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

(आधार पाठ्यक्रम)

प्रथम प्रश्नपत्र

हिंदी भाषा

कोड....

पूर्णांक 75

क्रेडिट 05

पाठ्यक्रम का उद्देश्य:-

1. हिंदी साहित्य की मूल संवेदना से सामान्य रूप से परिचित कराना ।
2. भारत की सामाजिक, आर्थिक एवं पर्यावरण संबंधी समग्र राष्ट्रीय विकास की रणनीति के विषय में सामान्य जानकारी प्रदान करना।
3. हिंदी में अभिव्यक्ति की पद्धतियों से अवगत कराना एवं उनके संप्रेषण कौशल में वृद्धि करना।
4. कामकाजी भाषा का सम्यक ज्ञान प्रदान करना।

23/2/23

23/2/23

23/2/23

इकाई 1 (क) भारत माता : सुमित्रानंदन पंत शहर से सोचता हूँ : विनोद कुमार शुक्ल (ख) कथन की शैलियाँ: 1. विवरणात्मक शैली 2. मूल्यांकनपरक शैली 3. व्याख्यात्मक शैली 4. विचारात्मक शैली	अंक 15 18 कालखंड
इकाई 2(क)सूखी डाली : उपेंद्रनाथ अश्क अपोलो का रथ : श्रीकांत वर्मा (ख) विभिन्न संरचनाएँ 1. विनम्रता सूचक संरचना 2. विधिसूचक संरचना 3. निषेधपरक संरचना 4. कालबोधक संरचना 5. स्थान बोधक संरचना 6. दिशाबोधक संरचना 7. कार्य-कारण संबंध संरचना 8. अनुक्रम संरचना	अंक 15 18 कालखंड
इकाई 3 (क) रहीम चाचा: शानी निमित्त : भीष्म साहनी (ख) कार्यालयीन पत्र 1. परिपत्र 2. आदेश 3. अधिसूचना 4. ज्ञापन 5. अनुस्मारक 6. पृष्ठांकन	अंक 15 18 कालखंड
इकाई 4(क) आज भी खरे हैं तालाब (आज भी खरे हैं तालाब काअध्याय) : अनुपम मिश्र एक गाँव में विश्व पर्यावरण वर्ग (धरती की पुकार का अध्याय) : सुंदरलाल बहुगुणा (ख) समसामयिक विषयों पर एक निबंध (शब्द सीमा 250)	अंक 15 18 कालखंड
इकाई 5 (क)संस्कृतिऔरराष्ट्रीयएकीकरण : योगेश अटल शक्तिमानता का अर्थशास्त्र :ओंकारशरणश्रीवास्तव	अंक 15 18 कालखंड

23/1/23 23.2.2023

(ख) घटनाओं, समारोहोंका प्रतिवेदन, विभिन्न प्रकार के निमंत्रण पत्र	

मूल्यांकन योजना:-

प्रत्येक इकाई से एक-एक प्रश्न पूछे जाएंगे। एक प्रश्न के 15 अंक होंगे। प्रत्येक प्रश्न में आंतरिक विकल्प होगा। प्रत्येक प्रश्न के दो भाग 'क' और 'ख' होंगे एवं अंक क्रमश:08 एवं 07 होंगे। प्रश्नपत्र का पूर्णांक75 निर्धारित है।प्रश्नपत्रकेपूर्णांककादसप्रतिशतअंकआंतरिकमूल्यांकनकेलिएनिर्धारितहै।

पाठ्यक्रम के संभावित परिणाम:-

1. हिंदी साहित्य से सामान्य परिचय हो सकेगा ।
2. हिंदी में अभिव्यक्ति की पद्धतियों से परिचय होगा एवं उनके संप्रेषण कौशल में वृद्धि हो सकेगी।
3. कामकाजी भाषा लेखन का कौशल विकसित हो सकेगा ।
4. भारतीय संस्कृति के समन्वयात्मक स्वभाव के प्रति विश्वास जागृत हो सकेगा।

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 English Language was held for the formulation of Syllabus at School of Studies Literature and Languages, Pt. RSU, Raipur from 11am onwards.

Minutes of the Meeting -

1) The meeting was presided by Prof . G. A. Ghanshyam, o.S.D. Higher Education,Govt. C.G., who alongwith The Chairperson and other members of Central Board of Studies for Foundation Course English Language finalised the Textbooks to be implemented for 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. 2/6/23

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 – 2.6.2023

2/6/23

(P C 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 the works of Indian authors & poets.
- To get exposure of the usage of grammar according to contemporary times.
- To have an exposure about the literary genre with the help of the authors & poets across the globe.
- To develop an appreciation for English Language & Communication Skills.

21/6/23
(PC Choudhary)

(Dr. Sushama Mishra)

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

21/6/23

BA/B.Sc./B.Com/B.Sc. Home.Sc. (Part-III)
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 Writing Skills Writing a Film Review Book Review Editorial Writing Story Wrtiting	1x10=10	18	01
Unit -III Reading Comprehension (a) Unseen Passage (MCQ -based) (b) Vocabulary (Text-based)	1x5=05 1xl0=10	09	0.5
Unit -IV CV Writing: Chronological CV & Functional CV Precis Writing	1x10=10	09	01
Unit-V Grammar • Reporled speech • Punctuation . • Simple, Compound & Complex Sentences • Clause Analysis: Co-ordinate Clauses & Subordinate Clauses • Translation from English to Hindi(5 sentences only)	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.			

Dr. Sushama Thakur

2/6/23
P C Choudhary

Minutes of Meeting

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

Minutes of the Meeting -

23/2/2023

1) The meeting was presided by Prof. P C Choudhury, Chairman Central Board of Studies in English Literature.
2) Syllabus for annual pattern has been separated from Semester pattern and syllabus for Foundation course English has been prepared which is to be included either in Semester I.
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. 23.2.2023
3. Dr. Merily Roy, HoD English, Indira Govt P.G. College, Vaishali Nagar, Durg. 23.2.23
4. Dr. Rakesh Tiwari, HOD, Govt. Mahatma Gandhi P.G. College Kharsia. 23/2/23
5. Prof. Sunil Sahu, HoD, Govt. I. K. Girls College, Kanker.
6. Dr. Sushama Mishra, HoD, Govt. Pt. Shyamacharan Shukla College, Dharsiwa. 23.2.2023

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.

Part A :Introduction				
Program: **Degree Course**		Class: **B.Sc.**	Year: **Third Year**	Session: **2024-25**
1	Course Code	**PHY- 5T**		
2	Course Title	Digital, Analogue Circuits and Instrumentation		
3	Course Type	Theory		
4	Pre-requisite (if any)	Passed B.Sc. II		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Understand the basic principles and industrial applications of semiconductor diode, Zener diode and transistor • Understand the construction working and applications of transistor • Gain the knowledge of analogue and digital circuits • Understand the construction and working principles of various instruments that are used in the physics laboratory • Develop interest in electronic components		
6	Credit Value	Theory :4		
7	Total Marks	**Max. Marks: 50**	**Min. Passing Marks: 17**	

Part B: Content of the Course		
Total No. of Lectures: 60		
Unit	**Topics**	**No. of Lectures**
1	Semiconductor Devices and Amplifiers: Semiconductor Diodes: p and n type semiconductors. Barrier Formation in PN Junction Diode. Qualitative Idea of Current Flow Mechanism in Forward and Reverse Biased Diode, PN junction and its characteristics, Principle and structure of (1) LEDs (2) Photodiode (3) Solar Cell.	12
2	Power Supply: Half-wave Rectifier, Central-tapped and Bridge Full-wave Rectifiers, Calculation of Ripple Factor and Rectification Efficiency, Basic idea about capacitor filter, L-section filter and π-section filter, Zener diode as voltage regulator. Bipolar Junction transistors: n-p-n and p-n-p Transistors. Characteristics of CB, CE and CC Configurations. Active, Cutoff, and Saturation Regions. Current gains α, β and γ. Relations between α, β and γ. Load Line analysis of Transistors. DC Load line and Q-point. Classification of Amplifiers: Class A, B, and C	12
3	Voltage Divider Bias Circuit for CE Amplifier. h-parameter Equivalent Circuit. Analysis of a single-stage CE amplifier using Hybrid Model. Input and Output impedance. Current, Voltage and Power Gains. Operational Amplifiers (Black Box approach): Characteristics of an Ideal and Practical Op-Amp (IC 741), Open-loop & Closed-loop Gain. CMRR, concept of Virtual ground. Applications of Op-Amps: (1) Inverting and Non-inverting Amplifiers (2) Adder (3) Subtractor (4) Differentiator (5) Integrator, (6) Zero Crossing Detector.	12
4	Sinusoidal Oscillator: Barkhausen's criterion for Self-sustained oscillations, Determination frequency of RC oscillator. Wein Bridge Oscillator, Hartley oscillator and Phase shift oscillator Introduction to CRO: Block diagram, construction and working of CRO, Applications of CRO in (i) study of waveform (ii) measurement of voltage, current , frequency and phase difference,	12
5	Digital Circuits Difference between Analog and Digital Circuits. Binary Numbers. Decimal to Binary and Binary to Decimal Conversion, AND, OR and NOT Gates (Realization using Diodes and Transistor). NAND and NOR Gates as Universal Gates. XOR and XNOR Gates. De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean Algebra. Fundamental Products. Minterms and Maxterms. Conversion of a Truth Table into an Equivalent Logic Circuit by (1) Sum of Products Method and (2) Karnaugh Map. Binary Addition. Binary Subtraction using 2's Complement Method).Half Adders and Full Adders and Subtractors, 4-bit binary Adder-Subtractor.	12

Part C: Learning Resources
Text Books, Reference Books, Other Resources
Suggested Readings: • Integrated Electronics, J. Millman and C.C. Halkias, 1991, Tata Mc-Graw Hill. • Electronic devices and circuits, S. Salivahanan and N. Suresh Kumar, 2012, Tata Mc-Graw Hill. • Microelectronic Circuits, M.H. Rashid, 2nd Edn.,2011, Cengage Learning. • Modern Electronic Instrumentation & Measurement Tech., Helfrick&Cooper,1990, PHI Learning • Digital Principles & Applications, A.P. Malvino, D.P. Leach & Saha, 7th Ed.,2011, Tata McGraw Hill • Microelectronic circuits, A.S. Sedra, K.C. Smith, A.N. Chandorkar, 2014, 6th Edn., Oxford University Press. • Fundamentals of Digital Circuits, A. Anand Kumar, 2nd Edition, 2009, PHI Learning Pvt. Ltd. • OP-AMP and Linear Digital Circuits, R.A. Gayakwad, 2000, PHI Learning Pvt. Ltd. • **e-resources:** 1. https://www.quora.com 2. https://www.allaboutcircuit.com 3. https://www.wileyindia.com 4. https://www.instrumentationtools.com 5. https://www.ibiblio.com 6. https://www.easyengineering.net 7. https://www.elsevier.com

Part D: Assessment and Evaluation
Suggested Continuous Evaluation Method: Maximum Marks: 50 Continuous Comprehensive Evaluation(CCE): Not Applicable University Exam. (UE): 50 Marks
Internal Assessment: Max. Marks: 10 Class Test/Assignment/Presentation (Proposed)

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 8-6-22

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

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

Part A :Introduction				
Program: **Degree Course**		Class: **B.Sc. III year**	Year: **2024** Third Year	Session: **2024-25**
1	Course Code	**PHY- 6T**		
2	Course Title	ELEMENTS OF MODERN PHYSICS		
3	Course Type	Theory		
4	Pre-requisite (if any)	B.Sc. II		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Gain of advanced theoretical and experimental method including the use of numerical method • Understand the basic postulates of quantum mechanics • Gain knowledge about physical quantities as operators • Understand the Schrodinger equation and its applications • Gain knowledge about structure of nucleus, nuclear fission and fusion and be familiar of nuclear energy		
6	Credit Value	Theory :4		
7	Total Marks	**Max. Marks: 50**	**Min. Passing Marks: 17**	

Part B: Content of the Course		
Total No. of Lectures: 60		
Unit	**Topics**	**No. of Lectures**
1	Planck's quantum theory, Planck's constant and light as a collection of photons; Photo-electric effect and Compton scattering. De Broglie wavelength and matter waves; Davisson Germer experiment. Problems with Rutherford model- instability of atoms and observation of discrete atomic spectra; Bohr's quantization rule and atomic stability; calculation of energy levels for hydrogen like atoms and their spectra.	12
2	Position measurement- gamma ray microscope thought experiment; Wave-particle duality, Heisenberg uncertainty principle- impossibility of a particle following a trajectory; Estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle, Two slit interference experiment with photons, atoms and particles; linear superposition principle as a consequence	12
3	Matter waves and wave function; probabilistic interpretation of wave function, Probability and probability current densities in one dimension. Normalization of wave function, Expectation value of dynamical variables, Operators: Position, Momentum and Energy operators; stationary states; probabilities and normalization; Schrodinger equation for non-relativistic particles;	12
4	One dimensional infinitely rigid box- energy eigenvalues and eigen function, Quantum dot; Quantum mechanical scattering and tunneling in one dimension - across a step potential and across a rectangular potential barrier. Schrodinger equation in spherical polar co-ordinates, spherical symmetric potential, energy states of hydrogen using Schrodinger equation	12
5	Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle. Nature of nuclear force, NZ graph, semi-empirical mass formula and binding energy. Radioactivity: stability of nucleus; Law of radioactive decay; Mean life & half-life; α- decay; β-decay, energy released, spectrum and Pauli's prediction of neutrino; γ-ray emission. Fission and fusion - mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Nuclear reactor: slow neutrons interacting with Uranium 235; Fusion and thermonuclear reactions.	12

Part C: Learning Resources
Text Books, Reference Books, Other Resources
Suggested Readings: • Concepts of Modern Physics, Arthur Beiser, 2009, McGraw-Hill • Modern Physics, John R. Taylor, Chris D. Zafiratos, Michael A.Dubson,2009, PHI Learning • Six Ideas that Shaped Physics: Particle Behave like Waves, Thomas A. Moore, 2003, McGraw Hill • Quantum Physics, Berkeley Physics Course Vol.4. E.H. Wichman, 2008, Tata McGraw-Hill Co. • Modern Physics, R.A. Serway, C.J. Moses, and C.A.Moyer, 2005, Cengage Learning • Modern Physics, G. Kaur and G.R. Pickrell, 2014, McGraw Hill • e-Resources: 1. https://link.springer.com 2. https://web.pdx.edu 3. https://yooktal.in 4. https://www.bookfobia.com.av 5. https://www.nhbs.com

Part D: Assessment and Evaluation
Suggested Continuous Evaluation Method: Maximum Marks: 50 Continuous Comprehensive Evaluation(CCE): Not Applicable University Exam. (UE): 50 Marks
Internal Assessment: Max. Marks: 10 Class Test/Assignment/Presentation (Proposed)

DECLARATION

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

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

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

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

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

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

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

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

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

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

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

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

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

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

14/ Dr. Ugendra Kumar Kurrey, Govt.C.L.C Arts & Science College, Patan, Durg, - Member 8/6/22

15/ Dr.Dipti Jha , Dr. Radhabai Govt. Navin Kanya Mahavidyalya, Raipur, - Member 8/6/22

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

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

Part A :Introduction				
Program: **Degree Course**		Class: **B.Sc. III year**	Year: **2024** Third Year	Session: **2024-25**
1	Course Code	**PHY- 3 P**		
2	Course Title	LAB 3		
3	Course Type	Practical		
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 working of semiconductor diode, LED, transistor, and their characteristics • Understand the working of rectifier, filter, regulator etc. • Understand the function of Zener diode as voltage regulator • Gain knowledge about amplifier and logic gates,		
6	Credit Value	Practical : 2		
7	Total Marks	**Max. Marks: 50**	**Min. Passing Marks: 17**	

Part B: Content of the Course
Total No. of Lectures: 60
Experiments
At least 12 experiments from the following or other experiments of equal standards 1. To study IV characteristics of p n junction diode, Zener diode and LED 2. To study the characteristics of p n p and n p n transistor in CE configuration 3. To study the characteristics of p n p and n p n transistor in CB configuration 4. To study regulated power supply and determination of ripple factor and voltage regulation factor 5. To draw and study the frequency response curve of two stage RC coupled amplifier 6. To design and study the CE amplifier of a given gain using voltage divider biasing circuit 7. To measure voltage and frequency of a periodic waveform using a CRO 8. To design and study Wein Bridge Oscillator 9. To design and verify the truth table of AND, OR, NOT AND XOR gates 10. To determine Boltzmann constant using I-V characteristics of p n diode 11. To determine function of material of filament of directly heated vacuum diode valve 12. To determine Planck's constant using LEDs of at least four different colors 13. To determine ionization potential of mercury 14. To measure the susceptibility of paramagnetic solution (Quinke's method) 15. To draw the B-H curve of iron using a solenoid and determine the energy loss from hysteresis 16. To measure the resistivity of semiconductor (Ge) crystal with temperature by four probe method and to determine its band gap 17. To determine the Hall coefficient of a semiconductor sample 18. To study the photo electric effect by drawing photo current versus intensity curve and to determine the wavelength of light 19. To study the diffraction pattern of a single and double slit using laser source 20. To study Half adder, Full adder and 4-bit binary adder 21. Study of adder, subtractor using full adder IC 22. To minimize a given logic circuit

Part C: Learning Resources
Text Books, Reference Books, Other Resources

Suggested Readings:

- Basic Electronics- A Text Lab Manual, P.B. Zbar, A.P. Malvino, M. A. Miller, 1994,Tata Mc Graw Hill
- Electronics: Fundamentals and Applications, J. D. Ryder, 2004, Prentice Hall of India
- Electronic Principles, A.P. Malvino,2008, Tata Mc Graw Hill
- Integrated Electronics, J. Millman and C.C. Halkias, 1991, Tata Mc-Graw Hill.
- Electronic devices and circuits, S. Salivahanan and N. Suresh Kumar, 2012, Tata Mc-Graw Hill.
- Microelectronic Circuits, M.H. Rashid, 2ndEdn.,2011, Cengage Learning.
- Modern Electronic Instrumentation & Measurement Tech., Helfrick&Cooper,1990, PHI Learning
- Digital Principles & Applications, A.P. Malvino, D.P. Leach & Saha, 7th Ed.,2011, Tata McGraw Hill
- Microelectronic circuits, A.S. Sedra, K.C. Smith, A.N. Chandorkar, 2014, 6th Edn., Oxford University Press.
- Fundamentals of Digital Circuits, A. Anand Kumar, 2nd Edition, 2009, PHI Learning Pvt. Ltd.
- OP-AMP and Linear Digital Circuits, R.A. Gayakwad, 2000, PHI Learning Pvt. Ltd.
- e-Resources:
  https://link.springer.com
  https://web.pdx.edu
  https://yooktal.in
  https://www.bookfobia.com.av
  https://www.nhbs.com

Part D: Assessment and Evaluation
Suggested Continuous Evaluation Method:
Maximum Marks: 50
Continuous Comprehensive Evaluation(CCE): Not Applicable
University Exam. (UE): 50 Marks

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

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. Lakshmi) (Prof. G.K. Pandey)

(Dr. VENU GOPAL)

Program Specific out come -

Paper I – Study of War and Peace.

Paper II – Modern Warfare.

Understand the key element of International Organisation. To create interests in students to pursue their efforts in UNO.

Acquire knowledge on how significant the role of science and technology is to society and to National security. The paper also provides realization in contemplating on the military-industrial complex of a nation; beside understanding the concept and applications of Electronic warfare, space and ballistic missile Defence in warfare.

Part – A Introduction			
Programme – Degree Course	Class – B.A. /B.Sc. III year	Year -	Session –

Subject – Defence Studies		
1	Course Code	DS3T - 0921
2	Cource Title	**Study of War and Peace**
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. Be familiar with the working of International organization. 2. Get information about the UNO. 3. Will understand the means to establish world peace. 4. Will get information about laws related to warfare.
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. International Organisation – Meaning, classification and legal Functions of the organizations. 2. United Nation Organisation – aims, Purpose, principles and Preamble of Uno. 3. Reforms of U.N. charter. 4. Achievements of the UNO.	12
2	Organs of UNO - 1. General Assembly. 2. Security Council. 3. Economic and Social Council. 4. International Court of justice. 5. Trusteeship Council.	12
3	1. Specilised agencies of United Nation. 2 . Settlement of Disputes. 3. War crime and Genocide.	12
4	1. Collective Security. 2. Regional Security. 3. Neutrality. 4. Disarmament. 5. Balance of Power.	12
5	1. Law of Maritime warfare. 2. Law of Land warfare. 3. Law of Ariel warfare. 4. Law of Outerspace, Moon an d Antartica treaty.	12

Part – C Learning Resources

Text Books, Reference Books and other Resources.			
1.	Maunceclark, J	:	Reading in the Economics of War.
2.	International Security	:	Modern political Science series.
3.	Rajani Kothari	:	World order.
4.	Openhem, I	:	Use of Force by state and International law.
5.	J.N. Chodhary	:	India's problem of national security in 1970
6.	J.N. Chodhary	:	India's land borders problems and challenges
7.	L.J. Kavic	:	Indias quest for securities
8.	S.C. Bajpai	:	Northern frontier of India
9.	S.S. Khera	:	India's defence problem
10.	K.M. Pannikar	:	Problems of India's defence
11.	K. Subhramanyam	:	Defence and development
12.	V.K.R.V. Rao	:	War in Indian economy
13.	V.D. Mahajan	:	International security
14.	J.M. Srivastava	:	Rashtriya Suraksha
15.	Lallan ji Singh	:	Rashtriya raksha ke aayam

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

1	कोर्स कोड	DS3T - 0921
2	कोर्स शीर्षक	युद्ध व शांति का अध्ययन
3	कोर्स का प्रकार	कोर सैद्धांतिक – 1
4	पूर्व आवश्यकता	सभी के लिए
5	पाठ्यकम अध्ययन की परिलब्धियां CLO	इस पाठ्यकम को पूरा करने के बाद छात्र इस स्थिति में होगा कि– 1. अन्तर्राष्ट्रीय संगठन की कार्यप्रणाली से अवगत होगें। 2. संयुक्त राष्ट्र संघ की जानकारी होगी। 3. विश्वशांति स्थापित करनें के उपायों की जानकारी होगी। 4. युद्ध से सम्बन्धीत नियमों की जानकारी प्राप्त होगी।
6	केडिट मूल्य	सैद्धांतिक – 4
7	कुल अंक	अधिकतम अंक – 50

भाग ब : पाठ्यकम 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. अन्तर्राष्ट्रीय संगठन– अर्थ, वर्गीकरण व संगठन का विधिय कार्य 2. संयुक्त राष्ट्र संघ – लक्ष्य, प्रयोजन, सिद्धांत व प्रस्तावना। 3. संयुक्त राष्ट्र संघ के संविधान में संशोधन। 4. संयुक्त राष्ट्र संघ की उपलब्धिया।	12
2	संयुक्त राष्ट्र संघ के अंग – 1. महासभा 2. सुरक्षा परिषद 3. आर्थिक व सामाजिक परिषद 4. अन्तर्राष्ट्रीय न्यायालय 5. न्यासिता परिषद	12
3	1. संयुक्त राष्ट्र संघ के विशिष्ट अभिकरण 2. विवादों का समाधान 3. युद्ध अपराध व जनवध	12
4	1. सामूहिक सुरक्षा 2. क्षेत्रीय सुरक्षा 3. तटस्थता	12

	4. निःशस्त्रीकरण 5. शक्ति संतुलन	
5	1. सामुद्रिक युद्धविधि 2. थलीय युद्धविधि 3. हवाई युद्धविधि 4. बाह् अंतरिक्ष युद्ध नियम व चंद्रमा व अंर्टाटिका संधि	12

भाग – स अनुशंसित अध्ययन संसाधन

पाठ्यपुस्तकें, संदर्भ पुस्तके , अन्य संसाधन			
1.	Maunceclark, J	:	Reading in the Economics of War.
2.	International Security	:	Modern political Science series.
3.	Rajani Kothari	:	World order.
4.	Openhem, I	:	Use of Force by state and International law.
5.	J.N. Chodhary	:	India's problem of national security in 1970
6.	J.N. Chodhary	:	India's land borders problems and challenges
7.	L.J. Kavic	:	Indias quest for securities
8.	S.C. Bajpai	:	Northern frontier of India
9.	S.S. Khera	:	India's defence problem
10.	K.M. Pannikar	:	Problems of India's defence
11.	K. Subhramanyam	:	Defence and development
12.	V.K.R.V. Rao	:	War in Indian economy
13.	V.D. Mahajan	:	International security
14.	J.M. Srivastava	:	Rashtriya Suraksha
15.	Lallan ji Singh	:	Rashtriya raksha ke aayam

Part – A Introduction			
Programme – Degree Course	Class – B.A. /B.Sc. III year	Year -	Session –

Subject – Defence Studies		
1	Course Code	DS3T - 0922
2	Cource Title	**Modern Warfare**
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. Understand the impact of modern weapons on war. 2. Know the effect of Science and Technology on warfare. 3. There will be information about the development related to Modern warfare in India. 4. Will understand Cyber warfare, artificial intelligence, Information technology warfare.
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. Development of Nuclear weapons. 2. Effects of nuclear weapons.. 3. Spread of nuclear weapons. 4. Types of Missile and their characteristics.	12
2	1. Trends of science and technology and their impact on war. 2. Role of research and development in military. 3. Development of weapons and their impact on tactics. 4. Command, control, communication and intelligence (C3I) in Modern warfare.	12
3	1. Military Satellite. 2. Explosive Bomb. 3. Chemical weapons.	12

	4. Biological weapons. 5. Smart weapons.	
4	1. Rocket technology and India. 2. Missile technology and India. 3. Nuclear technology and India. 4. Atomic minerals and India. 5. Space technology and India.	12
5	1. Cyber Security. 2. Artificial Intelligence and future prospects. 3. Information warfare. 4. Nuclear deterrence. 5. Emerging technology and its impact on weapons.	12

Part – C Learning Resources

Text Books, Reference Books and other Resources.			
1.	Halailan Morton	:	Cotemporary Military strategy
2.	Brodue, Y.	:	Strategy in the missile Age.
3.	Markabi, Y.	:	Nuclear war and Nuclear peace
4.	Osanka, F.M.	:	Modern Guerilla warfare
5.	Gerald, J.	:	Defence Psychology
6.	Know Kalus	:	Science and Defence
7.	Pandey Girishkant	:	Yudhmein Vigyanaven Takaniki

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

1	कोर्स कोड	DS3T - 0922
2	कोर्स शीर्षक	आधुनिक युद्धकर्म
3	कोर्स का प्रकार	कोर सैद्धांतिक – 2
4	पूर्व आवश्यकता	सभी के लिए
5	पाठ्यकम अध्ययन की परिलब्धियां CLO	इस पाठ्यकम को पूरा करने के बाद छात्र इस स्थिति में होगा कि– 1. आधुनिक हथियारों का युद्ध पर प्रभाव समझेगें। 2. विज्ञान व तकनीकी का युद्धकला पर प्रभाव को जानेंगे। 3. भारत में आधुनिक युद्धकर्म से संबंधित विकास की जानकारी होगी। 4. सायबर युद्धकर्म, कत्रिम बुद्रि व सूचना युद्ध को समझेंगे।
6	केडिट मूल्य	सैद्धांतिक – 4
7	कुल अंक	अधिकतम अंक – 50

भाग ब : पाठ्यकम 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. परमाणु हथियारों का विकास 2. परमाणु विस्फोट के प्रभाव 3. नाभकीय हथियारों का फैलाव 4. प्रक्षेपास्त्रों के प्रकार व उनका वर्गीकरण	12
2	1. विज्ञान व प्रौद्योगिकी के रुझान और युद्ध पर उनका प्रभाव 2. सैन्य क्षेत्र में शोध व विकास का भूमिका 3. हथियारों का विकास व सामरिकी पर प्रभाव 4. आधुनिक युद्धकर्म में कमान, कन्ट्रोल, संचार व आःसूचना (सी 3 आई)	12
3	1. सैन्य उपग्रह 2. विस्फोटक बम 3. रासायनिक हथियार 4. जैविक हथियार 5. स्मार्ट हथियार	12

4	1. राकेट प्रौद्योगिकी व भारत 2. प्रक्षेपास्त्र प्रौद्योगिकी व भारत 3. नाभिकीय प्रौद्योगिकी व भारत 4. नाभिकीय खनिज व भारत 5. अंतरिक्ष प्रौद्योगिकी व भारत	12
5	1. सायबर सुरक्षा 2. कृत्रिम बुद्धि व भविष्य की संभावना 3. सूचना युद्ध 4. परमाणु निरोध 5. उभरती तकनीक व युद्ध पर इसका प्रभाव	12

भाग – स अनुशंसित अध्ययन संसाधन

पाठ्यपुस्तकें, संदर्भ पुस्तके , अन्य संसाधन			
1.	Halailan Morton	:	Cotemporary Military strategy
2.	Brodue, Y.	:	Strategy in the missile Age.
3.	Markabi, Y.	:	Nuclear war and Nuclear peace
4.	Osanka, F.M.	:	Modern Guerilla warfare
5.	Gerald, J.	:	Defence Psychology
6.	Know Kalus	:	Science and Defence
7.	Pandey Girishkant	:	Yudhmein Vigyanaven Takaniki

Part – A Introduction			
Programme – Degree Course	Class – B.A. /B.Sc. III year	Year -	Session –

Subject – Defence Studies		
1	Course Code	DS Practical
2	Cource Title	Map and Psychological Experiment.
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. Information about the place of strategic importance of the World will be known through the map. 2. Get acquainted with mental fatigue. 3. Map study, direction and bearings information will be available.
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	
3	1. Show the place of strategic importance on the map - i. India's defence industries and nuclear power plant. ii. World – Ocean and Sea, Straits, Canals, nuclear power countries and military base of powers. 2. Psychological experiment – Mental fatigue test. 3. Map study – Bearing and its conversion, cardinal points, grid System and map reference.	

