हिंदी भाषाकेव्याकरण के रचना पक्ष का ज्ञान, संप्रेषण कौशल, सामाजिकसंदेश एवं भाषायी दक्षता की दृष्टि तथा नई शिक्षा नीति के उद्देश्य को ध्यान में रखकर पाठ्यक्रम का निर्माण किया गया है।

बी.ए./ बी.एस-सी./ बी.कॉम./ बी.एच.एस.सी. भाग- दो

(आधार पाठ्यक्रम)

प्रथम प्रश्नपत्र

हिंदी भाषा

कोड....

पूर्णांक 75

क्रेडिट 05

पाठ्यक्रम का उद्देश्य:-

(1)गद्य विधाओंसे अवगत कराना एवं निबंध कौशल सिखाना।

(2)कार्यालयीन हिंदी का ज्ञान प्रदान करना ।

(3)हिंदी व्याकरण का समग्र ज्ञान प्रदान करना ।

(4)हिंदी भाषा में प्रचलित विभिन्न शब्द रूपों से परिचित कराना।

पाठ्य विषय:-

इकाई1. (क) नाखून क्यों बढ़ते हैं?: हजारी प्रसाद द्विवेदी (ख) कार्यालयीन भाषा, मीडिया की भाषा, वित्त एवं वाणिज्य की भाषा,मशीनी भाषा	अंक 15 18 कालखंड
इकाई 2. (क)युवकों का समाज में स्थान : आचार्य नरेंद्र देव (ख) हिंदी के तत्सम, तद्भव, देशज, विदेशी शब्द-परिचय,	अंक 15 18 कालखंड

संज्ञा, सर्वनाम,	
इकाई 3 (क)डॉ खूबचंद बघेल : हरि ठाकुर (ख)कारक, विशेषण, क्रिया विशेषण	अंक 15 18 कालखंड
इकाई 4 (क) एक पहाड़ीमैना की मौत : डॉ. कांति कुमार जैन (ख) समास, संधि	अंक 15 18 कालखंड
इकाई 5 (क) मातृभूमि : वासुदेव शरण अग्रवाल (ख)अनुवाद - परिभाषा स्वरूप, प्रकार, स्रोत भाषा और लक्ष्य भाषा. अंग्रेजी से हिंदी में अनुवाद	अंक 15 18 कालखंड

मूल्यांकन योजना:-

प्रत्येक इकाई से एक-एक प्रश्न पूछे जाएंगे। प्रत्येक प्रश्न में आंतरिक विकल्प होगा। प्रत्येक प्रश्न के 15 अंक होंगे। प्रत्येक प्रश्न के दो भाग 'क' और 'ख' होंगे एवं अंक क्रमश: 08 एवं 07 होंगे। प्रश्नपत्र का पूर्णांक 75 निर्धारित

है।प्रश्नपत्रकेपूर्णांककादसप्रतिशतअंकआंतरिकमूल्यांकनकेलिएनिर्धारितहै।

पाठ्यक्रम अधिगम परिणाम:-

1. गद्य की विभिन्न विधाओं से परिचित हो सकेंगे एवंउनमेंसाहित्यिक रूझान पैदा होगा।
2. हिंदी के आधारभूत व्याकरणिक अवधारणाओं से विद्यार्थी परिचित हो सकेंगे। उनमें रचनात्मकताएवं भाषाकौशल का विकास होगा।
3. विभिन्नप्रतियोगी परीक्षाओं की तैयारी में यह पाठ्यक्रम सहायक होगा।

पाठ्यक्रम निर्माण का औचित्य :-

सुप्रसिद्ध विद्वानों के लेख/निबंध/संस्मरण के माध्यम से विद्यार्थियों के चिंतनपरक दृष्टिकोण एवं व्यक्तित्व का विकास करते हुए उन्हें व्याकरणिक एवं भाषा-प्रयोग विषयक पक्ष से परिचित कराते हुए प्रतियोगी परीक्षाओं की दृष्टि से तैयार करने की दिशा में यह पाठ्यक्रम उपयोगी रहेगा।

23/2/23 23.2.2023 23/2/23

Meeting -II

Today on 27th May 2022, a meeting of central Board of studies for Foundation course E Language was held for the formulation of Syllabus at School of Studies Literature and Languages, Pt. RSU, Raipur from 1lam onwards.

Minutes of the Meeting -

1) The meeting was presided by Prof . G. A. Ghanshyam, o.S.D. Higher Education,Gov C.G., who alongwith The Chairperson and other members of Central Board of Stud Foundation Course English Language finalised the Textbooks to be implemented f undergraduation classes from the new academic session.
2) The Memebers chalked down the Programme outcomes, Learning outcomes, and programme Specific Outcomes for the UG classes for English Language.
3) Marks distribution was done as per credit system.

Hence the final syllabus was laid down after discussion by all the members & Chairperson for foundation course English Language.

Following members were present in the meeting:

Prof. P C Choudhury chairman central Board of studies in English Literature.
Dr. G.A Ghanshyam. O.S.D. Higher Education. Nava Raipur.
Dr. Qamar Talat HoD English, Govt V. Y.T . PG Autonomous college Durg.
Dr. shukla Banerjee. HoD English Govt. N .P. G . college of Science , Raipur.
Dr. Merily Roy, HoD English, rndira Govt P.G. college, vaishali Nagar,Durg.
Dr. shrabani chakravorty Subject Expert Govt. Bilasa Girls pG college,
Dr. Rakesh Tiwari, HOD, K.M.T. Govt Girls College, Raigarh.
Prof.SunilSahu,HoD,Govtl.K.GirlsCollege,Kanker
Dr. sushama Mishra, HoD, Govt. pt. shyamacharan shukra coilege, Dharsiwa

2/6/23
PC Choudhury

Central Board of Studies Foundation Course Paper-II
English Language for Under Graduate Students

Programme Outcomes for English Language B.A/B.Sc/B.Com I, II, III

The programme enables a student to get acquainted

- With the rich cultural heritage and develops patriotic feelings through works of Indian authors & poets.
- To get exposure of the usage of grammar according to contemporary tim
- To have an exposure about the literary genre with the help of the author poets across the globe.
- To develop an appreciation for English Language & Communication Skills

(Dr. Sushama Mishra)

(PC Chair)

Learning Outcomes (English Language) B.A/B.Sc/B.Com - I, II,III

The learning outcomes are as follows:

1. To strengthen the linguistic skills -Listening, Speaking, Reading and Writing.
2. To refine the way of thinking and speaking which would lead them to have mighty ideas in day to day life.
3. To improve students speaking ability in English both in terms of fluency and comprehensibility.
4. To enhance practical use of English in day-to-day life.
5. To enrich the vocabulary of the students.

Dr. Sushama Mishra 12.6.2023

2/6/23

Programme Specific Outcomes FC_ Paper-II (English Language) B.A/B.Sc/B.Com - I, II,III

The Programme Specific outcomes are as follows:

1. To develop abilities of the students as a critical reader and writer.
2. To develop the ability of public interaction and speaking.
3. To develop self awareness about English language.
4. To develop critical thinking .

To give a practice in writing, drafting of English assignments.

Dr. Sushama Mishra

2/6/2
PCCH

BA/B.Sc./B.Com/B.Sc. Home.Sc. (Part-II)

Foundation Course Paper-II English Language

Max. Marks:75 Qualifying Marks:26

Total credits: 05

Paper-II	Mark's	Period's	Credit
Unit-I English in Use: A Textbook for College Students (Semester III), Macmillan Publishers India Pvt Ltd	3x5=15	18	01
Unit -II Business Reports & Media Reports Writing Notices, Blog Writing	1x10=10	18	01
Unit -III Reading Comprehension (a) Unseen Passage (MCQ -based) (b) Vocabulary (Text-based)	1x5=05 1x10=10	18	01
Unit -IV Essay Writing: Discursive Essay, Argumentative Essay	1x10=10	09	0.5
Unit-V Grammar : • Ordering of words • Voice • Conditional sentences • Use of some, any, enough, too,otherwise, few, many, such, very • Prepositions • Question tags • Transformation of sentences(like-Simple to Compound to Complex,Exclamatory to Assertive) • Transformation of sentences with positive, Comparative and superlative degrees • Grammatical items given in the textbook'English in Use'	1x25=25	27	1.5
Total	**75**	**90**	**05**
Recommended Books- 1. Essential English Grammar, 2nd Edition by Raymond Murphy, Cambridge Publication 2. English Grammar in use 5th edition by Raymond Murphy, Cambridge Publication. 3. Advanced English Grammar by Martin Hewings Cambridge University Press.			

2/6/23

Minutes of Meeting

Today on 23rd Feb 2023, a meeting of Central Board of Studies for Foundation course En Language was held for the formulation of Syllabus at School of Studies Anthropology, Pt. Harbur from 12 noon onwards.

Minutes of the Meeting -

1) The meeting was presided by Prof. P C Choudhury, Chairman Central Board of Studi English Literature.
2) Syllabus for annual pattern has been separated from Semester pattern and syllab Foundation course English has been prepared which is to be included either in Seme
3) The syllabus of semester-I would carry 50 marks, 02 credits and 75 periods.

Following members were present in the meeting:

1. Prof. P. C.Choudhury Chairman Central Board of studies in English Literature.
2. Dr. Qamar Talat, HoD English, Govt V.Y.T. PG Autonomous college, Durg.
3. Dr. Merily Roy, HoD English, Indira Govt P.G. College, Vaishali Nagar, Durg.
4. Dr. Rakesh Tiwari, HOD, Govt. Mahatma Gandhi P.G. College Kharsia.
5. Prof. Sunil Sahu, HoD, Govt. I. K. Girls College, Kanker.
6. Dr. Sushama Mishra, HoD, Govt. Pt. Shyamacharan Shukla College, Dharsiwa.

Scheme of B. Sc. Physics

Year	Course Code	Subject Name	Theory/ Practical	Total Credit	Total Marks	
					Max	Min
First year	PHY-1T	Mechanics	Theory	4	50	17
	PHY-2T	Electricity and Magnetism	Theory	4	50	17
	PHY-1P	LAB 1: Mechanics, Electricity and Magnetism	Practical	2	50	17
Second year	PHY-3T	Thermal Physics and Statistical Mechanics	Theory	4	50	17
	PHY-4T	Waves and Optics	Theory	4	50	17
	PHY-2P	LAB 2: Thermal Physics, Statistical Mechanics, Waves and Optics	Practical	2	50	17
Third year	PHY-5T	Digital and Analog Circuits and Instruments	Theory	4	50	17
	PHY-6T	Elements of Modern Physics	Theory	4	50	17
	PHY-3P	LAB 3: Digital and Analog Circuits and Instruments, Modern Physics	Practical	2	50	17

Note: There shall be four extra credits in all the years of under graduation for internship/apprenticeship. The certificate of extra credits would be provided by the university concern.

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

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**		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

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: **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 - II

DEFENCE STUDIES

SYLLABUS

Three Year

Degree Course

DEFENCE STUDIES

Proposed Year wise structure of UG Program in Defence-Studies.

B.A. / B.Sc. I year	**Certificate Course.**
B.A. / B.Sc.I I year	**Diploma Course.**
B.A. / B.Sc. III year	**Degree Course.**

Program Outcomes (Pos)

1. Upon completion of the program of Batchelor's in Defence Studies, a student should have acquired basic competency in strategic affairs covering a wide spectrum of interstate security to global security issues including non kinetic dimensions.
2. Shall develop capability in understanding the implications of use and threat of use of force in international relations.
3. Shall seek, identify and apply the acquired knowledge in defence studies on contemporary issues of strategic relevance.
4. Ability to move from LOTS (Lower Order of thinking Skills) to HOTS (Higher Order of Thinking Skills) in Defence Studies.
5. The learning of strategic Studies shall arm the candidates to independently choose further course of action in his/her life whether pursuing higher education by taking specialized course in honours or identifying a career for himself or herself.
6. The course curriculum in Defence Studies is designed to encourage the acquisition of disciplinary/subject understanding, gain academic knowledge and professional skills required for any carrier pursuit be it choosing for higher studies or a job. The outcome based approach , particularly in the cntext of Defence Studies for undergraduate programme will incorporate a significant shift from teachers centric to learner centric pedagogies and from specific to active/participatory pedagogies where emphasis will be on field study, educational tours, writing assignments, seminar presentation and tutorials etc. teaching, therefore, becomes more intresting and absorbing aiming at demonstrative learning.

(Dr. P. Jaiswal) (Prof. G.K. Pandey)

B.A. / B.Sc. Part II Diploma Course of Defence Studies.

