIVITY, QUANTUM MECHANICS, ATOMIC MOLECULAR AND NUCLEAR PHYSICS

Unit-1 Reference systems, inertial frames, Galilean invariance propagation of light, Michelson-Morley experiment, search for ether. Postulates for the special theory of relativity, Lorentz transformations, length contraction, time dilation, velocity addition, variation of mass with velocity, mass-energy equivalence, particle with zero rest mass.

Unit-2 Origin of the quantum theory : Failure of classical physics to explain the phenomena such as black-body spectrum, photoelectric effect, Compton effect, Wave-particle duality, uncertainty principle, de Broglie's hypothesis for matter waves, the concept of Phase and group velocities, experimental demonstration of mater waves. Davisson and Germer's experiment. Consequence of de Broglie's concepts, Bohr's complementary Principle, Bohr's correspondence principle, Bohr's atomic model, energies of a particle in a box, wave packets. Consequence of the uncertainty relation, gamma ray microscope, diffraction at a slit.

Unit-3 Quantum Mechanics: Schrodinger's equation, Statistical interpretation of wave function, Orthogonality and normalization of wave function, Probability current density, Postulatory basis of quantum mechanics, operators, expectation values, Ehrenfest's theorem, transition probabilities, applications to particle in a one and three dimensional boxes, harmonic oscillator in one dimension, reflection at a step potential, transmission across a potential barrier.

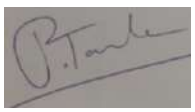
Unit-4 Spectra of hydrogen, deuteron and alkali atoms spectral terms, doublet fine structure, screening constants for alkali spectra for s, p, d and f states, selection rules. Discrete set of electronic energies of moleculers, quantisation of vibrational and rotational energies, determination of inter-nuclear distance, pure rotational and rotation vibration spectra. Dissociation limit for the ground and other electronic states, transition rules for pure vibration and electronic vibration spectra. Raman effect, Stokes and anti-Stokes lines, complimentary character of Raman and infrared spectra, experimental arrangements for Raman spectroscopy.

Unit-5 Structure of nuclei:- Basic Properties of Nuclei: (1) Mass, (2) Radii, (3) Charge, (4) Angular Momentum, (5) Spin, (6) Magnetic Moment (μ), (7) Stability and (8) Binding Energy, Nuclear Models:- Liquid Drop Model, Mass formula, Shell Model, Types of Nuclear reactions, laws of conservation, Q-value of reactions, Interaction of Energetic particles with matter, Ionization chamber, GM Counter, Cloud Chambers, Fundamental Interactions, Classification of Elementary Particles, Particles and Antiparticles, Baryons, Hyperons, Leptons, and Mesons, Elementary Particle Quantum Numbers: Baryon Number, Lepton Number, Strangeness, Electric Charge, Hypercharge and Isospin, introductory idea of discovery of Higg's Boson.

TEXT AND REFERENCE BOOKS:

1. H.S. Mani and G.K. Metha: "Introduction to Modern Physics"" (Affiliated East-West Press, 1989).
2. A Beiser, "Prospective of Modern Physics".
3. H.E. White, Introduction to Atomic Physics".
4. Barrow, "Introduction to Molecular Physics".
5. R.P. Feynman, R.B. Leighton and M Sands, "The Feynman Lectures on Physics", Vol.III (B.I. Publications, Bombay, Delhi, Calcutta, Madras).
6. T.A. Littlefield and N Thorley, "Atomic and Nuclear Physics" (Engineering Language Book Society)
7. H.A. Enge, "Introduction to Nuclear Physics", (Addision-Wesly)
8. Eisenberg and Resnick, "Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles" (John Wiley)
9. D.P. Khandelwal, "Optics and Atomic Physics", (Himalaya Publishing House, Bombay, 1988).
10. Quarks and Leptons, F. Halzen and A.D. Martin, Wiley India, New Delhi, 1984.
11. Radiation detection and measurement, G.F. Knoll (John Wiley & Sons, 2000).
12. Theoretical Nuclear Physics, J.M. Blatt & V.F.Weisskopf (Dover Pub.Inc., 1991).
13. Electronic Devices & Circuits By Milliman Helkiyan.





Paper-II

SOLID STATE PHYSICS, SOLID STATE DEVICES AND ELECTRONICS

Unit-1 Amorphous and crystalline solids, Elements of symmetry, seven crystal system, Cubic lattices, Crystal planes, Miller indices, Laue's equation for X-ray diffraction, Bragg's Law, Bonding in solids, classification. Cohesive energy of solid, Madelung constant, evaluation of Parameters, Specific heat of solids, classical theory (Dulong-Petit's law), Einstein and Debye theories, Vibrational modes of one dimensional monoatomic lattice, Dispersion relation, Brillouin Zone.