Part – C Learning Resources

Text Books, Reference Books and other Resources.			
1.	Kresey	:	Simple tactics.
2.	G.R. Ward	:	Ssection training exercise
3.	Lt. Col. Gambel	:	Simplified tactical instructions
4.	Barlew	:	Small arms manual
5.	Liddellhart	:	Elements of tactics
6.	Sharma and Nigam	:	Samartantra abhyas

भाग अ : परिचय			
कक्षा : बी.ए./बी.एससी. तृतीय वर्ष	वर्ष :	सत्र :	

विषय : रक्षा अध्ययन	
कोर्स कोड	DS3P
कोर्स शीर्षक	मानचित्र व मनोवैज्ञानिक परीक्षण
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. विश्व के स्त्रातजिक महत्व के स्थानों की जानकारी नक्शें वे माध्यम से जानेंगा। 2. मानसिक थकान से परिचित होगा। 3. मानचित्र अध्ययन, दिशाओं व दिक्मान की जानकारी होगी
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. स्त्रातजिक महत्व के स्थानों को मानचित्र में दर्शाइए – अ. भारत के रक्षा संस्थान, न्यूक्लियर प्लांट ब. महासागर व समुद्र, स्ट्रेट व केनाल, नाभिकीय शक्ति सम्पन्न देश व महाशक्तियों के सैन्य अड्डे। 2. सैन्य मनोविज्ञान अभ्यास – मानसिक थकान परीक्षण 3. मानचित्र अध्ययन – दिक्मान व उनका परिवर्तन, ग्रिड सिस्टम, मनचित्र रिफरेन्स व प्रमुख दिशाएँ।	

भाग – स अनुशंसित अध्ययन संसाधन

पाठ्यपुस्तकें, संदर्भ पुस्तके , अन्य संसाधन			
1.	Kresey	:	Simple tactics.
2.	G.R. Ward	:	Ssection training exercise
3.	Lt. Col. Gambel	:	Simplified tactical instructions
4.	Barlew	:	Small arms manual
5.	Liddellhart	:	Elements of tactics
6.	Sharma and Nigam	:	Samartantra abhyas

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: **Degree Course**		Class: **B.Sc. III Year**	Year: **2024**	Session:**2024-2025**
1.	Course Code	**CHEM-5T**		
2.	Course Title	Inorganic & Physical Chemistry		
3.	Course Type	Core Course		
4.	Pre-requisite (if any)	To Study this course our students must have had the diploma in chemistry 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 : • Metal-ligand bonding and stability of the metal complexes. • Spectroscopic and magnetic properties of transition metal complexes. • Fundamentals and catalytic and industrial applications of organometallic compounds. • Applications of bioinorganic chemistry, acid-base principles and inorganic polymers. • Fundamentals and applications of electromagnetic spectrum, microwave' infrared. Raman and electronic spectroscopy' • Basic concepts and theories of photochemistry and learn about the various aspects of its applications. • Problems and principles/concepts in electric, magnetic and optical properties of molecules.		
6.	Credit Value	Theory: 4		
7.	Total Marks	**Max. Marks**: 50	**Min Passing Marks**: 17	

Part B: Content of the Course		
Total No. of Lecturer (in hours per week):	Total Lecturer: 90	
Unit	**Topics**	**No. of Lectures**
I	**Metal- Ligand Bonding in Transition Metal Complexes**-Limitation of Crystal Field Theory, Tetragonal distortions from octahedral geometry, Jahn–Teller distortion, square planar geometry. Qualitative aspect of Ligand field and MO Theory, MO diagrams of representative coordination complexes of octahedral geometry. **Thermodynamic and kinetic aspects of metal complexes**. A brief outline of thermodynamic stability of metal complexes and factors affecting the stability. Substitution reactions of square planar complexes. Trans-effect, theories of trans-effect. Mechanism of substitution reactions of Square planar complexes.	15
II	**Magnetic Properties of Transition Metal Complexes:** Types of magnetic behavior, method of determining magnetic susceptibility by Gouy method, spin only formula, L-S coupling, correlation of μ_s (spin only) and μ_{eff}. Values, Orbital contribution to magnetic moments, Application of magnetic moment data for 3d metal complexes. **Electronic spectra of Transition Metal Complexes**:Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, spectro-chemical series. Orgel-energy level diagram for d^1 and d^2 states,	15

	Discussion of the Electronic spectrum of $[Ti(H_2O)_6]^{3+}$ complex ion.	
III	**Organometallic chemistry:** Definition and classification of organometallic compounds based on nature of metal-carbon bond. Concept of hapticity of organic ligands. Structures of mononuclear and binuclear carbonyls of Cr, Mn, Fe, Co and Ni using VBT. π-acceptor behavior of CO (MO diagram of CO to be discussed), Zeise's salt: Preparation and structure of Metal carbonyls : 18 electron rule . Electron count of mononuclear, polynuclear and substituted metal carbonyls of 3*d* series. General methods of preparation (direct combination, reductive carbonylation, thermal and photochemical decomposition) of mono and binuclear carbonyls of 3dseries. **Catalysis by Organometallic Compounds**–Study of the following industrial processes and their mechanism: Alkene hydrogenation (Wilkinson'sCatalyst), Polymerization of ethane (Ziegler–Natta Catalyst)	15
IV	**Bioinorganic chemistry:** Classification of elements according to their action in biological system. Essential and trace elements in biological processes, carbonic anhydrase and carboxypeptidase. Excess and deficiency of some trace metals, Metal ions present in biological systems, Toxicity of some metal ions (Hg, Pb, Cd and As), metalloporphyrins with special reference to hemoglobin and myoglobin and their structure and biological functions. Biological role of alkaline earth metals with special reference to Ca^{2+} and Mg^{2+}, nitrogen fixation. **Inorganic polymers:** Types of inorganic polymers, comparison with organic polymers, synthesis, structural aspects and applications of silicones and siloxanes. Silicates, phosphazenes and polyphosphate	15
V	**Spectroscopy-I Introduction**: Characterization of Electromagnetic radiation, regions of the spectrum, interaction of radiation with matter, types of spectrums, types of spectroscopy studied in different regions of electromagnetic radiation. Born-Oppenheimer Approximation. Basic idea of instrumentation of simple photometer, atomic absorption and emission spectrophotometers. **Photochemistry:** Difference between thermal and photochemical processes. Laws of photochemistry: Grothus-Drapper law, Lambert-Beer's law, Stark- Einstein law, quantum yield, examples of low and high quantum yields, Photochemical equilibrium and the differential rate of photochemical reactions, Quenching, Role of photochemical reaction in biochemical process. Jablonski diagram depicting various process occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), photosensitized reactions, energy transfer processes (simple examples), photostationary states, Chemiluminescence. **Electronic Spectroscopy:** Basic principles, Electronic Spectra of diatomic molecule, Franck- Condon principle, types of electronic transition, application of electronic spectra.	15
VI	**Spectroscopy-II Rotational Spectroscopy**: Rotational Spectrum of Diatomic molecules. Energy levels of a rigid rotor, selection rules, determination of bond length, qualitative description of non-rigid rotator, isotopic effect. **Vibrational Spectroscopy:** Theory of IR Spectroscopy, vibrating diatomic molecule, energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, rotational-vibrational Spectra, determination of force constant, anharmonic oscillator **Raman Spectroscopy:** Instrumentation of Raman spectrophotometer, Concept of polarizability, quantum theory of Raman spectra, stokes and	15

	antistokes lines, pure rotational and pure vibrational Raman spectra, selection rule, Applications of Raman Spectra.	

Keywords: Crystal field theory, transition metal complexes, magnetic properties, electronic spectra, organometallic compounds, carbonylation, inorganic polymers, electromagnetic radiations, photochemistry, rotational and vibrational spectroscopy, raman spectroscopy

Part C: Learning Resource

Text Books, Reference Books, Other Resources

Suggested Reading :

1. Lippard, S.J. & Berg, J.M. Principles of Bioinorganic Chemistry Panima Publishing Company 1994.
2. Cotton, F.A. & Wilkinson, G, Advanced Inorganic Chemistry Wiley-VCH, 1999.
3. Malik W.U. & et Al., Selected Topics in Inorganic Chemistry, S Chand Publication (2010). Puri, B.R., Sharma, L.R., KaliaK.C., Principles of Inorganic Chemistry, Vishal Publishing Co. (2021).
4. Gurtu, J.N., Gurtu, A., Advanced Physical Chemistry, Pragati Prakashan, Meerut, Edition IV, 2017
5. Dogra, S.K.,Physical Chemistry through problems, Wiley Eastern.
6. Khera, H.C., Gurtu, J.N., Singh, J., Chemistry for B.Sc. Ist Year, Pragati Prakashan
7. Ball, D.W., Physical Chemistry, Thomson Press, India, 2007
8. Castellan, G.W., Physical Chemistry, 4th Edition, Narosa, 2004
9. Bariyar, A. & Goyal, S., B.Sc. Chemistry Combined (in Hindi), Krishna Educational Publishers Year 2019
10. Levine, I.N., Physical Chemistry, 6th Edition, Tata McGraw-Hill, 2010
11. Metz, C.R., 2000 Solved Problems in Chemistry, Sahaun Series, 2006
12. Puri, B.R., Pathania, M.S., Sharama, L.R., Principles of Physical Chemistry, Vishal Publishing Company 2020
13. Negi, A.S. & Anand, S.C., A Text Book of Physical Chemistry, 3rd Edition, New Age International Publication
14. Bajpai, D.N., Advanced Physical Chemistry, S. Chand, 2019
15. Bahal & Tuli, Essential of Physical Chemsitry, 2020
16. Greenwood, N.N. & Earnshaw A. Chemistry of the Elements, Butterworth-Heinemann, 1997.
17. Purcell, K.F & Kotz, J.C. Inorganic Chemistry W.B. Saunders Co, 1977.
18. Huheey, J.E., Inorganic Chemistry, Prentice Hall, 1993.
19. Lee, J.D. Concise Inorganic Chemistry, ELBS, 1991
20. Atkins, P. W and Shriver D. N. Atkins' Inorganic Chemistry 5th Ed. Oxford University Press (2010).
21. Engel, T. and Reid, P., Physical Chemistry, 3rd Edition, Prentice Hall, 2012
22. Mortimer, R.G., Physical Chemistry, 3rd Edition, Elsevier, Noida, UP, 2009
23. Atkins' Physical Chemistry, 10th Edition, Oxford University Press, 2014
24. Barrow, G.M., Physical Chemistry Tata McGraw-Hill, 2007
25. Physical Chemistry, A Modern Introduction, 2nd Edition, William M. Davis, CRC Press, 2018.
26. Chemical Kinetics, Stochastic Processes and irreversible Thermodynamics, Santillan Moises. Springer, 2014.
27. Physical Chemistry, Madan R.L., McGraw Hill, 2021.
28. Physical Chemistry, 3rd Edition, Robert G. Mortimer, Elsevier, 2021.

E-learning resources:

- http://heecontent.upsde.gov.in/Home.aspx
- https://nptel.ac.in/courses/104/106/104106096/
- http://heecontent.upsde.gov.in/Home.aspx
- https://nptel.ac.in/courses/104/106/104106096/
- https://www2.chemistry.msu.edu/faculty/reusch/VirtTxtJml/intro1.htm
- https://nptel.ac.in/courses/104/103/104103071/#

- https://nptel.ac.in/courses

Fundamental Chemistry related topics on SWAYAM platform and E-pathshala

Part D: Assessment and Evaluation

Maximum Marks: 50

DECLARATION

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

1. Dr. Alka Shrivastav, - Chairman
   Assistant Professor,
   Govt. E.V.P.G. College, Korba
2. Smt. Priyanka Tiwari, - Member
   Assistant Professor,
   Govt. J.P. Verma P.G. College, Bilaspur (C.G.)
3. Mr. Vijay Kumar Lahare, - Member
   Assistant Professor,
   Govt. Lahiri P.G. College Chirimiri(C.G.)
4. Dr. Rajmani Patel. - Member
   Assistant Professor,
   Hemchand Yadav University, Durg (C.G.)
5. Dr. A.K. Singh, - Member
   Professor,
   Govt. V.Y.T. P.G. College Durg (C.G.)
6. Dr. P.K. Singh, - Member
   Assistant Professor,
   Govt. T.C.L. P.G. College Janjgir(C.G.)
7. Dr. P.K. Agnihotri, - Member
   Professor,
   Govt. Yuganandam Chhattisgarh College Raipur(C.G.)
8. Dr. B.D. Diwan, - Member
   Professor,
   Govt. M.M.R. P.G. College Champa(C.G.)
9. Dr. Sandhya Patre, - Member
   Assistant Professor,
   Sant Shiromani Guru Ravidas Govt. College Sargaon,
   Mungeli(C.G.)
10. Mrs. Mousami Lahare, - Member
    Assistant Professor,
    Govt. G.N.A. P.G. College Bhatapara, (C.G.)
11. Dr. Alka Shukla, - Member
    Assistant Professor,
    Mohan Lal Jain(Mohan Bhaiya) Govt. College Khursipar,
    Bhilai(C.G.)
12. Dr. Arti Gupta. - Member
    Professor, Govt. Dr. W.W.P. Girl's P.G. College Durg (C.G.)
13. Dr. Deepti Tikariha, - Member
    Assistant Professor, APSGMNS Govt. P.G. College
    Kawardha(C.G.)
14. Dr. Seema Negi, - Member
    Assistant Professor, Govt. J.M.P. College, Takhatpur (C.G.)
15. Dr. Vikesh Kumar Jha, - Member

Assistant Professor, Govt. R.R.M. P.G. College Surajpur (C.G.)

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

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

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

Part A: Introduction

Program: **Degree Course**		Class: **B.Sc. III Year**	Year: **2024**	Session:**2024-2025**
1.	Course Code	CHEM-6T		
2.	Course Title	Organic & Physical Chemistry		
3.	Course Type	Core Course		
4.	Pre-requisite (if any)	To Study this course our students must have had the diploma in chemistry 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 • Fundamental theoretical knowledge about the heterocyclic chemistry. • Common organometallic reactions and draw reasonable reaction mechanisms. • Various synthetic dyes and their structures. • Chemical structure of proteins, amino acids and nucleic acids. 5: To acquire knowledge about different mechanisms involved in polymerization, useful polymers and their structures. • Basic principles of UV-Visible, IR and NMR spectra and their applications. • Fundamentals/concepts/principles/postulates of quantum mechanics and need for development of quantum mechanics. • Applications of quantum mechanics in the study of black body radiation, photoelectric effect, simple quantum mechanical models, bonding in molecules and molecular spectroscopy.		
6.	Credit Value	Theory: **4**		
7.	Total Marks	Max. Marks: **50**		Min Passing Marks: **17**

Part B: Content of the Course

Total No. of Lecturer (in hours per week): **4**		Total Lecturer: **90**
Unit	**Topics**	**No. of Lectures**
I	**Heterocyclic Compounds** : Classification and Nomenclature of Hetrocyclic Compounds, Five Membered Hetrocyclic Compounds. Furan or Furfuran C_4H_4O, Pyrrole (C_4H_5N), Thiophene (C_4H_4S), 1,4 dicarbonyl compound. Six membered Hetrocyclic Compounds Pyridine (C_5H_5N), Orientation in Pyridine and Substitution Reactions, Comparison of Basicity of Pyridine, Piperidine and Pyrrol. Condensed Five and Six Membered Hetrocyclic, Indole (2,3 Benzopyrrole) C_8H_7N. Quinoline or α, β - Benzopyridine; (C_9H_7N), Isoquinoline (C_9H_7N).	15
II	**Carbohydrates:** Classification of Carbohydrates, Biological Importance of Carbohydrates, Monosaccharides, Relative and Absolute Configuration of Glucose and Fructose, Epimers and Anomers, Mutarotation, Determination of Ring size of Glucose and Fructose, Haworth Projections and Conformational Structure, Mutual Transformations or Inter Conversion among Monosaccharides, Disaccharides, Polysaccharides.	15

	Biomolecules: Amino acids, Proteins and Nucleic acids: Amino Acids, Isoelectric Point, Proteins, Difference between Globular Proteins and Fibrous Proteins, Peptide and Peptide Bond, Nucleic acid, structure and functions of RNA and DNA.	
III	**Infra-red and Ultraviolet –Visible Spectroscopy:** **Infra-red Spectroscopy:** Basics of Infra-red Spectroscopy, Fundamental vibrations and their symmetry, Instrumentation, Measurement of IR Spectra, Regions and Interpretation of IR Spectra of organic molecules and its applications. **Ultra-violet and Visible Spectroscopy:** Absorption Laws and Molar Absorptivity, Presentation of *UV*- Spectra of conjugated enes, UV Spectra of conjugated enones, applications of Ultra-violet spectroscopy. Effect of conjugation on λ_{max}	**15**
IV	**NMR and Mass Spectroscopy:** **NMR Spectroscopy:** Principle of NMR Spectroscopy, Instrumentation of NMR Spectroscopy, Nuclear Shielding and Deshielding, The Chemical Shift, Signal Splitting : Spin-Spin Coupling, Interpretation of PMR, Spectra, Structural Elucidation using UV, IR and NMR, Anisotropy and Anisotropic Effect, Coupling constant and signal resolution, ^{13}C-NMR Spectroscopy. **Mass Spectroscopy:** Principle of mass Spectroscopy, Instrumentation of mass Spectroscopy, fragmentation process, The m/z value of the molecular ion to calculate the molecular formula, Isotope Effect.	**15**
V	**Quantum Mechanics–I :** Historical background of quantum mechanics, Black-body radiation, Planck's radiation law, photoelectric effect, Compton effect, Operator: Hamiltonian operator, angular momentum operator, Laplacian operator, postulate of quantum mechanics, eigen values, eigen function, Schrodinger time independent wave equation, physical significance of ψ & ψ^2, application of Schrodinger wave equation to particle in a one-dimensional box, hydrogen atom (separation into three equations) radial and angular wave functions.	**15**
VI	**Quantum Mechanics-II :** Quantum Mechanical approach of Molecular orbital theory, basic ideas-criteria for forming M.O. from A.O., LCAO approximation, formation of H_2^+ ion, calculation of energy levels from wave functions, bonding and antibonding wave functions, Concept of σ, σ^*, π, π^* orbitals and their characteristics, Hybrid orbitals-sp, sp^2, sp^3 Calculation of coefficients of A.O.'s used in these hybrid orbitals. Introduction to valence bond model of H_2, comparison of M.O. and V.B. models.	**15**

Part C: Learning Resource

Suggested Readings :

1. Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd.(Pearson Education).
2. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Finar, I. L. Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
4. Puri, B.R., Pathania, M.S., Sharama, L.R., Principles of Physical Chemistry, Vishal Publishing Company 2020
5. Gurtu, J.N., Gurtu, A., Advanced Physical Chemistry, Pragati Prakashan, Meerut, Edition IV, 2017
6. Dogra, S.K.,Physical Chemistry through problems, Wiley Eastern.

7. Khera, H.C., Gurtu, J.N., Singh, J., Chemistry for B.Sc. Ist Year, Pragati Prakashan
8. Ball, D.W., Physical Chemistry, Thomson Press, India, 2007
9. Castellan, G.W., Physical Chemistry, 4th Edition, Narosa, 2004
10. Bariyar, A. & Goyal, S., B.Sc. Chemistry Combined (in Hindi), Krishna Educational Publishers Year 2019
11. Levine, I.N., Physical Chemistry, 6th Edition, Tata McGraw-Hill, 2010
12. Metz, C.R., 2000 Solved Problems in Chemistry, Sahaun Series, 2006
13. Bahal & Tuli, Essential of Physical Chemsitry, 2020
14. Negi, A.S. & Anand, S.C., A Text Book of Physical Chemistry, 3rd Edition, New Age International Publication
15. Bajpai, D.N., Advanced Physical Chemistry, S. Chand, 2019
16. Engel, T. and Reid, P., Physical Chemistry, 3rd Edition, Prentice Hall, 2012
17. Eliel, E. L. &Wilen, S. H. Stereochemistry of Organic Compounds. Wiley: London, 1994
18. Kalsi, P. S. Organic spectroscopy. New Age International, 2005.
19. Dyer, J.R., Introduction to spectroscopy, PHI
20. McMurry, J.E. Fundamentals of Organic Chemistry, 7th Ed. Cengage Learning India Edition, 2013.
21. Mortimer, R.G., Physical Chemistry, 3rd Edition, Elsevier, Noida, UP, 2009
22. Atkins' Physical Chemistry, 10th Edition, Oxford University Press, 2014
23. Barrow, G.M., Physical Chemistry Tata McGraw-Hill, 2007

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/#
7. https://nptel.ac.in/courses

Fundamental Chemistry related topics on SWAYAM platform and E-pathshala

Part D: Assessment and Evaluation

Maximum Marks: 50

DECLARATION

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Part A: Introduction			
Program: **Degree Course**	Class: **B.Sc. III Year**	Year: **2024**	Session: **2024-25**
1	Course Code	**CHEM-3P**	
2	Course Title	LAB. 3: GENERAL CHEMISTRY 3	
3	Course Type	Chemistry Practical	
4	Pre-requisite (if any)	To study this course our students must have had the diploma in chemistry or equivalent	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will learn the following aspects of laboratory exercises : • Preparation of inorganic complexes • Preparation of organic compounds • Explain /define different terms in conductometry • Explain/define different terms in colorimetry • Understand the theoretical principles with the help of practicals	
6	Credit Value	Practical : **02**	
7	Total Marks	**Max. Marks:** 50	**Min. Passing Marks:** 17

Part B: Content of the Course		
Total No. of Lectures: **30**		
	LABORATORY COURSE	**No. of Lectures**
Tentative list of practical	**Inorganic Chemistry** Gravimetric analysis: Estimation of nickel (II) using dimethylglyoxime (DMG), estimation of copper as CuSCN, estimation of iron as Fe_2O_3 by precipitating iron as $Fe(OH)_3$, estimation of Al (III) by precipitating with oxine and weighing as $Al(oxine)_3$ (aluminium oxinate), estimation of Barium as $BaSO_4$ Inorganic Preparations: •Tetraamminecopper (II) sulphate, $[Cu(NH_3)_4]SO_4.H_2O$ •Cis and trans $K[Cr(C_2O_4)_2.(H_2O)_2]$ Potassium dioxalatodiaquachromate(III) •Tetraamminecarbonatocobalt (III) ion •Potassium tris(oxalate)ferrate(III)/ Sodium tris(oxalate)ferrate(III) •Cu(I) thiourea complex, bis (2,4-pentanedionate) zinc hydrate; Double salts (Chrome alum/ Mohr's salt)	10
	Organic chemistry 1.Preparation of organic Compounds: Synthesis of oxalic acid from cane sugar. Acetylation of one of the following compounds: amines (aniline, o-, m-, p- toluidines and o-,m-, p-anisidine) and phenols (β-naphthol, vanillin, salicylic acid) Benzolyation of one of the following amines (aniline, o-, m-, p-toluidines and o-, m-, panisidine) and one of the following phenols (β-naphthol, resorcinol, p cresol) by Schotten-Baumann reaction. Bromination of any one of the following: **a.** Acetanilide by conventional methods **b.** Acetanilide using green approach (Bromate-bromide method)	10

	• Nitration of any one of the following: a. Acetanilide/nitrobenzene by conventional method b. Salicylic acid by green approach (using ceric ammonium nitrate). • Reduction of p-nitrobenzaldehyde by sodium borohydride. • Hydrolysis of amides and esters. • Semicarbazone of any one of the following compounds: acetone, ethyl methyl ketone, cyclohexanone, benzaldehyde. • Benzylisothiouronium salt of one each of water soluble and water insoluble acids (benzoic acid ,oxalic acid ,phenyl acetic acid and phthalic acid) • Aldol condensation using either conventional or green method. • Benzil-Benzilic acid rearrangement. • Preparation of sodium polyacrylate. • Preparation of urea formaldehyde. • Preparation of methyl orange. The above derivatives should be prepared using 0.5-1g of the organic compound. The solid samples must be collected and may be used for recrystallization, melting point and TLC. 1. Qualitative Analysis: Qualitative analysis of an organic mixture containing two solid components using water, $NaHCO_3$, NaOH for separation and preparation of suitable derivatives. 2. Extraction of caffeine from tea leaves. 3. Analysis of Carbohydrate: aldoses and ketoses, reducing and non-reducing sugars. 4. Identification of simple organic compounds by IR spectroscopy and NMR spectroscopy. (Spectra to be provided). 5. Estimation of glycine by Sorenson's formalin method. 6. Study of the titration curve of glycine. 7. Estimation of proteins by Lowry's method. 8. Study of the action of salivary amylase on starch at optimum conditions 9. Effect of temperature on the action of salivary amylase.	
	Physical chemistry Conductometry • Determination of cell constant • Determination of equivalent conductance, degree of dissociation and dissociation constant of a weak acid. • Perform the following conductometric titrations: i.Strong acid vs. strong base ii.Weak acid vs. strong base iii.Mixture of strong acid and weak acid vs. strong base iv.Strong acid vs. weak base • To determine the strength of the given acid conductometrically using standard alkali solution. • To determine the solubility and solubility product of a sparingly soluble electrolyte conductometrically • To study the saponification of ethyl acetate conductometrically. Potentiometry/pH metry: • Perform the following potentio/pH metric titrations: i. Strong acid vs. strong base ii. Weak acid vs. strong base	10

iii. Dibasic acid vs. strong base
iv. Potassium dichromate vs. Mohr's salt
v. Determination of pKa of monobasic acid

UV/ Visible spectroscopy:

- Verify Lambert-Beer's law and determine the concentration of $CuSO_4$/$KMnO_4$/$K_2Cr_2O_7$ in a solution of unknown concentration
- Determine the concentrations of $KMnO_4$ and $K_2Cr_2O_7$ in a mixture.
- Study the kinetics of iodination of propanone in acidic medium.
- Determine the amount of iron present in a sample using 1,10-phenathroline.
- Determine the dissociation constant of an indicator (phenolphthalein).
- Study the kinetics of interaction of crystal violet/ phenolphthalein with sodium hydroxide.
- Study of pH-dependence of the UV-Vis spectrum (200-500 nm) of potassium dichromate.
- Spectral characteristics study (UV) of given compounds (acetone, acelaldehyde, acetic acid, etc.) in water.
- Absorption spectra of $KMnO_4$ and $K_2Cr_2O_7$ (in 0.1 M H_2SO_4) and determine λmax values.