Program Specific out come -

Paper I – Western Military History.

Paper II – Theory and Practice of War.

Become familiar in western military system. Learn and understand thr strategy, tactics and application of principle of war. Causes of world war, strategy, tactics and weapons use in world war.

Acquaint them with the concept of strategic thinking as propounded by prominent classical and modern thinkers. Understand the national security challenges both internal and external a country face.

Part – A Introduction			
Programme – Diploma Course	Class – B.A. /B.Sc. IInd year	Year -	Session –

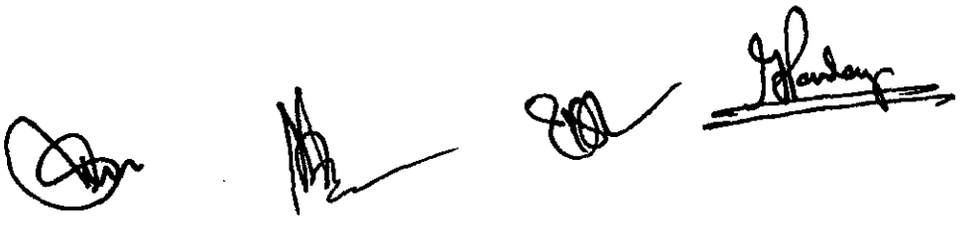
Subject – Defence Studies		
1	Course Code	DS2T - 0867
2	Cource Title	Western Military Histoty
3	Cource Type	Core Theory - I
4	*Pre requisite (if any)*	Open for all
5	Cource Learning Outcomes CLO	After undergoing this course a student will be in a position to – 1. Know the periods of western military history. 2. Will understand through western military system and war. 3. Will understand the effect of the advent of gunpowder on the art of warfare. 4. Know the strategy and tactics of the First and second world War.
6	Credit Value	Theory - 4
7	Total Marks	Maximum Marks - 50

Part – B Content of the Course

Total number of Lectures – Tutorials – 03/week (2 Hrs.15 Min.)		
Total number of Lectures - 60		
Unit	Topic	No. of Lectures
1	1. Military system of Greek and tactics of Phalanx. 2. Alexander and its military reforms . 3. Military system of roman and tactics of Legion. 4. Battle of Arbela 311 B.C. 5. Battle of Canne 216 B.C.	12
2	1. Emergence and decline of cavalry. 2. Battle of Adrianopole 378 A.D. 3. Battle of Hastings 1066 A.D. 4. Cavalry tactics of Zengis Khan. 5. Battle of Crecee 1346 A.D.	12
3	1. Impact of Gunpowder in war.. 2 . Military contribution of Gustavas Adolphus and Fredrik the Great. 3. Causes of American Independence war 1775 – 83. 4. Causes of French revolution. 5. Napoleon's art of war and his military reforms.	12
4	1. Causes of Ist World War, strategic policies and plan of warring Powers. 2. Role of Air Force in First W.W. and Dohet's air power theory. 3. Role of Navy in Ist W.W. and A.T.Mahan's naval theory. 4. Causes of Second World War. 5. Objectives and Strategy of Allied and Axis countries.	12
5	1. Armament and Mechanical warfare with reference to theories Of J.F.C. Fuller and Capt. Liddelhart. 2. Role of Air-power, weapons, doctrine and tactics in IInd W.W. 3. Role of Naval-power, weapons, doctrine and tactics in IInd W.W. 4. Tactics of IInd World War. 5. Advent of Nuclear weapons and their impact on warfare.	12

Part – C Learning Resources

Text Books, Reference Books and other Resources.			
1.	Nuclear war and Nuclear peace	:	Y. Harkabi
2.	Makers of Modern strategy	:	E.M. Earl
3.	J.F.C. Fuller	:	Armament and History
4.	B.K.Tandon	:	Pashchaty a Yodhan Sambhar.
5.	N.P.Tewari	:	Yodhan Sambhar
6.	M.P.Verma	:	Yodhan Sambhar
7.	Arther Birnie	:	Art of War
8.	A.P.J. Abdul Kalam	:	Mere Sapno ka Bharat



भाग अ : परिचय			
डिप्लोमा कोर्स	कक्षा : बी.ए./बी.एससी. द्वितीय वर्ष	वर्ष :	सत्र :

विषय : रक्षा अध्ययन

1	कोर्स कोड	DS2T - 0867
2	कोर्स शीर्षक	पाश्चात्य सैन्य इतिहास
3	कोर्स का प्रकार	कोर सैद्धांतिक – 1
4	पूर्व आवश्यकता	सभी के लिए
5	पाठ्यक्रम अध्ययन की परिलब्धियां CLO	इस पाठ्यक्रम को पूरा करने के बाद छात्र इस स्थिति में होगा कि– 1. पाश्चात्य सैन्य इतिहास के काल को जानेगा। 2. पाश्चात्य सैन्य पद्धति व सामरिकी को युद्धों के व्दारा समझेगा। 3. बारुद के अविष्कार से युद्धकला में परिवर्तन को समझेगा। 4. प्रथम व द्वितीय विश्वयुद्ध की स्त्रातजी व सामरिकी को समझेगा
6	केडिट मूल्य	सैद्धांतिक – 4
7	कुल अंक	अधिकतम अंक – 50

भाग ब : पाठ्यक्रम की सामग्री

कुल व्याख्यानों की संख्या – ट्यूटोरियल 03 प्रति सप्ताह /2 घंटा 15 मिनिट

व्याख्यानों की कुल संख्या – 60

ईकाई	विषय वस्तु	व्याख्यानों की संख्या
1	1. यूनानी सैन्य पद्धति, फैलेंक्स की सामरिकी 2. अलेक्ज़ेन्डर व उसके सैन्य सुधार 3. रोमन सैन्य पद्धति, लिज़न की सामरिकी 4. अरबेला का संग्राम 311 ई.पू. 5. कैने का संग्राम 216 ई.पू.	12
2	1. अश्वरोही सेना का उत्थान व पतन 2. एड्रियानोपल का संग्राम 378 ई. 3. हेस्टिंग का संग्राम 1066 ई. 4. चंगेज खॉ की अश्वरोही सामरिकी 5. केसी का युद्ध 1345 ई.	12
3	1. बारुद का युद्धकला पर प्रभाव 2. गुस्तावस एडालफस व फ्रेड्रिक महान का सैन्य योगदान 3. अमेरिका का स्वतंत्रता का युद्ध (1775–83) के कारण 4. फ्रांस की क्रांति के कारण 5. नेपोलियन की युद्धकला व उसके सैन्य सुधार	12

4	1. प्रथम विश्वयुद्ध के कारण, युद्धरत देशों की नितियां व स्त्रातजिक योजनाऐं 2. प्रथम विश्वयुद्ध में वायुसेना की भूमिका तथा डूहेट का नभ सिद्वांत 3. प्रथम विश्वयुद्ध में नौसेना की भूमिका तथा ए.टी.महान का नौ–सेना सिद्वांत 4. द्वितीय विश्वयुद्ध के कारण 5. मित्र व धुरी राष्ट्र के उद्देश्य व स्त्रातजी	12
5	1. कवचित व मशीनीकृत युद्धकर्म के संदर्भ में जे.एफ.सी.फूलर व लिडिल हार्ट के सिद्धांत 2. द्वितीय विश्वयुद्ध में वायुशक्ति की भूमिका, हथियार, सिद्धांत व सामरिकी 3. द्वितीय विश्वयुद्ध में नौशक्ति की भूमिका, हथियार, सिद्धांत व सामरिकी 4. द्वितीय विश्वयुद्ध की सामरिकी 5. परमाणु हथियारों का आगमन व उसका युद्धकला पर प्रभाव	12

भाग – स अनुशंसित अध्ययन संसाधन

पाठ्यपुस्तकें, संदर्भ पुस्तके , अन्य संसाधन			
1.	Nuclear war and Nuclear peace	:	Y. Harkabi
2.	Makers of Modern strategy	:	E.M. Earl
3.	J.F.C. Fuller	:	Armament and History
4.	B.K.Tandon	:	Pashchaty a Yodhan Sambhar.
5.	N.P.Tewari	:	Yodhan Sambhar
6.	M.P.Verma	:	Yodhan Sambhar
7.	Arther Birnie	:	Art of War
8.	A.P.J. Abdul Kalam	:	Mere Sapno ka Bharat

Part – A Introduction			
Programme – Diploma Course	Class – B.A. /B.Sc. IInd year	Year -	Session –

Subject – Defence Studies		
1	Course Code	DS2T - 0868
2	Cource Title	Theory and Practice of War.
3	Cource Type	Core Theory - II
4	Pre requisite (if any)	Open for all
5	Cource Learning Outcomes CLO	After undergoing this course a student will be in a position to – 1. Will get information about thoughts of military thinkers. 2. Will know the type of war. 3. Will know about the measures to establish world peace. 4. In the context of national security, you will get information about external and internal security arrangements.
6	Credit Value	Theory - 4
7	Total Marks	Maximum Marks - 50

Part – B Content of the Course

Total number of Lectures – Tutorials – 03/week (2 Hrs.15 Min.)		
Total number of Lectures - 60		
Unit	Topic	No. of Lectures
1	1. Sunt Zu. 2. Clausewitz. 3. Macheavelli. 4. Jomini.	12
2	1. Mahatma Gandhi. 2. Kautilya. 3. A. Hitler. 4. Mao Tse Tung.	12
3	1. Balance of Power. 2 . Economic War. 3. Psychological War. 4. Collective Security.	12

4	1. Indo-China war 1962 – causes of war, political and military Lessons. 2. Indo-Pak war 1965 – causes of war, political and military Lessons. 3. Indo-Pak war 1971 – causes of war, political and military Lessons. 4. Kargil conflict – 1999.	12
5	1. Internal and External threats of national security. 2. Insurgency and Counter-insurgency, 3. Terrorism – Problem and solution. 4. Naxalism – Problem and solution.	12

Part – C Learning Resources

Text Books, Reference Books and other Resources.			
1.	Theory and Practice of war	:	M. Howard
2.	Clausewitz	:	M. Howard
3.	Guerilla warfare	:	Mao Tse Tung
4.	The Lightning War TaditYudh	:	D.K. Palit
5.	War of 1971	:	Mankekar
6.	Indo - Pak conflict on Kashmir	:	Bhopinder Singh
7.	India - the search for power	:	M.K. Chopra
8.	The Indian army	:	S.P. Cohen
9.	The Pakistan army	:	S.P. Cohen
10.	Himalyan blunder	:	J.P. Dalvi
11.	The Chinese aggression	:	S. Sinha
12.	India - China boundary: India's option	:	T.S. Murti
13.	Kashmir	:	Sisir Gupta
14.	The theory of force and organization of defense	:	Nagendra Singh

भाग अ : परिचय			
डिप्लोमा कोर्स	कक्षा : बी.ए./बी.एससी. द्वितीय वर्ष	वर्ष :	सत्र :
विषय : रक्षा अध्ययन			

1	कोर्स कोड	DS2T - 0868
2	कोर्स शीर्षक	युद्ध के सिद्धांत और अभ्यास
3	कोर्स का प्रकार	कोर सैद्धांतिक – 2
4	पूर्व आवश्यकता	सभी के लिए
5	पाठ्यक्रम अध्ययन की परिलब्धियां CLO	इस पाठ्यक्रम को पूरा करने के बाद छात्र इस स्थिति में होगा कि– 1. सैन्य विचारकों के सेना सम्बन्धी विचारों से अवगत होंगे। 2. युद्धों के प्रकार को समझेगें। 3. विश्वशांति स्थापित करनें के उपायों की जानकारी होगी। 4. राष्ट्रीय सुरक्षा के संदर्भ में आंतरिक व बाह्य सुरक्षा की चुनौतियों से अवगत होंगे।
6	केडिट मूल्य	सैद्धांतिक – 4
7	कुल अंक	अधिकतम अंक – 50

भाग ब : पाठ्यक्रम की सामग्री

कुल व्याख्यानों की संख्या – ट्यूटोरियल 03 प्रति सप्ताह /2 घंटा 15 मिनिट		
व्याख्यानों की कुल संख्या – 60		
ईकाई	विषय वस्तु	व्याख्यानों की संख्या
1	1. संतजू 2. क्लाजविट्ज 3. मैक्यावली 4. जोमीनी	12
2	1. महात्मा गॉधी 2. कौटिल्य 3. एडोल्फ हिटलर 4. माओं त्सेतुंग	12
3	1. शक्ति संतुलन 2. आर्थिक युद्ध 3. मनोवैज्ञानिक युद्ध 4. सामूहिक सुरक्षा	12
4	1. भारत चीन युद्ध 1962 – युद्ध के कारण, राजनितिक व सैन्य शिक्षाए. 2. भारत पाक युद्ध 1965 – युद्ध के कारण, राजनितिक व सैन्य शिक्षाए. 3. भारत पाक युद्ध 1971 – युद्ध के कारण, राजनितिक व सैन्य शिक्षाए. 4. कारगिल संर्घष 1999.	12