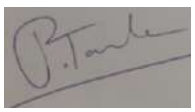
Unit-2 Free electron model of a metal, Solution of one dimensional Schrödinger equation in a constant potential, Density of states, Fermi Energy, Energy bands in a solid (Kronig-Penny model without mathematical details), Difference between Metals, Insulator and Semiconductors, Hall effect, Dia, Para and Ferromagnetism, Langevin's theory of dia and para-magnetism, Curie- Weiss's Law, Qualitative description of Ferromagnetism (Magnetic domains), B-H curve and Hysteresis loss.

Unit-3 Intrinsic and extrinsic semiconductors, Concept of Fermi level, Generation and recombination of electron hole pairs in semiconductors, Mobility of electrons and holes, drift and diffusion currents, p-n junction diode, depletion width and potential barrier, junction capacitance, I-V characteristics, Tunnel diode, Zener diode, Light emitting diode, solar cell, Bipolar transistors, pnp and npn transistors, characteristics of transistors, different configurations, current amplification factor, FET and MOSFET Characteristics.

Unit-4 Half and full wave rectifier, rectifier efficiency ripple factor, Bridge rectifier, Filters, Inductor filter, L and π section filters, Zener diode, regulated power supply using zener diode, Applications of transistors, Bipolar Transistor as amplifier, h-parameter, h-parameter equivalent circuit, Transistor as power amplifier, Transistor as oscillator, principle of an oscillator and Bark Hausen's condition, requirements of an oscillator, Wein-Bridge oscillator and Hartley oscillator.

Unit-5 Digital Circuits: Difference between Analog and Digital Circuits, Binary Numbers, Decimal to Binary and Binary to Decimal Conversion, AND, OR and NOT Gates (Realization using Diodes and Transistor), NAND and NOR Gates as Universal Gates, XOR and XNOR Gate, De Morgan's Theorems, Boolean Laws, Simplification of Logic Circuit using Boolean Algebra, Digital to Analog Converter, Analog to Digital Converter.





TEXT AND REFERENCE BOOKS:

1. Introduction to solid state physics: C. Kittel.
2. Solid State Physics: A.J. Dekkar.
3. Electronic Circuits: Mottershead.
4. Electronic Circuits: Millman and Halkias.
5. Semiconductor Devices: S.M. Sze.
6. Electronic devices: T.L. Floyd.
7. Device and Circuits: J. Millman and C. Halkias.
8. Electronic Fundamental and Applications: D. Chatopadhyay and P.C. Rakshit.
9. Electricity and Magnetism: K.K. Tiwari.

PRACTICALS

Minimum 16 (Eight from each group)

Experiments out of the following or similar experiments of equal standard

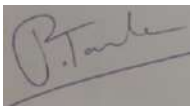
1. Determination of Planck's constant.
2. Determination of e/m by using Thomson tube.
3. Determination of e by Millikan's methods.
4. Study of spectra of hydrogen and deuterium (Rydberg constant and ratio of masses of electron proton).
5. Absorption spectrum of iodine vapour.
6. Study of alkali or alkaline earth spectra using a concave grating.
7. Study of Zeeman effect for determination of a Lande g-factor.
8. Analysis of a given band spectrum.
9. Study of Raman spectrum using laser as an excitation source.
10. Study of absorption of alpha and beta rays.
11. Study of statistics in radioactive measurement.
12. Coniometric study of crystal faces.
13. Determination of dielectric constant.
14. Hysteresis curve of transformer core.
15. Hall-probe method for measurement of magnetic field.
16. Specific resistance and energy gap of semiconductor.
17. Characteristics of transistor.
18. Characteristics of tunnel diode.
19. Study of voltage regulation system.
20. Study of regulated power supply.
21. Study of lissajous figures using CRO.
22. Study of VTVM.
23. Study of RC and TC coupled amplifiers.
24. Study of AF and RF oscillators.
25. Find roots of f(x) = 0 by using Newton-Raphson Method.

26. Find root of f(x) = 0 by using secant method.
27. Integration by Simpson rule.
28. To find the value of V at
29. String manipulations.
30. Towers of Hanoi (Non-recursive).
31. Finding first four perfect numbers.
32. Quadratic interpolation using Newton's forward-difference formula of degree two.

TEXT AND REFERENCE BOOKS:

1. B.G. Strechman, Solid state electronics devices II edition (Prentice-Hall of India New Delhi 1986)
2. W.D. Stanley, Electronics devices, circuits and applications (Prentice-Hall new jersey, USA 1988).
3. S. Lipschutz and A Poe; Schaum's outline of theory and problems of programming with Fortran (Mc Graw-Hill Book Co. Singapore, 1986).
4. C Dixon, Numerical Analysis.