Note: Experiments may be added/deleted subject to availability of time and facilities

Keywords: Gravimetric analysis, Inorganic complex preparation, Organic compounds, Conductometry, Potentiometric, pH metry, Spectroscopy.

Part C : LEARNING RESOURCES

Suggested Readings:

1. Vogel, A.I. Quantitative Organic Analysis, Part 3, Pearson (2012).31
2. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
3. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5th Ed., Pearson (2012)
4. Ahluwalia, V.K. &Aggarwal, R. Comprehensive Practical Organic Chemistry:
5. Preparation and Quantitative Analysis, University Press (2000).
6. Ahluwalia, V.K. &Dhingra, S. Comprehensive Practical Organic Chemistry: Qualitative Analysis, University Press (2000),
7. Manual of Biochemistry Workshop, 2012, Department of Chemistry, University of Delhi
8. Green Chemistry, ,Theory and Practice,P.T.AnastasandJ.C.Warner
9. Green Chemistry ,Environmental friendly alternatives ,R.S.Sanghli and M.M. Srivastava, Narosa Publications.
10. Gupta, A., Unified Chemistry Practical, Navbodh Publications.

E-Learning Resources:

1. http://vlab.amrita.edu/index.php
2. http://www.chemguide.co.uk/

Fundamental Chemistry related topics on SWAYAM platform and E-pathshala

Part D: Assessment and Evaluation
Maximum Marks: 50

Experiments	**08 hours / M.M. 50**
Five Experiments to be performed	
Inorganic chemistry – Two experiments to be performed . a) Gravimetric Estimation compulsory. b) Anyone experiment from synthesis and analysis.	 08 marks 04 marks
Organic chemistry – Two experiments to be performed. a) Qualitative analysis of organic mixture containing two solid components.	 08 marks (03 marks for each compound and 02 marks for separation)
b) One experiment from synthesis of organic compound	04 marks
Physical chemistry – one experiment from physical chemistry	12 marks
Sessional	04 marks
Viva	10 marks
[Note ; In case of Ex-student , one mark each will be added to gravimetric analysis and qualitative analysis of organic mixture and two marks in experiment in physical chemistry].	

DECLARATION

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

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

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

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

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. Girlas 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 Manedragarh(C.G.)

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

Scheme of B. Sc. Mathematics

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 1 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: Degree Course		Class: B. A. / B.Sc. Part III	Year: 2022	Session:2024-2025
1	Course Code	Paper – MATH – 6T(I)		
2	Course Title	Discrete Mathematics		
3	Course Type	Theory		
4	Pre-requisite (if any)	No		
5	Course Learning Outcome (CLO)	• Learn about partially ordered sets, lattices and their types. • Understand Boolean algebra and Boolean functions, logic gates, switching circuitsand their applications. • Solve real-life problems using finite-state and Turing machines. • Assimilate various graph theoretic concepts and familiarize with their applications.		
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	**Partially Ordered Sets:** Definitions, examples and basic properties of partially ordered sets (poset), Order isomorphism, Hasse diagrams, Dual of a poset, Duality principle, Maximal and minimal elements, Least upper bound and greatest upper bound, Building new poset, Maps between posets.	12
II	**Lattices:** Lattices as posets, Lattices as algebraic structures, Sublattices, Products and homomorphisms; Definitions, examples and properties of modular and distributive lattices; Complemented, relatively complemented and sectionally complemented lattices.	12
III	**Boolean Algebras and Switching Circuits:** Boolean algebras, De Morgan's laws, Boolean homomorphism, Representation theorem; Boolean polynomials, Boolean polynomial functions, Disjunctive	12

	and conjunctive normal forms, Minimal forms of Boolean polynomials, Quine-McCluskeymethod, Karnaugh diagrams, Switching circuits and applications.	
IV	**Finite-State and Turing Machines:** Finite-state machines with outputs, and with no output; Deterministic and nodeterministic finite-state automaton; Turing machines: Definition, examples, and computations.	12
V	**Graphs:** Definition, examples and basic properties of graphs, Königsberg bridge problem; Subgraphs, Pseudographs, Complete graphs, Bipartite graphs, Isomorphism of graphs, Paths and circuits, Eulerian circuits, Hamiltonian cycles, Adjacency matrix, Weighted graph, Travelling- salesman problem, Shortest path, Dijkstra's algorithm.	12

Part C - Learning Resource

Text Books and Reference Books:

1. B. A. Davey & H. A. Priestley . *Introduction to Lattices and Order* (2nd edition). Cambridge University Press. 2002
2. Edgar G. Goodaire& Michael M. Parmenter. *Discrete Mathematics withGraph Theory* (3rd edition). Pearson Education. 2018
3. Rudolf Lidl & Günter Pilz. *Applied Abstract Algebra* (2nd edition). Springer. 1998
4. Kenneth H. Rosen. *Discrete Mathematics and its Applications: With Combinatorics and Graph Theory* (7th edition). McGraw-Hill. 2012
5. C. L. Liu *Elements of Discrete Mathematics* (2nd edition). McGraw-Hill. 1985

E-Resources:

1. Suggested Equivalent **online courses:** Web link NPTEL/ SWAYAM/ MOOCs
2. https://www.youtube.com/watch?v=hklHg9oMkGA&list=PLwdnzlV3ogoVxVxCTll45pDVM1aoYoMHf

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

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: Degree Course		Class: B. A. / B.Sc. Part III	Year: 2022	Session:2024-2025
1	Course Code	Paper – MATH – 6T(II)		
2	Course Title	Tensors and Differential Geometry		
3	Course Type	Theory		
4	Pre-requisite (if any)	No		
5	Course Learning Outcome (CLO)	• Explain the basic concepts of tensors. • Understand role of tensors in differential geometry. • Learn various properties of curves including Frenet - Serret formulae and theirapplications. • Know the Interpretation of the curvature tensor, Geodesic curvature, Gauss andWeingarten formulae. • Understand the role of Gauss's Theorema Egregium and its consequences. • Apply problem-solving with differential geometry to diverse situations in physics, engineering and in other mathematical contexts.		
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	**Tensors:** Contravariant and covariant vectors, Transformation formulae, Tensor product of two vectorspaces, Tensor of type (r, s), Symmetric and skew-symmetric properties, Contraction of tensors, Quotient law, Inner product of vectors.	12
II	**Further Properties of Tensors:** Fundamental tensors, Associated covariant and contravariant vectors, Inclination of two vectors and orthogonal vectors, Christoffel symbols, Law of transformation of Christoffel symbols, Covariant derivatives of covariant and contravariant vectors, Covariant differentiat- ion of tensors, Curvature tensor, Ricci tensor, Curvature tensor identities.	12
III	**Curves in $\mathbb{R}^2$, and $\mathbb{R}^3$:** Basic definitions and examples, Arc length, Curvature and the Frenet□Serret formulae, Fundamental existence and uniqueness theorem for curves, Non-unit speed curves.	12

IV	**Surfaces in $\mathbb{R}^3$:** Basic definitions and examples, The first fundamental form, Arc length of curves on surfaces, Normal curvature, Geodesic curvature, Gauss and Weingarten formulae, Geodesics, Parallelvector fields along a curve and parallelism.	12
V	**Geometry of Surfaces:** The second fundamental form and the Weingarten map; Principal, Gauss and mean curvatures; Isometries of surfaces, Gauss's Theorema Egregium, The fundamental theorem of surfaces, Surfaces of constant Gauss curvature, Exponential map, Gauss lemma, Geodesic coordinates, The Gauss-Bonnet formula and theorem.	12

Part C - Learning Resource

Text Books, Reference Books:

1. Christian Bär. *Elementary Differential Geometry*. Cambridge University Press. 2010
2. Manfredo P. do Carmo. *Differential Geometry of Curves & Surfaces* (Revisedand updated 2nd edition). Dover Publications. 2016
3. Alferd Gray. *Modern Differential Geometry of Curves and Surfaces with Mathematica* (4th edition). Chapman & Hall/CRC Press, Taylor & Francis. 2018
4. Richard S. Millman & George D. Parkar. *Elements of Differential Geometry*.Prentice-Hall. 1977
5. R. S. Mishra. *A Course in Tensors with Applications to Riemannian Geometry*.Pothishala Pvt. Ltd. 1965
6. Sebastián Montiel & Antonio Ross. *Curves and Surfaces*, American Mathematical Society. 2009

E-Resources

1. Suggested Equivalent **online courses:** Web link NPTEL/ SWAYAM/ MOOCs
2. https://www.youtube.com/watch?v=OyQj-RWLuV4

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

MaximumMarks: 50 Marks

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: Degree Course		Class: B. A. / B.Sc. Part III	Year: 2022	Session:2024-2025
1	Course Code	Paper – MATH – 6T(III)		
2	Course Title	Number Theory		
3	Course Type	Theory		
4	Pre-requisite (if any)	No		
5	Course Learning Outcome (CLO)	• Some of the open problems related to prime numbers, viz., Goldbach conjecture etc. • About number theoretic functions and modular arithmetic. • Public crypto systems, in particular, RSA.		
6	Credit Value	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	**Distribution of Primes and Theory of Congruencies:** Linear Diophantine equation, Prime counting function, Prime number theorem, Goldbach conjecture, Fermat and Mersenne primes, Congruence relation and its properties, Linear congruence and Chinese remainder theorem, Fermat's little theorem, Wilson's theorem.	12
II	**Number Theoretic Functions:** Number theoretic functions for sum and number of divisors, Multiplicative function, The Mobius inversion formula, The greatest integer function. Euler's phi-function and properties,Euler's theorem.	12
III	**Primitive Roots:** The order of an integer modulo n, Primitive roots for primes, Composite numbers having primitive roots; Definition of quadratic residue of an odd prime, and Euler's criterion.	12

IV	**Quadratic Reciprocity Law and Public Key Encryption:** The Legendre symbol and its properties, Quadratic reciprocity, Quadratic congruencies withcomposite moduli.	12
V	**Applications:** Public key encryption, RSA encryption and decryption, Some important application.	12

Part C - Learning Resource

Text Books and Reference Books

1. David M. Burton. *Elementary Number Theory* (7th edition). McGraw-Hill. 2007
2. Gareth A. Jones & J. Mary Jones. *Elementary Number Theory*. Springer. 2005
3. Neville Robbins. *Beginning Number Theory* (2nd edition). Narosa. 2007

E- Resources

1. Suggested Equivalent **online courses:** Web link NPTEL/ SWAYAM/ MOOCs
2. https://www.youtube.com/watch?v=u7cBLb0b7pk&list=PLOzRYVm0a65fuj_5fuj1BLeONULrM4Irj

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

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: Certificate Course		Class: B. A. / B.Sc. Part III	Year: 2022	Session:2024-2025
1	Course Code	Paper – MATH – 6T(IV)		
2	Course Title	Probability and Statistics		
3	Course Type	Theory		
4	Pre-requisite (if any)	No		
5	Course Learning Outcome (CLO)	• Understand the basic concepts of probability. • Appreciate the importance of probability distribution of random variables and to know the notion of central tendency. • Establish the joint distribution of two random variables in terms their correlation andregression. • Understand Correlation , Regression, Partial and Multiple correlation. • Study Attributes, Chi-square distribution and sampling. • Learn Curve Fitting , Interpolation, Extrapolation and Finite Differences		
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	**Probability and Random Variables:** Axiomatic and empirical definitions of probability, Independent and dependent events, Conditional probability and Baye's theorem; Discrete and continuous random variables and their probability distributions, Cumulative distribution function, n^{th} Moments, Moment generating function, Characteristic function.	12

II	**Univariate Distributions:** Discrete distributions: Bernoulli trials and Bernoulli distribution, Binomial and Poisson distributions; Continuous distributions: Uniform, Geometric, Gamma, Exponential, Beta and normal distributions; Normal approximation to the binomial distribution, Central limit theorem.	12
III	**Curve Fitting , Interpolation, Extrapolation and Finite Differences:** Method of least squares, Normal equation, Fitting of the curve of the type $y = ab^x$ and $y = ax^b$. Methods of Interpolation , Newton's Binomial Method, Lagrange's Interpolation Formula, Gausses forwardand backward formula, Striling formula, Bessel's formula, Everett's formula, Divided difference table, Newton's divided difference formula.	12
IV	**Correlation, Regression, Partial and Multiple Correlation:** Correlation, Karl Pearson's Coefficient of correlation, Correlation of ranks, Correlation coefficient, Regression, Line of regression, Equations to the line of regression, Schwarz's Inequality, Moment of Bivariate Distribution. Multiple Correlation, Partial Correlation, Distribution of two, three and more variable, Regression Coefficient , Residuals, Standard deviation of the residuals, Multiple correlation and Partial correlation coefficient.	12
V	**Attributes, Chi-square distribution and sampling:** Attributes, Positive and Negative Attributes, Testing, Condition for consistence in attributes, Independence , Criterion of Independence, Association, complete association, coefficient of association, degree of association, Chi–square distribution, Origin of sampling, Essentials of sampling, Random sampling, Large samples, simple sampling, comparison of large sample, sample from different populations, level of significance, testing the significance of an observed coefficient of correlation and rank of correlation coefficient, Fisher's z-test, Small samples, t-distribution, Fisher's z-distribution, Snedecore's F-distribution.	12

Part C - Learning Resource

Text Books and Reference Books:

1. David Applebaum. *Probability and Information: An Integrated Approach.*Cambridge University Press. 1996
2. Robert V. Hogg, Joseph W. McKean & Allen T. Craig *Introduction to Mathematical Statistics* (7th edition), Pearson Education. 2013
3. Irwin Miller & Marylees Miller (2014). *John E. Freund's Mathematical Statistics with Applications* (8th edition). Pearson. Dorling Kindersley Pvt. Ltd. India.
4. Jim Pitman (1993). *Probability*. Springer-Verlag.
5. Sheldon M. Ross (2014). *Introduction to Probability Models* (11th edition). Elsevier.
6. A. M. Yaglom and I. M. Yaglom (1983). *Probability and Information*. D. Reidel Publishing Company. Distributed by Hindustan Publishing Corporation (India) Delhi.

7. M. Ray and Sar Swarup Sharma, (1988);*Mathematical Statistics*, 8th edition Ram Prasad adb Sons Agra

Other Resources:

1. Suggested Equivalent **online courses:** Web link NPTEL/ SWAYAM/ MOOCs
2. https://www.youtube.com/watch?v=COI0BUmNHT8&list=PLyqSpQzTE6M_JcleDbrVyPnE0PixKs2JE

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

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: Degree Course		Class: **B.A. /B.Sc. III Year**	Year: **2022**	Session: **2024-2025**
1	Course Code	**MATH-3P (I)**		
2	Course Title	**I - Lab 03 - Mathematics Paper 1 and Paper 2**		
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 mathematical theory studied in Mathematics Paper 1 and 2 byusing FOSS software's.** • **Acquire knowledge of applications of Mathematics through 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 /Phython/R. **List of Practical's:** (At least 10 practical's from Paper 1 and Paper 2) • **Note:** Additional practical may be included in the list at the college level as perchoice of optional papers **Mechanics: Suggested book:** Scilab Textbook Companion for Engineering Mechanics by A. K. Tayal 1. Using the Principle of Virtual Work find the force to hold the system ofpulleys in equilibrium. 2. Using the Principle of Virtual Work to determine vertical and horizontalcomponents of reactions of end points of a frame made up with hinge joints. 3. Displacement time relationship for a traveling car. 4. Displacement time relationship for a stone dropped from top of a tower.

5. Distance travelled by a particle in the nth second.

Numerical Methods: Suggested book: Scilab Textbook Companion forNumerical Methods by B. Ram

1. Program to find solution of nonlinear equations using Bisection method.
2. Program to find smallest positive root of a cubic equation using Newton'smethod.
3. Program to find solution of linear systemof equations usingTriangularization Method.
4. Program to find solution of linear system of equations using Gauss JacobiMethod.
5. Program to find solution of linear system of equations using Gauss SeidelMethod.
6. Program for value of a function at given point using Newton forwarddifference interpolation.
7. Program for value of a function at given point using Newton backwarddifference interpolation.
8. Program to find first and second order approximation of first derivative ofa function.
9. Program to find integral approximation by Simpson three eight rule.
10. Program to solve initial value problem using Euler's method.

Linear Algebra: Suggested book: Scilab Textbook Companion for LinearAlgebra by K. Hoffman and R. Kunze

1. Progam to find matrix of differential operator with respect to standard basis on the vector space of polynomial functions of degree three or less.
2. Progam to find GCD to two polynomials.
3. Program to find Characteristic Polynomial of a matrix of order 2.
4. Program to find Characteristic and minimal polynomial of a matrix.

5. Program to find Orthogonal projection in R3.

6. Program to find Unitary matrix.

Integral Transforms and Fourier analysis: Suggested book: Scilab Textbook Companion for Higher Engineering Mathematics by B. S. Grewal

1. Find Fourier sine integral.

2. Find Fourier transform of given function.

3. Find Fourier sine transform.

4. Find Fourier cosine transform.

Discrete Mathematics: Suggested book: Scilab Textbook Companion for Discrete Mathematics by S. Lipschutz, M. Lipson And V. H. Patil, Scilab Textbook Companion for Discrete Mathematics And Its Applications by K. H. Rosen

1. Use of Adjacency matrix

2. Use of Path matrix

Probability and Statistics: Suggested book: Scilab Textbook Companion for Probability And Statistics For Engineers And Scientists by S. M. Ross

1. Program for application of Bye's theorem.

2. Program to obtain probability of union of events.

3. Program for probability of equality likely events

4. Program for applications of Bionomial distribution.

5. Program to obtain probability using Poison distribution.

6. Program for probabilities of a uniform random variable.

7. Program to make scatter plot of two sets of data.

8. Program to fit a linear curve to a given set of data and to determine the sum of squares of the residuals.

Number Theory: Suggested book: Scilab Textbook Companion for Discrete Mathematics And Its Applications by K. H. Rosen

1. To find the quotient and reminder when an integer is divided by

	anotherinteger. 2. To find prime factorization of a given integer. 3. Test that a given integer is prime or not. 4. To find the greatest common divisor of two integers using recursion. 5. To find the greatest common divisor of two integers using Euclideanalgorithm.

Part C - Learning Resource		
Text Books, Reference Books, Other Resources		
SUPPORT FROMTHE GOVTFOR 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 learningopen source software's like scilab, maxima, octave, geogebra and others. (Website: http://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

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: Degree Course		Class: B.A./ B.Sc. III Year	Year: 2022	Session: 2024-2025
1	Course Code	MATH-3P (II)		
2	Course Title	II - Project 03 - 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 Swami Bharti Krishna Tirth and Ramanujan, Madhav and Neelkanth Somyaji and contribution involved in contents of the paper of opted by student. (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

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.)

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**

22.2.23 22-2-2023

B. Sc. Part III

ELECTRONICS

Paper I

ELB-301T: COMMUNICATION ELECTRONICS

Theory: **Max. Marks : 50**

Aims & Objectives

To demonstrate the electronic communication system, related modulation techniques, satellite and mobile communication.

Course Learning Outcomes:

After the completion of the course, Students will be able to

1. The different modulation and demodulation techniques used in analog and digital communication.
2. Explain the basics of satellite communication.
3. Understand GSM, CDMA, TDMA and FDMA concepts.
4. Study of evolution of mobile communication generations 2G, 3G and 4G with their characteristics and limitations.

Unit- 1

Electronic Communication: Block diagram of an electronic communication system, electromagnetic spectrum-band designations and applications, need for modulation, concept of channels and base-band signals. Concept of Noise, Types of Noise, Signal to noise ratio, Noise Figure, Noise Temperature, Friss formula.

Unit-2

Analog Modulation: Amplitude Modulation, modulation index and frequency spectrum.Generation of AM (Emitter Modulation), Amplitude Demodulation (diode detector), Concept of Single side band generation and detection. Frequency Modulation (FM) and Phase Modulation (PM), modulation index and frequency spectrum, equivalence between FM and PM, Generation of FM using VCO, FM detector (slope detector),Qualitative idea of Super heterodyne receiver

Analog Pulse Modulation: Channel capacity, Sampling theorem, Basic Principles-PAM, PWM, PPM, modulation and detection technique for PAM only, Multiplexing.

Unit-3

Digital Pulse Modulation: Need for digital transmission, Pulse Code Modulation,Digital Carrier Modulation Techniques, Sampling, Quantization and Encoding. Concept of Amplitude

Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying(PSK), and Binary Phase Shift Keying (BPSK).

Optical Communication: Introduction of Optical Fiber, Block Diagram of optical communication system.

Unit-4

Satellite Communication– Introduction, need, Geosynchronous satellite orbits, geostationary satellite advantages of geostationary satellites. Satellite visibility, transponders (C - Band), path loss, ground station, simplified block diagram of earth station, Uplink and downlink.

Brief idea of frequency allocation for radio communication system in India (TRAI), Electromagnetic communication spectrum, band designations and usage, Channels and base-band signals.

Unit-5

Mobile Telephony System – Basic concept of mobile communication, frequency bands used in mobile communication, concept of cell sectoring and cell splitting, SIM number, IMEI number, need for data encryption, architecture (block diagram) of mobile communication network, idea of GSM, CDMA, TDMA and FDMA technologies, simplified block diagram of mobile phone handset, 2G, 3G and 4G concepts (qualitative only).GPS navigation system (qualitative idea only)

Reference Books:

1. Electronic Communications, D. Roddy and J. Coolen, Pearson Education India.
2. Advanced Electronics Communication Systems- Tomasi, 6th edition, Prentice Hall.
3. Modern Digital and Analog Communication Systems, B.P. Lathi, 4th Edition, 2011, Oxford University Press.
4. Electronic Communication systems, G. Kennedy, 3rdEdn., 1999, Tata McGraw Hill.
5. Principles of Electronic communication systems – Frenzel, 3rd edition, McGraw Hill
6. Communication Systems, S. Haykin, 2006, Wiley India
7. Electronic Communication system, Blake, Cengage, 5th edition.
8. Wireless communications, Andrea Goldsmith, 2015, Cambridge University Press

Paper II
ELB-302T: MICROPROCESSOR AND MICROCONTROLLER

Theory: **Max. Marks: 50**

Aims & Objectives

To introduce the IC technologies, microcomputer organization, microprocessor and microcontroller, assembly language programming and interfacing circuits.

Course Learning Outcomes:

After the completion of the course, Students will be able to

1. Develop an assembly language program in 8086 microprocessor using the internal organization for the given specification.
2. Describe the architecture and functional block of 8051 microcontroller.
3. Develop an embedded C and assembly language program in 8051 microcontroller using the internal functional blocks for the given specification.

Unit-1

Introduction to IC Technology, Basic fabrication steps, Environment for IC Technology (Basics Requirements), Impurity Incorporation: Solid State Diffusion Modeling and Technology, Ion implantation modeling.

Oxidation: Kinetics of Silicon Dioxide Growth for both thick and ultra thin films, oxidation technology in VLSI and ULSI, characterization of oxide films Lirthography: Photolithography, Modern Lithography techniques(Basic Knowledge) Chemical Vapour Deposition techniques : CVD techniques, Epitaxial Growth of Silicon, Basic understanding of Metal film Deposition and Rapid Thermal Processing

Unit-2

Microcomputer Organization: Input/output Devices. Data storage (idea of RAM and ROM). Computer memory. Memory organization & addressing. Memory Interfacing. Memory Map.
Basic Microprocessor Architecture

Architecture of 8086: Block diagram of 8086, Overview of 8086 Microprocessor Family, Architecture and Pin Configuration of 8086, System Bus Structure: Basic 8086/8088 system bus architecture, Minimum Mode Configuration, Maximum Mode configuration; System Bus Timings, Bus Standards. 8087 Numeric Data Processor& 8089 I/O Processor: Architecture only (no Programming)

Unit-3

Instruction Set and Assembly Language Programming of 8086: Instruction Format: Addressing modes, Data Transfer Instruction, Arithmetic Instructions, Branching and Looping Instructions, NOP and Halt, Flag Manipulation Instructions, Logical, Shift and Rotate Instruction, Byte and String Manipulation: String Instructions; REP Prefix, Table Translation, Number Format conversions, Assembler Directives and Operators, Translation of Assembler Instructions. Programming of Microprocessor 8086, Interrupts of Microprocessor 8086.

Unit-4

8051 Microcontroller: Introduction and block diagram of 8051 microcontroller, architecture of 8051, overview of 8051 family, 8051 assembly language programming, Program Counter and ROM memory map, Data types and directives, Flag bits and Program Status Word (PSW) register, Jump, loop and call instructions.

8051 I/O Port Programming: Introduction of I/O port programming, pin out diagram of8051 microcontroller, I/O port pins description & their functions, I/O port programming in 8051 (using assembly language), I/O programming: Bit manipulation.

Unit -5

Interfacing with 8086: Architecture and Interfacing of 8-bit ADC (0808/0809) and DAC (0800) with 8086 using PPI 8255. Interfacing of Stepper motor, 8279 (Keyboard & Display Driver) and LCD interface with 8086.

Architecture of 32 Bit Microprocessors: Intel 80386Architecture, Special 80386 Registers, Memory Management, Interrupts and Exceptions, Management of T asks–Real, Protected and Virtual 8086mode, Architectural Differences Between 80486 and 80386 Microprocessor.

Reference Books:

1. VLSI Technology, S.M. Sze (2nd Edition) , McGraw Hill Companies Inc.
2. ULSI Technology, C.Y. Chang and S.M. Sze, McGraw Hill Companies Inc.
3. Embedded Systems: Architecture, Programming & Design, Raj Kamal, 2008, Tata McGraw Hill
4. The 8051 Microcontroller and Embedded Systems Using Assembly and C, M.A. Mazidi, J.G. Mazidi, and R.D. McKinlay, 2nd Ed., 2007, Pearson Education India.
5. Microprocessor and Microcontrollers, N. Senthil Kumar, 2010, Oxford University Press
6. 8051 microcontrollers, Satish Shah, 2010, Oxford University Press.
7. Embedded Systems: Design & applications, S.F. Barrett, 2008. Pearson Education India
8. Introduction to embedded system, K.V. Shibu, 1st edition, 2009, McGraw Hill

ELECTRONICS LABORATORY

ELB-303P: Communication Electronics, Microprocessor and Microcontroller Lab

The scheme of practical examination will be as follows-

Experiment & Project Work	--	**30 (20+10)**
Viva (Practical + Project)	--	**10 (5+5)**
Sessional	--	**10**
Total	--	**50**

Min.Marks :17 **Max. Marks 50**

A student is required to do at least 10 experiments and project work in an academic year. The scheme of practical examination will be as follows-

(i) One experiment and working and demonstration of project works-

Marks

Experiment	20
Viva-voce	05
Sessional	10
Project work & viva	15 (10+5)
Total	50

List of Experiments:

1. Study of AM generation and detection.
2. Radio receiver measurements.
3. Study of low pass, band pass and high pass filters.
4. Study of FM using voltage controlled oscillator.
5. Study of Choppers.
6. Study of pulse code modulation.
7. Addition of two binary numbers with microprocessor (8086).
8. Subtraction of two binary numbers with microprocessor (8086).
9. Multiplication of two binary numbers with microprocessor (8086).
10. Division of two binary numbers with microprocessor (8086).
11. Data transfer from memory to register and vice versa using 8086 microprocessor.
12. Interfacing of 8255 with 8086 microprocessor.
13. Subtraction of two binary numbers with 8051 microcontroller.
14. Multiplication of two binary numbers with 8051 microcontroller.
15. Division of two binary numbers with 8051 microcontroller.
16. I/O programming in 8051 microcontroller.

Note:

1. Out of above mentioned sixteen experiments at least ten experiments should be done..
2. Other experiments of equal standard may also be set.