5	1. राष्ट्रीय सुरक्षा के आंतरिक व बाह्य खतरें 2. राजद्रोह व प्रतिराजद्रोह 3. आंतकवाद – समस्या व समाधान 4. नक्सलवाद – समस्या व समाधान	12

भाग – स अनुशंसित अध्ययन संसाधन

पाठ्यपुस्तकें, संदर्भ पुस्तके , अन्य संसाधन			
1.	Theory and Practice of war	:	M. Howard
2.	Clausewitz	:	M. Howard
3.	Guerilla warfare	:	Mao Tse Tung
4.	The Lightning War TaditYudh	:	D.K. Palit
5.	War of 1971	:	Mankekar
6.	Indo - Pak conflict on Kashmir	:	Bhopinder Singh
7.	India - the search for power	:	M.K. Chopra
8.	The Indian army	:	S.P. Cohen
9.	The Pakistan army	:	S.P. Cohen
10.	Himalyan blunder	:	J.P. Dalvi
11.	The Chinese aggression	:	S. Sinha
12.	India - China boundary: India's option	:	T.S. Murti
13.	Kashmir	:	Sisir Gupta
14.	The theory of force and organization of defense	:	Nagendra Singh

Part – A Introduction

Programme – Certificate Course	Class – B.A. /B.Sc. II nd year	Year -	Session –

Subject – Defence Studies

1	Course Code	DS Practical
2	Cource Title	Tactical exercise without troops.
3	Cource Type	Core Practical
4	Pre requisite (if any)	Open for all
5	Cource Learning Outcomes CLO	After undergoing this course a student will be in a position to – 1. Understand Infantry Platoon and Section organization. 2. Information about tactical exercise will be received.
6	Credit Value	Practical- 2
7	Total Marks	Maximum Marks - 50

Part – B Content of the Course

Total number of Lectures – Practical – 04/week (3 Hrs.)		
Total number of Lectures - 60		
	Topic	
2	1. Organisation and equipment of Infantry Platoon and Section. 2. Section Formation. 3. Platoon Formation. 4. Indication of Target by various methods. 5. Fire control order. 6. Patrols. 7. Verbal order. 8. Battle Procedure.	12

Part – C Learning Resources

Text Books, Reference Books and other Resources.

1.	London Her	:	Manual of Map Reading
2.	लल्लन जी सिंह	:	प्रयोगात्मक सैन्य विज्ञान :
3.	M.P.Verma	:	Sainik manchitra vigyan
4.	Y.K. Sharma	:	Map reading
5.	Balwant Singh	:	An easy approach to map reading
6.	Gale and Porden	:	A complete guide to military map reading
7.	J.M. Srivastava	:	Practical military science part 1
8.	B.N. Maliwal	:	Military science pratical

भाग अ : परिचय			
कक्षा : बी.ए./बी.एससी. द्वितीय वर्ष	वर्ष :	सत्र :	
विषय : रक्षा अध्ययन			

कोर्स कोड	DS2P
कोर्स शीर्षक	प्रारम्भिक सामरिकी अभ्यास
कोर्स का प्रकार	कोर प्रायोगिक
पूर्व आवश्यकता	सभी के लिए
पाठ्यक्रम अध्ययन की परिलब्धियां CLO	इस पाठ्यक्रम को पूरा करने के बाद छात्र इस स्थिति में होगा कि– 1. पैदल सेना की प्लाटून व सेक्शन के संगठन को जानेगें। 2. सामरिक अभ्यास व युद्धकला की जानकारी प्राप्त करेंगें।
केडिट मूल्य	प्रायोगिक – 2
कुल अंक	अधिकतम अंक – 50

भाग ब : पाठ्यक्रम की सामग्री

कुल व्याख्यानों की संख्या – प्रायोगिक 04 प्रति सप्ताह /3 घंटा		
व्याख्यानों की कुल संख्या – 60		
	विषय वस्तु	व्याख्यानों की संख्या
	1. सेक्शन व प्लाटून का संगठन व हथियार. 2. सेक्शन विरचनाएँ. 3. प्लाटून की विरचनाएँ. 4. लक्ष्य संकेत की विधियॉ 5. फायर नियत्रंण आदेश 6. गश्ती दल 7. मौखिक आदेश. 8. रण प्रकिया.	

भाग – स अनुशंसित अध्ययन संसाधन

पाठ्यपुस्तकें, संदर्भ पुस्तके , अन्य संसाधन			
1.	London Her	:	Manual of Map Reading
2.	लल्लन जी सिंह	:	प्रयोगात्मक सैन्य विज्ञान :
3.	M.P.Verma	:	Sainik manchitra vigyan
4.	Y.K. Sharma	:	Map reading
5.	Balwant Singh	:	An easy approach to map reading
6.	Gale and Porden	:	A complete guide to military map reading
7.	J.M. Srivastava	:	Practical military science part 1
8.	B.N. Maliwal	:	Military science pratical

Scheme of B. Sc. Chemistry

Year	Course Code	Subject Name	Theory/ Practical	Total Credit	Total Marks	
					Max	Min
First year	CHEM-1T	Inorganic and Physical Chemistry	Theory	4	50	17
	CHEM-2T	Organic and Physical Chemistry	Theory	4	50	17
	CHEM-1P	LAB 1 : General Chemistry-1	Practical	2	50	17
Second year	CHEM-3T	Inorganic and Physical Chemistry	Theory	4	50	17
	CHEM-4T	Organic and Physical Chemistry	Theory	4	50	17
	CHEM-2P	LAB 2 : General Chemistry-2	Practical	2	50	17
Third year	CHEM-5T	Inorganic and Physical Chemistry	Theory	4	50	17
	CHEM-6T	Organic and Physical Chemistry	Theory	4	50	17
	CHEM-3P	LAB 3 : General Chemistry-3	Practical	2	50	17

Note: There shall be four extra credits in each year for internship/apprenticeship. The certificate of extra credits for this would be provided by the concern university and it is not mandatory.

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, 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 08/6/2022
4. Dr. Rajmani Patel, Assistant Professor, Hemchand Yadav University, Durg (C.G.) - Member 08.06.22
5. Dr. A.K. Singh, Professor, Govt. V.Y.T. P.G. College Durg (C.G.) - Member 8.6.'22

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).

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 08.06.22
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 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**

	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, Assistant Professor, Govt. E.V.P.G. College, Korba - Chairman
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.)

Scheme of B. Sc. Mathematics

Part - II

Year	Course Code	Subject Name	Theory/ Practical	Total Credit	Total Marks	
					Max	Min
First year	MATH-1T	Calculus	Theory	4	50	33
	MATH-2T	Algebra	Theory	4	50	
	MATH-1P (Any One)	Lab 1 : Calculus and Algebra	Practical	2	50	17
		Project 1 : History of Mathematicians	Project	2	50	17
Second year	MATH-3T	Differential Equations	Theory	4	50	33
	MATH-4T	Real Analysis	Theory	4	50	
	MATH-2P (Any One)	Lab 2 : Differential Equations and Real Analysis	Practical	2	50	17
		Project 2 : History of Mathematicians	Project	2	50	17
Third year	MATH-5T Optional I (Any One)	Mechanics	Theory	4	50	33
		Numerical Methods	Theory	4	50	
		Linear Algebra	Theory	4	50	
		Integral Transforms and Fourier Analysis	Theory	4	50	
	MATH-6T Optional II (Any One)	Discrete Mathematics	Theory	4	50	
		Tensors and Differential Geometry	Theory	4	50	
		Number Theory	Theory	4	50	
		Probability and Statistics	Theory	4	50	
	MATH-3P (Any One)	Lab 3 : Mathematics Paper I and Paper 2	Practical	2	50	17
		Project 3 : History of Mathematicians	Project	2	50	17

Note: There shall be four extra credits in all the years of under graduation for internship/apprenticeship. The certificate of extra credits would be provided by the concern university and is not mandatory.

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
1	**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=C2qloHkhEuM&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				
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

Scheme & Syllabus

Subject: Electronics

Approved at Central Board of Studies meeting held at School of Studies in Electronics & Photonics on 22nd Feb, 2023

Jointly by
School of Studies in Electronics & Photonics
Pt. RavishankarShukla University
Raipur (C.G.)
&
Office of Commissioner
Department of Higher Education
Govt. of Chhattisgarh, IndrāvatiBhavan,
Naya Raipur (C.G.)

22.2.23

22-2-2023

B.Sc. Electronics (Three Year)

Programme Outcomes (PO)

PO creates an educational environment to train the students to meet the challenges of modern Electronics & Communication industry through state of the art technical knowledge and present challenges. Following are the expected programme outcomes.

- Analyze, plan and apply the acquired knowledge in basic sciences and mathematics in solving Electronics and Communication Engineering problems with technical, economic, environmental and social contexts.
- Design, build and test analog & digital electronic systems for given specifications.
- Architect modern communication systems to meet stated requirements.
- Work in a team using technical knowhow, common tools and environments to achieve project objectives.
- Engage in lifelong learning, career enhancement and adapt to changing professional and societal needs.
- In addition the course caters to the requirements of providing complete exposure to NET/SET syllabus for Electronics farmed by the U.G.C.

Programme Specific Outcomes (PSO)

PSO enables the students

- To understand basic facts and concepts in Electronics while retaining the exciting aspects of Electronics so as to develop interest in the study of Electronics as a discipline.
- To develop the ability to apply the electronic circuits.
- To get benefited with the present state of art of the electronic based circuit and serve society with its applications.
- To develop the capability to work hands-on on the electronic circuits that is becoming vital for the mankind for the purpose of work regulation
- To be familiarized with the emerging areas of Electronics and their applications in various spheres of Electronic sciences.
- To appraise the capability of students to make its relevance in future studies.
- To develop skills in the building and studying the circuits along with the software implementation.
- To be exposed to get compete with present scenario of the industrial automation.

22.2.2023 22-2-2023

Three Year (Yearly) Syllabus for Undergraduates

As recommended by Central Board of Studies of Electronics
For approval of Kuladhipati, Governor of Chhattisgarh
For Three Years 2023-26
July 2023 onwards
Class: B.Sc. Electronics

Program: Certificate/Diploma/Degree

Paper Code	Courses Opted	Title of Course	Total Credit (per year)	Total No. of (L-T-P) (Per week)
First Year (Under Graduate Certificate in Electronics)				
ELC-101T	Core Course-1	Network Analysis and Analog Electronics	**4**	**2-0-0**
ELC-102T	Core Course-2	Digital Electronics	**4**	**2-0-0**
ELC-103P	Core Course-1 &2 Practical/Tutorial	Network Analysis, Analog and Digital Lab	**2**	**0-0-2**
Second Year (Under Graduate Diploma in Electronics)				
ELD-201T	Core Course-3	Operational Amplifier	**4**	**2-0-0**
ELD-202T	Core Course-4	Industrial Electronics	**4**	**2-0-0**
ELD-203P	Core Course-3 & 4 Practical/Tutorial	Operational Amplifier and Industrial Electronics Lab	**2**	**0-0-2**
Third Year (Degree Bachelor in Electronics)				
ELB-301T	Core Course-5	Communication Electronics	**4**	**2-0-0**
ELB-302T	Core Course-6	Microprocessor and Microcontroller	**4**	**2-0-0**
ELB-303P	Core Course-5 & 6 Practical/Tutorial	Communication Electronics, Microprocessor and Microcontroller Lab	**2**	**0-0-2**

1. **Internship/Apprenticeship providing agencies would be enlisted by the concerned University.**
2. **15 Periods (10 hrs. of teaching) = 1 Credit**

22.2.23 22.2.2023

Three Year (Yearly) Syllabus for Undergraduates

As recommended by Central Board of Studies of Electronics
For approval of Kuladhipati, Governor of Chhattisgarh
For Three Years 2023-26
July 2023 onwards
Class: B.Sc. Electronics

Scheme of Examination

Paper Code	Course Opted	Title of Course	Theory	Practical	Grand Total	Minimum Passing Marks
First Year (Under Graduate Certificate in Electronics)						
ELC-101T	Core Course-1	Network Analysis and Analog Electronics	50	–	100	33
ELC-102T	Core Course-2	Digital Electronics	50	–		
ELC-103P	Core Course-1 &2 Practical/Tutorial	Network Analysis, Analog and Digital Lab	–	50	50	17
Second Year (Under Graduate Diploma in Electronics)						
ELD-201T	Core Course-3	Operational Amplifier	50	–	100	33
ELD-202T	Core Course-4	Industrial Electronics	50	–		
ELD-203P	Core Course-3 & 4 Practical/Tutorial	Operational Amplifier and Industrial Electronics Lab	–	50	50	17
Third Year (Degree Bachelor in Electronics)						
ELB-301T	Core Course-5	Communication Electronics	50	–	100	33
ELB-302T	Core Course-6	Microprocessor and Microcontroller	50	–		
ELB-303P	Core Course-5 & 6 Practical/Tutorial	Communication Electronics, Microprocessor and Microcontroller Lab	–	50	50	17

22.2.2023 22.2.2023

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 opetational 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)

22.2.2023 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

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.