MATHEMATICS

There shall be three theory papers. Two compulsory and one optional. Each paper carrying 50 marks is divided into five units and each unit carry equal marks.

B.A./B.SC. Part-III

PAPER - I
ANALYSIS

METRIC SPACES

UNIT-I Definition and examples of metric spaces. Neighbourhoods, Limit points, Interior points, Open and Closed sets, Closure and interior. Boundary points, Sub-space of a metric space. Cauchy sequences, Completeness, Cantor's intersection theorem. Contraction principle, construction of real numbers as the completion of the incomplete metric space of rationals. Real numbers as a complete ordered field.

UNIT-II Dense subsets. Baire Category theorem. Separable, second countable and first countable spaces. Continuous functions. Extension theorem. Uniform continuity, isometry and homeomorphism. Equivalent metrics. Compactness, sequential compactness. Totally bounded spaces. Finite intersection property. Continuous functions and Compact sets, Connectedness, Components, Continuous functions and Connected sets.

COMPLEX ANALYSIS

UNIT-III Complex numbers as ordered pairs. Geometrical representation of complex numbers. Stereographic projection. Continuity and differentiability of complex functions. Analytic functions. Cauchy-Riemann equations. Harmonic functions. Elementary functions. Mapping by elementary functions. Mobius transformations. Fixed points, Cross ratio. Inverse points and critical mappings. Conformal mappings.

REAL ANALYSIS

UNIT-IV Series of arbitrary terms. Convergence, divergence and oscillation. Abel's and Dirichlet's test. Multiplication of series. Double series. Partial derivation and differentiability of real-valued functions of two variables. Schwarz and Young's theorem. Implicit function theorem. Fourier series. Fourier expansion of piecewise monotonic functions.

UNIT-V Riemann integral. Intergrability of continuous and monotonic functions. The fundamental theorem of integral calculus. Mean value theorems of integral calculus. Improper integrals and their convergence. Comparison tests. Abel's and Dirichlet' tests. Frullani's integral. Integral as a function of a parameter. Continuity, derivability and integrability of an integral of a function of a parameter.

REFERENCES :

1. T.M. Apostol, Mathematical Analysis, Narosa Publishing House, New Delhi, 1985.
2. R.R. Goldberg, Real Analysis, Oxford & IBH publishing Co., New Delhi, 1970.
3. S. Lang, Undergraduate Analysis, Springer-Verlag, New York, 1983.
4. D. Somasundaram and B. Choudhary, A First Coarse in Mathematical Analysis, Narosa Publishing House, New Delhi, 1997.
5. Shanti Narayan, A Course of Mathematical Analysis, S. Chand & Co. New Delhi.
6. P.K. Jain and S.K. Kaushik, An introduction to Real Analysis, S. Chand & Co., New Delhi, 2000.
7. R.V. Churchill and J.W. Brown, Complex Variables and Applications, 5th Edition, McGraw- Hill, NewYork, 1990.
8. Mark J. Ablowitz and A.S. Fokas, Complex Variables : Introduction and Applications, Cambridge University Press, South Asian Edition, 1998.
9. Shanti Narayan, Theory of Functions of a Complex Variable, S. Chand & Co., New Delhi.
10. E.T. Copson, Metric Spaces, Cambridge University Press, 1968.
11. P.K. Jain and K. Ahmad, Metric Spaces, Narosa Publishing House, New Delhi, 1996.
12. G.F. Simmons, Introduction to Topology and Modern Analysis, McGraw-Hill, 1963.

Dr. shabnamkhan. (Dr. Asha Rani Das)

B.A./B.SC. Part-III

PART - II
ABSTRACT ALGEBRA

UNIT-I Group- Automorphisms, inner automorphism. Automorphism of groups and their computations, Conjugacy relation, Normaliser, Counting principle and the class equation of a finite group. Center for Group of prime-order, Abelianizing of a group and its universal property. Sylow's theorems, Sylow subgroup, Structure theorem for finite Abelian groups.

UNIT-II Ring theory-Ring homomorphism. Ideals and quotient rings. Field of quotients of an integral domain, Euclidean rings, polynomial rings, Polynomials over the rational field. The Eisenstien criterion, polynomial rings over commutative rings, Unique factorization domain. R unique factorisation domain implies so is $R[x_1, x_2 ..... x_n]$. Modules, Submodules, Quotient modules, Homomorphism and Isomorphism theorems.

UNIT-III Definition and examples of vector spaces. Subspaces. Sum and direct sum of subspaces. Linear span, Linear dependence, independence and their basic properties. Basis. Finite dimensional vector spaces. Existence theorem for bases. Invariance of the number of elements of a basis set. Dimension. Existence of complementary subspace of a finite dimensional vector space. Dimension of sums of subspaces. Quotient space and its dimension.