B. Sc. Bioscience

Scheme of Examination

Paper	Name of Paper	Max Marks	Total Marks	Min Marks
B.Sc. I Year				
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

22/02/2023

22-2-23

Syllabus	
B.Sc. III Year	
Paper – I	**Plant and Animal Physiology, Development and Biochemistry**
Unit – I	Plant water relations: Importance of water to plant life, Physical properties of water, Diffusion and Osmosis, Ascent of sap, Physiology of stomatal movement. Transpiration. Photosynthesis: light reaction & dark reaction: C3, C4 and CAM metabolism. Respiration: Aerobic and anaerobic respiration, Glycolysis, Fermentation, Krebs cycle, ETC, oxidative phosphorylation.
Unit – II	Nitrogen Metabolism: Biology of nitrogen fixation; Nitrogenase. Structure, function and regulation of Nitrate Reductase and Nitrite Reductase, Assimilation of Ammonia Photomorphogenesis: Photochemical and biochemical properties of phytochrome Phytohormones: Structure, function and applications of Auxin, Gibberlic acid, Cytokinin, Abscisic acid and Ethylene.
Unit – III	Physiology of digestion and absorption of dietary components Physiology of heart, cardiac cycle, ECG and Blood Coagulation Respiration: mechanism and control of breathing
Unit – IV	Excretion: Physiology of excretion, osmoregulation Physiology of muscle contraction Physiology of nerve impulse, Synaptic transmission Endocrine system and physiology of reproduction
Unit – V	Gametogenesis-spermatogenesis and oogenesis; Mechnism of Fertilization in invertebrates and vertebrates; Types and patterns of cleavage; Blastulation and fate map construction in chick; Gastrulation; Competence, determination, differentiation, induction and regeneration In-vitro fertilization, embryo transfer technique, collection and preservation of gametes; parthenogenesis

Paper – II	**Biostatistics, Computer and Bioinformatics**
Unit – I	Nature and scope of statistical methods and their limitations, Data compilation, classification, tabulation and applications in life sciences, graphical representation, computation of mean, median, mode and standard deviation.
Unit – II	Sampling methods – simple random, stratified, systemic and cluster sampling procedures, analysis of variance, Tests of significance based on *t* and chi-square.
Unit – III	Classification of computers – computer generation, low, medium and high level languages, software and hardware, operating systems, compilers and interpreters, personal, mini, main frame and super computers. Computer memory and its types, Input-output devices, secondary storage media.
Unit – IV	Application software: word-processing software, and spreadsheet. Microsoft excel: Data entry, graphs, formulas and functions Computer networks: Basic concepts on LAN and WAN and internet systems. search engines

22/2/23 22.2.23 22/02/2023

Unit – V	Bioinformatics and its relation with molecular biology. Tools (FASTA, BLAST, BLAT, RASMOL), databases (GENBANK, Pubmed, PDB) and software (RASMOL). Data generation; Generation of large scale molecular biology data. (Through Genome sequencing, Protein sequencing, Gel electrophoresis and microarray). Applications of Bioinformatics

Practical	1. Measurement of osmotic potential of cell sap by plasmolytic method. 2. Determination of osmotic potential of cell sap by gravimetric method. 3. Estimation of Nitrate reductase activity: *In-vivo* and *In-vitro*. 4. Estimation of osmotic potential of cell sap by Chardakows method. 5. Extraction and estimation of chlorophyll-a, chlorophyll-b and total chlorophyll content. 6. Bioassay of Auxin using wheat coleoptiles. 7. Bioassay of Cytokinin by using cucumber cotyledons. 8. To determine Percent germination, Germination index, Mean daily germination and Peak value of given seed lots. 9. Microscopic examination & preparation of tissues in selected animal models 10. Virtual dissection of alimentary canal in mammalian and non-mammalian models (Alternative methods: By Clay/Thermacol/drawing/Model etc.) 11. Qualitative and quantitative determination of digestive enzymes 12. Virtual dissection of cranial nerves in selected animal models (Alternative methods: By Clay/Thermacol/drawing/Model etc.) 13. Chemical analyses of urine 14. Study of structure of egg of hen and vital staining of the embryo 15. Window preparation in hen egg 16. Whole mount preparations of chick embryos 17. Types of egg-study 18. Live gametes under microscope 19. Living chick embryo-observations 20. Construction of frequency distribution curve. 21. Computation of measures of central tendency and dispersion. 22. Exercises on presentation of data. 23. Hypothesis testing: *t-test*, χ^2*-test*. 24. Study of different components of a computer system. 25. Exercise on word processing package (MS Word) 26. Exercise on Excel package. 27. Exercise on Internet use 28. Primer designing and specificity verification 29. Sequence identification, sequence similarity match or sequence BLAST 30. Identification of conserved regions of following genes and proteins and determination of homology [sequance similarity] in different plants and animals: a- Gene sequence of 18SrRNA, Actin, Tubulin, Superoxide dismutase, Ctalase b- Late embryogenic abundant protein [LEA], Heat shock proteins

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

	[HSP] and peroxiredoxins [Prx] 31. Identification of SNPs & SNP database

Books Recommended	1. Fosket DF: Plant Growth & Development 2. Leopold AC & Kriedemann PE: Plant Growth & Development 3. L Taiz & E Zeiger: Plant Physiology 4. BB Buchanan, W Gruissem & RL Jones Biochem. & Molecular Biology of Plants 5. MB Wilkins: Advanced Plant Physiology 6. JA Hopkins: Introduction to Plant Physiology 7. FB Salisburry & CW Ross: Plant Physiology 8. Animal Physiology: Mechanisms and Adaptations - Roger Eckert, David J. Randall, George Augustine, Published by W.H. Freeman, 1988 9. Textbook of Medical Physiology - Arthur C. Guyton, Published by Saunders, 2000 10. Review of Medical Physiology - William F. Ganong, Published by McGraw-Hill Professional, 2005 11. Human Physiology – C.C. Chatterjee, Published by Medical Allied Agency, Kolkata, 2002 12. Balinsky: Introduction to Embrology, CBS College Publishers 13. Berril, NJ: Developmental Biology, Tata-McGraw Hill 14. Davenport: An outline of animal developmental, Addison-Werley 15. Gilbert SF: Developmental Biology, Sinauer Associates, Massachusetts 16. Grant: Biology of Development Systems 17. Subramanyam, T: Developmental Biology, Narosa Publising House 18. Rao, KV: Developmental Biology: A Modern Synthesis, Oxford-IBH Publishers 19. Campbell RC: Statistics for biologists 20. Snedecor GW & Cochran WG: Statistical Methods 21. Sokal RR & Rohlf FJ: Introduction to Biostatistics 22. Zar JH: Biostatistical Analysis 23. Khan and Khanum: Fundamentals of Biostatistics 24. Shrivastava Chetan: Fundamentals of Information Technology 25. S.K. Bajpai & D.S. Yadav: Introduction to Computer & C Programming 26. S. Banerjee: MS Word –2000 Thumb Rules & Details 27. S. Govindrajan, M. Chandrashekaran, A.A. Haq, T.R. Narayanan: Introduction to Computer Science 28. Gupta Kamlesh, Chawla P.K.: An Introduction to Computer Science 29. Animesh K. Datta (2007) "Basic Biostatistics and it's application"First Edition, New Central Book Agency, Ltd, Kolkata. 30. Baxevanis, A.D. and Francis Ouellellette, B.F. (1998) "Bioinformatics–a practical guide" 31. Mount, D. (2004) "Bioinformatics: Sequence and Genome Analysis"; Cold Spring Harbor Laboratory Press, New York. 32. Sharma, V. Munjal, A. and Shankar, A. (2008) "A text book of Bioinformatics" first edition, Rastogi Publication, Meerut – India.

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 ABID)

Part A Introduction				
Program: **DegreeCourse**		Class: **B.Sc. IIIYear**	Year: **2022**	Session:2024-2025
S.No.				
1	Course Code	GEOL- 5T		
2	Course Title	(Palaeontology& Stratigraphy) Paper I		
3	Course Type	Theory		
4	Pre-requisite-(if any)	To study in this class, students must have passed B.Sc. Part 2 class with Geology subject.		
5	Course Learning Outcomes (CLO)	At the end of the course, the students will be able to – • Understand modes of fossilization and uses of fossils. • Identify Gondwana plant fossils. • Describe morphology, geological distribution of Brachiopods, Lamellibranches. • Describe morphology, geological distribution of Trilobites, Gastropods, Graptolites and Echinoids. • Understand the principles of Stratigraphy and details of Geological Time scale • Understand Indian stratigraphic systems of Archean, Dharwar, Cuddapah, and VindhyanSupergroups • Describe the Geological Time events of The Paleozoic, Gondwana, Triassic, Jurassic and Cretaceous and the Tertiary rocks		
6	Credit Value	04		
7	Total Marks	Maximum Marks: 50	Min. Marks 17	

Part B Content of the Course		
Total Periods: 60		
Unit	**Topics**	**No. of Periods**
I	**Palaeontology:** Palaeontology:Fossils- definition, essentials and modes of fossilization.Uses of fossils, Derived fossils, Index fossils & their significance, Use of Palaeontology in Stratigraphy,Palaeoecology&Palaeogeography, Brief idea about Micropalaeontology and its significance, Introduction to Gondwana plant fossils.	12
II	**Palaeontology:** Morphology and Geological distribution of Foraminifera &Anthozoa fossils, Morphology and Geological distribution of Gastropoda and Lamellibranchiafossils, Morphology and Geological distribution of Cephalopoda, Morphology and Geological distribution of Echinoidea&Brachiopoda fossils, Morphology and Geological distribution of Trilobite and Graptolite fossils.	12

III	**Stratigraphy :** Principles of Stratigraphy, Geological Time Scale: Various divisions of Geological Time Scale, their nomenclature and type area, Basic concepts of Lithostratigraphic, Chronostratigraphic&BiostratigraphicUnits,Tectonic& Physical Subdivisions of Indian subcontinent.Distribution, classification and Economic importance ofArchaeozic rocks of India (Dharwar), Stratigraphy & Economic Importance of Archaeozic rocks of Bastar (Chhattisgarh).	12
IV	**Stratigraphy :** Distribution, stratigraphy and Economic importance of Vindhyan& Chhattisgarh Supergroup of rocks, Stratigraphy, Palaeoclimate, Geographical, Geological distribution & economic importance of GondwanaSupergroup, Stratigraphy, distribution and age of Deccan-traps, Stratigraphy, distribution and fossil contents of intertrappean and infratrappean(Bagh&Lameta) Beds. Distribution, Stratigraphy and Palaeontology of Palaeozoic rocks of Salt Range.	12
V	**Stratigraphy :** Distribution, Stratigraphy and Economic importance of Palaeozoic rocks of Spiti Valley, Stratigraphy, Distribution, Fossil content of Cretaceous rocks of Trichonopoly, Stratigraphy, distribution, Fossil content &Economic importance of Jurassic rocks of Kutchh-Region, Distribution, Stratigraphy, economic importance of Tertiary rocks of Assam-Region, Distribution, Stratigraphy and Palaeontological importance of Siwalik group of rocks.	12

Part C

Learning Resources

Suggested Readings

1) जीवाश्मविज्ञान के सिद्धांत–डॉ. अंबिकाप्रसादअग्रवाल
(2) जीवाश्मविज्ञान–डॉ. आर.पी. मिश्रा
(3) अकशेरूकी एवंकशेरूकीय जीवाश्मविज्ञान–डॉ. दीपकराजतिवारी
(4) भारतवर्षकाभूविज्ञान–डॉ.अंबिकाप्रसादअग्रवाल
(5) प्रायोगिकभूविज्ञान भाग–3–डॉ. गुप्ता, पुनवटकर, रघुवंशी
(6) Invertebrate Palaeontology- H.Woods.
(7) Introduction to Palaentology- A.N. Davis.
(8) An Introduction to Invertebrate Palaeontology- P.G. Jain & M.S.Anantharaman
(9) Historical Geology of India- Ravindra Kumar
(10) Geology of India- R.Vaidyanadhan&M.Ramkrishnan (Geol. Soc. Ind. Publication)

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:**DegreeCourse**		Class: **B.Sc. III Year**	Year: **2022**	Session:2024-2025
S.No.				
1	Course Code	GEOL- 6T		
2	Course Title	Earth Resources & Applied Geology (Paper II)		
3	Course Type	Theory		
4	Pre-requisite (if any)	To study in this class, students must have passed B.Sc. Part 2 class with Geology subject.		
5	Course Learning Outcomes (CLO)	• This course of B.Sc. Geology enables the students to understand origin, occurrence, formation process and distribution in the Indian Subcontinent of various economic minerals. • Knowledge about engineering properties of rocks and soils, soil groups, geological considerations in construction of damsand tunnels, Mineral exploration and mining.		
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	**Processes of mineral deposit formation :** Economic Geology: Definition and scope. Introductory idea about Ore, ore mineral, gangue mineral, tenor, grade, assay. Concept of distribution of mineral deposits in time & space in Indian context, Brief idea about classification of mineral deposits. Igneous processes of mineralization (a) Magmatic process and its Indian examples. (b)Hydrothermal processes and its Indian examples, Sedimentary processes of mineral formation. (a) Mechanical and residual concentration (b) Precipitation (c)Evaporites, Oxidation & supergene sulphideenrichment processes	12
II	**Metallic and non-metallic mineral deposits :** Geological, Geographical distribution, mode of occurrence, mineralogy & economic importance of following metallic & nonmetallic deposits of India, Iron, Manganese, Chromium, Copper, Lead, Zinc, Gold, Aluminium, Refractory and Fertilizer minerals, Minerals used in cement & chemical industries.	12

III	**Natural fuels :** Coal deposit: Origin, & stratigraphy, Types of coal: Peat, Lignite, Bituminous & Anthracite Coal deposits of Chhattisgarh, Origin of Natural-hydrocarbon, its migration & accumulation. Types of oil traps; Structural, stratigraphic and composite. Offshore & onshore oil fields of India, Radioactive minerals : Mineralogy, Geological & Geographical distribution in India, Introduction to Reconnaissance Permit(RP), Prospecting License(PL) and Mining Lease(ML).	12
IV	**Applied Geology :** Engineering geology & its importance, Engineering properties of rocks, Geological consideration for site selection of Dam and Tunnels, Elementary study of Photogeology and use of Aerial photographs in geological studies, Hydrologic cycle. Mode of occurrence of ground water, Hydrologic properties of rocks. Porosity and permeability. Brief idea about aquifer, aquiclude, aquitard and aquifuge.	12
V	**Applied Geology :** Introduction to mineral exploration. Principles and instruments of Gravity and Electrical methods of geophysical exploration. Principles and instruments of Magnetic and Seismic methods of geophysical exploration, Elementary idea about Remote Sensing and GIS and its applications, Sampling, principles of ore reserve estimation, Environmental impact of mining.	12

Part C

Learning Resources

Suggested Readings

(1) आर्थिकभूविज्ञान–कृष्णगोपालव्यास
(2) आर्थिक एवंव्यावहारिकभूविज्ञान–आर.पी. मांजरेकर
(3) भौमजलविज्ञान– एल.के. रिछारिया
(4) प्रारंभिक खनिकी–बी.के. सिंह
(5) प्रायोगिकभूविज्ञान भाग–3–गुप्ता, पुनवटकर एवंरघुवंशी
(6) Economic mineral deposits of India- Umeshwar Prasad.
(7) Economic mineral deposits- A.Bateman
(8) Ore-deposit of India- Gokhale&Rao
(9) India's Mineral Resource- S. Krishnaswami
(10) Principle of Engineering Geology &Geotechniques- Krynine& Judd.
(11) Ground-water Hydrology- D.K. Todd
(12) Courses in mining Geology- R.N.P. Arogyaswami
(13) Principle & Application of photogeology- S.N. Pandey.
(14) Ground water- Assessment, Development & Management- K.R. Karanth
(15) Geophysical methods in Geology- P.V. Sharma.
(16) Environmental Geology- K.S. Valdiya (1987)

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 Atal Bihari Bajpai University Bilaspur on 3rd June 2022.

S.No	Name	College	Designation	Signature
1	Prof. Mahfooz Arif	Govt.E.Raghvendra Rao Science college, Bilaspur(C.G.)	Chairman	
2	Prof.Ramesh Joshi	Govt.Kaktiya PG College, Jagdalpur, Bastar (C.G.)	Member	
3	Prof.Pradeep Singh Gour	Bhanu Pratap Deo Govt.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.Amitanshu Shekhar Jha	Govt.Kaktiya PG College, Jagdalpur, Bastar (C.G.)	Member	
7	Prof.Sunil A.K.Kerketta	Rajiv Gandhi Govt.PG College, Ambikapur (C.G.)	Member	Present online
8	Dr. Ninad Bodhankar	Prof. & Head Department of Geology & WRM SOS in Geology, Pt. RS University Raipur	Member	Present online
9	Dr. Sandeep Vansutre	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. Bhargava Ayangar	Department of Applied Geology.NIT Raipur	Member	Present online

Part A Introduction				
Program: **DegreeCourse**		Class: **B.Sc. III Year**	Year: **2022**	Session:2024-2025
S.No.				
1	Course Code	GEOL - 3P		
	Course Title	Palaeontology, Stratigraphy, Earth Resources & Applied Geology (Paper Practical)		
	Course Type	Practical		
	Pre-requisite (if any)	This practical course is related to theory course Geology Paper I& II.		
	Course Learning Outcomes (CLO)	On completion of course, the students will be able - • Identify ore forming minerals in hand specimen. • Demarcate ore deposits and economic mineral deposits in Outline map of India. • Estimate the ore reserves from the given data. Interpret aerial photographs with the help of stereoscope. • Visually interpret satellite Imageries. • Construct and interpret water table maps on the basis of given data. • Identify various invertebrate and plant fossils on the basis of their morphological characters.		
	Credit Value	Practical : 2		
	Total Marks	Maximum Marks: 50	Minimum Passing Marks : 17	

Part B1 Content of the Course	
Palaeontology& Stratigraphy	
Topics	**No. of Periods**
Study of morpholgy of fossils belonging to various phyla.	3
Study of Important plant fossils	3
Representation of Litho units & Stratigraphic Units in outline map of India.	3
Sketching of physiographic division of India.	3
Palaeoecological studies of plant Fossils	3

Part B2 Content of the Course	
Earth Resources & Applied Geology	
Topics	**No. of Periods**
Study of important metallic/nonmetallic minerals on the basis of physical & optical properties &Magascopic studies of coal & its varieties.	3
Distribution of main metallic/nonmetallic deposits within outline map of India.	3
Study of hydrologic properties of rocks, Preparation of hydrological maps.	3
Exercises related with mineral exploration; Reserve calculation, Tonnage factor calculation,Exercises related with drilling.	3
Study of Aerial photographs with the help of stereoscopes. & Study of satellite imageries.	3
Field work of seven days is compulsory for the students.	

Part C
Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings

(1) जीवाश्मविज्ञान के सिद्धांत–डॉ.अंबिकाप्रसादअग्रवाल
(2) जीवाश्मविज्ञान–डॉ. आर.पी. मिश्रा
(3) अकशेरूकी एवंकशेरूकीय जीवाश्मविज्ञान–डॉ. दीपकराजतिवारी
(4) भारतवर्षकाभूविज्ञान–डॉ.अंबिकाप्रसादअग्रवाल
(5) प्रायोगिकभूविज्ञान भाग–3–डॉ. गुप्ता, पुनवटकर, रघुवंशी
(6) Invertebrate Palaeontology- H.Woods.
(7) Introduction to Palaentology- A.N. Davis.
(8) An Introduction to Invertebrate Palaeontology- P.G. Jain & M.S.Anantharaman
(9) Historical Geology of India- Ravindra Kumar
(10) Geology of India- R.Vidhyanathan&M.Ramkrishna (GSI Publication)
(11) Geology of India & Burma- M.S. Krishnan.
(12) आर्थिकभूविज्ञान–कृष्णगोपालव्यास
(13) आर्थिक एवंव्यावहारिकभूविज्ञान–आर.पी. मांजरेकर
(14) भौमजलविज्ञान– एल.के. रिछारिया
(15) प्रारंभिक खनिकी–बी.के. सिंह
(16) प्रायोगिकभूविज्ञान भाग–3–गुप्ता, पुनवटकर एवंरघुवंशी
(17) Economic mineral deposits of India- Umeshwar Prasad.
(18) Economic mineral deposits- A.Bateman
(19) Ore-deposit of India- Gokhale&Rao
(20) India's Mineral Resource- S. Krishnaswami
(21) Principle of Engineering Geology &Geotechniques- Krynine& Judd.
(22) Ground-water Hydrology- D.K. Todd
(23) Courses in mining Geology- R.N.P. Arogyaswami
(24) Principle & Application of photogeology- S.N. Pandey.
(25) Ground water- Assessment, Development & Management- K.R. Karanth
(26) Geophysical methods in Geology- P.V. Sharma.
(27) Environmental Geology- K.S. Valdiya (1987)

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. Chhatisgarh. 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

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: **Degree Course**		Class: **B.Sc.-CS III Year**	Year: **2022**	Session:2022-2023
1.	Course Code	**COMP-5T**		
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: 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	**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=6ZGVZ7gUeeE&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
7. Computer Networking
   https://www.tutorialspoint.com/data_communication_computer_network/index.htm

Part D: Assessment and Evaluation

Maximum Marks: 50

Declaration

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

1. Dr. H.S. Hota - Chairman
   Prof. and Head, Dept. of Computer Science and Application
2. Dr. Sanjay Kumar - Member
   Prof. and Head, SoS in Computer Science, Pt. Ravishankar Shukla University, Raipur
3. Mr. Jitendra Kumar - Member
   Asst. Prof., Dept. of Computer Science and Application
   Atal Bihari Vajpayee Vishwavidyalaya, Bilaspur
4. Mr. H.S.P. Tonde - Member
   Asst. Prof. and Head, Dept. of Computer Science,
   Sant Gahira Guru University Sarguja, Ambikapur
5. Dr. Mamta Singh - Member
   Asst. Prof. and Head, Sai College, Bhilai
   Hemchand Yadav Vishwavidyalaya, Durg
6. Mr. Sushil Kumar Sahu - Member
   Asst. Prof. and Head, Christ College, Jagdalpur
   Shaheed Mahendra Karma Vishwavidyalaya, Bastar
7. Mr. Vikrant Gupta - Member
   Prof. and Head, Batmul Ashram College, Salheana
   Shaheed Nand Kumar Patel University, Raigarh
8. Mr. L.K. Gavel - Member
   Asst. Prof. and Head, Govt. Ghanshyam Singh Gupt, PG College, Balod
   Hemchand Yadav Vishwavidyalaya, Durg
9. Dr. Anil Kumar Sharma - Member
   Asst. Prof. and Head, A.P.S.G.M.N.S, Govt. PG College, Kawardha
   Hemchand Yadav Vishwavidyalaya, Durg
10. Mr. Vishwnath Tamrakar - Member
    Asst. Prof. and Head, Sant Guru Ghasidas Govt. PG College, Kurud,
    Pt. Ravishankar Shukla University, Raipur
11. Ms. Anjeeta Kujur - Member
    Asst. Prof. and Head, Govt. R.B.R.N.E.S. PG College, Jashpur
    Sant Gahira Guru University Sarguja, Ambikapur
12. Mr. Suresh Kumar Thakur - Member
    Asst. Prof. and Head, Indira Gandhi Govt. PG College, Vaishali Nagar
    Hemchand Yadav Vishwavidyalaya, Durg
13. Dr. Ugrasen Suman - Member
    Prof. and Head, Dept. of Computer Science (Present Online)
    Devi Ahila Vishwavidyalaya, Indore

Date : 03.06.2022

Part A: Introduction

Program: **Degree Course**	Class: **B.Sc.-CS III Year**	Year: **2022**	Session:2022-2023

1.	Course Code	**COMP-6T**
2.	Course Title	**Relational Database Management System**
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: • Learn about Database Concepts, Architecture, various Users, Data Models and Data Management which helps them to interact with various Databases. • Develop various Tables and Databases which helps them to develop new Software. • Practice various SQL commands which help them to generate new relationships among various Tables and Databases which are useful for Software Development. • Familiar about RDBMS Software like Oracle and SQL Server which are used as Backend for Software Development. • Develop new Databases for their Minor and Major Project Development which enhances their Data Storage, Data Accessibility and Data Management.
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	**Overview of Database Management**: Data, Information and Knowledge, Data Processing versus Data Management. File Oriented Approach verses Database Oriented Approach, Data Independence, Database Administration Roles. Overview of Database, DBMS Architecture, Different kinds of DBMS users. Introduction to Data Dictionary. Data Models: Network Model, Relational Model, Hierarchical Model. Database Languages: DDL, DML, DCL, And TCL. Structured Query Language: Basic Data Types, Commands : Create, Insert, Select, Delete, Truncate , Drop, Alter, Grant ,Revoke, Commit, Rollback, Queries on Multiple Relation, Join Operation, String Operation, Set Operation, Grouping, Nested Subqueries.	12
II	**Concepts of Database Management System :** Definition of Tables, Cardinality relationships in a Database, Constraints in a Database, Entity, Attributes, Strong and weak entities, ER-Diagram, Symbols and Implementation, Concept of keys: Candidate key, Primary key, Alternate key, Foreign key, Case studies of ER modeling Generalization, Specialization and Aggregation. Converting an ER model into relational Schema, Extended ER features.	12
III	**Relational Database Design:** Normalization concept in logical model, Pitfalls in database design, Functional dependencies, Join dependencies, Natural Join, Normal forms (1NF, 2NF, 3NF), Boyce Codd Normal form, Decomposition, Multi-Valued Dependencies, 4NF, 5NF. Issues in physical design: Concepts of indexes, File organization for relational tables, De-normalization. Relational Database: Structure of Relational Database, Schema, Relational Operation:	12

	Database: Structure of Relational Database, Schema, Relational Operation: Selection, Projection, Cartesian Production, Union, Intersection and Minus operation. Relational Algebra: Select operation, Project operation, Union operation, Cartesian Product operation, Intersection operation, Join operation, Different types of joins (Inner join, Outer join, Self join).	
IV.	**SQL Server Basics:** Microsoft SQL Server 2019, Overview of SQL Server 2019, Versions of SQL Server, Installation of SQL Server 2019, SQL Server Management Studio(SSMS), Azure Data Studio(ADS), Features of SQL Server Express, SQL Server Support Life Cycle. Data Definition Language (DDL) Commands, Data Manipulation Language (DML) Commands, Data Control Language (DML) Commands, Transaction Control Language (TCL) Commands, Data Constraints, Stored Procedure, Function .	12
V.	**Oracle Basics:** Oracle Corporation, Versions of Oracle, Oracle Products, Oracle Installation, Oracle Client and Server Products, Online Transaction Processing, Hybrid cloud Installation. Data Definition Language (DDL) Commands, Data Manipulation Language (DML) Commands, Data Control Language (DML) Commands, Transaction Control Language (TCL) Commands, Data Constraints, Introduction to PL/SQL Programming, Data Types, Looping Statements, Cursors, Stored Procedure, Function .	12
Keywords: Data Models, Keys, SQL Commands, DBMS, RDBMS, Oracle, SQL Server.		

Part C - Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings:

1. Database system concept, H. Korth and A. Silberschatz, TMH Publications.
2. Data Base Management System, Alexies & Mathews,Vikash publication.
3. Data Base Management System, C. J. Date ,Narosha Publication.
4. Data Base Management System By James Matin.
5. Principles of Database System By Ullman.
6. Program Design, Peter Juliff, PHI Publications.
7. The Complete Reference, Kevin Loney, Oracle Press.
8. SQL, PL/SQL The Programming Language of Oracle, Ivan Bayross , PustakKosh Publication.
9. Microsoft SQL Server Management and Administration, Ross, STM Publications.