22-2-2023

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.

B. Sc. Bioscience

Scheme of Examination

B.Sc. I Year

Paper	Name of Paper	Max Marks	Total Marks	Min Marks
Paper – I	Cell Biology and Genetics	50	100	33
Paper – II	Biodiversity and Systematics of Plants and Microbes	50		
Practical	Based on Paper - I & - II		50	17

B.Sc. II Year

Paper – I	Ecology, Environmental Biology, Evolution and Behaviour	50	100	33
Paper – II	Biodiversity and Systematics of Invertebrates and Vertebrates	50		
Practical	Based on Paper - I & - II		50	17

B.Sc. III Year

Paper – I	Plant and Animal Physiology, Development and Biochemistry	50	100	33
Paper – II	Biostatistics, Computer and Bioinformatics	50		
Practical	Based on Paper - I & - II		50	17

22/2/23

22/2/23

22-2-23

22/02/2023

Syllabus	
B.Sc. II Year	
Paper – I	**Ecology, Environmental Biology, Evolution and Behaviour**
Unit – I	Ecology: Definition, Scope and Importance. Ecological factors: Abiotic and biotic factor. Ecosystem: Types of Ecosystem, Components of ecosystem. Energy flow in the Ecosystem: Energy flow models. Food Chains and Food Web. Ecological pyramids. Ecological succession.
Unit – II	Air pollution: Evolution and composition of atmosphere, Chemical and photochemical reactions in the atmosphere, Air pollutants, Control of air pollution. Water pollution: Sources of water pollution, Hydrologic cycle, water quality standards, Eutrophication and algal blooms.
Unit – III	Industrial pollution: Sources and major pollutants. Bioremediation: Types and techniques. Solid waste management. Environmental impact assessment. Pollution control laws and acts.
Unit – IV	Evolution: Basic concepts. Theories of organic evolution Patterns of evolution: Divergent and convergent evolution, parallel evolution, co-evolution. Evolution in action: Variations, mutations, recombination, ploidy, isolation, Natural selection, Concept of species and speciation. Micro and Macroevolution
Unit – V	Concepts and patterns of behaviour. Instinct and learning: Innate behavior, Learned behaviour and types of learning, Genetic basis of behaviour. Control of behavior: Neural, hormonal and pheromonal. Social organization: Communication, Living in groups, Eusocial organization. Migration, orientation and navigation

Paper – II	**Biodiversity and Systematics of Invertebrates and Vertebrates**
Unit – I	General characters and classification of Invertebrates up to orders with examples emphasizing their biodiversity, economic importance and conservation measures. Protozoa: Plasmodium. Protozoa and diseases. Porifera: Sycon. Coelentrata: Obellia. Helminths: Liver fluke
Unit – II	Annelida: Nereis, Metamorphism and Trocophore larvae. Arthropoda: Prawn. Mollusca: Pila. Echinodermata: Star fish, Echinoderm larvae. Hemichordata: Balanoglossus
Unit – III	Chordata: Origin and Classification. Protochordata; Classification up to orders, interrelationships, Urochordates; Amphioxus Agnatha: Petromyzon, Fishes: skin and scales, Migration and Parental care
Unit – IV	Amphibia : Parental care, Neoteny. Reptiles : Extinct reptiles, poisonous and non-poisonous snakes, poisonous apparatus and snake venom

22/2/23 22/2/23 22.2.23

22/02/2023

Unit – V	Birds: Migration, Ratitae, Flight adaptation. Mammals; Aquatic mammal, Dentition in mammal, Prototheria and Affinities

Practical	1. Determination of density, abundance and frequency of biota from grasslands 2. Determination of temperature and pH of the industrial effluents. 3. Determination of phenopthalein, methyl orange and total alkalinities and free and total CO2 of industrial effluents 4. Determination of phosphate, sulphate, nitrate, nitrite and ammonia nitrogen of industrial effluents. 5. Determination of DO of industrial effluents 6. Collection and identification of plants and animal species from different industrial effluent channels. 7. Study of specimens of representative examples of different phylum (Classification up to order). 8. Study of permanent slides of different sections of representative examples as per theory syllabus. 9. Microscopic techniques including unstained and stained permanent mount of animal material. 10. Examination of local fauna of different ponds. 11. Phototactic behaviour in *Mimosa pudica* and fish 12. Learning behaviour of cockroach, mice 13. Reasoning behaviour of mouse and rat 14. Study of representative examples of the different chordates (classification and characters) 15. Simple microscopic techniques through unstained and stained permanent mounts 16. Study of histological slides in accordance with the theory papers. 17. Study of osteology of different chordates

Books Recommended	1. Odum EP: Ecology 2. PD Sharma: Fundamentals of Ecology 3. Moody: Introduction to Evolution 4. Paul L. Bishop - Pollution Prevention: Fundamentals and Practice 5. Marquita K. Hill - Understanding Environmental Pollution: A Primer 6. Daniel Vallero - Fundamentals of Air Pollution, Fourth Edition 7. Kenneth M. Vigil - Clean Water: An Introduction to Water Quality and Pollution Control 8. W.Wesley Eckenfelder - Industrial Water Pollution Control 9. A.G. Clarke - Industrial Air Pollution Monitoring - Gaseous and particulate emissions 10. Harry M. Freeman - Industrial Pollution Prevention Handbook 11. Alcock (2009): Animal Behaviour: An Evolutionary Approach 12. Grier (1984): Biology of Animal Behaviour 13. Lorenz (1981): The Foundation of Ethology 14. Manning & Dawkins (1998): An Introduction to Animal Behaviour 15. Mcfarland (1985): Animal Behaviour: Psychology, Ethology and Evolution 16. Scott (2005): Essential Animal Behaviour 17. Anil Kulshreshtha: Unified Practical Zoology

22/2/23 22-2-23 22/02/2023

	18. Michael Stachowitsch, Sylvie Proidl (Illustrator): The invertebrates: An illustrated glossary 19. L.H. Hyman: The Invertebrata vol I & II 20. Rouer and Parsons – The Vertebrate Body, Saunders 21. Kotpal: Modern text book of Zoology: Invertebrates (11th ed. 2016 Rastogi) 22. Kotpal: Modern text book of Zoology: Vertebrates (4th ed. 2016 Rastogi) 23. Jordan & Verma: Invertebrate Zoology (Reprint 2014, S. Chand) 24. Jordan & Verma: Chordate Zoology (Reprint 2014, S. Chand)

22/2/23 22/2/23 22.2.23 22/02/2023

Scheme of Examination
B.Sc.
Geology

Year	Course Code	Subject Name	Theory/ Practical	Total Credit	Total Marks	
First Year	GEOL- 1 T	Geodynamics and Geomorphology	Theory	4	50	17
	GEOL- 2 T	Mineralogy and Crystallography	Theory	4	50	17
	GEOL-1 P	Geodynamics and Geomorphology Mineralogy and Crystallography	Practical	2	50	17
Second Year	GEOL- 3 T	Petrology	Theory	4	50	17
	GEOL - 4 T	Structural Geology	Theory	4	50	17
	GEOL – 2P	Petrology Structural Geology	Practical	2	50	17
Third Year	GEOL- 5 T	Palaeontology and Stratigraphy	Theory	4	50	17
	GEOL – 6T	Earth Resources and Applied Geology	Theory	4	50	17
	GEOL – 3P	Palaeontology and Stratigraphy Earth Resources and Applied Geology	Practical	2	50	17

Note : There shall be four extra credits in all the years of under graduation for internship/ apprenticeship/ skill based course. The certificate of extra credits would be provided by the concern university and is not mandatory.

(MAHFOOZ ARIF)

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

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				
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	5.6.22
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

Scheme of B.Sc. Computer Science

Year	Course Code	Subject Name	Theory/ Practical	Total Credit	Total Marks	
					Max	Min
First	COMP-1T	Computer Fundamental and Operating System	Theory	4	50	17
	COMP-2T	Programming with C and C++	Theory	4	50	17
	COMP-1P	LAB 1: Programming with C and C++	Practical	2	50	17
Second	COMP-3T	Data Structure	Theory	4	50	17
	COMP-4T	Web technology and Java	Theory	4	50	17
	COMP-2P	LAB 2: Web technology and Java	Practical	2	50	17
Third	COMP-5T	Data Communication and Networking	Theory	4	50	17
	COMP-6T	Relational Database Management System	Theory	4	50	17
	COMP-3P	LAB 3: Relational Database Management System	Practical	2	50	17
Total				**30**	**450**	

Note: There shall be four extra credits in all the years of under graduation for internship/apprenticeship. The certificate of extra credits would be provided by the concern university and is not mandatory.

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=OjdT21-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 (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-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=klEn4LqAQIE&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=mtc0HHtrUKo&list=PLJ5C_6qdAvBEJ6-TBzKoa1Ov21lwDzJfM&index=12
- Introduction to SQL
  https://www.youtube.com/watch?v=ar2naKv0aPw&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 - Member

6. Mr. Sushil Kumar Sahu
   Asst. Prof. and Head, Christ College, Jagdalpur
   Shaheed Mahendra Karma Vishwavidyalaya, Bastar - Member
7. Mr. Vikrant Gupta
   Prof. and Head, Batmul Ashram College, Salheana
   Shaheed Nand Kumar Patel University, Raigarh - Member
8. Mr. L.K. Gavel
   Asst. Prof. and Head, Govt. Ghanshyam Singh Gupt, PG College, Balod
   Hemchand Yadav Vishwavidyalaya, Durg - Member
9. Dr. Anil Kumar Sharma
   Asst. Prof. and Head, A.P.S.G.M.N.S, Govt. PG College, Kawardha
   Hemchand Yadav Vishwavidyalaya, Durg - Member
10. Mr. Vishwnath Tamrakar
    Asst. Prof. and Head, Sant Guru Ghasidas Govt. PG College, Kurud, Not agree because Syllabus is wrong
    Pt. Ravishankar Shukla University, Raipur - Member
11. Ms. Anjeeta Kujur
    Asst. Prof. and Head, Govt. R.B.R.N.E.S. PG College, Jashpur
    Sant Gahira Guru University Sarguja, Ambikapur - Member
12. Mr. Suresh Kumar Thakur
    Asst. Prof. and Head, Indira Gandhi Govt. PG College, Vaishali Nagar
    Hemchand Yadav Vishwavidyalaya, Durg - Member
13. Dr. Ugrasen Suman
    Prof. and Head, Dept. of Computer Science
    Devi Ahila Vishwavidyalaya, Indore - Member (Present Online)

Date: 03.06.2022

Scheme of B.Sc./ B.Sc. (Hons.) Biotechnology

Year	Course Code	Subject Name	Theory/ Practical	Total Credit	Total Marks	
					Max	Min
First year	BIOT -1T	Biochemistry, Biostatics and Computers	Theory	4	50	17
	BIOT -2T	Cell Biology, Genetics and Microbiology	Theory	4	50	17
	BIOT -1P	LAB 1: Microbiology and Biochemical Techniques	Practical	2	50	17
Second year	BIOT -3T	Molecular Biology and Biophysics	Theory	4	50	17
	BIOT -4T	Recombinant DNA Technology and Genomics	Theory	4	50	17
	BIOT -2P	LAB 2: Molecular Biology, Bioinstrumentation, and Genomics	Practical	2	50	17
Third year	BIOT -5T	Plant, Environmental and Industrial Biotechnology	Theory	4	50	17
	BIOT -6T	Immunology, Animal and Medical Biotechnology	Theory	4	50	17
	BIOT -3P	LAB 3: Applied Biotechnology	Practical	2	50	17
			Total (I+II+III years)	**30**	**450**	--

Note: There shall be four extra credits in each year for internship/apprenticeship. The certificate of extra credits for this would be provided by the university concern.