UNIT-IV Linear transformations and their representation as matrices. The Algebra of linear transformations. The rank nullity theorem. Change of basis. Dual space. Bidual space and natural isomorphism. Adjoint of a linear transformation. Eigenvalues and eigenvectors of a linear transformation. Diagonalisation. Annihilator of a subspace. Bilinear, Quadratic and Hermitian forms.

UNIT-V Inner Product Spaces-Cauchy-Schwarz inequality. Orthogonal vectors. Orthogonal Complements. Orthonormal sets and bases. Bessel's inequality for finite dimensional spaces. Gram-Schmidt Orthogonalization process.

REFERENCES :

1. I.N. Herstein, Topics in Algebra, Wiley Eastern Ltd., New Delhi, 1975.
2. N. Jacobson, Basic Algebra, Vols. I & II. W.H. Freeman, 1980 (also published by Hindustan Publishing Company).
3. Shanti Narayan, A Text Book of Modern Abstract Algebra, S.Chand & Co. New Delhi.
4. K.B. Datta, Matrix and Linear Algebra, Prentice Hall of India Pvt. Ltd., New Delhi, 2000.
5. P.B. Bhattacharya, S.K. Jain and S.R. Nagpal, Basic Abstract Algebra (2"" Edition) Cambridge University Press, Indian Edition, 1997.
6. K. Hoffman and R. Kunze, Linear Algebra, (2nd Edition), Prentice Hall. Englewood Cliffs, New Jersey, 1971.
7. S.K. Jain, A. Gunawardena and P.B. Bhattacharya, Basic Linear Algebra with MATLAB. Key College Publishing (Springer-Verlag) 2001.
8. S. Kumaresan, Linear Algebra, A Geometric Approach, Prentice-Hall of India, 2000.
9. Vivek Sahai and Vikas Bist, Algebra, Norosa Publishing House, 1997.
10. I.S. Luther and I.B.S.Passi, Algebra, Vol. I-Groups, Vol. II-Rings. Narosa Publishing House (Vol. I-1996, Vol. II-1999)
11. D.S. Malik, J.N. Mordeson, and M.K. Sen, Fundamentals of Abstract Algebra, McGraw- Hill International Edition, 1997.

Dr. Shabnam Khan. (Dr. Asha Rani Das)

B.A./B.SC. Part-III

PAPER - III - (OPTIONAL)

(I) PRINCIPLES OF COMPUTER SCIENCE

UNIT-I **Data Storage** - Storage of bits. Main Memory. Mass Storage. Coding Information of Storage. The Binary System. Storing integers, storing fractions, communication errors.
Data Manipulation - The Central Processing Unit. The Stored-Program Concept. Programme Execution. Other Architectures. Arithmetic/Logic Instructions. Computer- Peripheral Communication.

UNIT-II **Operating System and Networks** - The Evolution of Operating System. Operating System Architecture. Coordinating the Machine's Activities. Handling Competition Among Process. Networks. Networks Protocol.
Software Engineering - The Software Engineering Discipline. The Software Life Cycle. Modularity. Development Tools and Techniques. Documentation. Software Ownership and Liability.

UNIT-III **Algorithms** - The Concept of an Algorithm, Algorithm Representation. Algorithm Discovery. Iterative Structures. Recursive Structures. Efficiency and Correctness. (Algorithms to be implemented in C++).
Programming Languages - Historical Perspective. Traditional Programming Concepts, Program Units. Language Implementation. Parallel Computing. Declarative Computing.

UNIT-IV **Data Structures** - Arrays. Lists. Stacks. Queues. Trees. Customised Data Types. Object Oriented Programming.
File Structure - Sequential Files. Text Files. Indexed Files. Hashed Files. The Role of the Operating System.
Database Structure - General Issues. The Layered Approach to Database Implementation. The Relational Model. Object-Oriented Database. Maintaining Database Integrity. E-R models

UNIT-V **Artifical Intelligence** - Some Philosophical Issues. Image Analysis. Reasoning, Control System Activities. Using Heuristics. Artificial Neural Networks. Application of Artificial Intelligence.
Theory of Computation - Turning Machines. Computable functions. A Non computable Function. Complexity and its Measures. Problem Classification.

REFERENCES :

1. J. Glen Brookshear, Computer Science : An Overview, Addition -Wesley.
2. Stanley B. Lippman, Josee Lojoie, C++ Primer (3rd Edition), Addison-Wesley.

Dr. Shabnam Khan. (Dr. Asha Rani Das)

B.A./B.SC. Part-III

PAPER - III - (OPTIONAL)

(II) DISCRETE MATHEMATICS

UNIT-I **Sets and Propositions -** Cardinality. Mathematical Induction, Principle of inclusion and exclusion. **Computability and Formal Languages -** Ordered Sets. Languages. Phrase Structure Grammars. Types of Grammars and Languages. Permutations. Combinations and Discrete Probability.