E Resources:

1. SWAYAM URL link for DBMS and RDBMS: https://youtu.be/f6LGtJutWyA
2. SWAYAM URL link for DBMS and RDBM: https://youtu.be/IoL9Ve2SRwQ
3. SWAYAM URL link for DBMS and RDBMS: https://**swayam**.gov.in/courses/4434-data-base-management-system.
4. Introduction of DBMS: https://onlinecourses.swayam2.ac.in/cec19_cs05/preview
5. Introduction of RDBMS: https://onlinecourses.nptel.ac.in/noc19_cs46/preview
6. DMBS Contents from W3SHOOL: https://www.w3schools.in/dbms/intro
7. Data independence from W3SHOOL: https://www.w3schools.in/dbms/data-independence
8. Generalization and Aggregation: https://www.w3schools.in/dbms/generalization-aggregation
9. DMBS Contents from Javatpoint: https://www.javatpoint.com/dbms-tutorial

Part D: Assessment and Evaluation
Maximum Marks: 50

Declaration

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

1. Dr. H.S. Hota - Chairman
   Prof. and Head, Dept. of Computer Science and Application
2. Dr. Sanjay Kumar - Member
   Prof. and Head, SoS in Computer Science, Pt. Ravishankar Shukla University, Raipur
3. Mr. Jitendra Kumar - Member
   Asst. Prof., Dept. of Computer Science and Application
   Atal Bihari Vajpayee Vishwavidyalaya, Bilaspur
4. Mr. H.S.P. Tonde - Member
   Asst. Prof. and Head, Dept. of Computer Science,
   Sant Gahira Guru University Sarguja, Ambikapur
5. Dr. Mamta Singh - Member
   Asst. Prof. and Head, Sai College, Bhilai
   Hemchand Yadav Vishwavidyalaya, Durg
6. Mr. Sushil Kumar Sahu - Member
   Asst. Prof. and Head, Christ College, Jagdalpur
   Shaheed Mahendra Karma Vishwavidyalaya, Bastar
7. Mr. Vikrant Gupta - Member
   Prof. and Head, Batmul Ashram College, Salheana
   Shaheed Nand Kumar Patel University, Raigarh
8. Mr. L.K. Gavel - Member
   Asst. Prof. and Head, Govt. Ghanshyam Singh Gupt, PG College, Balod
   Hemchand Yadav Vishwavidyalaya, Durg
9. Dr. Anil Kumar Sharma - Member
   Asst. Prof. and Head, A.P.S.G.M.N.S. Govt. PG College, Kawardha
   Hemchand Yadav Vishwavidyalaya, Durg
10. Mr. Vishwnath Tamrakar - Member
    Asst. Prof. and Head, Sant Guru Ghasidas Govt. PG College, Kurud,
    Pt. Ravishankar Shukla University, Raipur
11. Ms. Anjeeta Kujur - Member
    Asst. Prof. and Head, Govt. R.B.R.N.E.S. PG College, Jashpur
    Sant Gahira Guru University Sarguja, Ambikapur
12. Mr. Suresh Kumar Thakur - Member
    Asst. Prof. and Head, Indira Gandhi Govt. PG College, Vaishali Nagar,
    Hemchand Yadav Vishwavidyalaya, Durg
13. Dr. Ugrasen Suman - Member (Present Online)
    Prof. and Head, Dept. of Computer Science
    Devi Ahila Vishwavidyalaya, Indore

Date 03-06-2022

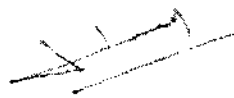
Part A: Introduction				
Program: **Degree Course**		Class: **B.Sc.-CS III Year**	Year: **2022**	Session:**2022-2023**
1	Course Code	**COMP-3P**		
2	Course Title	**LAB 3: Relational Database Management System**		
3	Course Type	**Practical**		
4	Pre-requisite (if any)	Basic Knowledge of SQL		
5	Course Learning. Outcomes (CLO)	At the end of course, Students will be able to: • Learn about Database Concepts, Architecture, various Users, Data Models and Data Management which helps them to interact with various Databases. • Develop various Tables and Databases which helps them to develop new Software. • Practice various SQL commands which helps them to generate new relationships among various Tables and Databases which are useful for Software Development. • Familiar about RDBMS Software like Oracle and SQL Server which are used as Backend for Software Development. • Develop new Databases for their Minor and Major Project Development which enhances their Data Storage, Data Accessibility and Data Management.		
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. 1. Design an employee table in Oracle/SQL Server having eid(primary key) ename, edesignation, edoj, edob, eaddress, salary, econtact as fields and answer the following questions : a) Insert five records in above created table. b) Display all five records. c) Delete the fourth record. d) Update the third record of field ename as 'hari'. e) Add one new field in the table. 2. Design a salary table Oracle/SQL Server with one primary key and foreign key(employee table) having following fields :

Month, working days, deptid, gross, incentive, deduction and net salary.

a) Insert five records in above created table.
b) Display all five records.
c) Use foreign key relation and display records.
d) Update the second record of field deptid as 'Sales'.
e) Add one new field in the table.

3. Create a new user in Oracle/SQL Server.
4. Create a view in Oracle/SQL Server.
5. Create a new table in Oracle/SQL Server and practice for join operation.
6. Create a new user in Oracle/SQL Server and practice for commit and rollback command.
7. Create a new database in Oracle/SQL Server having atleast five tables for Hotel Management System.
8. Create a new database in Oracle/SQL Server having atleast four tables for Covid Vaccination Management System.
9. Create a new database in Oracle/SQL Server having atleast five tables for Library Management System.
10. Create a new table in Oracle/SQL Server and practice for Group by and Order by Clause.
11. Create a new table in Oracle/SQL Server and practice for max(), min(), avg() and count() functions.
12. Create a new table in Oracle/SQL Server and practice for lower(), substr(),trim() and upper() functions.
13. Create a new table in Oracle/SQL Server and practice for unique and check constraint.
14. Create a new table in Oracle/SQL Server and practice for any two date formats.
15. Create a new table in Oracle/SQL Server and practice for using clause.
16. Create a new table in Oracle/SQL Server and practice for having clause with sub queries.
17. Create a new table in Oracle/SQL Server and practice for alias in any table.
18. Create a new table in Oracle/SQL Server and practice for inner and outer join.
19. Create a new table in Oracle/SQL Server and practice for Drop command.
20. Write a PL/SQL program for addition of two numbers .
21. Write a PL/SQL program to find the factorial value of any entered number.
22. Write a PL/SQL program for swapping of two numbers.



	23) Write a PL/SQL program to print first ten Natural Numbers. 24) Write a PL/SQL program to generate even series upto five digits starting from 2 and sum all the terms. 25) Write a PL/SQL program to practice for implicit and explicit cursor.

Part C - Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings:

1. Database system concept , H. Korth and A. Silberschatz, TMH Publications .
2. Data Base Management System, Alexies & Mathews,Vikash publication.
3. Data Base Management System, C. J. Date ,Narosha Publication.
4. Data Base Management System by James Matin.
5. Principles of Database System by Ullman.
6. Program Design, Peter Juliff, PHI Publications.
7. The Complete Reference, Kevin Loney, Oracle Press.
8. SQL, PL/SQL The Programming Language of Oracle, Ivan Bayross , PustakKosh Publication.
9. Microsoft SQL Server Management and Administration, Ross, STM Publications.

E Resources:

1. SWAYAM URL link for DBMS and RDBMS: https://youtu.be/f6LGtJutWyA
2. SWAYAM URL link for DBMS and RDBM: https://youtu.be/loL9Ve2SRwQ
3. SWAYAM URL link for DBMS and RDBMS : https://**swayam**.gov.in/courses/4434-data-base-management-system

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 50
Continuous Comprehensive Evaluation (CCE): Not Applicable
University Exam(UE): 50 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable

Declaration

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

1. Dr. H.S. Hota - Chairman
   Prof. and Head, Dept. of Computer Science and Application
2. Dr. Sanjay Kumar - Member
   Prof. and Head, SoS in Computer Science, Pt. Ravishankar Shukla University, Raipur
3. Mr. Jitendra Kumar - Member
   Asst. Prof., Dept. of Computer Science and Application
   Atal Bihari Vajpayee Vishwavidyalaya, Bilaspur
4. Mr. H.S.P. Tonde - Member
   Asst. Prof. and Head, Dept. of Computer Science,
   Sant Gahira Guru University Sarguja, Ambikapur
5. Dr. Mamta Singh - Member
   Asst. Prof. and Head, Sai College, Bhilai
   Hemchand Yadav Vishwavidyalaya, Durg
6. Mr. Sushil Kumar Sahu - Member
   Asst. Prof. and Head, Christ College, Jagdalpur
   Shaheed Mahendra Karma Vishwavidyalaya, Bastar
7. Mr. Vikrant Gupta - Member
   Prof. and Head, Batmul Ashram College, Salheana
   Shaheed Nand Kumar Patel University, Raigarh
8. Mr. L.K. Gavel - Member
   Asst. Prof. and Head, Govt. Ghanshyam Singh Gupt, PG College, Balod
   Hemchand Yadav Vishwavidyalaya, Durg
9. Dr. Anil Kumar Sharma - Member
   Asst. Prof. and Head, A.P.S.G.M.N.S, Govt. PG College, Kawardha
   Hemchand Yadav Vishwavidyalaya, Durg
10. Mr. Vishwnath Tamrakar - Member
    Asst. Prof. and Head, Sant Guru Ghasidas Govt. PG College, Kurud,
    Pt. Ravishankar Shukla University, Raipur
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

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: **B.Sc. Course**		Class: **B.Sc. III Year**	Year: **2024**	Session:**2024-2025**
1	Course Code	BIOT-5T		
2	Course Title	**Plant, Environmental and Industrial Biotechnology**		
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: • learn the basics of plant tissue culture • learn the application of GMO plants • learn about basics of Environmental Biotechnology and its management • learn the basics of Biological degradation of pollutant • learn the basics of Bioreactor		
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.Introduction to Plant cell and tissue culture: History Scope and Applications; Tissue culture media 2. Micropropagation, Somatic embryogenesis, Organogenesis, Somaclonal variations 3. Protoplast isolation and fusion, Anther and Ovule culture, Triploid production	12 Periods / 08 Hours
2	1.Agrobacterium mediated Transformation, Ti & Ri Plasmid 2. Bt gene and its applications, Edible vaccine; Genetically modified plants: Herbicide resistant Plant and drought resistant plants 3. Germplasm storage and cryopreservation	12 Periods / 08 Hours
3	1. Environmental Biotechnology: Introduction and scope 2. Environmental pollution and its types, Global environmental problems (Acid rain, Ozone depletion, Global warming) 3. Solid Waste management: Principle of management, Concept of composting and Vermicomposting 4. Wastewater Treatment: Primary, Secondary and Tertiary treatment	12 Periods / 08 Hours
4	1.Biofertilizer and Biopesticides: types and applications 2. Bioremediation and Biodegradation of Xenobiotics: Phytoremediation, Bioleaching 3. Biological indicators of pollution, Biotechnological method of pollution management	12 Periods / 08 Hours
5	1. Types of Bioreactor: Design of Stirred tank, Fluidized bed 2. Fermentation: Lactic acid & Alcohol 3. Industrially important microoganisms: Isolation, Preservation (Slant, Mineral Oil and Lyophilize) and its application) 4. Food Technology: Production of fermented foods (Chees, Butter milk & Yoghourt), Food spoilage, Canning, Packing and Food Preservation	12 Periods / 08 Hours
Keywords: Plant cell and Tissue culture, Agrobacterium, Waste water treatment, Bioremediation, Bioreactor,		

Part C - Learning Resource		
Text Books, Reference Books, Other Resources		
Suggested Readings: 1. A text Book of Biotechnology: Indu Shekher Thakur, 2nd edition. I.K. International Pvt. Ltd. New Delhi. 2. Biotechnology (Fundamentals and Applications): S.S. Purohit - Agrobios (India), Jodhpur. 3. Fundamentals of Microbiology and Immunology: Ajit Kr. Banerjee, Nirmalya Banerjee New Central Book Agency (NCBA); 1st edition (2017) 4. Plant Biotechnology: H.S. Chawla Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi. 5. Plant Biotechnology: B.D. Singh - Kalyani Publication, New Delhi. 6. Biotechnology: Fundamental & Application (2005) S.S. Purohit 7. Immunology: J. Kubey et al. 7th edition. 8. Immunology: Roitt et al. 9. Fundamental of Immunology: W. Paul. 10. Plant Tissue culture: K. K. De. 11. Plant Tissue Culture (Practical): H.S. Chawla. 12. Biochemistry & Molecular Biology of Plant: Buchanan, Gruissemen& Jones 2nd edition. 13. Tools and Techniques in Biotechnology (2011) M. Debnath **E-learning Resources** https://swayam.gov.in/ https://lecturenotes.in/subject/652/environmental-biotechnology-eb https://britannica.com https://en.wikibooks.org/wiki/Biochemistry https://nptel.ac.in https://onlinecourses.nptel.ac.in/noc21_bt41/preview		
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: B.Sc Course		Class: B.Sc. III Year	Year: 2024	Session: 2024-2025
1	Course Code	BIOT-6T		
2	Course Title	Immunology, Animal and Medical Biotechnology		
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: • learn the basics of immune system • learn about the DNA diagnostic methods • learn the types of Ag-Ab interaction • learn the basics of Animal tissue culture		
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. Concept of Immunity: Innate and Acquired, Humoral and Cell mediated Response. 2. Cells and Organs involved in Immune system-Structure and Function. 3. Antigen, Antibody: Types, Structure and Functions.	12 Periods / 08 Hours
2	1. Cytokines 2. Autoimmune diseases- Hemolytic Anemia, Rheumatoid arthritis, Insulin dependent diabetes. 3. Immuno deficiencies, Diseases-SCID, AIDS.	12 Periods / 08 Hours
3	1. Antigen-Antibody Interaction: Agglutination, Precipitation, RIA, ELISA, Immuno Electrophoresis and Immunofluorescence. 2. Immunity of Infectious Diseases: Protozoa (Malaria, Kalaazar), Bacteria (T.B., Typhoid) and Virus (Influenza, Pox). 3. Fundamental of Diseases: Swine flu, Dengue and Covid-19.	12 Periods / 08 Hours
4	1. Animal Cell Culture and Growth Media. 2. Primary, Secondary culture and Established Cell line Culture. 3. Tissue engineering: Basic Concept, Transgenic animal: Mice and Sheep.	12 Periods / 08 Hours
5	1. Hypersensitivity, Interferon and Monoclonal antibody. 2. Organ Transplantation, Biology of Cancer. 3. *In vitro* fertilization and Embryo Transfer. 4. Vaccine vectors and Nucleic acid vaccines 5. DNA in disease diagnosis (Tuberculosis and AIDS)	12 Periods / 08 Hours
Keywords: Immunity, Cytokines, Ag-Ab Interaction, Animal Cell Culture, Hypersensitivity, DNA in Disease Diagnosis.		

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

1. Fundamentals of Microbiology and Immunology: Ajit Kr. Banerjee, Nirmalya Banerjee –New Central Book Agency (P) Ltd., Kolkata.
2. Plant Biotechnology: H.S. Chawla Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
3. Plant Biotechnology: B.D. Singh - Kalyani Publication, New Delhi.
4. Biotechnology: Fundamental & Application (2005) S.S. Purohit
5. Immunology: J. Kubey et al. 7th edition.
6. Immunology: Roitt et al.
7. Fundamental of Immunology: W. Paul.
8. Biotechnology : Books and Allied Ltd : U Satyanarayana
9. Immunology : Saras Publication : Dulsy Fatima, N Arumugam

E-learning Resources

https://britannica.com
https://en.wikibooks.org/wiki/Biochemistry
https://nptel.ac.in
https://www.vedantu.com/biology/immunology
https://www.clearitmedical.com/2019/06/biology-notes-biotechnology-principles-and-processes.html
https://www.edx.org/learn/immunology

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: **B.Sc Course**		Class: **B.Sc. III Year**	Year. **2024**	Session: **2024-2025**
1	Course Code	**BIOT-3P**		
2	Course Title	**LAB 3: Applied Biotechnology**		
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: • learn to prepare Plant Tissue Culture (PTC) media • learn to perform PTC • learn to determine the quality of water • learn to perform the diagnostic test of microbial disease		
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 practical's as per requirement. 1. Preparation of Tissue culture media (ATC/PTC). 2. Sterilization of plant material (Explants). 3. Seed Germination, Root, Shoot and Callus Culture. 4. Determination of total dissolved solids of water. 5. Determination of DO, BOD, COD of water. 6. Determination of Coliform by MPN Test. 7. Production of Enzymes/Antibiotics/Acids. 8. Effect of Biopesticides on microorganism. 9. Antigen Antibody interaction- Determination of Blood Group and Rh factor. 10. Widal Test 11. VDRL Test. 12. ELISA Test. 13. Perform of Immuno-diffusion test

Part C - Learning Resource
Text Books, Reference Books, Other Resources
Suggested Readings:

1. Molecular Biotechnology: Principles and Applications of Recombinant DNA (2010) 4th ed., Glick B.R., Pasternak, J.J. and Patten, C.L., ASM Press (Washington DC), ISBN: 978-1-55581-498-4 (HC).
2. 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:10-14641- 0962-1.
3. Textbook of Biochemistry with Clinical Correlations (2011) Devlin, T.M. John Wiley & Sons, Inc. (New York), ISBN: 978-0-4710-28173-4.
4. Molecular Biochemistry (2018) DSVGK Kaladhar, RBSA Publishers ISBN 9788176117708.
5. . Introduction to Human Physiology (2013) 8th edition; Lauralee Sherwood. Brooks/Cole, Cengage Learning.

E-learning Resources:

https://britannica.com
https://en.wikibooks.org/wiki/Biochemistry
https://nptel.ac.in
https://freebookcentre.net/biology-books-download/Introduction-to-Biotechnology-Laboratory-Manual.html
http://site.iugaza.edu.ps/mwhindi/files/Laboratory_Manual_And_Workbook_In_Microbiology.pdf
https://www.vnmkv.ac.in/student-academic/Study_Material_Practical_Manual_Fundamental_of_Plant_Biochemistry_Biotechnology.pdf

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. 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: B.Sc.	Class: B.Sc. III Year	Year: 2024	Session:2024-2025
1. Course Code	BOT-5T		
2. Course Title	Plant Physiology and Ecology		
3. Course Type	Theory		
4. Pre-requisite (if any)	NO		
5. Course Learning Outcomes (CLO)	After the completion of the course the students will be able to: 1. Understand the role of Physiological and metabolic processes for plant growth and development. 2. Learn the symptoms of Mineral Deficiency in crops and their management. 3. Assimilate Knowledge about Biochemical constitution of plant diversity 4. acquaint the students with complex interrelationship between organisms and environment; 5. make them understand methods for studying vegetation, community patterns and processes,ecosystem functions, and principles of phytogeography. 6. This knowledge is critical in evolving strategies for sustainable natural resource managementand biodiversity conservation.		
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 Period
I	**Plant water relation, Mineral Nutrition, Transpiration and translocation in phloem:** Importance of water, water potential and its components; Osmosis, Diffusion, Diffusion Pressure Deficit, Plasmolysis, Imbibition, Mechanism of water absorption. Transpiration and its significance; Factors affecting transpiration; Root pressure and guttation.Criteria of essentiality of elements; Role of essential elements- micro and macro elements; Symptoms of mineral deficiency in major crops, Minerals absorption and their transport across the cell membrane, Ascent of sap, Phloem transport	12
II	**Carbon metabolism:** **Enzymes:** Structure of enzyme: holoenzyme, apoenzyme, cofactors, coenzymes and prosthetic group; mechanism of action (activation energy, lock and key hypothesis, induced- fit theory), enzyme inhibition and factors affecting enzyme activity, Allosteric enzymes & Abzymes. **Photosynthesis**: structure of chloroplast, Pigments, Absorption and Action spectra, Emerson's Enhancement effect, Photosystems, Electron transport system (Z-Scheme) and Photophosphorylation,-Carbon fixation- the Calvin cycle, Photorespiration, C4 and CAM cycle. **Respiration**-structure of mitochondria, aerobic and anaerobic respiration and fermentation, glycolysis, Krebs cycle, and electron transport system,ATP-synthase, RQ, Factors affecting respiration, Pentose phosphate pathway	12

13-6-22

III	**Nitrogen and Lipid Metabolism:** Physical and biological nitrogen fixation (examples of legumes and non-legumes), Physiology and biochemistry of nitrogen fixation, Nitrate and ammonia assimilation, reductive amination and transamination, amino acid synthesis. **Lipid Metabolism:** Synthesis and breakdown of triglycerides, alfa and beta - oxidation, glyoxylate cycle, gluconeogenesis and its role in mobilization of lipids during seed germination **Plant Development, Movements, Dormancy & Responses:** Plant growth curve, developmental roles of phytohormones (auxins, gibberellins, cytokinins, ABA, ethylene), Photoperiodism (SDP, LDP, Day neutral plants); Phytochrome (discovery,structure and functions), Seed and bud Dormancy, Vernalization &Senescence, Plant movements	12
IV	**Natural resources & Sustainable utilization; Ecology & Ecosystem:** Definition of Ecology, Ecological Factors, Positive and negative interactions. Ecosystem– Concept of structure and function of an ecosystem- trophic levels, food chain, food web, Ecological pyramids Abiotic and biotic components,-Energy flow in an ecosystem Ecological Succession-Definition & types. Processes and types (autogenic, allogenic,autotrophic, heterotrophic, primary & secondary), Hydrosere and Xerosere. Ecological Adaptations - Hydrophytes, Xerophytes	12
V	**Biodiversity**: alfa, beta and gamma diversity, social, ethical and aesthetic values; hotspots of biodiversity, threats to biodiversity, biotic communities and populations and their characteristics and dynamics. Endemic and endangered species of plants in India. Ecological niche, ecotypes, Ecotone , ecological indicators. **Conservation of Biodiversity:** Ex-situ and in-situ conservation, Red data book, botanical gardens, National park,Sanctuaries, hot & hottest spots and Bioreserves.	12

Keywords: Mineral nutrition, Carbon assimilation, Nitrogen and lipid metabolism, Natural resource management, Ecological succession, biodiversity conservation

Part C -Learning Resources

Text Books, Reference Books, Other Resources

1. Plant Physiology and Biochemistry ISBN #:81-301-0035-5Sunil D Purohit, K. Ahmed & Gotam K Kukda Edition: 2013Pages: 368 + VIII Text Book (Hindi)
2. Hopkins, W.G. &Hiiner, N.P. Introduction to Plant Physiology (3rd ed.) 2004, John Wiley & Sons.
3. A Handbook On Mineral Nutrition And Diagnostic Techniques For Nutritional Disorders of Crops (pb)ISBN :9788177543377Edition : 01Year : 2011Author : Pathmanabhan G , Vanangamudi M , Chandrasekaran CN ,Sathyamoorthi K , Babu CR , Babu RC , BoopathiPNPublisher : Agrobios (India)
4. Jain, V.K. Fundamental of Plant Physiology (7th ed.) 2004. S. Chand and Company.
5. Salisbury, F.B. & Ross, C.W. Plant Physiology (4th ed.), 19992, Wadsoworth Publishing Company.
6. Panday, S.N. & Sinha, B.K. Plant Physiology (4th ed.), 2006, Vikas Publishing House Pvt. Ltd.
7. Mukherjee, S. & Ghosh, A. Plant Physiology (2nd ed.), 2005, New Central Book Agency.
8. Chaudhuri, D., Kar, D.K., and Halder, S.A. Handbook of Plant Biosynthetic Pthways 2008. New CentralBook. Agencies.

9. Voet, D. and Voet, J.G., Bio-Chemistry (3rd ed.), 2005, John Wiley & Sons.
10. Mathews, C.K., Van Holder, K.E. &Ahren, K.G. Bio-Chemistry (3rd ed.). 2000, Pearson Education.
11. Lehninger Principles of Biochemistry. Sixth Edition. 2013. David L. Nelson, Michael M. Cox. Freeman, Macmillan.
12. Srivastava, HN. 2006. Pradeep's Botany Vol. V. Pradeep Publications, Jalandhar.
13. Verma, SK. Plant Physiology and Biochemistry. S. Chand & Sons, New Delhi.
14. Buchanon, Gruissen and Jones. Plant Physiology & Biochemistry: Biochemistry and Molecular Biology of plants, 2000,I.K. International.
15. Chapman and Riss. Ecology: Principles and Applications, Latest Ed., Cambridge University Press
16. Shukla, R.S. & Chandel, P.S. Plant Ecology, Latest Ed., S. Chandel and Co.
17. Kumar, H.D. Modern Concept of Ecology, Latest Ed. Vikas Publishing House
18. Begon, M., Herper, J.L. and Townsend, C.R. Ecology- Individuals, Populations and Communities (3rd ed.). Oxford Blackwell Science
19. Verma, P.S. & Agarwal, U.K. Concept of Ecology, Latest Ed., S. Chand & Company
20. Odum, F.P. Fundamentals of Ecology, Latest Ed., Saunders
21. Sharma, P.D. Elements of Ecology, Latest Ed., Rastogi Publications
22. Ambasht, R.S. &Ambasht, N.K. A Text Book of Plant Ecology. Latest Ed., CBS Publication & Distributors
23. Mani, M.S. Bio-Geography of India, Latest Ed., Springer-Verlag.
24. Mackenzie et al. Ecology, Latest Ed., Viva Books.
25. Gurevitch, J. (et al.)., The Ecology of plants, 2002, Sinauer Associates
26. . Kimar, U. &Asija, M.J. Bio-diversity: Principles & Conservation, 2005, Student Edition. Agrobios (India)
27. Krishnamurthy, K.V. An Advanced Text Book on Biodiversity, 2003, Oxford & IBH Publishing Co. Ltd.
28. Mitra, D., Guha, J.K., Chowdhury, S.K. Studies in Botany, Vol. II (7th ed.) Moulik Library.
29. Primack. R.B. Essentials of Conservation Biology, 1993, Sinauer Associates.
30. Lo, C.P. & Yeung, A.K.W. Concepts and Techniques of Geographic Information Systems. 2002, Printice-Hallof India.
31. Cain, Bowman, Hacker. Ecology. 2014. 3rd Ed. Sinauer Associates
32. Vasudevan, N. (2006). Essentials of Environmental Science. Narosa Publishing House, New Delhi.
33. Singh, J. S., Singh, S.P. and Gupta, S. (2006). Ecology, Environment and Resource Conservation. AnamayaPublications, New Delhi.
34. Rogers, P.P., Jalal, K.F. and Boyd, J.A. (2008). An Introduction to Sustainable Development. Prentice Hall ofIndia Private Limited, New Delhi.
35. Abbasi, S. A. (1998). Environmental Pollution and its Control. Cogent International, Pondicherry.
36. Abbasi, S. A. and Ramasamy, E. V. (1999). Biotechnological Methods of Pollution Control. Universities Press(India) Limited, Hyderabad.
37. Peavy, H. S., Rowe, D. R. and Tchobanoglaus, G. (1985). Environmental Engineering, Mc Graw Hill BookCompany, Singapore.
38. Rand, M. C., Greenberg, A. E. and Taras, M. J. (Ed.) (1995). Standard methods for the examination of water andwastewater: 19th edition, American Public Health association (APHA), Washington, D.C.
39. Scragg, A. (1999). Environmental Biotechnology, Addison Wesley Longman, Singapore.
40. Tchobanoglaus, G. (1988). Wastewater Engineering: Treatment, Disposal, Reuse. Tata Mc Graw Hill, NewDelhi.
41. Aarve, V. P., William, A. W. and Debra, R. R. (2002). Solid waste engineering. Cengage reading, USA.
42. George. T., Hilary, T. and Samuel, A. V. (1993). Integrated solid Waste Management. Engineering Principlesand Management Issues, Mc Graw Hills.