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**
I	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

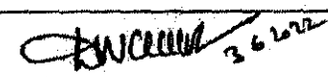
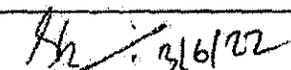
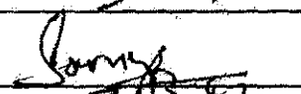
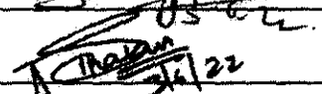
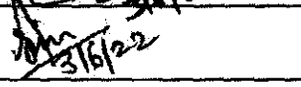
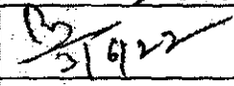
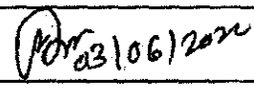
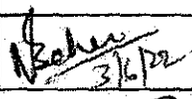
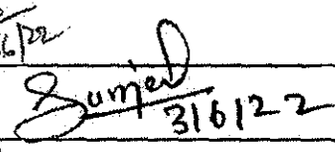
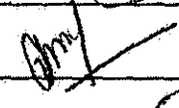
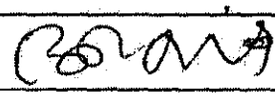
Name	Signature
Dr DSVGK Kaladhar, Prof & Chairperson CBoS Biotechnology, UTD ABVV	
Dr Pramod Kumar Mahish, Asst. Professor Govt. Digvijay College Rajnandgaon	
Dr Saumya Khare, Asst Prof, Kalyan PG. College Bhilai	
Dr Shubha Thakur, Asst Prof, St. Thomas College Bhilai	
Dr Akanksha Jain, Asst Prof. Shri 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	

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	

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/

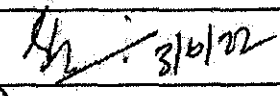
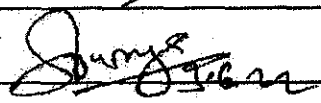
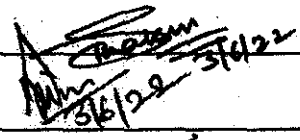
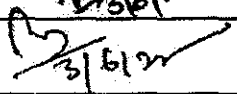
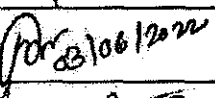
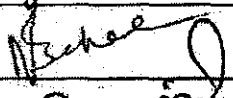
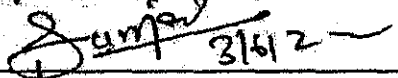
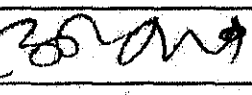
Part D: Assessment and Evaluation

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	

Scheme of B.Sc.
Zoology

Year	Course Code	Subject Name	Theory/ Practical	Total Credit	Total Marks	
					Max	Min
First year	ZOOL-1T	Animal Diversity:Non-Chordata and Chordata , Comparative Anatomy and Physiology of Non-chordates	Theory	4	50	17
	ZOOL-2T	Cell Biology , Histology and Comparative Anatomy & Physiology Of Chordates	Theory	4	50	17
	ZOOL-1P	Practical	Practical	2	50	17
Second year	ZOOL-3T	Genetics , Developmental Biology and Evolution	Theory	4	50	17
	ZOOL-4T	Biochemistry and Molecular Biology	Theory	4	50	17
	ZOOL-2P	Practical	Practical	2	50	17
Third year	ZOOL-5T	Animal Behavior , Chronobiology and Ecology	Theory	4	50	17
	ZOOL-6T	Microbiology , Parasitology , Immunology and Applied Zoology	Theory	4	50	17
	ZOOL-3P	Practical	Practical	2	50	17
Total				**30**	**450**	

Note: There shall be four extra credits in all the years of under graduation for internship/apprenticeship. The certificate of extra credits would be provided by the university concern.

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	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.-

uUkE9PQ

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 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 - 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: **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	

13.6.2023

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
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.

Scheme of B.Sc. Botany

Year	Course Code	Subject Name	Theory/ Practical	Total Credit	Total Marks	
					Max	Min
First year	BOT-1T	Microbial Diversity and Plant Pathology	Theory	4	50	17
	BOT--2T	Archegoniateae and Plant Architecture	Theory	4	50	17
	BOT--1P	LAB 1 : Microbial Techniques and Archegoniate identification	Practical	2	50	17
Second year	BOT--3T	Plant Systematics, Economic Botany and Ethnobotany	Theory	4	50	17
	BOT--4T	Plant Anatomy, Embryology and Plant Breeding	Theory	4	50	17
	BOT--2P	LAB 2 : Plant Identification and Embryology	Practical	2	50	17
Third year	BOT -5T	Plant Physiology and Ecology	Theory	4	50	17
	BOT -6T	Cytogenetics, plant tissue culture and biometry	Theory	4	50	17
	BOT -3P	LAB 3 : Experiments in Physiology, Biochemistry & Molecular biology	Practical	2	50	17

Note: There shall be four extra credits in each year for internship/apprenticeship. The certificate of extra credits for this would be provided by the concern university and it is not mandatory.

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

2.6.22

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

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. [redacted] - 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.

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. [redacted] - Member

for 13.6.22

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

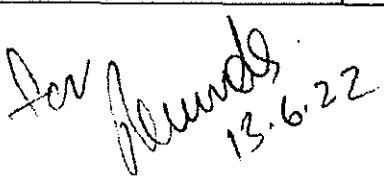
for 13.6.22

	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



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. [redacted] - Member

for 13.6.22

Scheme of B. Sc./ B.Sc. (Hons.) Biochemistry

Year	Course Code	Subject Name	Theory/ Practical/Project	Total Credit	Total Marks	
					Max	Min
First year	BIOC -1T	Chemistry of Biomolecules	Theory	4	50	17
	BIOC -2T	Biochemical Techniques	Theory	4	50	17
	BIOC -1P	LAB 1: Biomolecules and Biochemical Techniques Lab	Practical	2	50	17
Second year	BIOC -3T	Enzymology	Theory	4	50	17
	BIOC -4T	Metabolism of Biomolecules	Theory	4	50	17
	BIOC -2P	LAB 2: Enzymology and Metabolism of Biomolecules Lab	Practical	2	50	17
Third year	BIOC -5T	Cellular and Molecular Biochemistry	Theory	4	50	17
	BIOC -6T	Applied Biochemistry	Theory	4	50	17
	BIOC -3P	LAB 3: Molecular Cell Biology and Applied Biochemistry Lab	Practical	2	50	17
			Total (I+II+III years)	30	450	--

Note: There shall be four extra credits in each year for internship/apprenticeship. The certificate of extra credit for this would be provided by the concern University and is not mandatory.

Part A: Introduction				
Program: **Diploma Course**		Class: **B.Sc. II Year**	Year: **2023**	Session:**2023-2024**
1	Course Code	BIOC-3T		
2	Course Title	**Enzymology**		
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: • Describe the classification and nomenclature of enzymes on the basis of their action, specificity of enzyme action, mechanism of enzyme catalysis and regulatory enzymes. • Explain the mechanism of enzymes and the role of vitamins as coenzyme precursors. • Express the Michaelis-Menten equation, single and double reciprocal plots, and graphical representation of various inhibitors. • Discuss the factors affecting enzyme activity and enzyme isolation & purification. • Describe the principles and methods of enzyme immobilization. • CLO3: Acquire knowledge of allosteric enzymes and their kinetics. • Analyze the thermodynamics of enzyme substrate reactions. • Outline the knowledge of enzyme action, isolation and purification techniques.		
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	**Introduction to enzymes:** Nature of enzymes - protein and non-protein (ribozyme). Cofactor and prosthetic group, apoenzyme, holoenzyme. IUBMB classification of enzymes.] **Features of enzyme catalysis:** Factors affecting the rate of chemical reactions, collision theory, activation energy and transition state theory, catalysis, reaction rates and thermodynamics of reaction. Catalytic power and specificity of enzymes (concept of active site), Fischer's lock and key hypothesis, Koshland's induced fit hypothesis.	12 Periods / 08 Hours
2	**Enzyme kinetics** : Relationship between initial velocity and substrate concentration, steady state kinetics, equilibrium constant - monosubstrate reactions. Michaelis-Menten equation, Lineweaver-Burk plot, Eadie-Hofstee and Hanes plot. Km and Vmax, Kcat and turnover number. Effect of pH, temperature and metal ions on the activity of enzyme. **Bisubstrate reactions:** Types of bi reactions (sequential – ordered and random, ping pong reactions). Differentiating bi substrate mechanisms (diagnostic plots, isotope exchange).	12 Periods / 08 Hours

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)		
Any remarks/ Suggestions: -		

Declaration

Syllabus is framed as per the ToR

Name	Signature
Dr. DSVGK Kaladhar, Chairman BOS, Biochemistry, Professor, Atal Bihari Vajpayee University, Bilaspur	3/6/2022
Dr. Mrigendra Dwivedi, Chairman BOS, Biochemistry, Pt.Ravishankar Shukla University Assistant Professor, Biochemistry, Govt Nagarjuna PG College of Science, Raipur	03/06/2022
Dr. Harit Jha, Subject expert, Assistant Professor, Biotechnology, Guru Ghasidas University, Bilaspur	

Part A: Introduction				
Program: Diploma Course		Class: B.Sc. II Year	Year: 2023	Session:2023-2024
1	Course Code	BIOC-4T		
2	Course Title	**Metabolism of Biomolecules**		
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: • Describe the fundamentals of thermodynamics in biochemical processes. • Acquire the knowledge of energy production in living systems by the degradation of fatty acids. • Explain the various pathways of fatty acid synthesis in living systems. • Describe the energy generated from the carbohydrate metabolism. • Explain the mechanism of the machinery system involved in carbohydrate metabolism. • Discuss breakdown and synthesis of amino acids in humans and recognize its relevance with respect to nutrition and human diseases. • Describe how amino acids are converted into a variety of precursors. • Describe breakdown and synthesis of nucleotides in humans and recognize its relevance with respect to nutrition and human diseases. • Explain inhibitors of nucleotide metabolism, which are potentially being used as chemotherapeutic drugs. • Define citric acid cycle and oxidative phosphorylation in the cell.		
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	**Basic design of metabolism**: Autotrophs, heterotrophs, metabolic pathways, catabolism, anabolism, ATP as energy currency, reducing power of the cell. **Glycolysis, gluconeogenesis and pentose phosphate pathway** **Glycogen metabolism**: Glycogenesis and glycogenolysis, regulation of glycogen metabolism, glycogen storage diseases. Citric acid cycle , Synthesis of carbohydrates and Calvin cycle	12 Periods / 08 Hours
2	**Fatty acid oxidation** : Digestion, mobilisation and transport of cholesterol and triacyl glycerols, β oxidation of saturated, unsaturated, odd and even numbered and branched chain fatty acids, regulation of fatty acid oxidation, peroxisomal oxidation, ω oxidation, ketone bodies metabolism, ketoacidosis. **Fatty acid Biosynthesis**: Fatty acid synthase complex. Synthesis of saturated, unsaturated, odd and even chain fatty acids and regulation. Biosynthesis of membrane lipids : Synthesis of membrane phospholipids in prokaryotes and eukaryotes, respiratory distress syndrome, biosynthesis of triacylglycerol, biosynthesis of plasmalogens, sphingolipids and glycolipids, lipid storage diseases	12 Periods / 08 Hours

3	**Electron Transport Chain and Oxidative Phosphorylation** Structure of mitochondria, sequence of electron carriers, sites of ATP production, inhibitors of electron transport chain. Hypothesis of mitochondrial Oxidative phosphorylation. Transport of reducing potentials into mitochondria.	12 Periods / 08 Hours
4	Amino acid metabolism, Metabolic fates of amino groups. Digestion and absorption of dietary proteins. transamination, role of pyridoxal phosphate, glucose-alanine cycle, Kreb's bicycle, urea cycle and inherited defects of urea cycle. Catabolism of amino acids: Catabolic pathways of individual amino acids. Glucogenic and ketogenic amino acids. Metabolism of one carbon units. Disorders of amino acids metabolism, phenylketonuria, Overview of amino acid synthesis. Biosynthesis of non-essential amino acids and its regulation.	12 Periods / 08 Hours
5	Biosynthesis of purine and pyrimidine nucleotides : De novo synthesis of purine and pyrimidine nucleotides, regulation and salvage pathways. Deoxyribonucleotides and synthesis of nucleotide triphosphate, Biosynthesis of deoxyribonucleotides and its regulation, conversion to triphosphates, Degradation of purine and pyrimidine nucleotides. Inhibitors of nucleotide metabolism. Disorders of purine and pyrimidine metabolism – Lesch-Nyhan syndrome, Gout, SCID, adenosine deaminase deficiency. Integration of metabolic pathways (carbohydrate, lipid and amino acid metabolic pathways), tissue specific metabolism (brain, muscle, and liver).	12 Periods / 08 Hours
Keywords: Metabolism, Biosynthesis, Oxidation, Catabolism, disorders, pathways		