UNIT-II **Relations and Functions -** Binary Relations, Equivalence Relations and Partitions. Partial Order Relations and Lattices. Chains and Antichains. Pigeon Hole Principle.

Graphs and Planar Graphs - Basic Terminology. Multigraphs. Weighted Graphs. Paths and Circuits. Shortest Paths. Eulerian Paths and Circuits. Travelling Salesman Problem. Planner Graphs. Trees.

UNIT-III **Finite State Machines -** Equivalent Machines. Finite State Machines as Language Recognizers. **Analysis of Algorithms -** Time Complexity. Complexity of Problems. Discrete Numeric Functions and Generating Functions.

UNIT-IV **Recurrence Relations and Recursive Algorithms -** Linear Recurrence Relations with constant coefficients. Homogeneous Solutions. Particular Solution. Total Solution. Solution by the Method of Generating Functions. Brief review of Groups and Rings.

UNIT-V **Boolean Algebras -** Lattices and Algebraic Structures. Duality, Distributive and Complemented Lattices. Boolean Lattices and Boolean Algebras. Boolean Functions and Expressions. Prepositional Calculus. Design and Implementation of Digital Networks. Switching Circuits.

REFERENCES :

1. C.L. Liu, Elements of Discrete Mathematics, (Second Edition), McGraw Hill, International Edition, Computer Science Series, 1986

Dr. Shabnamkhan. (Dr. Asha Rani Das)

B.A./B.SC. Part-III

PAPER - III - (OPTIONAL)

(III) PROGRAMMING IN C AND NUMERICAL ANALYSIS

(Theory & Practical)

Theory component will have maximum marks 30.

Practical component will have maximum marks 20.

UNIT-I Programmer's model of a computer. Algorithms. Flow Charts. Data Types. Arithmetic and input/output instructions. Decisions control structures. Decision statements. Logical and Conditional operators. Loop. Case control structures. Functions. Recursions. Preprocessors. Arrays. Puppetting of strings. Structures. Pointers. File formatting.

Numerical Analysis

UNIT-II **Solution of Equations:** Bisection, Secant, Regula Falsi, Newton's Method, Roots of Polynomials. **Interpolation:** Lagrange and Hermite Interpolation, Divided Differences, Difference Schemes, Interpolation Formulas using Differences. Numerical Differentiation. Numerical Quadrature: Newton-Cote's Formulas. Gauss Quadrature Formulas, Chebychev's Formulas.

UNIT-III **Linear Equations:** Direct Methods for Solving Systems of Linear Equations (Guass Elimination, LU Decomposition, Cholesky Decomposition), Iterative Methods (Jacobi, GaussSeidel, Relaxation Methods).

The Algebraic Eigenvalue problem: Jacobi's Method, Givens' Method, Householder's Method, Power Method, QR Method, Lanczos' Method.

UNIT-IV **Ordinary Differential Equations:** Euler Method, Single-step Methods, Runge-Kutta's Method, Multi-step Methods, Milne-Simpson Method, Methods Based on Numerical Integration, Methods Based on Numerical Differentiation, Boundary Value Problems, Eigenvalue Problems.

Approximation: Different Types of Approximation, Least Square Polynomial Approximation, Polynomial Approximation using Orthogonal Polynomials, Approximation with Trigonometric Functions, Exponential Functions, Chebychev Polynomials, Rational Functions.

Monte Carlo Methods

Unit-V Random number generation, congruential generators, statistical tests of pseudo-random numbers. Random variate generation, inverse transform method, composition method, acceptance rejection method, generation of exponential, normal variates, binomial and Poisson variates.

Monte Carlo integration, hit or miss Monte Carlo integration, Monte Carlo integration for improper integrals, error analysis for Monte Carlo integration.

REFERENCES :

1. Henry Mullish and Herbert L. Cooper, Spirit of C: An Introduction to Modern Programming, Jaico Publishers, Bombay.
2. B.W. Kernighan and D.M. Ritchie. The C Programming Language 2nd Edition, (ANSI features) Prentice Hall, 1989.
3. Peter A Darnel and Philip E. Margolis, C : A Software Engineering Approach, Narosa Publishing House, 1993.
4. Robert C. Hutehisonand Steven B. Just, Programming using C Language, McGraw Hill, 1988.
5. Les Hancock and Morris Krieger, The C Primer, McGraw Hill, 1988.
6. V. Rajaraman, Programming in C, Prentice Hall of India, 1994.
7. Byron S. Gottfried, Theory and Problems of Programming with C, Tata McGraw-Hill Publishing Co. Ltd., 1998.
8. C.E. Froberg, Introduction to Numerical Analysis, (Second Edition), Addison-Wesley, 1979.
9. James B. Scarborough, Numerical Mathematical Analysis, Oxford and IBHPublishing Co. Pvt. Ltd. 1966.
10. Melvin J. Maron, Numerical Analysis A Practical Approach, Macmillan publishing Co., Inc. New York, 1982.
11. M.K. Jain, S.R.K. lyengar, R.K. Jain, Numerical Methods Problems and Solutions, New Age International (P) Ltd., 1996.