43. George, T. and Frank, K. (2002). Handbook of solid waste management: (Second edition). Mc Graw Hills.
44. Kanthi, L. S. (2000). Basics of Solids and hazardous waste management Technologies. Prentice Hall.
45. Anonymous. 1997. National Gene Bank: Indian Heritage on Plant Genetic Resources (Booklet). National Bureauof Plant Genetic Resources, New York.
46. Gillespie, A. 2006. Climate Change, Ozone Depletion and Air Pollution: Legal Commentarieswith Policy and Science Considerations. MartinusNijhoff Publishers.
47. Hardy, J.T. 2003. Climate Change: Causes, Effects and Solutions. John Wiley & Sons.
48. Harvey, D. 2000. Climate and Global Climate Change. Prentice Hall.
49. Manahan, S.E. 2010. Environmental Chemistry. CRC Press, Taylor and Francis Group.
50. Maslin, M. 2014. Climate Change: A Very Short Introduction. Oxford Publications.
51. Mathez, E.A. 2009. Climate Change: The Science of Global Warming and our Energy Future.Columbia UniversityPress.
52. Mitra, A.P., Sharma, S., Bhattacharya, S., Garg, A., Devotta, S. &Sen. K. 2004. Climate Change and India.Universities Press, India.
53. Philander, S.G. 2012. Encyclopedia of Global Warming and Climate Change (2nd edition).Sage Publications.
54. Demers, M.N. 2005. Fundamentals of Geographic Information System. Wiley & Sons.
55. Richards, J. A. & Jia, X. 1999. Remote Sensing and Digital Image Processing. Springer.
56. Sabins, F. F. 1996. Remote Sensing: Principles an Interpretation. W. H. Freeman.
57. Gaston, K J. & Spicer, J.I. 1998. Biodiversity: An Introduction. Blackwell Science, London.
58. Singh, J. S. & Singh, S. P. 1987. Forest vegetation of the Himalaya. The Botanical Review 53:80-192.
59. Sodhi, N.S. & Ehrlich, P.R. (Eds). 2010. Conservation Biology for All. Oxford University Press.
60. Sodhi, N.S., Gibson, L. & Raven, P.H. 2013. Conservation Biology: Voices from the Tropics. Wiley-Blackwell, Oxford, UK.

Suggested equivalent online courses:

1. https://www.classcentral.com/course/swayam-plant-physiology-and-metabolism-17732
2. https://www.wiziq.com/course/3249-plant-physiology-in-10-live-online-classes
3. https://www.easybiologyclass.com/plant-physiology-free-lecture-notes-online-tutorials-lecture-notes-ppts-mcqs/
4. https://onlinecourses.swayam2.ac.in/cec19_bt09/preview
5. https://community.plantae.org/tags/moocuturelearn.com/courses/teaching-biology-inspiring-students-with-plants-in-science
6. https://www.coursera.org/courses?query=plants
   http://egyankosh.ac.in/handle/123456789/53530

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50

Continuous Comprehensive Evaluation (CCE):As per rule

University Exam(UE): 50Marks

13.6.22

Declaration

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

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

for 13.6.22

Part A: Introduction

Program: B.Sc.	Class: B.Sc. III Year	Year: 2024	Session:2024-2025
1. Course Code	BOT-6T		
2. Course Title	**Cytogenetics, plant tissue culture and biometry**		
3. Course Type	**Theory**		
4. Pre-requisite (if any)	NO		
5. Course Learning Outcomes (CLO)	After the completion of the course the students will be able to: • Acquire knowledge on cell ultrastructure. • Understand the structure and chemical composition of chromatin and concept of cell division. • Interpret the Mendel's principles, acquire knowledge on cytoplasmic inheritance and sex-linked inheritance • Understand the concept of 'one gene one enzyme hypothesis' along with the molecular mechanism of mutation. • students will be familiar with data handling.		
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	**Cell biology:** Structure and function of cell wall, plasma membrane, ribosomes, Endoplasmic reticulum, Golgi apparatus, mitochondria, chloroplast, lysosomes, peroxisomes and cell inclusions. Organization of nucleus: nuclear envelope, nucleoplasm and nucleolus. Chromosomal nomenclature- chromatids, centromere, telomere, satellite, secondaryconstriction.Organization of chromosomes- Nucleic acid and histones-types andclassification. Lampbrush chromosomes and polytene chromosomes-Karyotype andidiogram.Cell cycle: G0, G1, S and G2 phases –mitosis: open and closed mitosis –amitosis and meiosis. Chromosomal aberrations (Structural and Numerical)	12
II	**Genetics:** History of Genetics and Mendelian inheritance, Chromosome theory of inheritance, crossing over and linkage; Incomplete dominance andcodominance; Interaction of Genes; Multiple alleles, Lethal alleles, Epistasis, Pleiotropy.Polygenic inheritance; Extra-nuclear Inheritance, Linkage, crossing over. Concept of sexdetermination and Sex chromosomes; Patterns of Sex determination in plants Sex linked inheritance.	12
III	**Genetic material:** Miescher to Watson and Crick- historic perspective, Griffith's and Avery's transformation experiments. Hershey-Chase, bacteriophage experiment, DNA structure, types of DNA, types of genetic material. DNA replication (Prokaryotes and eukaryotes): semi– conservative. DNA replication (Prokaryotes and eukaryotes): bidirectional replication, semi– conservative, semi discontinuous RNA priming, Ø (theta) mode of replication, replication of linear, dsDNA, replicating the 5'end of linear chromosome including replication enzymes.	12

IV	**Gene mutation and mutagens** – substitution- transition and transversion, DNA damage and repairs, physical (ionizing and non- ionising) and chemical mutagens **Transcription & Regulation of gene expression** Types of structures of RNA (mRNA, tRNA, rRNA), RNA polymerase- various types; Translation, (Prokaryotes and eukaryotes), genetic code-. deciphering and properties. Regulation of gene expression inProkaryotes: Lac operon **Plant tissue culture:** Principles, components and techniques (preparation of culture media: liquid and solid medium, basal and supplemented media) and culturing of protoplast- principle and application, regeneration of protoplasts, protoplast fusion and somatic hybridization- selection of hybrid cells, Somaclonal variation, Plant secondary metabolites production. Artificial seeds	12
V	**Biostatistics:** Definition, statistical methods, basic principles, variables-measurements, functions,limitations and uses of statistics. Biometry: Data, Sample, Population, random sampling,Frequency distribution- definition only, Central tendency–Arithmetic Mean, Mode andMedian; Measurement of dispersion–Coefficient of variation, Standard Deviation, Standarderror of Mean; Test of significance: chi- square test for goodness of fit. Computer applicationin biostatistics - MS Excel and SPSS	12

Keywords: Mineral nutrition, Carbon assimilation, Nitrogen and lipid metabolism, Natural resource management, Ecological succession, biodiversity conservation

Part C - Learning Resources

Suggested Readings:

1. Cell Biology And Genetics (Hindi) 2/e PB....Gupta P K (Hindi) Rastogi Publications
2. PLANT BIOTECHNOLOGY (HINDI) October 2019 Publisher: Kindle DirectPublishingISBN: ISBN: 9781698665283 Authors:H. R. Dagla Jai Narain Vyas University
3. Biotechnology: Fundamentals And Application (hindi) (hb) ISBN : 9788177544732Edition :03Year : 2018Author : Dr. Purohit SS , Mathur S
4. Biotechnology (Hindi) (Hindi, Paperback, B.D.Singh) Hindi Publisher: Kalyani PubishersISBN: 9789327246070, 9327246071
5. Cytogenetics, Plant Breeding, Evolution and Biostatistics ISBN #: 978-81-301-0066-1SunilD Purohit &Gotam K Kukda, Apex Publishing House
6. Genetics and Biotechnology Sunil D Purohit, K. Ahmed &Gotam K KukdaApexPublishing House
7. PadapPrajanan (Hindi)
8. G.M. Cooper. (2015). The cell: A Molecular Approach. 7th Edition. Sinauer Associates.
9. Alberts, B., Johnson, A.D., Lewis, J., Morgan, D., Raff, M., Roberts, K., Walter, P. (2014). Molecular Biology ofCell. 6th Edition. WW, Norton & Co.
10. Campbell. M.K. (2012) Biochemistry. 7th ed., Published by Cengage Learning.
11. Campbell, P.N. and Smith, A.D. (2011). Biochemistry Illustrated, 4th ed., Published by Churchill Livingstone
12. Tymoczko, J.L., Berg, J.M. and Stryer, L. (2012). Biochemistry: A short course, 2nd ed., W.H.Freeman.
13. Berg, J.M., Tymoczko, J.L. and Stryer, L. (2011) Biochemistry, W.H.Freeman and Company
14. Nelson, D.L. and Cox, M.M. (2008). Lehninger Principles of Biochemistry. 5th Ed., W.H. Freeman and Company.
15. . Karp, G. (2010). Cell Biology, John Wiley & Sons. U.S.A. 6th edition.
16. Hardin, J., Becker, G., Skliensmith, L.J. (2012). Becker's World of the Cell. 8th edition.Pearson Education Inc.U.S.A.)
17. Gardner, E.J., Simmons, M.J., Snustad, D.P. (1991). Principles of Genetics, John Wiley & sons. India. 8th e
18. Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics, John Wiley & Sons Inc., India.5th edition.
19. Klug, W.S., Cummings, M.R., Spencer, C.A. (2009). Concepts of Genetics. Benjamin Cummings, U.S.A..
20. Griffiths, A.J.F., Wessler, S.R., Carroll, S.B., Doebley, J. (2010). Introduction to Genetic Analysis. W. H. Freemanand Co., U.S.A. 10th edition.
21. M K Raxdan An Introduction to Plant Tissue Culture –; Oxfird& IBH Publishing Co.Pvt. Ltd..New Delhi
22. Aggarwal SK (2009) Foundation Course in Biology, 2nd Edition, Ane Books Pvt. Ltd
23. Allard RW (1960) Principles of Plant Breeding. John willey and Sons. Inc. New York
24. BD Singh (2003) Plant Breeding. Kalyani Publishers
25. Cohn, N.S. (1964) Elements of Cytology. Brace and World Inc, New Delhi
26. Darnel, J.Lodish. Hand Baltimore, D. (1991) Cell and molecular biology. Lea and Fibiger. Washington.
27. De Robertis, E.D.P and Robertis, E.M.P (1991) Cell and molecular biology Scientific American books.
28. Dobzhansky, B (1961) Genetic and origin of species. Columbia university Press New Yor
29. Durbin (2007) Biological Sequence Analysis. Cambridge University Press India Pvt. Ltd
30. Gerald Karp (1985) Cell biology. Mc Graw Hill company..
31. Lewin. B. (1994) Genes, Oxford University Press, New York.
32. Lewis. W.H (1980) Polyploidy. Plenum Press, New York.
33. Nicholl T (2007) An Introduction to Genetic Engineering, Cambridge University Press India Pvt. Ltd
34. Roy S.C. and Kalayan Kumar De (1997) Cell biology. New central Books,Calcutta

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50

Continuous Comprehensive Evaluation (CCE):As per rule

University Exam(UE): 50Marks

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

13.6.22

Part A : Introduction

Programme: Certificate	Class B.Sc.-III	Year: 2022	Session: 2022-23

1.	Course Code	**BOT-3P**
2.	Course Title	**Experiments in physiology, Biochemistry & molecular biology**
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. • Know and authentic the physiological processes undergoing in plants along with • their metabolism • Identify Mineral deficiencies based on visual symptoms • Understand and develop skill for conducting molecular experiments for genetic • engineering
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.))** **Plant water relation, Mineral Nutrition and translocation in phloem** 1. Determination of osmotic potential of plant cell sap by plasmolytic method using leaves of *Rhoeo / Tradescantia.* 2. Osmosis – by potato osmoscope experiment 3. Effect of temperature on absorption of water by storage tissue and determination of Q10. 4. Experiment to demonstrate the transpiration phenomenon with the bell jar method 5. Structure of stomata (dicot & monocot) 6. Experiment to measure the rate of transpiration by using Ganong's/

13.6.22

	Farmer's potometer 7. Study of mineral deficiency symptoms using plant material/photographs. **Cell biology** 1. Study of plant cell structure with the help of epidermal peal mount of *Onion/Rhoeo/Crinum/ etc.* 2. Measurement of cell size by the technique of micrometry (Ocular and stage micrometer). 3. Determination of mitotic index/ meiotic index and frequency of different mitotic / meiotic stages in pre-fixed root tips and flower buds respectively.
	Nitrogen Metabolism, Photosynthesis & Respiration : 1. A basic idea of chromatography: Principle, paper chromatography , column chromatography and TLC; demonstration of chromatography. 2. Separation of photosynthetic pigments by paper chromatography. 3. Effect of quality of light/concentration of Carbon dioxide on photosynthetic rate in aquatic plant 4.Determination of the RQ starchy/ proteinaceous/ oily germinating seeds **Genetics:** 1. Monohybrid cross (Dominance, codominance and incomplete dominance) 2. Dihybrid cross (Dominance and incomplete dominance) 3. Gene interactions (All types of gene interactions mentioned in the syllabus) a. Recessive epistasis 9: 3: 1. b. Dominant epistasis 12: 3: 1 c. Complementary genes 9: 7 d. Duplicate genes with cumulative effect 9: 6: 1 e. Inhibitory genes 13: 3 4. Observe the genetic variations among inter and intra specific plants. 5. Demonstration of Breeding techniques-Hybridization, emasculation/ bagging/ tagging experiment.
	Genetic material: 1. Instruments and equipments used in molecular biology. 2. Isolation of DNA from plants
	Techniques for biochemical analysis: 1. Weighing and Preparation of solutions -percentage, molar & normal solutions, dilution from stock solution etc. 2. Separation of amino acids by paper chromatography. 3. Detection of organic acids: citric, tartaric, oxalic and malic from laboratory samples., 4. Qualitative Analysis of carbohydrates, 5. Estimation of reducing sugar by anthrone method, 6. Qualitative Analysis of Lipids 7. Qualitative analysis of Amino acids and Proteins
	Biostatistics: 1.Univariate analysis of statistical data: Statistical tables, Central

for Members 13.6.22

	tendency - mean, mode, median, standard deviation and standard error (using seedling population /leaflet size). 2.Calculation of correlation coefficient values and finding out the probability. 3.Determination of goodness of fit in Mendelian and modified mono-anddihybrid ratios (3:1, 1:1, 9:3:3:1, 1:1:1:1, 9:7, 13:3, 15:1) by Chi-squareanalysis and comment on the nature of inheritance. 3. Computer application in biostatistics - MS Excel and SPSS

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

1. A Laboratory Manual Of Plant, Physiology, Biochemistry And Ecology ISBN: 9788177544589Edition: 01Year: 2012Author: Akhtar InamPublisher : Agrobios (India).
2. Wilson and Walker. Practical Biochemistry: Principles and Techniques. Cambridge University Press.U.K.
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. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley & Sons, Inc.

E-learning Resources:

1. https://www.edx.org/learn/molecular-biology
2. https://krishikosh.egranth.ac.in/handle/1/5810039999
3. https://www.classcentral.com/course/swayam-genetic-engineering-theory-and-application-14090
4. https://www.coursera.org/courses?query=genetics
5. https://www.coursera.org/courses?query=molecular%20biology
6. https://www.edx.org/learn/genetic-engineering
7. https://www.mooc-list.com/tags/genetic-engineering
8. https://www.classcentral.com/course/edx-molecular-biology-part-1-dna-replication-and-repair-2907

13.6.27

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

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. III rd. Year**	Year: **2024**	Session **2024:2025**
1	Course code	**ZOOL: 5T**		
2	Course Title	Animal Behaviour, Chronobiology and Ecology		
3	Course type	Theory		
4	Pre requisite	NO		
5	Course learning Out comes (CLO)	After successfully completing this course, the students will be able to: • Learn a wide range of theoretical and practical techniques used to study animal behaviour. • Develop skills, concepts and experience to understand all aspects of animal behaviour. • Objectively understand and evaluate information about animal behaviour and ecology encountered in our daily lives. • Understand and be able to objectively evaluate the role of behaviour in the protection and conservation of animals in the wild. • Consider and evaluate behaviour of all animals, including humans, in the complex ecological world, including the urban environment. • Know the evolutionary and functional basis of animal ecology. • Understand what makes the scientific study of animal ecology a crucial and exciting endeavour. • Analyse a biological problem, derive testable hypotheses and then design experiments and put the tests into practice. • Solve the environmental problems involving interaction of humans and natural systems at local or global level.		
6	Credit value	4		
7	Total Marks	Max. Marks: 50	Minimum. Passing Marks: 17	

13.6.2022

Part B : Content of Course		
Total Periods: 60		
Unit	**Topics**	No. of Period
I	**Concept and pattern and control of behaviour** Animal behaviour: Scope and importance of study. Concept of behaviour : Motivation, Fixed action of pattern, sign stimulus, Innate releasing mechanism, Action specific energy, Physiological Basis, Learning, Imprinting, Behavioural Genetics, and Evolution of Behaviour. Patterns of behaviour : Kinds of behaviour: foraging behaviour, Territorial behaviour. Mate selection and courtship behaviour. Parental care, Defensive behaviour. Stereotyped Behaviours : Orientation: Kinesis and taxes and Simple Reflex. Neural control And Hormonal Control of Behaviour.	12
II	**Innate; Learning behaviour and socio:biology** Innate behaviour: communication by sound (cricket vocalizations), Bird song, Echolocation in Bat. Chemical Signalling: Pheromones (types of pheromones) and bee Dance. Schooling behaviour in fish and Flocking Behaviour in Birds. Types of learning: Habituation, Imprinting and types of imprinting :filial and sexual, Classical conditioning, Instrumental learning, Latent learning and Trial and error learning, insight learning. Social behaviour : aggregation, group selection, kin selection, altruism.	14
III	**Chronobiology :** Biological clocks, biological rhythms: Circadian and circannual rhythms. Tidal, solar and lunar rhythms, entrainments. Biological oscillation. The concept of Average, amplitude, phase and period. Role of melatonin. Applications of Chronobiology: Chrono pharmacology, Chrono medicine, Chronotherapy. Migratory behaviour in birds and fishes.	11
IV	**An overview of ecology, ecosystems and population ecology** Structure and function of ecosystem: Major ecosystems of the world. Law of limiting factors. Ecological succession. Energy flow in ecosystem, food chain and food web. Recycling of nutrients: C, N, P & S cycle. Ecology of populations: Density, natality, mortality, Fertility and fecundity, survivorship curves. Unique and group attributes of population: mortality, age ratio and age pyramid, sex ratio, dispersal. Factors regulating population dispersal and growth: Exponential and logistic growth. Population regulation: Density:dependent and independent factors; r and K strategies.	12

V	**Biotic community, environmental degradation:** Community characteristics: stratification; dominance, diversity, species richness, abundance, evenness, similarity. diversity and food:web indices. ecotone and edge effect. Types of interaction: Positive interactions: commensalism, proto:cooperation, and mutualism. Negative interactions: parasitism and allelopathy; predation and predator:prey dynamics; herbivory. Interspecific competition and coexistence. Environmental ethics; Pollution: Air, water and noise pollution and their control. Natural resources, Mineral, water and forest, their significance and conservation. Types of biodiversity, Hotspots, benefit and threat of conservation strategies.	11
Key words – Innate and Learning Behaviour, Sociobiology, Biological clock, Circadian rhytham, Population, Community, Succession, Pollution, Biological interaction, Biodiversity.		

Part : C Learning Resource

Text books, Reference Books, Other Resources:

1. McFarland, D. (1999) Animal Behaviour (3rd edition) Pitman Publishing Limited, London, UK.
2. Manning, A. and Dawkins, M. S. (2012) An Introduction to Animal Behaviour (6th edition) Ca
3. Alcock, J. (2005) Animal Behaviour (8th edition) Sinauer Associate Inc., USA.
4. Sherman, P. W. and Alcock, J. (2013) Exploring Animal Behaviour (6th edition) Sinauer Associate Inc., Massachusetts, USA.
5. Dunlap, J. C.; Loros, J.J. and DeCoursey, P. J. (2009)Chronobiology Biological Timekeeping (1st edition) Sinauer Associates, Inc. Publishers, Sunderland, MA, USA.
6. McFarland, D. (1999) Animal Behaviour (3rd edition) Pitman Publishing Limited, London, UK.
7. Manning, A. and Dawkins, M. S. (2012) An Introduction to Animal Behaviour (6th edition) Ca
8. McFarland, D. (1999) Animal Behaviour (3rd edition) Pitman Publishing Limited, London, UK.
9. Manning, A. and Dawkins, M. S. (2012) An Introduction to Animal Behaviour (6th edition) Ca
10. Alcock, J. (2005) Animal Behaviour (8th edition) Sinauer Associate Inc., USA.
11. McFarland, D. (1999) Animal Behaviour (3rd edition) Pitman Publishing Limited, London, UK.
12. Manning, A. and Dawkins, M. S. (2012) An Introduction to Animal Behaviour (6th edition) Ca
13. McFarland, D. (1999) Animal Behaviour (3rd edition) Pitman Publishing Limited, London, UK.

14. Manning, A. and Dawkins, M. S. (2012) An Introduction to Animal Behaviour (6th edition) Ca
15. Alcock, J. (2005) Animal Behaviour (8th edition) Sinauer Associate Inc., USA.
16. Sherman, P. W. and Alcock, J. (2013) Exploring Animal Behaviour (6th edition) Sinauer Associate Inc., Massachusetts, USA.
17. Dunlap, J. C.; Loros, J.J. and DeCoursey, P. J. (2009)Chronobiology Biological Timekeeping (1st edition) Sinauer Associates, Inc. Publishers, Sunderland, MA, USA.
18. Kumar, V. (2002).Biological Rhythms: Narosa Publishing House, Delhi/ Springer : Verlag, Germany. mbridge, University Press, UK
19. Colinvaux, P. A. (1993) Ecology (2nd edition) Wiley, John and Sons, Inc.
20. Krebs, C. J. (2001) Ecology (6th edition) Benjamin Cummings. 57
21. Odum, E.P., (2008) Fundamentals of Ecology. Indian Edition. Brooks/Cole.
22. Ricklefs, R.E. (2000) Ecology (5th edition) Chiron Press.
23. Southwood, T.R.E. and Henderson, P.A. (2000) Ecologial Methods (3rd edition) Blackwell Sci.
24. Kendeigh, F C. (1984) Ecology with Special Reference to Animal and Man. Prentice Hall Inc.
25. Stiling, P. D. (2012) Ecology Companion Site: Global Insights and Investigations. McGraw Hill Education.

E:Resources:

1. SWAYAM: .https://swayam.gov.in/explorer?searchText=
2. https://academic.oup.com
3. https://medineplus.gov
4. https://ncin.nlon.nih.gov
5. https://zoologylearningpoint.woodpress.com
6. https://zoologyresources.com
7. National digital library – https://ndl.iitkgp.ac.in
8. e:PG Pathshala (MHRD) Portal, https://egpg.inflibnet.ac.in
9. Science Direct Open Access Content
10. https://www.sciencedirect.com/book/9781843342038/ open Access
11. https://egyankosh.ac.in
12. https://Sciencedirect .com
13. https://Britannica.com> science > animal :behaviour
14. https://www nontesonzoology . com>animal behaviour
15. https://www biologyonline.com
16. https://www sciencing.com> Science > Biology > Ecology
17. https://www2 . hcmuf.edu.vn
18. https://wwwresearchgate . net

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 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.

Program: Certificate Course | Class: B.Sc. III Year | Year: 2024 | Session: 2024-2025

1	**Course Code**	**ZOOL – 6 T**	
2	**Course Title**	**Microbiology, Parasitology, Immunology and Applied Zoology**	
3	**Course Type**	Theory	
4	**Pre-requisite (if any)**	No	
5	**Course Learning Outcomes (CLO)**	After completing this course, the students will be able to - • Understand causative agents, pathogenesis, diagnosis, prophylaxis, and chemotherapy for various bacterial, viral, protozoan, and helminthic diseases. • Understand the concept of immune mechanisms, their pathways, acquired immunity, hypersensitivity, and autoimmune disorders. • Understand the aquaculture techniques, their problems, and commercial viability. • Understand the techniques and commercial significance of apiculture, sericulture, and lac culture. • Understand the basic and technical skills related to dairy management, poultry, and vermicomposting.	
6	**Credit Value**	4	
7	**Total Marks**	Max. Marks: 50	Min Passing Marks : 17

Part B: Content of the Course

Total Periods: 60

Unit	Topics	No. of Period
I	**Microbiology and Parasitology :** Bacterial diseases – Caused by *Salmonella typhi, Helicobactor pyloriand, Mycobacterium tuberculosis* with their pathogenesis, diagnosis, prophylaxis, and chemotherapy. Viral diseases – Hepatitis, influenza, AIDS, with their pathogenesis, diagnosis, prophylaxis, and chemotherapy. Protozoan diseases – Amoebiasis, Malaria, Trypanosomiasis, and Leishmaniasis with the life cycle of pathogen and possible treatments. Helminthic diseases – Schistosomiasis, Taeniasis, Ascariasis, and Filariasis with the life cycle of pathogen and possible treatment.	12
II	Immunology : Cells and organelles of the immune system. Characteristics of antigen, Antigenicity, Immunogenicity, Epitopes, Haptens, Adjuvant. Immunoglobulin : Classification, properties, and function of immunoglobulin. Antigen, and Antibody interaction. Humoral and cell:mediated immune response. The role of B and T cells in immunity. MHC complex, Hypersensitivity. Autoimmune disorders: Thyroid problem, Rheumetoid Arthritis . Monoclonal antibodies. Concept of vaccine.	12
III	**Aquaculture :** Prawn culture – Prawn culture in freshwater, its preservation, and processing. Pearl culture – Biology and technology followed (Fresh & Marine). Fish culture –Maintainance of fresh water fish farm and Breeding, Composite fish farming.	12
IV	**Apiculture, Sericulture, Lac culture :** Apiculture – types of the honey bee and culture technology. Lac culture – cultivation process with the life cycle of lac insect. Sericulture – types of silkworm and technology for mulberry silk worm culture. Economic values of Apiculture, Sericulture and Lac culture.	11
V	**Dairy Management, Poultry farming, and Vermicomposting :** Dairy Management : Techniques for dairy management; Cattle disease. Poultry – Types of breeds, rearing methods and diseases. Biology and rearing method of earthworm *Eisenia foetida/ Pharitima Posthuma.* The technology of Vermicompost production.	13

Keywords: Micro organism, Parasites, Immune System, Economic Zoology, Dairy Management, Poultry Management, Vermicomposting.