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. Textbook of Biochemistry with Clinical Correlations (2011)
3. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley& Sons. Inc.
4. Textbook of Biochemistry with Clinical Correlations (2011) 7th ed., Devlin, T.M., John Wiley & Sons, Inc. (New York), ISBN: 978-0-470-28173-4 / BRV ISBN: 978-0-470-60152-5.
5. Textbook of Biochemistry with Clinical Correlations (2011) 7th ed., Devlin, T.M., John Wiley & Sons, Inc. (New Jersey), ISBN:978-0-470-28173-4.
6. Biochemistry (2012) 7th ed., Berg, J.M., Tymoczko, J.L. and Stryer L., W.H. Freeman and Company (New York), ISBN:10:1-4292-2936-5, ISBN:13:978-1-4292-2936-4

E-learning Resources

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)		
Any remarks/ Suggestions: -		

Declaration

Syllabus is framed as per the ToR

Name	Signature
Dr. DSVGK Kaladhar, Chairman BOS, Biochemistry, Professor, Atal Bihari Vajpayee University, Bilaspur	
Dr. Mrigendra Dwivedi, Chairman BOS, Biochemistry, Pt.Ravishankar Shukla University Assistant Professor, Biochemistry, Govt Nagarjuna PG College of Science, Raipur	03/06/2022
Dr. Harit Jha, Subject expert, Assistant Professor, Biotechnology, Guru Ghasidas University, Bilaspur	

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

1	Course Code	**BIOC-2P**
2	Course Title	**LAB 1 : Enzymology and Metabolism of Biomolecules lab**
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: • Explain purification of proteins by various methods. • Estimate enzyme activity by different methods. • Explain progress curve of enzyme. • Interpret the effect of physical parameters on enzyme activity. • Practice the effect of inhibitors on enzyme activity. • Demonstrate the continuous assay of an enzyme. • Explain enzyme assay of salivary enzyme. • Practice the estimation of plasma sugar. • Demonstrate the cholesterol level from known sources • Demonstrate assay for various clinically important enzymes. • Practice clinical test by various proteins in biological samples.
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 Periods- 30/ Hours – 20	
Tentative Practical List	**Note:** This is tentative list; the teachers concern can add more practical's as per requirement. 1. Partial purification of acid phosphatase from germinating mung bean. 2. Assay of enzyme activity and specific activity, e.g. acid phosphatase. 3. Effect of pH on enzyme activity 4. Determination of Km and Vmax using Lineweaver-Burk graph. 5. Enzyme inhibition - calculation of Ki for competitive inhibition. 6. Continuous assay of lactate dehydrogenase. 7. Coupled assay of glucose-6-phosphate dehydrogenase. 8. Estimation of blood glucose. 9. Sugar fermentation of microorganisms. 10. Assay of salivary amylase. 11. Isolation of lecithin, identification by TLC, and its estimation. 12.. Isolation of cholesterol from egg yolk and its estimation. 13.. Assay of serum transaminases – SGOT and SGPT. 14. Estimation of serum urea. 15. Separation of Blood Plasma and Serum a. Estimation of proteins from serum by biuret and lowry methods. b. Determination of albumin and A/G ratio in serum. 16. Estimation of bilirubin (conjugated and unconjugated) in serum. 17. i. Estimation of total lipids in serum by vanillin ii. Estimation of cholesterol in serum. 18. Estimation of lipoproteins in plasma. 19. Estimation of lactic acid in blood before and after exercise. 20. Separation and identification of amino acids by (a) paper chromatography and (b) thinlayer chromatography. 21. Separation of polar and non-polar lipids by thin-layer chromatography. 22. Estimation of SGPT and SGOT in serum. 23. a. Assay of serum alkaline phosphatase activity.

	b. Inhibition of alkaline phosphatase activity by EDTA. c. Effect of substrate concentration on alkaline phosphatase activity and determination of its Km value. 24. a. Effect of temperature on enzyme activity and determination of activation energy. b. Effect of pH on enzyme activity and determination of optimum pH. c. Effect of enzyme concentration on enzyme activity. 25. a. Preparation of starch from potato and its hydrolysis by salivary amylase. b. Determination of achromatic point in salivary amylase. c. Effect of sodium chloride onamylases
Keywords: Metabolism, Biosynthesis, Enzyme activity, techniques, serum, fermentation	

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. Textbook of Biochemistry with Clinical Correlations (2011) 7th ed., Devlin, T.M., 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. Biochemistry (2011) 4th ed., Donald, V. and Judith G.V., John Wiley & Sons Asia Pvt. Ltd. (New Jersey), ISBN:978-1180-25024.
8. Fundamentals of Enzymology (1999) 3rd ed., Nicholas C.P. and Lewis S., Oxford University Press Inc. (New York), ISBN:0 19 850229 X.
9. Biochemistry (2012) 7th ed., Berg, J.M., Tymoczko, J.L. and Stryer L., W.H. Freeman and Company (New York), ISBN:10:1-4292-2936-5, ISBN:13:978-1-4292-2936-4

E-learning Resources:

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)		

Declaration

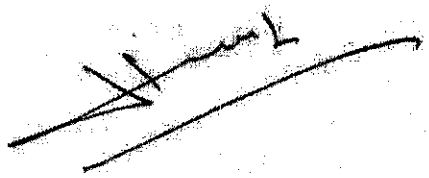
Syllabus is framed as per the ToR

Name	Signature
Dr. DSVGK Kaladhar, Chairman BOS, Biochemistry, Professor, Atal Bihari Vajpayee University, Bilaspur	
Dr. Mrigendra Dwivedi, Chairman BOS, Biochemistry, Pt.Ravishankar Shukla University Assistant Professor, Biochemistry, Govt Nagarjuna PG College of Science, Raipur	03/06/2022
Dr. Harit Jha, Subject expert, Assistant Professor, Biotechnology, Guru Ghasidas University, Bilaspur	

Scheme of B.Sc.-IT (Information Technology)

Year	Course Code	Subject Name	Theory/ Practical	Total Credit	Total Marks	
					Max	Min
First	BSCIT-1T	Computer Fundamental and Operating System	Theory	4	50	17
	BSCIT-2T	Programming with C and C++	Theory	4	50	17
	BSCIT-1P	LAB 1: Programming with C and C++	Practical	2	50	17
Second	BSCIT-3T	Data Communication and Networking	Theory	4	50	17
	BSCIT-4T	Web Technology and Java	Theory	4	50	17
	BSCIT-2P	LAB 2: Web Technology and Java	Practical	2	50	17
Third	BSCIT-5T	Data Structure	Theory	4	50	17
	BSCIT-6T	Python Programming	Theory	4	50	17
	BSCIT-3P	LAB 3: Python Programming	Practical	2	50	17
Total				30	450	

Note: There shall be four extra credits in all the years of under graduation for internship/apprenticeship. The certificate of extra credits would be provided by the concern university and is not mandatory.



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

03.06.2022

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=klEn4LqAQlE&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

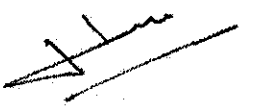
The syllabus of this subject is frame as per the TOR of department of higher education, Chhattisgarh.

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
    Not Agree because Syllabus is length
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.-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.

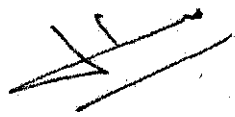
Part C: Learning Resources

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, Not Agreed due to Words is lengthy.
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 - II

कार्य वृत :–दिनांक 03/03/2023 को पूर्वान्ह 12:00 बजे केन्दीय अध्ययन मंडल, भूगोल की बैठक भूगोल अध्ययनशाला, पं. रविशंकर शुक्ल वि.वि., रायपुर में आयोजित हुई जिसमें निम्नानुसार अनुशंसा की गई :–

कार्य सूची – 1 के संदर्भ में सदस्यों द्वारा बी.ए./बी. एस. सी – प्रथम, द्वितीय एवं तृतीय वर्ष, 2023–24 के पाठ्यक्रम के विषय में चर्चा की गई तथा बी.ए./बी. एस. सी. – प्रथम, द्वितीय एवं तृतीय वर्ष, 2022–23 के पाठ्यक्रम में संशोधन कर निम्नलिखित संशोधित पाठ्यक्रम अनुशंसित किया गया –

Brief Summary

3 Year Integrated UG Courses (B.A./B. Sc.) in Geography

B.A. /B.Sc. Part I

The B.A. /B.Sc. Part-I Examination in Geography will be 150 marks. There will be two theory papers and one Practical each of 50 marks as follows:

Paper - I	Physical Geography
Paper - II	Human Geography
Paper - III	Practical Geography

B.A. /B.Sc. Part-II

The B.A./B.Sc. Part-II Examination in Geography will be 150 marks. There will be two theory papers and one Practical each of 50 marks as follows:

Paper-I	Economic and Resources Geography
Paper-II	Regional Geography of India
Paper-III	Practical Geography

B.A. /B.Sc. Part III

The B.A. /B.Sc. Part III Examination in Geography will be 150 marks. There will be two theory papers and one Practical each of 50 marks as follows

Paper – I	Remote Sensing and GIS
Paper - II	Geography of Chhattisgarh
Paper - III	Practical Geography

(Dr C.P. NANDA) (A. BECK) (Dr. S Ambele) (Dr. Sheela Shirdey)

Program: B.A./B.Sc.	Class: II Year.	Session : 2023-24

Paper I :Economic And Resources Geography (UGeo-0201)

Content of the Course

Course Learning Outcome (CLO)	After the completion of course, the students will have ability to: 1. Understand about the Nature and Scope of Economic Geography. 2. Understand the concept and classification of resource as well as major mineral resources. 3. Identify the major crops and their production and distribution. 4. Understand the fundamental theories in economic geography. 5. Understand the types, characteristics different modes of transportation at national and international level. 6. Understand various international block and role of international trade in economic development. 7. Understand the conservation and management of resources as well as sustainable development.

Content of the Course

Unit	Topic
1.	Meaning, scope and concept of economic geography; Resource: Meaning and classification
2.	Mineral resources: iron ore and bauxite, Power resources: coal, petroleum and hydro electricity; Resource conservation. **Principal Crops**: Wheat, Rice, Sugarcane, Tea, Coffee, Cotton.
3.	Agricultural regions of the world (D. Whittlesey); Theory of agricultural location (Von Thunen); Theory of industrial location (Weber).
4.	International trade: patterns and trends; Major trade blocks: SAARC, BRICKS, OPEC, LAFTA, EEC, ASEAN; Effect of globalization on developing countries
5.	Meaning, scope and concept of economic geography; Resource: Meaning and classification

Learning Resources: Text Books, Reference Books, Other Resources

Suggested readings

1. Alexander, J. W. (1988): Economic Geography. Prentice-Hall, New Delhi,.
2. Bryson, J., Henry, N., Keeble, D. and Martin, R. (eds.) (1999): The Economic Geography Reader: Producing and Consuming Global Capitalism. John Wiley and Sons, Inc, New York.
3. Clark,G. L., Gertler, M. S. and Feldman, M. P. (eds.) (2000): The Oxford Handbook of Economic Geography. Oxford University Press, USA.
4. Coe, N. (2007): Economic Geography: A Contemporary Introduction. Blackwell Publishers, Inc., Massachusetts.
5. Gautam, A. (2006): *Aarthik Bhugol Ke Mool Tattava,* Sharda Pustak Bhawan, Allahabad.
6. Guha, J. S. and Chattoraj, P.R. (2002): A New Approach to Economic Geography: A Study of Resources. The World Press Private Limited, Kolkata.
7. Hanink, D. M. (1997): Principles and Applications of Economic Geography: Economy, Policy, Environment. John Wiley and Sons, Inc, New York.
8. Hartshorne, T. A. and Alexander, J. W. (1988): Economic Geography (3rd revised edition) Englewood Cliff, New Jersey, Prentice Hall

Hudson, R. (2005): Economic Geographies: Circuits, Flows and Spaces. Sage Publications,

Suggested equivalent online course: 1. epgp.inflibnet.ac.in
2. virtual lectures available on YouTube

Program: B.A./B.Sc.	Class: II Year.	Session : 2023-24

Paper II : Regional Geography of India (UGeo-0202)

Course Learning Outcome (CLO)	After the completion of course, the students will have ability to: 1. Understand the about the physiographic division of India and Drainage system of India. 2. Understand the seasonal variation of climate and monsoon of India. 3. Understand the various biotic, conventional and non conventional resources and their distribution in India. 4. Understand the growth, density and distribution of Indian population. 5. Identify the major crops, production and distribution, agriculture region of India 6. Understand the impact of green revolution on Indian agriculture. 7. Understand the industrial production and development in India.