Dr. Shabnamkhan. (Dr. Asha Rani Das)

12. M.K. Jain, S.R.K. lyengar, R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International (P) Ltd., 1999.
13. R.Y. Rubistein, Simulation and the Monte Carlo Methods, John Wiley, 1981.
14. D.J. Yakowitz, Computational Probability and Simulation, Addison-Wesley, 1977.

PAPER - III - (OPTIONAL)
(IV) PRACTICAL
PROGRAMMING IN C AND NUMERICAL ANALYSIS

LIST OF PRACTICAL TO BE CONDUCTED...

1. Write a program in C to find out the largest number of three integer numbers.
2. Write a program in C to accept monthly salary from the user, find and display income tax with the help of following rules :

Monthly Salary	Income Tax
9000 or more	40% of monthly salary
7500 or more	30% of monthly salary
7499 or less	20% of monthly salary

3. Write a program in C that reads a year and determine whether it is a leap year or not.
4. Write a program in C to calculate and print the first n terms of fibonacci series using looping statement.
5. Write a program in C that reads in a number and single digit. It determines whether the first number contains the digit or not.
6. Write a program in C to computes the roots of a quadratic equation using case statement.
7. Write a program in C to find out the largest number of four numbers using function.
8. Write a program in C to find the sum of all the digits of a given number using recursion.
9. Write a program in C to calculate the factorial of a given number using recursion.
10. Write a program in C to calculate and print the multiplication of given 2D matrices.
11. Write a program in C to check that whether given string palindrome or not.
12. Write a Program in C to calculate the sum of series:

$$1 + x + \frac{1}{2!}x^2 + \frac{1}{3!}x^3 + \ \ldots\ldots + \frac{1}{n!}x^n$$

13. Write a program in C to determine the grade of all students in the class using Structure. Where structure having following members - name, age, roll, sub1, sub2, sub3, sub4 and total.
14. Write a program in C to copy one string to another using pointer. (Without using standard library functions).
15. Write a program in C to store the data of five students permanently in a data file using file handling.

Dr. Shabnam Khan. (Dr. Ritesh Tiwari) (Dr. Asha Rani Das)

B.SC.-III

PAPER- I (BOTANY)

(ANALYTICAL TECHNOLOGY PLANT PATHOLOGY, EXPERIMENTAL EMBRYOLOGY, ELEMENTARY BIOSTATISTICS, ENVIRONMENTAL POLLUTION AND CONSERVATION)

UNIT-I

Structure, Principle and applications of analytical instrumentation.

Chromatography technique, Oven, Incubator, Autoclave, Centrifuge, Spectrophotometere

UNIT-II

Plant Tissue culture techniques, growth media, totipotency, protoplast culture, somatic hybrids and cybrids, micropropagation, somaclonal variations, haploid culture.

Analytical techniques: Microscopy-Light microscope, Electron microscope

UNIT-III

General principles of plant pathology, general symptoms of fungal, bacterial and viral diseases, mode of infection] diseases resistance and control measures, plant quarantine. A study of epidemiology and etiology of following plant diseases.

Rust diseases of wheat, Tikka diseases of groung nut, Red rot of sugar can, Bacterial blight of rice, yellow vein mosaic of b hindi, Little Leaf of brinjal.

UNIT-IV

Introduction to pollution, green house gases, Ozone depletion, Dissolve oxygen, B.O.D., C.O.D.

Bio magnification, Eutrophication, Acid precipitation, Pytoremediation. Plant indicators, Biogeographical Zones of India, Concept of Biodiversity, CBD, MAB, National parks and biodiversity Hot spots, Conservation strategies, Red Data Book, IUCN threat categories, invasive species, endemic species. concept of sustainable development.

UNIT-V

ELEMENTARY BIOSTATISTICS:

Introduction and application of Biostatics, measure of central tendency-Mean, Median, Mode, measures of dispersal-Standard deviation, standard error.

Books Recommended:

Singh, RS, **Plant Diseases,** Oxford & IBH, New Delhi.