Part C :Learning Resource
Text Books, Reference Books, Other Resources – 1. Jawetz, M., and Adelberg (2015) Medical Microbiology (27 th edition). 2. Chatterjee, K.D. (2015) Parasitology (13 th edition). 3. Goldsby, R.A.; Kindt, T.J. and Kuby, J. (2006) Immunology (6th edition). 4. Roitt, I.; Brostoff, J. and Male, D. (2012) Immunology (8th edition). 5. Shukla, G.S. and Upadhyaya, V.B. (1999:2000). Economic Zoology (Rastogi Publishers). 6. Mani, M.S. (2006). Insects, NBT, India. 7. Jabde, P.V. (2005) Text Book of Applied Zoology: Vermiculture, Apiculture, Sericulture, Lac culture.
E: Resources – 1. SWAYAM: .https://swayam.gov.in/explorer?searchText 2. https://academic.oup.com 3. https://medineplus.gov 4. https://ncin.nlon.nih.gov 5. https://zoologylearningpoint.woodpress.com 6. https://zoologyresources.com 7. National digital library – https://ndl.iitkgp.ac.in 8. e:PG Pathshala (MHRD) Portal, https://egpg.inflibnet.ac.in 9. Science Direct Open Access Content – https://www.sciencedirect.com/book/9781843342038/ open Access 10.https://egyankosh.ac.in

Part D: **Assessment andEvaluation**
Maximum Marks, University exam. (UE) : : **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 : Degree course		**Class: B.Sc.III Year**	**Year -2024**	**Session :-2024-2025**
1	**Course code**	**ZOOL-3P**		
2	**Course Title**	**Lab course - 3**		
3	**Course Type**	**Practical**		
4	**Pre-Requisite(If Any)**	No		
5	**Course Learning Outcome (CLO)**	At The end of Course Students will be able to - • Learn a wide range of practical techniques used to study animal behaviour. • Develop skills, concepts and experience to understand all aspects of animal behaviour. • Objectively understand and evaluate information about animal behaviour and ecology encountered in our daily lives. • Understand and be able to objectively evaluate the role of behaviour in the protection and conservation of animals in the wild. • Consider and evaluate behaviour of all animals, including humans, in the complex ecological world, including the urban environment. • Understand causative agents, pathogenesis, diagnosis, prophylaxis, and chemotherapy for various bacterial, viral, protozoan, and helminthic diseases. • Understand the concept of immune mechanisms, their pathways, acquired immunity, hypersensitivity, and autoimmune disorders. • Understand the aquaculture techniques, their problems, and commercial viability. • Understand the techniques and commercial significance of apiculture, sericulture, and lac culture. • Understand the basic and technical skills related to dairy management, poultry, and vermicomposting.		
6	Credit Value	2		
7	Total marks	Maximum marks : 50 Minimum marks: 17		

13.6.2022

Part : B Content of course	
Total lecture-30	
Tentative Practical List	**Note :This is tentative list .The teacher concern can add per requirement** 1. Orientation of an animal to light. 2. Chemical communication in ants. 3. Predatory behaviour of a carnivorous animal. 4. Nests and nesting habits of the birds and social insects 5. To study geotaxis behaviour in earthworm. 6. To study the phototaxis behaviour in insect larvae. 7. Study of circadian functions in humans (daily eating, sleep and temperature patterns). 8. Visit to Forest/ Wild life Sanctuary/Biodiversity Park/Zoological Park to study behavioural activities of 9. Making an ecosystem in a wide-mouthed bottle. 10. Constructing a food web by observing and collecting organisms from a given area. 11. Studying the impact of herbivore on plant species (planted in pots under specific conditions) 12. Estimation of the ratio of the producers and consumers. 13. Studying insect diversity in a habitat. 14. Study of permanent slides and specimens of parasitic protozoans and helminthes. 15. Pathological examination of sputum, blood, urine and stool. 16. Staining and identification of Gram positive and Gram negative bacteria. 17. RBC and WBC counting. 18. Identification of Blood group. 19. Demonstration of antigen-antibody interaction in gel. 20. Morphological characterization of common fish species. 21. Identification of two major carps – Labeo *rohita* and Catla *catla* and their life cycles. 22. Through charts/specimens- study of bees. 23. Worker honey bee with emphasis on leg modifications (through specimens/charts). 24. Life cycle of mulberry silkworm, Bombyx mori and tasar silkworm (model/chart/specimens). 25. External morphology and nomenclature of dairy animals. 26. Determination of the specific gravity of milk by using a mercury lactometer. 27. Test for good quality eggs (Floating test, cracking test) and for fertilized and unfertilized eggs (Light test, Cracking test). 28. External morphology of poultry birds (model). 29. Project report on visit to dairy farm and visit to Poultry farm (Poultry management).

Part-C Learning Resource
Text books, References, Books Other Resource :
1. Practical Ecology, Anmol Publications. 2. Practical Methods in Ecology and Environmental Science,R. K. Trivedy, P. K. Goel, C. L. Trisal Enviro Media Publications, 1987. 3. Ethology practical Vilmos Altbäcker Márta Gácsi András Kosztolányi Ákos Pogány Gabriella Lakatos Péter Pongrácz. 4. Animal Behaviour Reena Mathur Rastogi publication. 5. ANIMAL BEHAVIOUR Practical work and data response exercises for sixth form students Michael D. 6. Animal Cell Culture and Technology Michel butcher Publisher : .Taylor & Francis 7. Our Animal Resources: Animals and Their Economic Importance Hardcover. 8. Publisher Holt, Rinehart, and Winston : 9. Practical Microbiology D.K. Maheshwari. 10. practical microbiology R.C. Dubey. 11. microbiology textbook. Dr Arora. 12. Microbiology: A Laboratory Manual - Book by James G. Cappuccino and Natalie Sherman. 13. Micro extremely Lecturio and sketchy rock's. 14. Lehninger – Biochemistry. 15. Kuby – immunology. 16. Ananthnarayan- medical Microbiology. 17. Tortora- for studying diseases caused by the normal flora and antibiotic classes. 18. Stanbury and Whittekar -fermentation Microbiology. 19. Genes by Lewis- for Genetics/ molecular biology and genetic engineering 20. Watson- Molecular biology. 21. Kooper - Cell biology.

Part D: **Assessment and Evaluation**		
Suggested Continuous Evaluation Methods: University exam (UE) : Maximum Marks: 50		
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 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

13.6.2022

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 - 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 - 13.06.22
Assistant Professor, Govt. Mahamaya College, Ratanpur, Bilaspur

11. Dr. Hema Kulkarni - Member - 13/6/22
Assistant Professor, Shahid Domeshwar Sahu Govt. College, Jamgaon R. Dist -Durg

Date : 13.06.2022.

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: **B.Sc. Course**	Class: **B.Sc. III Year**	Year: 2024	Session: 2024-2025
1	Course Code	BIOC-5T	
2	Course Title	**Cellular and Molecular Biochemistry**	
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: • Distinguish the process of replication in prokaryotes as well as eukaryotes. • Distinguish the process of transcription in prokaryotes as well as eukaryotes. • Explain the process of DNA damage and various DNA repair mechanisms. • Explain the process of DNA damage and various DNA repair mechanisms. • Explain to understand of cell transport, cell division and cell cycle.	
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	Prokaryotic (archaea and eubacteria) and eukaryotic cell (animal and plant cells). cells as experimental models. **DNA Replication:** DNA replication in prokaryotes-conservative, semiconservative and Dispersive types, experimental evidence for semiconservative replication. DNA polymerases, other enzymes and protein factors involved in replication. **Transcription:** Transcription in prokaryotes. RNA polymerase, promoters, initiation, Elongation and termination of RNA synthesis, inhibitors of transcription. Reverse transcriptase, post-transcriptional processing of RNA in eukaryotes. DNA Repair : UV repair system in E. coli, significance of thymine in DNA	12 Periods / 08 Hours
2	**Translation and Regulation of Gene Expression** Genetic code: Basic features of genetic code, biological significance of degeneracy. Wobble hypothesis, gene within genes and overlapping genes. Mechanisms of translation: Ribosome structure, A and P sites, charged tRNA f-met-tRNA , inititor codon, Shine-Dalgarno consensus sequence (AGGA) , formation of 70S initiation complex, role of EF-Ts, EF-G and GTP , non –sense codons and release factors, RF1 and RF2. Regulation of Gene Expression in prokaryotes: Enzyme induction and repression , operon concept, Lac operon, Try operon.	12 Periods / 08 Hours
3	Asymmetrical organization of lipid, proteins and carbohydrates in membrane. Active and passive transport across the membrane. **Protein trafficking**: Selective transport of proteins to and from the nucleus. Regulation of nuclear protein import and export. Targeting proteins to ER, smooth ER and lipid synthesis. Export of proteins and lipids from ER and into ER. Lipid and polysaccharide metabolism in Golgi. Protein sorting and export from Golgi. Mechanism of vesicular transport, cargo selection, coat proteins and vesicle budding, vesicle fusion. Protein import and mitochondrial assembly, protein export from mitochondrial matrix. Import and sorting of chloroplast proteins	12 Periods / 08 Hours

4	**Cytoskeletal proteins:** Structure and organization of actin filaments. Treadmilling and role of ATP in microfilament polymerization, organization of actin filaments. Non-muscle myosin. Intermediate filament proteins, assembly and intracellular organization. Assembly, organization and movement of cilia and flagella	12 Periods / 08 Hours
5	**Cell wall and extracellular matrix:** Prokaryotic and eukaryotic cell wall, cell matrix proteins. Cell-matrix interactions and cell-cell interactions. Adherence junctions, tight junctions, gap junctions, desmosomes, hemidesmosomes, focal adhesions and plasmodesmata. **Cell cycle, cell death and cell renewal**: Eukaryotic cell cycle, restriction point, and checkpoints. Cell division. Apoptosis and necrosis - brief outline. Salient features of a transformed cell.	12 Periods / 08 Hours

Keywords: Cell, Molecules, protein trafficking, molecular process, proteins, cell cycle

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

1. The Cell: A Molecular Approach (2009) 5th ed., Cooper, G.M. and Hausman, R.E., ASM Press & Sunderland (Washington DC), Sinauer Associates, MA, ISBN:978-0-87893- 300-6.
2. Molecular Cell Biology (2012) 7th ed., Lodish, H., Berk, A., Zipursky, S.L., Matsudaira, P., Baltimore, D. and Darnell, J., W.H. Freeman & Company (New York), ISBN:13:978- 1-4641-0981-2 / ISBN:10: 1-4641-0981-8.
3. Molecular Biology of the Cell (2008) 5th ed., Alberts, B., Johnson.A., Lewis, J., and Enlarge, M., Garland Science (Princeton), ISBN:0-8153-1619-4 / ISBN:0-8153-1620-8.

E-learning Resources

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
https://ia600105.us.archive.org/30/items/FundamentalsBiochemistry4e_201802/FundamentalsBiochemistry4e.pdf

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	03/08/2021
Dr. Harit Jha, Subject expert, Assistant Professor, Biotechnology, Guru Ghasidas University, Bilaspur	

Part A: Introduction				
Program: B.Sc. Course		Class: B.Sc. III Year	Year: 202	Session: 202 -2025
1	Course Code	BIOC-6T		
2	Course Title	**Applied Biochemistry**		
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 fundamentals and skilled for clinical laboratory works. • Understand basis phenomenon of disease occurrence and its cause. • Understand fundamentals and skilled with recombinant DNA technology. • Understand basic factors of nutrition and immunity and can help to others for improvement of nutrition and immune system.		
6	Credit Value	Theory: 4		
7	Total Marks	**Max. Marks:** 50	**Min Passing Marks:**	

Part B: Content of the Course		
Total No. of Teaching – Periods- 60 / Hours – 40		
Unit	**Topics**	No. of Period Hour
1	**Clinical Biochemistry:** Organization of clinical laboratory. Introduction to instrumentation and automation in clinical biochemistry laboratories safety regulations and first aid. General comments on specimen collection, types of specimen for biochemical analysis. Precision, accuracy, quality control, precautions and limitations. **Evaluation of biochemical changes in diseases:** Basic hepatic, renal and cardiovascular physiology. Biochemical symptoms associated with disease and their evaluation. Diagnostic biochemical profile	12 Periods / 08 Hours
2	**Structure of genes and chromosomes**: Definition of a gene, chromosomal organization of genes in viruses, bacteria and eukaryotes. Supercoiling of DNA. **Replication of genomes:** General features of DNA replication, properties of prokaryotic and eukaryotic DNA polymerases. Replication of DNA and telomeres in linear chromosomes. Replication of RNA genomes.	12 Periods / 08 Hours
3	**RECOMBINANT DNA TECHNOLOGY:** Overview of recombinant DNA technology. Plasmids and bacteriophage DNA as cloning vectors, pBR322, pUC8. Purification of plasmid and bacteriophage DNA. Enzymes used in manipulating DNA, separation by electrophoresis., **Cloning of a gene in a vector and functional analysis:** Polymerases chain reaction (parametric optimization, primer designing), ligation, introduction of DNA construct into host cells, selection of recombinants.	12 Periods / 08 Hours
4	**Nutritional Biochemistry and disorders**: Overview of major and minor nutrient components in the diet. Balanced diet and the concept of RDA. Nutrient deficiencies; Kwashiorkor and Marasmus, Scurvy, beri beri, pellagra and B12 deficiency, Xerophthalmia and Night blindness, Vitamin D deficiency. Vitamin K deficiency. Discuss with relation to biochemical basis for symptoms. Metabolic and Lifestyle disorders, Multifactorial complex disorders and Cancer. Diseases due to misfolded proteins, Monogenic diseases.	12 Periods / 08 Hours
5	**Immune system** Self-versus nonself. Humoral and cellular immunity. Innate and adaptive immunity. Cells of the immune system, primary and secondary lymphoid	12 Periods / 08 Hours

	tissues and organs. Cellular and humoral responses. Defensins. Non-immunological barriers. Cells and soluble mediators of innate immunity. Acute phase proteins. Cytokines. Complement system. **Humoral B cell response:** Structure of antibodies, types of immunoglobulins, generation of antibody diversity, B cell activation, theory of clonal selection, formation of plasma and memory cells; T-independent B-response; antigens, haptens carriers and adjuvants. **Cell mediated immunity:** T-cell development, MHC locus. Structure, function and distribution of MHC glycoproteins. Antigen processing and presentation. Cell mediated immune responses by different T-cell sub populations. Hypersensitive reactions. Concept of autoimmunity.

Keywords: Clinical biochemistry, replication, rDNA, nutrition, disorders, Immunity

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

1. Molecular Biology of the Gene (2008) 6th ed., Watson, J.D., Baker, T.A., Bell, S.P., Gann, A., Levine, M. and Losick, R., Cold Spring Harbor Laboratory Press, Cold Spring Harbor (New York) ISBN:0-321-50781 / ISBN: 978-0-321-50781-5.
2. Gene Cloning and DNA Analysis (2010) 6th ed., Brown, T.A., Wiley-Blackwell Publishing (Oxford UK). ISBN: 978-1-4051-8173-0.
3. Principles of Gene Manipulation and Genomics (2006) 7th ed., Primrose, S. B., and Twyman, R. M., Blackwell publishing (Oxford) ISBN: 13: 978-1-4051-3544-3.
4. Molecular Biotechnology: Principles and Applications of Recombinant DNA (2010) 4th ed., Glick B.R., Pasternak, J.J. and Patten, C.L., ASM Press (Washington DC), ISBN: 978-1-55581-498-4 (HC).
5. 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:10-14641- 0962-1.
6. Textbook of Biochemistry with Clinical Correlations (2011) Devlin, T.M. John Wiley & Sons, Inc. (New York), ISBN: 978-0-4710-28173-4.
7. Molecular Biochemistry (2018) DSVGK Kaladhar, RBSA Publishers ISBN 9788176117708.
8. Introduction to Human Physiology (2013) 8th edition: Lauralee Sherwood. Brooks/Cole, Cengage Learning.

learning Resources

https://britannica.com
https://en.wikibooks.org/wiki/Biochemistry
https://aprel.ac.in
https://ia600105.us.archive.org/30/items/FundamentalsBiochemistry4e_201802/FundamentalsBiochemistry4e.pdf

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)		**Total: 50M**

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: **B.Sc. Course**		Class: **B.Sc. III Year**	Year: **2024**	Session: **2024-2025**
1	Course Code	**BIOC-3P**	
2	Course Title	**LAB I : Molecular cell Biology and Applied Biochemistry 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: • Demonstrate assay for nucleic acid by various methods. • Demonstrate isolation process of DNA from different samples. • Apply electrophoresis technique for different isolated compounds. • Illustrate PCR techniques. • Illustrate SDS-PAGE techniques by biomolecules. • Demonstrate effect of various mutagens in various samples. • Demonstrate cell division in various types of cell. • Demonstrate transport of solute across the membrane.	
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 experiments as per requirement. 1. Visualization of animal and plant cell by methylene blue. 2. Identification of different stages of mitosis in onion root tip. 3. Identification of different stages of meiosis in grasshopper testis. 4. Micrographs of different cell components (dry lab). 5. Sub-cellular fractionation. 6. Visualization of nuclear fraction by acetocarmine stain. 7. Staining and visualization of mitochondria by Janus green stain. 8. Collection of blood and storage. 9. Estimation of blood glucose by glucose oxidase peroxidase method. 10. Amplification of DNA segment/gene of interest by PCR 11. Quantitative determination of DNA and RNA by absorbance at 260 nm and using A260/A280 ratio to distinguish between them 12. Permanent slides for different types of cancer
Key words: Cell, meoisis, mitosis, stain, amplification, PCR, cancer, Visualization	

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

Suggested Readings:

1. Molecular Biotechnology: Principles and Applications of Recombinant DNA (2010) 4th ed., Glick B.R., Pasternak, J.J. and Patten, C.L., ASM Press (Washington DC), ISBN: 978-1-55581-498-4 (HC).
2. 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:10-14641- 0962-1.
3. Textbook of Biochemistry with Clinical Correlations (2011) Devlin, T.M. John Wiley & Sons, Inc. (New York). ISBN: 978-0-4710-28173-4.
4. Molecular Biochemistry (2018) DSVGK Kaladhar, RBSA Publishers ISBN 9788176117708.
5. . Introduction to Human Physiology (2013) 8th edition; Lauralee Sherwood. Brooks/Cole, Cengage Learning.

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: **Degree Course**	Class: **B.Sc.- IT III Year**	Year: **2022**	Session:**2022-2023**

1.	Course Code	**BSCIT-5T**
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:** 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
https://www.w3schools.in/data-structures/tutorials/
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 frame as per the TOR of department of higher education, Chhattisgarh.

1. Dr. H.S. Hota - Chairman
   Prof. and Head, Dept. of Computer Science and Application
2. Dr. Sanjay Kumar - Member
   Prof. and Head, SoS in Computer Science, Pt. Ravishankar Shukla University, Raipur
3. Mr. Jitendra Kumar - Member
   Asst. Prof., Dept. of Computer Science and Application
   Atal Bihari Vajpayee Vishwavidyalaya, Bilaspur

4. Mr. H.S.P. Tonde - Member
   Asst. Prof. and Head, Dept. of Computer Science,
   Sant Gahira Guru University Sarguja, Ambikapur
5. Dr. Mamta Singh - Member
   Asst. Prof. and Head, Sai College, Bhilai
   Hemchand Yadav Vishwavidyalaya, Durg
6. Mr. Sushil Kumar Sahu - Member
   Asst. Prof. and Head, Christ College, Jagdalpur
   Shaheed Mahendra Karma Vishwavidyalaya, Bastar
7. Mr. Vikrant Gupta - Member
   Prof. and Head, Batmul Ashram College, Salheana
   Shaheed Nand Kumar Patel University, Raigarh
8. Mr. L.K. Gavel - Member
   Asst. Prof. and Head, Govt. Ghanshyam Singh Gupt, PG College, Balod
   Hemchand Yadav Vishwavidyalaya, Durg
9. Dr. Anil Kumar Sharma - Member
   Asst. Prof. and Head, A.P.S.G.M.N.S, Govt. PG College, Kawardha
   Hemchand Yadav Vishwavidyalaya, Durg
10. Mr. Vishwnath Tamrakar - Member
    Asst. Prof. and Head, Sant Guru Ghasidas Govt. PG College, Kurud,
    Pt. Ravishankar Shukla University, Raipur
11. Ms. Anjeeta Kujur - Member
    Asst. Prof. and Head, Govt. R.B.R.N.E.S. PG College, Jashpur
    Sant Gahira Guru University Sarguja, Ambikapur
12. Mr. Suresh Kumar Thakur - Member
    Asst. Prof. and Head, Indira Gandhi Govt. PG College, Vaishali Nagar
    Hemchand Yadav Vishwavidyalaya, Durg
13. Dr. Ugrasen Suman - Member
    Prof. and Head, Dept. of Computer Science (Present Online)
    Devi Ahila Vishwavidyalaya, Indore

Date: 02.06.2022

Part A: Introduction				
Program: **Degree Course**		Class: **B.Sc.-IT III Year**	Year: **2022**	Session:**2022-2023**
1.	Course Code	**BSCIT-6T**		
2.	Course Title	**Python Programming**		
3.	Course Type	**Theory**		
4.	Pre-requisite (if any)	Basic knowledge of programming and concept of object-oriented programming		
5.	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Define the structure and components of a Python program. • Demonstrate proficiency in handling of loops and creation of functions. Identify the methods to create and manipulate lists, tuples and dictionaries. • Discover the commonly used operations involving regular expressions and file system. • Determine the need for scraping websites and working with CSV, JSON and other file formats. • Interpret the concepts of Object-Oriented Programming as used in Python.		
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 to Python:** Installing Python, basic syntax, interactive shell, editing, saving, and running a script, the concept of data types; variables, assignments; immutable variables; numerical types, Operators (Arithmetic Operator, Relational Operator, Logical or Boolean operator, Assignment Operator, Ternary operator, Bit wise Operator, Increment or Decrement operator) and Expressions, comments in the program, understanding error messages.	12
II	**Creating Python Programs:** Input and Output Statements, Control statements (Branching, Looping, Conditional Statement, exit function, Difference between break, continue and pass.) **Function:** Defining a function, calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables	12
III	**Strings and text files**: manipulating files and directories, os and sys modules: text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab-separated). **String manipulations:** subscript operator, indexing, slicing a string; **strings and number system**: converting strings to numbers and vice- versa. Binary, Octal, Hexadecimal numbers.	12

IV.	**Lists, Tuples, and Dictionaries;** Basic list Operators, replacing, inserting, removing an element, searching and sorting lists, Accessing tuples, Operations, Working, Functions and Methods, dictionary literals, adding and removing keys, accessing and replacing values, Traversing Dictionaries.	12
V.	**Exception Handling:** Exception, Exception Handling, except clause, try, finally, clause, User defined exceptions. **Python Libraries:** Exploring python libraries like Panda, Numpy, TensorFlow, Scikit-Learn, Keras, PyTorch, SciPy etc.	12
Keywords: List, Tuple, Dictionary, Panda, Numpy, TensorFlow, Scikit-Learn, Keras, PyTorch, SciPy.		

Part C -Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings:

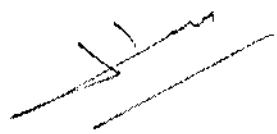
1. T. Budd, Exploring Python, TMH, 1st Ed, 2011
2. Allen Downey, Jeffrey Elkner, Chris Meyers, How to think like a computer scientist: Learning with Pyth,Freelyavailableonline.2012
3. Luca Massaron John Paul Mueller, Python for Data Science For Dummies,Wiley, 2ed,2019
4. Think Python: How to Think Like a Computer Scientist, 2nd edition by Allen B. Downey, O'Reilly, 2015
5. Learn Python 3 the Hard Way by Zed A. Shaw (Addison-Wesley, 2016)

E-Resources:

1. Introduction
   https://www.w3schools.com/python/default.asp
2. File Handling
   https://www.w3schools.com/python/python_file_handling.asp
3. NumPy
   https://www.w3schools.com/python/numpy/default.asp
4. Pandas
   https://www.w3schools.com/python/pandas/default.asp
5. SciPy
   https://www.w3schools.com/python/scipy/index.php
6. Django
   https://www.w3schools.com/django/index.php
7. Matplotlib
   https://www.w3schools.com/python/matplotlib_intro.asp
8. Machine Learning
   https://www.w3schools.com/python/python_ml_getting_started.asp
9. Python MySQL
   https://www.w3schools.com/python/python_mysql_getstarted.asp
10. Topics related Python from SWAYAM/NPTEL
    https://www.youtube.com/channel/UCxu1cR5XRauYn37yg-Fh6rA

https://www.youtube.com/channel/UCJAgw1niUkaShdmA5aAZdQw

11. Introduction to Python Programming from Coursera:
    https://www.coursera.org/learn/python-programming-intro
12. Crash Course on Python:
    https://www.coursera.org/learn/python-crash-course
13. Python for everybody:
    https://www.coursera.org/specializations/python
14. Introduction to Scripting in Python Specialization
    https://www.coursera.org/specializations/introduction-scripting-in-python
15. Topics related to Python from Tutorials
    https://www.javatpoint.com/python-tutorial
    http://docs.python.org/3/tutorial/index.html
    http://interactivepython.org/courselib/static/pythonds
    http://www.ibiblio.org/g2swap/byteofpython/read/



Part D: Assessment and Evaluation
Maximum Marks: 50

Declaration

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

1. Dr. H.S. Hota - Chairman
   Prof. and Head, Dept. of Computer Science and Application
2. Dr. Sanjay Kumar - Member
   Prof. and Head, SoS in Computer Science. Pt. Ravishankar Shukla University, Raipur
3. Mr. Jitendra Kumar - Member
   Asst. Prof., Dept. of Computer Science and Application
   Atal Bihari Vajpayee Vishwavidyalaya, Bilaspur
4. Mr. H.S.P. Tonde - Member
   Asst. Prof. and Head, Dept. of Computer Science,
   Sant Gahira Guru University Sarguja, Ambikapur
5. Dr. Mamta Singh - Member
   Asst. Prof. and Head, Sai College, Bhilai
   Hemchand Yadav Vishwavidyalaya, Durg
6. Mr. Sushil Kumar Sahu - Member
   Asst. Prof. and Head. Christ College, Jagdalpur
   Shaheed Mahendra Karma Vishwavidyalaya, Bastar
7. Mr. Vikrant Gupta - Member
   Prof. and Head, Batmul Ashram College, Salheana
   Shaheed Nand Kumar Patel University, Raigarh
8. Mr. L.K. Gavel - Member
   Asst. Prof. and Head, Govt. Ghanshyam Singh Gupt, PG College, Balod
   Hemchand Yadav Vishwavidyalaya. Durg
9. Dr. Anil Kumar Sharma - Member
   Asst. Prof. and Head. A.P.S.G.M.N.S, Govt. PG College, Kawardha
   Hemchand Yadav Vishwavidyalaya. Durg
10. Mr. Vishwnath Tamrakar - Member
    Asst. Prof. and Head, Sant Guru Ghasidas Govt. PG College, Kurud,
    Pt. Ravishankar Shukla University, Raipur
11. Ms. Anjeeta Kujur - Member
    Asst. Prof. and Head, Govt. R.B.R.N.E.S. PG College. Jashpur
    Sant Gahira Guru University Sarguja, Ambikapur
12. Mr. Suresh Kumar Thakur - Member

Asst. Prof. and Head, Indira Gandhi Govt. PG College, Vaishali Nagar
Hemchand Yadav Vishwavidyalaya, Durg

13. Dr. Ugrasen Suman - Member
Prof. and Head, Dept. of Computer Science (Present Online)
Devi Ahila Vishwavidyalaya, Indore

Date: 03.06.2022

Part A: Introduction				
Program: **Degree Course**		Class: **B.Sc.-IT III Year**	Year: **2022**	Session: 2022-2023
1	Course Code	**BSCIT-3P**		
2	Course Title	**LAB 3: Python Programming**		
3	Course Type	**Practical**		
4	Pre-requisite (if any)	Theoretical knowledge of python.		
5	Course Learning Outcomes (CLO)	At the end of course, Students will be able to • Learn the Numbers, Math functions, Strings, List in Python. • Learn the tuples and dictionaries in Python. • Demonstrate proficiency in handling of loops and creation of functions. • Identify the methods to create and manipulate lists, tuples and dictionaries. • Express different Decision-Making statements and Functions.		
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. 1. Python program to find the union of two lists. 2. Python program to find the intersection of two lists. 3. Using for loop, print a table of Celsius/Fahrenheit equivalences. Let c be the Celsius temperatures ranging from 0 to 100, for each value of c, print the corresponding Fahrenheit temperature. 4. Using while loop, produce a table of sins, cosines and tangents. Make a variable x in range from 0 to 10 in steps of 0.2. For each value of x, print the value of sin(x), cos(x) and tan(x). 5. Write a program that reads an integer value and prints —leap yearl or —not a leap yearl. 6. Write a program that takes a positive integer n and then produces n lines of output shown as follows. For example, enter a size: 5 * ** *** **** ***** 7. Write a function that takes an integer _n'as input and calculates the

1 + 1/1! + 1/2! + 1/3! + … + 1/n

8. Write a function that takes an integer input and calculates the factorial of that number.
9. Write a function that takes a string input and checks if it's a palindrome or not.
10. Write a list function to convert a string into a list, as in list (_abc') gives [a, b, c].
11. Write a program to generate Fibonacci series.
12. Write a program to check whether the input number is even or odd.
13. Write a program to compare three numbers and print the largest one.
14. Write a program to print factors of a given number.
15. Write a method to calculate GCD of two numbers.
16. Write a program to create Stack Class and implement all its methods. (Use Lists).
17. Write a program to create Queue Class and implement all its methods. (Use Lists)
18. Write a program to implement linear and binary search on lists.
19. Write a program to sort a list using insertion sort and bubble sort.
20. Python program to remove the "i" th occurrence of the given word in a list where words repeat.
21. Python program to count the occurrences of each word in a given string sentence.
22. Python program to check if a substring is present in a given string.
23. Python program to map two lists into a dictionary.
24. Python program to count the frequency of words appearing in a string using a dictionary.
25. Python program to create a dictionary with key as first character and value as words starting with that character.
26. Python program to find the length of a list using recursion.
27. Python program to read a file and capitalize the first letter of every word in the file.
28. Python program to read the contents of a file in reverse order.
29. Python program to create a class in which one method accepts a string from the user and another prints it.
30. Study and Implementation of Database, Structured Query Language and database connectivity.