Content of the Course

Unit	Topic
1.	Physical Features: Structure, Relief, Drainage, Climate and Monsoon.
2.	Natural Resources: Soils - types, their distribution and characteristics. Water Resources (major irrigation and hydro- power projects); Forests: types and distribution.
3.	Mineral and Power resources: Iron-ore, Bauxite, Coal, Petroleum and Natural gas, Atomic energy and Non conventional sources of energy.
4.	Cultural Features: Population - Growth, Density and Distribution. Agriculture - Major Cereals: Paddy, Wheat. Major Cash crops: Tea, Coffee, Sugarcane.. Impact of Green Revolution, Agro-climatic region.
5.	Industries Localization, Development & Production - Iron and steel, Cotton Textile, Cement, Sugar. Transport, Industrial Region.

Learning Resources: Text Books, Reference Books, Other Resources

Books Recommended:

1. Chauhan, P.R. and Prasad, M. (2003): *Bharat Ka Vrihad Bhugol*, Vasundhara Prakashan, Gorakhpur.
2. Farmer, B.H. (1983): An Introduction to South Asia. Methuen, London
3. Gautam, A. (2006): Advanced Geography of India, Sharda Pustak Bhawan, Allahabad
4. Johnson, B.L.C. (1963): Development in South Asia. Penguin Books, Harmondsworth
5. Krishnan, M.S. (1982): Geology of India and Burma, CAS Publishers and Distributors, Delhi.
6. Khullar, D.R. (2007): India: A Comprehensive Geography, Kalyani Publishers, New Delhi
7. Nag, P. and Gupta, S. S. (1992): Geography of India, Concept Publishing Company, New Delhi.
8. Rao, B.P. (2007): *Bharat kee Bhaugolik Sameeksha*, Vasundhara Prakashan, Gorakhpur.
9. Singh , J. (2003): India: A Comprehensive Systematic Geography. Gyanodaya Prakashan, Gorakhpur
10. Singh, J. (2001): *Bharat: Bhougolik Aadhar Avam Ayam*, Gyanodaya Prakashan, Gorakhpur.
11. Singh, R.L. (ed.) (1971): India: A Regional Geography. National Geographical Society of India, Varanasi.
12. Spate, O.H. K., Learmonth A. T. A. and Farmer, B. H. (1996): India, Pakistan and Sri Lanka. Methuen, London, 7th edition.
13. Sukhwal, B.L. (1987): India: Economic Resource Base and Contemporary Political Patterns. Sterling Publication, New Delhi
14. Tiwari, R.C. (2007): Geography of India, Prayag Pustak Bhawan, Allahabad.

Suggested equivalent online course: 1. epgp.inflibnet.ac.in

2. virtual lectures available on YouTube

Program: B.A./B.Sc.	Class: II Year.	Session : 2023-24

Paper-III Practical Geography (UGeo-0203)

Course Learning Outcome (CLO)	After the completion of course, the students will have ability to: 1. Understand the map design and map layout through various Cartographic symbols and techniques. 2. Understand the Meaning, concept, classification and importance of map projections. 3. To get a knowledge of Weather Maps and the use of Meteorological instrument. 4. To get knowledge about Prismatic Compass Survey and Whole Circle Bearing and Reduced Bearing. 5. Students are understood about how to represent of geographical data with different types of cartographic technique and Statistical Methods through practical workbook.

Content of the Course

Unit	Topic
Section A: Map Interpretation, Projections And Statistical Methods	**MM- 25**
1.	Principle of map design, elements of maps layout, Types of cartographic symbol: point, line, area and their application. Maps: definition and their application- Dot Map, Sphere map, Choropleth Map, chorochromatic and Isopleth Map.
2.	Map Projections: Meaning, Definition, classification and importance; Cylindrical: Equidistance, Equal area and Mercator projection.
3.	Conical: One standard and two standard parallel, Polar Zenithal: Orthographic, Stereographic, Gnomonic Projection.
4.	Statistical Methods: Quartile: Mean Deviation, Standard Deviation and Quartile, Deviation; Relative Variability and Co-efficient of Variation.
Section B: Surveying	**MM- 15**
5.	Surveying: Prismatic Compass Survey, Whole Circle Bearing and Reduced Bearing, correction of bearing. Open traverse and close traverse.
Section C Practical Record And Viva Voce	**M.M- 10**

Learning Resources: Text Books, Reference Books, Other Resources

Suggested Readings:

1. Davis, R.E. and Foote, F.S. (1953): Surveying, 4th edition, McGraw Hill Publication, New York
2. Monkhouse, F. J. and Wilkinson, F.J. (1985): Maps and Diagrams. Methuen, London
3. Natrajan, V. (1976): Advanced Surveying, B.I. Publications., Mumbai
4. Raisz, E. (1962): General Cartography. John Wiley and Sons, New York. 5th edition.
5. Sarkar, A. K. (1997): Practical Geography: A Systematic Approach. Orient Longman, Kolkata.
6. Singh, R.L. and Singh, Rana P.B. (1993): Elements of Practical Geography. (Singh, L.R. (2006): Fundamentals of Practical Geography, Sharda Pustak Bhawan, Allahabad.
7. Venkatramaiah, C. (1997): A Text Book of Surveying, Universities Press, Hyderabad.
8. वर्मा,जे.पी. (2001) : प्रायोगिक भूगोल, रस्तोगी पब्लिकेषन, मेटूरं
9. मिश्रा, आर.एन.एवं पी.के.वर्मा (2019) : प्रायोगिक भूगोल, रावत पब्लिकेषन्स, जयपुरं
10. तिवारी,आर.सी.एवं सुधाकर त्रिपाठी (2009) : अभिनव प्रायोगात्मक भूगोल, प्रयाग पुस्तक भवनं
11. मॉक हाऊस तथा विल्किन्सन (अनुवाद प्रो. प्रेमचन्द्र अग्रवाल) : मानचित्र तथा आरेख, मध्यप्रदेष हिंदी इलाहबाद ग्रंथ अकादमी भोपालं

Suggested equivalent online course:1. epgp.inflibnet.ac.in 2. virtual lectures available on you tube

SYLLABUS
OF
B.A./B.Sc. ANTHROPOLOGY Part-II

(ANNUAL PROGRAMME)
2023

Approved by Central Board of Studies in Anthropology

(Dated : 22.02.2023)

Preamble

The learning outcomes-based curriculum framework for a B.Sc. degree in Anthropology aimsfor a comprehensive and an integrated framework for understanding of human beings and humanities and its adaptabilities across time and space dimensions. It deals with all kinds of communities including tribal, rural as well as urban societies. The curriculum is a broad framework which exposes the students to this diversity and to help them understand the challenges, best practices as well as biological and cultural adaptive features of communities that have evolved in the process of adaptations and acclimatization.

Anthropology as a discipline is oriented towards a holistic and relativistic understanding of humanity from both biology and cultural perspectives on one hand and from distant past to the present and also future possibilities. As a discipline, it is divided into three sub-branches viz., biological anthropology, social/cultural anthropology and pre-historical archaeology, which aims to study the three facets of human beings i.e. biological, cultural and pre- historical. Thus it brings together perceptive drawn from natural sciences, social sciences and the humanities. As Eric Wolf puts it, "anthropology is the most scientific of humanities and the most humane of the sciences.

A Bachelors of Science (Honors) Program in anthropology covers all the three branches of anthropology as mentioned above as well as study of courses which draws in perspectives from other allied subjects. The courses in economic environmental, molecular, medical,genetics and development anthropologies draws in the perspectives of these disciplines to the understanding of anthropological issues and problems. The curriculum is designed to expose the students to deal with real life empirical problems through case studies as well as first handunderstanding through fieldwork.

Graduate Attributes in Subject

Some of the characteristic attributes of a graduate in anthropology may include the following Disciplinary knowledge and skills: ability to understand key concepts used in the study of a society, culture and various biological aspects of human beings ; understanding of various theories of society, culture, evolution, genetics and prehistoric archaeology. The students will also have some understandings of other related areas of interdisciplinary studies like social and life sciences, environmental studies and humanities.

Communication Skills : To develop ability to communicate and express their ideas clearly and cogently both verbally as well in writing.

Critical thinking : To develop ability to think critically and understand the pros as well as criticisms relating to the key ideas and theoretical debates in anthropology. To be able to argues logically and support ones view point citing relevant data.

Problem solving : Capacity to apply the knowledge one has learned to solve problems of real life situations.

Analytical reasoning : The skill to shrift through mass of data and to identify what is relevant data relating to the problem under study; ability to judge others arguments and point out the logical flaws and contradictions if any.

Research-related skills : Ability to formulate a problem, and undertake a systematic and scientific

enquiry about it, which include the skill to generate hypotheses, prepare relevant questionnaire and schedules and apply them; ability to interpret the date, find out the relevant cause and effect relationship and based on finding draw the logical conclusions from the data Cooperation/Team work: Ability to work in a team and show the ability to cooperate with others, divide the work and work cohesively as a unit .

Cultural Relativism : Ability to appreciate the cultural backgrounds of others and appreciate the differences and put at back ones ethno-centricism and biases.

Scientific Temperament : The candidate must develop a scientific temperament and be sufficiently interested and inquisitive in things happening around them. They should have the ability to observe systematically, raise questions and search for answers.

B.A./B.Sc. in Anthropology
Scheme of Examination
2023

Class	Paper	Course Title	Course Code	Credit Value	Maximum Marks	Passing Marks
1st Year	I	Introduction to Biological Anthropology	ANTH-01T	04	50	17
	II	Introduction to Social-Cultural Anthropology	ANTH-02T	04	50	17
	III	Practical in Human Anatomy and Anthropometry	ANTH-01P	02	50	17
2nd Year	I	Archaeological Anthropology	ANTH-03T	04	50	17
	II	Tribal Culture of India	ANTH-04T	04	50	17
	III	Practical in Material Culture	ANTH-02P	02	50	17
3rd Year	I	Applied Biological Anthropology	ANTH-05T	04	50	17
	II	Theories and Methods in Social-Cultural Anthropology	ANTH-06T	04	50	17
	III	Practical in Applied Biological Anthropology	ANTH-03P	02	50	17
Total				**30**	**450**	

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

Syllabus for B.A./ B.Sc. Course, 2023-26
Subject: Statistics Paper-II

	Title of the paper	MAX. Marks
B.A./B.Sc. I	**Paper-I:** प्रायिकता सिद्धांत Probability Theory	50
	Paper-II: वर्णनात्मक सांख्यिकी Descriptive Statistics	50
	Paper III: प्रयोगात्मक (प्रश्नपत्र I तथा II पर आधारित) Practical (Based on papers I and II)	50
	Total	**150**
B.A./B.Sc. II	**Paper-I:** संख्यिकीय पद्धतियाँ Statistical Methods	50
	Paper-II: प्रतिचयन सिद्धांत और प्रयोगों की अभिकल्पना Sampling Theory and Design of Experiments	50
	Paper III: प्रयोगात्मक (प्रश्नपत्र I तथा II पर आधारित) Practical (Based on papers I and II)	50
	Total	**150**
B.A./B.Sc. III	**Paper I:** अनुप्रयुक्त सांख्यिकी Applied Statistics	50
	Paper II: सांख्यिकीय गुणवत्ता नियंत्रण और अभिकलनी तकनीक Statistical Quality Control and Computational Techniques	50
	Paper III: प्रयोगात्मक (प्रश्नपत्र I तथा II पर आधारित) Practical (Based on papers I and II)	50
	Total	**150**

22/2/2023
(Chairman)
Central Board of Studies
in Statistics

PROFESSOR & HEAD
School of Studies in Statistics
Pt. Ravishankar Shukla University
RAIPUR (C.G.)