Pandey,BP, **Plant Pathology,** S. Chand Publishing, New Delhi

Sharma, PD, **Microbiology and Plant pathology,** Rastogi Publications, Meerut

Sharma PD, **Mycology and Phytopathology,** Rastogi Publications, Meerut

Singh JS, Singh SP and Gupta, SR, **Ecology Environmental Science and Conservation,** S. Chand Publishing, New Delhi

Sharma, PD. **Ecology and Environment,** Rastogi Publications, Meerut

Bhojwani, SS and Razdan, MK, **Plant Tissue Culture: Theory and Practices,** Elsevier

Sharma AK, **Text book of Biostatistics,** Discovery Publishing House Pvt.Ltd.

B.SC.-III

PAPER- II (BOTANY)

(GENETICS, MOLECULAR BIOLOGY, BIOTECHNOLOGY AND BIOCHEMISTRY)

UNIT-I

Cell and cell organelles, organization and morphology of chromosomes, giant chromosomes, cell division, Mendel's laws, gene interactions, linkage and crossing over, chromosomal aberration, polyploidy, sex linked inheritance, sex determination, cytolasmic inheritance, gene concept: cistron muton, recon.

UNIT- II

Nucleic acids, Structure and forms of DNA and RNA, DNA/RNA as genetic material, replication of DNA, biochemical and molecular basis of mutation, genetic code and its properties, mechanism of transcription and translation in prokaryotes, regulation of gene expression, Operon model.

UNIT- III

Recombinant DNA, Enzymes in recombinant DNA technology, cloning vectors (Plasmid, Bacteriophages, Cosmids, Phagemids), gene cloning, PCR, Application of Biotechnology; G.M.Plants, Monoclonal antibodies, DNA finger printing

UNIT- IV

Protein: Chemical composition, primary, secondary and tertiary structure of Proteins.

Carbohydrate: general account of monosaccharides, disaccharids and Polsaccharides

Fat: Structure and properties of fats and fatty acids, synthesis and breakdown.

UNIT- V

ENZYMES: Nomenclature and classifaction, components of enzymes, theories of enzyme action, enzyme kinetics (Michaelis-Menten constant), allosteric enzymes, isozymes, Abzymes. Ribozymes, factors affecting enzyme activity.

Books Recommended:

Nelson, DL, Cox, MM, Lehninger Principles of Biochemistry, W.H. freeman and Company, New York, USA.

Cooper, GM, The Cell: A Molecular Approach, ASM Press & Sunderland, Washington, D.C. Sinauer Associates, MA.

Singh BD, Fundamental of Genetics, Kalyani Publication

Singh BD, Genetics, Kalyani Publication

Gupta, PK, Cell and Molecular Biology, Rastogi Publications, Meerut

Singh, BD, Biotechnology: Expanding Horizons, Kalyani Publications

Gupta, PK, Elements of Plant Biotechnology, Rastogi Publications, Meerut

Gupta, SN, concepts of Biochemistry, Rastogi Publications, Meeru

Jain, JL, Jain S, Jain, N, Fundamentals of Biochemistry, S Chand Publishing, New Delhi

B.Sc.- III (Botany)

Practical

1. Study of host parasite relationship pf plant diseases listed above.
2. Demonstration of preparation of Czapek's Dox medium and potato dextrose agar medium, sterilization of culture medium and pouring.
3. Inoculation in culture tubes and petriplates.
4. Gram Staining.
5. Microscopic examination of Curd.
6. Study of plant diseases as listed in the theory paper.
7. Biochemical test of carbohydrate and protein.
8. Instrumentation techniques

PRACTICAL SCHEME

TIME: 4 Hrs.	**M.M.: 50**
1. Plant Disease/Symptoms	10
2. Instrumentation techniques	05
3. Staining of Microbes	05
4. Tissue Culture techniques	05
5. Spotting	10
6. Project Work/ Field Study	05
7. Viva-Voce	05
8. Sessional	05

Hemchand Yadav Vishwavidyala, Durg (C.G.)

Zoology

B.Sc. Part III **(2021-22)**

Paper-I

ECOLOGY, ENVIRONMENTAL BIOLOGY: TOXICOLOGY, MICROBIOLOGY AND MEDICAL ZOOLOGY

Unit: I (Ecology)

- Aims and scopes of ecology
- Major ecosystems of the world-Brief introduction
- Population- Characteristics and regulation of densities
- Communities and ecosystem
- Bio-geo chemical cycles
- Air & water pollution
- Ecological succession

Unit: II (Environmental Biology)

- Laws of limiting factor
- Food chain in fresh water ecosystem
- Energy flow in ecosystem- Trophic levels
- Conservation of natural resources
- Environmental impact assessment

Unit: III (Toxicology)

- Definition and classification of Toxicants
- Basic Concept of toxicology
- Principal of systematic toxicology
- Heavy metal Toxicity (Arsenic, Murcury, Lead, Cadmium)
- Animal poisons- snake venom, scorpion & bee poisoning
- Food poisoning

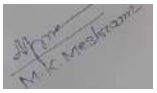
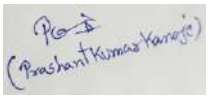
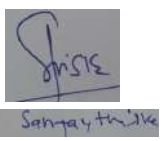
Unit: IV (Microbiology)

- General and applied microbiology
- Microbiology of domestic water and sewage
- Microbiology of milk & milk products
- Industrial microbiology: fermentation process, production of penicillin, alcoholic breverages, bioleaching.

Unit:V (Medical Zoology)

- Brief introduction to pathogenic microorganisms, Ricketssia, Spirochaetes, AIDS and Typhoid
- Brief account of life history & pathogenicity of the following pathogens with reference to man: prophylaxis & treatment
- Pathogenic protozoan's- Entamoeba, Trypanosome & Plasmodium
- Pathogenic helminthes- Schistosoma
- Nematode pathogenic parasites of man
- Vector insects



Zoology
B.Sc. Part III (2021-22)
Paper II

GENETICS, CELL PHYSIOLOGY, BIOCHEMISTRY, BIOTECHNOLOGY AND BIOTECHNIQUES

Unit: I (Genetics)

- Linkage & linkage maps, Sex Determination and Sex Linkage
- Gene interaction- Incomplete dominance & Codominance, Supplementary gene, Complementary gene, Epistasis Lethal gene, Pleiotropic gene and multiple alleles.
- Mutation: Gene and chromosomal mutation
- Human genetics: chromosomal alteration: Down, Edward, Patau, Turner and Klinefelter Syndrome Single gene disorders: Alkaptonuria, Phenylketonuria, Sickle cell anemia, albinism and colour blindness

Unit: II (Cell Physiology)

- General idea about pH & buffer
- Transport across membrane: Diffusion and Osmosis
- Active transport in mitochondria & endoplasmic reticulum
- Enzymes-classification and Action

Unit: III (Biochemistry)

- Amino acids & peptides- Basic structure & biological function
- Carbohydrates & its metabolism- Glycogenesis; Gluconeogenesis; Glycolysis; Glycogenolysis; Cosi-cycle
- Lipid metabolism- Oxidation of glycerol; Oxidation of fatty acids
- Protein Catabolism- Deamination, transamination, transmethylation

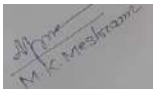
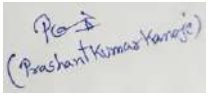
Unit: IV (Biotechnology)

- Application of Biotechnology
- Recombinant DNA & Gene cloning
- Cloned genes & other tools of biotechnology (Tissue culture, Hybridoma, Trasgenic Animals and Gene library)

Unit: V (Biotechniques)

1. Principles & techniques about the faollowing:
   (i) pH meter
   (ii) Colorimeter
   (iii) Microscopy- Light microscopes: Compound, Phase contrast & Electron microscopes
   (iv) Centrifuge
   (v) Separation of biomolecules by chromatography & electrophoresis




Smt. Usha Thakur


(Prashant Kumar Kanoje)

Dr. Sanjay Thite

B. Sc. Part III (2021-22)
Zoology
Practical

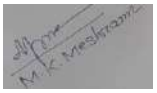
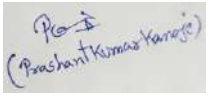
The practical work in general shall be based on syllabus prescribed in theory.
The candidates will be required to show knowledge of the following:

- Estimation of population density, percentage frequency, relative density.
- Analysis of producers and consumers in grassland.
- Detection of gram-negative and gram-positive bacteria.
- Blood group detection (A,B,AB,O)
- R. B. C. and W.B.C count
- Blood coagulation time
- Preparation of hematin crystals from blood of rat
- Observation of Drosophila, wild and mutant.
- Chromatography-Paper or gel.
- Colorimetric estimation of Protein.
- Mitosis in onion root tip.
- Biochemical detection of Carbohydrate, Protein and Lipid.
- Study of permanent slides of parasites, based on theory paper.
- Working principles of pH meter, colorimeter, centrifuge and microscope.

Scheme of marks distribution **Time: 3:30hrs**

• Hematological Experiment	08
• Ecological Experiment: Grassland Ecosystem/ Population Density/Frequency/relative density	06
• Bacterial staining	05
• Biochemical experiment	06
• Practical based on Instrumentation (Chromatography/ pH meter/microscope/centrifuge.	05
• Spotting (5 spots)	10
7 Viva	05
8. Sessional	05




Smt. Usha Thakur


(Prashant Kumar Kanoje)

Dr. Sanjay Thite