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

उददेश्य :– यह पाठ्यक्रम आकडों के सारांश और विश्लेषण मे उपयोग की जाने वाली विभिन्न तकनीकों के साथ छात्रों के लिये उपयोगी है। कोर्स सैद्धान्तिक और व्यवहारिक दोनों 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

वंटन से प्रतिचयन :– यादृच्छिक प्रतिदर्श की परिभाषा, मानक वंटनों (द्विपद,प्वॉसों और प्रसामान्य) का यादृच्छिक प्रतिचयन, यादृच्छिक चरों के फलन के वंटन की अवधारणा, सांख्यिकीय अवधारणा और इसका प्रतिचय वंटन, प्राचल का विंदु 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 वंटन के माध्य के योग का प्रतिचयन वंटन, प्रसामान्य वंटन 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 वंटन के एक माध्य तथा प्रसरण का परीक्षण, एकल प्रसामान्य वंटन मे प्राप्त द्विमाध्य एवं प्रसरण के समानता का परीक्षण,संबंधित विश्वसनीयता अंतराल, द्विचर प्रसामान्य वंटन से प्राप्त प्रतिदर्श सहसंवंध के सार्थकता की जॉच एवं द्विचर प्रसामान्य वंटन 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

वृहद 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 वंटनों 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

अप्राचालिक परीक्षण : कोटि सांख्यिकी की परिभाषा एवं उनका वंटन, अप्राचालिक परीक्षण, एकल तथा द्वि वंटनो के लिये ज्या परीक्षण, विलकॉक्सन परीक्षण, मैन व्हिटिनी परीक्षण, रण परीक्षण, माध्यिका परीक्षण तथा स्पीयरमैन कोटि सहसंवंध 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 विधियॉ, 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 अनुपात के लिए वृहद प्रतिदर्श परीक्षण, आकस्मिकता सारिणी में गुडनेस आफ फिट और वर्गों 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।

Nonparametric tests: Sign, Run, Median, Wilcoxon, Mann-Whitney tests.

5. प्रतिदर्श का चयन और प्रतिदर्श के आकार का निर्धारण । सामान्य यादृच्छिक प्रतिचयन, स्तरीकृत और व्यवस्थित प्रतिचयन स्तरीकृत प्रतिचयन मे प्रतिदर्शो के वंटन की समस्या। आकलन के अनुपातीक और समाश्रयण विधियॉ।

Selection of samples and determination of sample size. Simple random sampling, Stratified and systematic sampling. Allocation problem in stratified sampling. Ratio and regression methods of estimation.

6. एक आयामी और द्वि–आयामी वर्गीकरणों के लिए, प्रसरण का विश्लेषण। पूर्ण यादृच्छिक अभिकल्पना, यादृच्छिक ब्लॉक अभिकल्पना और, लैटिन वर्ग अभिकल्पनाओं का विश्लेषण 2^2 और 2^3 प्रयोगों का विश्लेषण।

Analysis of variance for one way and two way classifications. Analysis of CRD, RBD and LSD. Analysis of 2^2 and 2^3 experiments.

B.A. /B.Sc. III Year
Subject: Statistics

Paper I
अनुप्रयुक्त सांख्यिकी
Applied Statistics

उद्देश्य: छात्र प्राप्त करेगें
(अ) विभिन्न विधियों द्वारा सूचकांक संख्या की गणना ।
(ब) समय श्रृंखला आंकड़े, अनेक क्षेत्रों मे इनके अनुप्रयोग और इनके अवयव
(स) अनेक वृद्धि वक्रों का आसंजन और आरेखन
(द) अनेक विधियों द्वारा रूझान और मौसमी अवयवों का असंजन ।
(य) चरों के अवयव विधि द्वारा यदृच्छिक अवयव के प्रसरण की गणना ।
(र) वास्तविक जीवन अवस्था का आय वंटन और इनके आसंजन।

Outcome: the students will know about
(a) Computation of Index Numbers by various methods.
(b) time series data, its applications to various fields and components of time series,
(c) fitting and plotting of various growth curves.
(d) fitting of trend and seasonal component by various methods.
(e) calculation of variance of random component by variate component method
(f) income distributions and their fitting in real life situations.

Unit I

भारतीय अनुप्रयुक्त सांख्यिकी प्रणाली : भारत मे वर्तमान अधिकारिक सांख्यिकीय प्रणाली, अधिकारीक सांख्यिकी के आंकडों के संग्रहण की विधियॉ, उनके विश्वासनियता और सीमायें, और प्रमुख प्रकाशनों और संचार , बैंकिंग और वित्त जैसे विषयों पर ऐसे आकंडे है।

Scheme of B. Sc./ B.Sc. (Hons.) Microbiology

Year	Course Code	Subject Name	Theory/ Practical/Project	Total Credit	Total Marks	
					Max	Min
First year	MICRO -1T	Microbial World and Microbial Techniques	Theory	4	50	17
	MICRO -2T	Bacteriology, Virology & Proto-zoology	Theory	4	50	17
	MICRO -1P	LAB 1: BASIC MICROBIOLOGY	Practical	2	50	17
Second year	MICRO -3T	Cell Biology, Biochemistry and Bioinstrumentation	Theory	4	50	17
	MICRO -4T	Microbial Genetics, Molecular Biology & Genetic Engineering	Theory	4	50	17
	MICRO -2P	LAB 2: Bacterial cell, Biochemistry & Molecular Biology	Practical	2	50	17
Third year	MICRO -5T	Environmental, Agriculture, Industrial Microbiology & Biostatistics	Theory	4	50	17
	MICRO -6T	Immunology and Medical Microbiology	Theory	4	50	17
	MICRO -3P	LAB 3: Applied Microbiology	Practical	2	50	17
			Total (I+II+III years)	**30**	**450**	--

Note: There shall be four extra credits in each year for internship/apprenticeship. The certificate of extra credits for this would be provided by the concern University and is not mandatory.

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 Hours
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
Jaspur

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

Dr. DK Srivastava
Member
HOD Microbiology
GovERR PG Sc.
College, Bilaspur

Dr. Radhana 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.)

Ds. Sweetlana Nagpal
HOD Microbiology,
Govt. M.K.G.C
Mahasamund.

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 Beloska
Subject Expert-
MBBT, ABVV
Bilaspur.

Prof. DSVGK Kaladhar
CBoS chairperson
Head Microbiology & Biotech
UTD, ABVV, Bilaspur

Part - A: Introduction

Program: *Diploma Course*	Class: **B. Sc. Part - II**	Year:**2023**	Session:2023-2[illegible]

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 / Hrs.
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:		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. 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.)

Dr. Rashmi Parihar
member, Subject expert
Dept. of microbiology
govt. E.R.R. PG. Sc. college
Bilaspur (C.G.)

Dr. Seema A. Belorkar
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
APSGMNS Govt. P.G.
College Kawardha

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

Prof D.V. Kalikar
Chos. chairperson
Head, Microbiology & Biotech,
CMD ASVV, Bhopal

Part A: Introduction

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

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/Hour
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. D.K. Shrivastava
Member
HOD Microbiology
Govt ERR 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. Pathy
Govt. T.C.L
P.G. College
Jaijaipur

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

P.S. Deshmukh
CBOS chairperson
Head Microbiology
UTD ABVV, Bilaspur

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

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

Part A: Introduction

Program: *Advance Diploma*	Class: **B. Sc. Part - III**	Year: **2024**	Session: 2024-2[illegible]

1	Course Code	**MICRO -5T**
2	Course Title	**Environmental, Agriculture, Industrial Microbiology and Biostatistics**
3	Course Type	**Core 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 • ***- describe and comprehend basic concepts of Environmental and Agriculture Microbiology*** • ***- develop critical thinking and understanding of Environmental and Agriculture Microbiology, which will also contribute to conservation and life improvement skills.*** • ***- learn about Microbial Interaction, Soil Microbes, Air and Water micro-flora and their impact on human life and Environment.*** • ***- impart commercial exploitation of microbial world to improve quality of life.*** • ***- enrich students with Systematic evaluation, presentation and interpretation of data collected and prove and process the given information***
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 [illegible]
I	**Air and water Microbiology:** Layers of Atmosphere and distribution of Microorganisms. Droplet nuclei and fomite infection. Methods of assessment of air quality. Aero allergy. Hydrological cycle, water zonation (fresh water and marine), Upwelling, Eutrophication, Hydrothermal vent and its microbial biodiversity, coral reef and its microbial biodiversity. Potability of water and its purification. Waste water reclamation.	12 / 08
II	**Microbial Interaction:** Microbe-Microbe interaction, Plant-Microbe interaction (Rhizosphere, Rhizoplane, Phyllosphere, Mycorrhiza), Animal-Microbe (Rumen Microbiology). Extremophiles. Xenobiotic compounds, Biodeterioration and Biomagnification.	12 / 08
III	**Soil and Agriculture Microbiology:** Soil profile, Litter degradation and Humus formation, Biogeochemical cycle- Nitrogen Cycle with special reference to microbial contribution (ammonifiers, symbiotic and non- symbiotic N- fixation, nitrifiers and denitrifiers) Nodulation and mechanism of biological nitrogen fixation. Phosphorous cycle and Phosphate Solubilizing Microorganisms, Sulphur cycle. Siderophores.	12 / 08

IV	**Industrial Microbiology:** History of Industrial Microbiology, Fermenter design and Principal Types of Fermenters, Production Media and Raw Material, Scale up, Industrial Sterilization. Isolation, Screening and Strain Improvement. Types of fermentation processes-Solid State, Liquid State, Batch, fed-batch and continuous fermentation. Industrial Production of Citric Acid, Ethanol, Amylases, Penicillin, Mushroom Production, Single Cell Protein	12 / 08
V	**Biostatistics:** Collection, Classification, and presentation of data. Sampling, **Measures of central tendency:** Mean, Median, Mode. **Measures of dispersion:** Standard deviation and Standard Error. Concept of Probability	12 / 08
Keywords	***Air microbiology, Water microbiology, Industrial microbiology, Biometary***	

PART – C

Learning Resources: Text Books, Reference Books and Others

Suggested Readings:

Text Books Recommended -

1. Willey JM, Sherwood LM, and Woolverton CJ. (2013) Prescott, Harley and Klein's Microbiology. 9th edition. McGraw Hill Higher Education.
2. Madigan MT, Martinko JM, Dunlap PV and Clark DP. (2014). Brock Biology of Microorganisms. 14th edition. Pearson International Edition.
3. Madigan MT, Martinko JM and Parker J. (2014).Brock Biology of Microorganisms. 14th edition. Pearson Benjamin Cummings.
4. Maier RM, Pepper IL and Gerba CP. (2009). Environmental Microbiology. 2nd edition, Academic Press.
5. Crueger W and Crueger A. (2000). Biotechnology: A textbook of Industrial Microbiology. 2nd edition. Panima Publishing Company, New Delhi.
6. Patel AH. (1996). Industrial Microbiology. 1st edition. MacMillan India Limited Publishing Company Ltd. New Delhi, India.
7. Gregory P.H. Microbiology of the atmosphere. 2nd edition. Leonard Hill.
8. Agricultural Microbiology by Bhagyaraj and Rangaswami
9. Biostatistics by Veerbala Rastogi Kalyani Publication
10. Statistical Methods by S.P Gupta
11. Biostatistics by Sunder Rao.

Online Resources –

https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SMB2203.pdf
https://microbenotes.com/microbial-interaction-and-its-types-with-examples/
https://microbenotes.com/category/agricultural-microbiology/
https://sites.google.com/site/soilagrlmicrobiol/
https://bookarchive.net/pdf/industrial-microbiology-by-l-e-casida-jr/
https://www.researchgate.net/publication/280733465_A_TEXT_BOOK_OF_BIOSTATISTICS

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. Richa Mishra
Member
HoD Microbiology
APSCMNS Govt-PG.
College Kawardha
(C.G.)

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

Dr. D.K. Srivastava
HoD Microbiology
GAERR PG Sc College
Bilaspur

JNAGAR
Dr. Swetlana Nagar
HOD Microbiology
Govt. MKSC Mahasamund

Dr. Seema Anil Belorkar
Subject Expert,
MBBS, ABVV, Bilaspur

Rashmi
Dr. Rashmi Parihar
subject expert
Govt. E.R.R.P.G. Science
College, Bilaspur

Dr. K.K. Roy
Member
Govt T.C.L P.G college
Jaijpur

Sadhana
Dr. Sadhana Jaiswal
HoD - Microbiology
Govt. N.P.G. college of Science
Raipur

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

Prof DSVGK Reddy
CBoS Chairperson
Head, Microbiology Bilaspur
UTD ABVV Bilaspur