Part C - **Learning Resources**
Text Books, Reference Books, Other Resources
Suggested Readings: 1. T. Budd, Exploring Python, TMH, 1st Ed, 2011

2. Allen Downey, Jeffrey Elkner, Chris Meyers, How to think like a computer scientist: Learning with Pyth,Freelyavailableonline.2012
3. Luca Massaron John Paul Mueller, Python for Data Science For Dummies, Wiley, 2ed, 2019
4. Allen B. Downey, Think Python: How to Think Like a Computer Scientist, 2nd edition by O'Reilly, 2015
5. Zed A. Shaw, Learn Python 3 the Hard Way (Addison-Wesley, 2016)

E-Resources:

Topics related Python from W3Shool

1. Introduction
   https://www.w3schools.com/python/default.asp
2. File Handling
   https://www.w3schools.com/python/python_file_handling.asp
3. NumPy
   https://www.w3schools.com/python/numpy/default.asp
4. Pandas
   https://www.w3schools.com/python/pandas/default.asp
5. SciPy
   https://www.w3schools.com/python/scipy/index.php
6. Django
   https://www.w3schools.com/django/index.php
7. Matplotlib
   https://www.w3schools.com/python/matplotlib_intro.asp
8. Machine Learning
   https://www.w3schools.com/python/python_ml_getting_started.asp
9. Python MySQL
   https://www.w3schools.com/python/python_mysql_getstarted.asp

Topics related Python from SWAYAM/NPTEL

10. https://www.youtube.com/channel/UCxu1cR5XRauYn37yg-Fh6rA
11. https://www.youtube.com/channel/UCJAgw1niUkaShdmA5aAZdQw

Topics related Python from Tutorials

12. https://www.javatpoint.com/python-tutorial
13. http://docs.python.org/3/tutorial/index.html
14. http://interactivepython.org/courselib/static/pythonds
15. http://www.ibiblio.org/g2swap/byteofpython/read/

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50

Continuous Comprehensive Evaluation (CCE): Not Applicable

University Exam(UE): 50 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable

Declaration

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

1. Dr. H.S. Hota - Chairman
   Prof. and Head, Dept. of Computer Science and Application
2. Dr. Sanjay Kumar - Member
   Prof. and Head, SoS in Computer Science, Pt. Ravishankar Shukla University, Raipur
3. Mr. Jitendra Kumar - Member
   Asst. Prof., Dept. of Computer Science and Application
   Atal Bihari Vajpayee Vishwavidyalaya, Bilaspur
4. Mr. H.S.P. Tonde - Member
   Asst. Prof. and Head, Dept. of Computer Science,
   Sant Gahira Guru University Sarguja, Ambikapur
5. Dr. Mamta Singh - Member
   Asst. Prof. and Head, Sai College, Bhilai
   Hemchand Yadav Vishwavidyalaya, Durg
6. Mr. Sushil Kumar Sahu - Member
   Asst. Prof. and Head, Christ College, Jagdalpur
   Shaheed Mahendra Karma Vishwavidyalaya, Bastar
7. Mr. Vikrant Gupta - Member
   Prof. and Head, Batmul Ashram College, Salheana
   Shaheed Nand Kumar Patel University, Raigarh
8. Mr. L.K. Gavel - Member
   Asst. Prof. and Head, Govt. Ghanshyam Singh Gupt, PG College, Balod
   Hemchand Yadav Vishwavidyalaya, Durg
9. Dr. Anil Kumar Sharma - Member
   Asst. Prof. and Head, A.P.S.G.M.N.S, Govt. PG College, Kawardha
   Hemchand Yadav Vishwavidyalaya, Durg
10. Mr. Vishwnath Tamrakar - Member
    Asst. Prof. and Head, Sant Guru Ghasidas Govt. PG College, Kurud,
    Pt. Ravishankar Shukla University, Raipur
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

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. NAND) (A. BECK) (Dr. S Ambrele)

(Dr Sheela Shirdey)

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

Paper I: Remote Sensing And GIS (UGeo-0301)

Course Learning Outcome (CLO)	After the completion of course, the students will have ability to: 1. Understand and get the knowledge about fundamental concept of Remote sensing. 2. To understand the types of remote sensing, and types of platforms in remote sensing. 3. To get a knowledge about satellite sensor and types of sensors, and their functions and Characteristics. 4. Understand the data product, types of data product and its applications and uses in remote Sensing.

Content of the Course

Unit	Topic
1.	Basics of Remote Sensing: definition, history, and Scope; Electro-magnetic Radiation: Characteristics, Spectral regions and Bands; Interaction with earth surface features and atmosphere; Spectral Signature
2.	Types of Remote Sensing: Air borne and Space borne; Aerial photos: Types and Characteristics; Remote Sensing satellites: Platforms and sensors: active and passive, Sensor characteristics: spatial resolution, spectral resolution, radiometric resolution, temporal resolution.
3.	Visual and Digital image processing techniques; Remote Sensing application in resource mapping and environmental monitoring, remote sensing in India: development and Growth. Indian Satellites, Space Organizations and data products.
4.	Introduction of GIS: Definition of Geoinformatics, Scope and Importance of Geoinformatics, History of GIS, Components of GIS, Functions of GIS,GIS tasks-Input, Manipulation, Management, Query analysis, Visualization, Topographical sheets, Surveying, Aerial photographs ,Satellite data and images, Data types-Spatial and Non spatial.
5.	Data model and data analysis: Raster data and their characteristics, Vector data and their characteristics, Raster data analysis- grid cells or Pixels. Vector data analysis- Spatial data, Generation in Vector Format, Spatial and Non Spatial data Management. Spatial information Technology.

Learning Resources: Text Books, Reference Books, Other Resources

Suggested Readings:

1. Bhatta, B. (2010): Remote Sensing and GIS, Oxford University Press, New Delhi.
2. Campbell, J.B. (2002): Introduction to Remote Sensing. 5th edition, Taylor and Francis, London
3. Curran, P.J. (1985): Principles of Remote Sensing, Longman, London
4. Lillesand, T.M. and Kiefer, R.W. (2000): Remote Sensing and Image Interpretation. 4th edition. John Wiley and Sons, New York
5. Nag Prithvish and Kudrat M. (1998): Digital Remote Sensing, Concept Publishing Company, New Delhi
6. Star J, and J. Estes, (1994), Geographic Information Systems: An Introduction, Prentice Hall, New Jersy.
7. Williams J. (1995): Geographic information from space, John Wiley and Sons, England,
8. चौनियाल, देवी दत्त (2004), सुदूर संवेदन एवं भौगोलिक सूचना प्रणाली, शारदा पुस्तक भवन, इलाहाबाद–2
9. खत्री, हरीष कुमार (2019) : सुदूर संवेदन तकनीक, कैलाष पुस्तकसदन भोपाल, मध्यप्रदेश

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

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

Paper II: Geography of Chhattisgarh (UGeo-0302)

Course Learning Outcome (CLO)	After the completion of course, the students will have ability i. Understand the about the physiographic division of Chhattisgarh State. ii. Understand the India Drainage system of Chhattisgarh Rivers. iii. Understand the climatic variation in Chhattisgarh State. iv. Examine and understand the types of vegetation of Chhattisgarh. v. Understand the variation in industrial development in Chhattisgarh State. vi. Examine and understand the developed and underdeveloped States in Chhattisgarh.

Content of the Course (Credit- 6)

Unit	Topic
1.	**Physical Features :** Geological Structure, Relief and Physiographic Regions, Drainage system, Climate
2.	**Natural Resources:** Soils – Types, characteristics and their Distribution. Water Resources (Major Irrigation and Hydel Power Projects), Forests-types, Distribution, and Conservation of Forest. Mineral Resources: Iron-ore, Coal, Lime stone, Bauxite, Tin.
3.	**Agriculture and Populations** – Agriculture: Cereals, Pulses and Millets. **Population**: Growth, Distribution, and Density; Tribal Populations; and Urban and Rural Population.
4.	**Industries** - Iron and Steel, Cement, Sugar, Aluminum; Industrial Regions of Chhattisgarh
5.	**Trade and Transport**, Tourism, Socio-Economic Development of Chhattisgarh.

Learning Resources: Text Books, Reference Books, Other Resources

Suggested Readings:

1. Jha, Vibhash Kumar and Saumya Naiyyar (2013) Chhattisgarh Samagra, Chhattisgarh Rajya Hindi Granth Akadmi, Raipur
2. Kumar, Pramila (2003): Chhattisgarh Ek Bhugolik Addhyayan. Madhya Pradesh Hindi Granth Akadmi, Bhopal
3. Nagesh Jitendra and at all (2014): Chhattisgarh Sandarbh 2014 Jansanmpark Vibhag, C.G. Govt., Raipur
4. Tiwari, Vijay Kumar (2004): Geography of Chhattisgarh, Himalya Publishing House, Pvt. Ltd
5. Tripathi, Kaushlendra and Pursottam Chandrakar (2001): Geography of Chhattisgarh, Shardaprakashan, Aazad Nagar , Bilaspur.
6. Verma ,L.N. (2017): Geography of Chhattisgarh, Madhya Pradesh Hindi Granth Akadmi, Bhopal.

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

2. virtual lectures available on YouTube

Dr. Neela Shirke

Program: B.A./B.Sc	Class: III Year.	Session : 2023-24
Paper II: Geography of Chhattisgarh (UGeo-0303)		

Course Learning Outcome (CLO)	After the completion of course, the students will have ability i. Understand the about the physiographic division of Chhattisgarh State. ii. Understand the India Drainage system of Chhattisgarh Rivers. iii. Understand the climatic variation in Chhattisgarh State. iv. Examine and understand the types of vegetation of Chhattisgarh. v. Understand the variation in industrial development in Chhattisgarh State. vi. Examine and understand the developed and underdeveloped States in Chhattisgarh.

Content of the Course

Unit	Topic	
Section A: Map Readings And Interpretation		**MM-20**
1.	Graphical Representation: Band graph	
2.	Topographical Sheets: Classification and numbering system (National and International)	
3.	Satellite Imageries: Describing the Marginal Information	
Section B: Surveying And Field Report		**MM-20**
4.	Surveying: Plane Table Survey, Basic Principles of plane table surveying, Plane table survey including intersection and resection.	
5.	Field work and field report: physical, social and economic survey of a micro - region.	
Section C: Practical Record And Viva Voce		**MM-10**

Learning Resources: Text Books, Reference Books, Other Resources

Suggested Readings:

1. Archer, J.E. and Dalton, T.H. (1968): *Field Work in Geography*. William Clowes and Sons Ltd. London and Beccles.
2. Bolton, T. and Newbury, P.A. (1968): *Geography through Fieldwork*. Blandford Press, London.
3. Monkhouse, F. J. (1985): Maps and Diagrams. Methuen, London.
4. Nag, P. (ed.) (1992): Thematic Cartography and Remote Sensing. Concept Publishing Company, New Delhi.
5. Natrajan, V. (1976): Advanced Surveying, B.I. Publications., Mumbai.
6. Raisz, E. (1962): Principles of Cartography, McGraw Hill, New York.
7. Robinson, A. H., Sale. R. D., Morrison, J. L. and Muehrcke, P. C. (1984): Elements of Cartography. 5th edition, John Wiley and Sons, Inc. New York.
8. Sarkar, A. K. (1997): Practical Geography: A Systematic Approach. Orient Longman, Kolkata
9. Sharma, J. P. (2001): *Prayogik Bhugol*., Rastogi Publication, Meerut 3rd. edition.
10. Singh, R.L. and Singh Rana P.B. (1993): *Elements of Practical Geography*. (Hindi and English editions). Kalyani Publishers, New Delhi.
11. Stoddard, Robert H. (1982): *Field Techniques and Research Methods in Geography*. Kendall/Hunt Pub. Dubuque IO.

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

SYLLABUS
OF
B.A./B.Sc. ANTHROPOLOGY

(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 Bachelor of Science (Honours) Program in anthropology covers all the three branches of anthropology as mentioned above as well as many of courses which draws in perspectives from other allied subjects. The courses in economic anthropology, sociology, medical, ecology and development anthropologies draws in the perspectives of these disciplines in 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 hand understanding 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 sieve 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 data, 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 Degree Course	Class B.A./B.Sc. 3rd Year	Year 2023	Session

1. Course Code : ANTH-05T
2. Course Title : APPLIED BIOLOGICAL ANTHROPOLOGY
3. Course Type : THEORY
4. Course Objective : Applied Biological Anthropology is a branch of Anthropology which deals with application of principles of Biological Anthropology. This help in to understand the basic principles of human genetics, to learn the methods/techniques used in genetic research. It is helpful to understand the pattern of inheritance of genetic disorders and the mechanism of genetic abnormalities, to realize the importance of genetic testing and counseling for people suffering from genetic disorders. This course helps to acquaint the students with the importance of demography in Anthropology & explore various dimensions of health and issues related to illness and disease.
5. Course Learning Outcome :
   - Student will acquire basic understanding of genetics, inheritance pattern of human traits, diseases and types of chromosomal abnormalities.
   - Helpful for understanding the importance of genetic counseling, prenatal diagnosis and newborn screening.
   - Students will learn the basic Anthropological approaches of studying demography and the biosocial determinants of demographic processes in human populations.
   - Student should be able to understand, analyze and interpret health, illness, disease related issues and develop critical understanding.
   - The student will learn about identification of human and non-human skeletal remains

1. Credit Value : Theory-04
2. Total Marks : Maximum Marks 58 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

- Meaning and scope of Applied Biological Anthropology
- Forensic Anthropology
- Ageing
- Public health

- Sports Anthropology
- Epidemiology

Unit – II

- Dermatoglyphics : History and its scope.
- Ridge characteristics.
- Classification of finger pattern.
- Basic of finger print comparison.
- Conventional and modern methods for development of latent finger prints.
- Dermatoglyphics and abnormal chromosomes.
- Application of dermatoglyphics.

Unit – III

- Human Chromosome : Morphology and types, Classification of normal chromosomes
- Chromosomal aberration
- Genetics of colour blindness and PTC
- Eugenics, Genetic Counseling and Genetic Screening
- Genetic Engineering and Population Genetics

Unit – IV

- Nutrition : Function, Types of nutrients, Nutritional Disorders
- Nutritional Status : Under nutrition, Over nutrition
- Assessment of Nutritional Status :
  - (i) Clinical Method
  - (ii) Anthropometric approaches to nutritional assessment
    - a. BMI b. Waist/hip ratio
  - (iii) Biochemical Methods

Unit – V

- Human Blood Groups : Inheritance of ABO, MN and Rhesus blood groups
- Human Skeletal biology
  - (i) Identification of human and non human skeletal remains
  - (ii) Age, sex and stature estimation from human bones
- Identification through somatoscopic measurements and somatoscopic observation
- Estimates of different demographic rates and ratios

Part C : Learning Resources

13. Bass, W.M.1991. Human Osteology : A Laboratory and Field manual of the Human Skeleton;

Columbia : Special Publication Missouri Archaeological Society
14. Brooker R.J.2012. Genetics analysis & Principles. Mc McGraw-Hill Companies, in 4th ed.
15. Byers, S.N. 2008. Forensic Anthropology. Boston : Pearson Edution Ltd.
16. Cavalli-Sforza, L.L. and Bodmer, W.F. 1971. The Genetics of Human Population . San Francisco Freeman.
17. Christensen, A.M.etal2014. Forensic Anthropology : Current methods and practices. Elsevier, New work.
18. Cumming,S.M.S. 2011. Human Heredity [illegible] Cengage Learnily.
19. Cummins, H & Midlo,c.1961. Finger Prints, Palms and Soles. [illegible] dermatophyphics Vol. 319. Newe York Dover Publications.
20. Daniel Bhrain 2009. Human [illegible] and Barry Bogin 2012. – Human Growth and development 2nd Edition Academic Press Elsevier.
21. Gordis. C 2004. Epidemiology. Third Edition Philadelphia: Elsevier Saunders.
22. Hahn, Robert, A 1999. Anthropology in Public Health Bridging Differences in culture and society. Newyork : Oxford University Press.
23. Harrison, G.A. and Weiner, [illegible] An introduction to Human Evolution, Variation, Growth and Ecology , Human Biology [illegible]
24. Henry,C. Lee and R.EGaensslen (Ed) 2001. Advances in Finger Print Technology. CRC Press London.
25. Khanna, K.Gupta.S.Passi [illegible] Text book of Nutrition and Dietetics. 2nd Ed. Elite Publishing House New Delhi.
26. Klug W.S 2012. Concept of Genetics. Pearson.
27. Lewis. R 2009. Human Genetics and concept of Applications. The McGraw-Hill Companies Inc.
28. Malhotra, K.C. And B. Balakrishnan 1996. Human Population Genetics in India
29. Malina, R.M. Bouchard, C. [illegible] 2004. Growth, Maturation and physical activity, Human Kinetics
30. Montagu. M.F.A.1964. An Introduction to Physical Anthropology.
31. Patch, C.2005.Applied Genetics in Health care. Taylor & Francis Group.
32. Relenth Ford. J.H. 2012. Human Population Genetics. Wiley Blackwell, USA.
33. Stern, C.Principles of Human Genetics
34. Ulijaszek, S.J. and Strickland S.S. 1993. Introduction to Nutritional Anthropology : Prospects and Perspectives. 1-5. Smith-Gordon London.
35. Vogel.F and Motulsky, A.G.1996. Human Genetics, Springer, [illegible]
36. Zubrow, E.B.W. 1976. Demographic anthropology, Quantitative approaches. University of New Mexico Albuquerque.

Part B: [illegible]

University Exam. (UE) : Max. Marks: [illegible] Marks

Part A : Introduction

Programme Degree Course	Class B.A./B.Sc. 3rd Year	Year 2023	Session

1. Course Code : ANTH-06T
2. Course Title : THEORIES AND APPROACHES IN SOCIAL-CULTURAL ANTHROPOLOGY
3. Course Type : THEORY
4. Course Objective : This is an introductory course on the main theoretical approaches which historically and contextually guided anthropological research and understanding of society and culture. The course would involve theory as well as practical. The practical will skill the students to apply the approaches critically to study of actual social issues and problems.
5. Course Learning Outcome :
   - The students will be able to explain the major theoretical paradigms in anthropology and link it with the social, political and geographic contexts in which they have developed.
   - They should also be able to explain clearly how these ideas have contributed to the process, structure, patterns and search for paradigms by various scholars.

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	Weightage of Questions
Units I, II, III, IV & V	As below	01 Question Each Unit

UNIT – I

- The contributions made by the following Anthropologists to Social-Cultural Anthropology : E. Durkheim, F. Boas, R. Redfield, A. Radcliffe-Brown, S.C. Dube, M.N. Srinivas, K.P. Vidyarthi.

UNIT – II

- Evolution: Biological and cultural evolution
- Evolutionism : Classical Evolutionists - E.B. Tylor & L.H. Morgan
- Neo-Evolutionists - Leslie White & Gordon Childe
- Diffusionism : British Diffusionists, European Austrian Diffusionists, American Diffusionists (Cultural traits, Culture Complexes, Culture Areas, Culture Circle)

UNIT – III

- Functionalism : Malinowski & Merton
- Structure Functionalism : Radcliffe Brown & Raymond firth
- Structuralism : Levi – Strauss & Leach

UNIT – IV

- Basic personality and Model Personality : Linton, Kardiner, Du Bois, Cora Du Bois, Abraham Kardiner
- Culture pattern & Configurationalism : Ruth Benedict
- Anthropological study of National Character
- Contributions of Margret Mead in Anthropological study

UNIT – V

- Field work tradition in Anthropology
- Tools and techniques of Research: Schedule, Questionnaire, observation, interview, case study & Genealogical Study.
- Types of Anthropological Methods: Historical Method, Comparative Method and Functional Method.

Part C : Learning Resources

1. Bidney, David, Theoretical Anthropology, New York: Columbia University press.
2. Erickson, Paul, Anthropological Ideas: Biographies of Eminent Anthropologists, New Delhi, Reliance.
3. Evans-Pritchard. A History of Anthropological Thought.
4. Harris, M. Rise of Anthropological Theory, Routledge and Kegan Paul, London.
5. Harskovits, M.J. Sanskriti ki manav vaigyanik (in Hindi).
6. Jha, M. Manavshastriya vicharadhara ek parichaya. (in Hindi).
7. Malinowski, B. Scientific theory of culture and other essays.
8. Muthal, S. Samajik Manav Vigyan: Saiddhantik Vyakhya (in Hindi).
9. Redfield, R., Human Nature and the Study of Society.
10. Shrivastava, A.R.N. Samajik Manav Vigyan : Siddhanta evam Vichardhara (in Hindi).
11. Upadhyay and Pandey. History of Anthropological thought.
12. Upadhyay and Pandey. Tribal Development in India.

Part D : Assessment and Evaluation

University Exam. (UE) : Max. Marks : 50 Marks

Part A : Introduction

Programme	Class	Year	Session
Degree Course	B.A./B.Sc. 3rd Year	2023	

1. Course Code : [illegible]
2. Course Title : PRACTICAL IN APPLIED BIOLOGICAL ANTHROPOLOGY
3. Course Type : PRACTICAL
4. Course Objective : The objective of this practical course is to familiarize the student about the tools and Method, analysis & statistical [illegible] in Human Biology. Laboratory procedures in Anthropometry dermatoglyphics would [illegible] dealing with all the applied dimensions.
5. Course Learning Outcome :

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 : Estimation of Nutritional status

- BMI
- Waist/ Hip Ratio
- Weight for Age
- Height for Age

Part – II : Somatometry:

- Measurements on body : Height vertex, Height tragion, Suprasternale height, Biacromial Breadth, Height dactylion, Bi-iliocristal breadth, [illegible], Upper extremity length, Sitting height, Body weight.
- Head and Face Measurement : Morphological upper facial length, Physiognomic upper facial length, Morphological facial length, Bizygomatic breadth, Maximum head length, Maximum head breadth, Nasal length, Nasal breadth.
- Somatometric indices : Cephalic index, Nasal index, Facial index.

Part – III : Genetics Traits

- Dermatoglyphics : finger pattern type.
- Finger ridge counts, Indices: Furuhata index, [illegible] index, Dankmeijer index, pattern intensity index.

- Palmar dermatoglyphics : Palmar formula, atd angle and ridge counts.
- Colour blindness, PTC taste sensitivity.

Part – IV : Statistics: Mean, mode,Median, Standard deviation, X^2test.

Part C : Learning Resources

1. Basin M.K. and I.P. Singh : Anthropometry
2. Cummins H. and Midlo C. : An Introduction of Dermatoglyphics
3. Fisher R.S. : Statistical methods of Research Worker's
4. Mitashree mitra : Prayogik manav vigyan bhag -(I)
5. Olivi : Practical Anthropolog

Part D : Assessment and Evaluation

University Exam. (UE) : Max. Marks : 50 Marks

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

	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.)

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 बंटन की समस्या। आकलन के अनुपातीक और समाश्रयण विधियाँ।

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 सांख्यीकी
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 बंटन 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 अधिकरिक सांख्यिकीय प्रणाली, अधिकारीक सांख्यिकी के आंकडों के संग्रहण की विधियाँ, उनके विश्वासनियता और सीमायें, और प्रमुख प्रकाशनों और संचार , बैंकिंग और वित जैसे विषयों पर ऐसे आकंडे है।

Indian Applied Statistics System: Present official statistical System in India, Methods of collection of Official Statistics, their reliability and limitations, and the principal publications containing such statistics on the topics-population agriculture, industry, trade, price, labour and employment, transport and communications, Banking and Finance.

Unit II

जनांकिकी ऑकड़ों का स्त्रोत : जनगणना , रजिस्टर और तंदर्थ सर्वेक्षण अस्पताल का अभिलेख, भारतीय जनगणना का जनांकिकी रूपरेखा, मृत्यु दर का मापन, और जीवन तालिका: संशोधित मृत्यु दर, सामान्यीकृत मृत्यु दर, सामान्यीकृत मृत्यु दर का प्रत्यक्ष और अप्रत्यक्ष विधि , पूर्ण जीवन तालीका –उनके मुख्य गुणधर्म , मृत्यु की प्रायिकता, उत्तरजीविता तालिका का उपयोग । प्रजनन क्षमता का मापन: अशोधित जन्मदर, सामान्य जन्म दर आयु विशिष्ट जन्य दर, सम्पूर्ण जन्म दर, सकल प्रजनन दर निवल प्रजनन दर ।

Demographic Methods: Sources of demographic data: Census, register and-hoc surveys, hospital records, demographic profiles of the Indian Census, Measurement of mortality, and life table,: crude death rate, age specific death rates, infant mortality rates, infant death rate, death rate by cause, standardized death rate, direct & indirect method of standardized death rate, Complete life tables- its main features, mortality rate and probability of dying , uses of survival tables. Measurement of fertility,: crude birth rate,, general fertility rate, age specific birth rate, total fertility rate, gross reproduction rate, net reproduction rate.

Unit III

वित्तिय सांख्यिकी : सुचकांक संख्या – परिभाषा और अनुप्रयोग मूल्य सापेक्ष और परिमाण या आयतन सापेक्ष, लिंक सापेक्ष और श्रृखला सापेक्ष , सुचकांक संख्याओं के गणना मे सामाहित समस्याऐं। औसत, सामान्य योगात्मक और भति औसत विधिया। लेस्पीयर, पासी, मॉर्शल – एडगेवर्थ और फिशर का सुचकांक संख्या। समय और कारक व्युत्क्रम परीक्षण। श्रृखला आधारित सुचकांक संख्या उपभोक्ता मूल्य सुचकांक संख्या ।

Economic Statistics: Index number- definition, application of index numbers. Price relatives and quantity or volume relatives. Link and chain relatives, problems involved in computation of index numbers, uses of averages, simple aggregative and weighted average methods, Laspeyre's, Paasche's, Marchal- Edgeworth's and Fisher's index numbers, Time and Factor reversal tests. Chain base index number, Consumer price –index numbers.

Unit IV

समय श्रखला विश्लेषण – वित्तिय समय श्रृखला विधिन्न अव्यय चित्रण ,योगात्मक और गुणात्तम, प्रतिमान, रूझान का निर्धारण वृद्धिवक्र, मौसमी चंचलता का विश्लेषण, मौसमी सूचकांको का निर्माण ।

Time series analysis- economic time series, different components, illustrations, additive and multiplicative models, determination of trend, growth curves, analysis of seasonal fluctuations, construction of seasonal indices.

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. Croxton F.E. and Cowden D.J. (1969): Applied General Statistics, Prentice Hall of India.

2.Chatfield, C.(1980):The Analysis of Time Series-An Introduction ,Second Edition Chapman and Hall.
3.Goon A.M.;Gupta,M.K. and Dasgupta ,B(1986):Fundamentals of Statistics, Volume-Two,World Press,Calcutta
4. Guide to Current Indian Official Statistics: Central Statistical Organization, Govt. of India, New Delhi.
5. Mukhopadhyay ,P.(1999) : Applied Statistics, New Central Book agency Pvt. Ltd.,Calcutta.
6. Srivastava O.S. (1983): A Text Book of Demography, Vikas Publishing.

ADDITIONAL REFERENCES

1.Cox,P.R.(1970):Demography,Cambridge University Press.
2. Pressat R. (1978): Statistical Demography, Methuen and Co. Ltd.

Paper II
सांख्यिकीय गुणवत्ता नियंत्रण और अभिकलनी तकनीक
Statistical Quality Control and Computational Techniques

<u>उद्देश्य :</u> छात्र प्राप्त करेंगे :

(अ) विभिन्न नियंत्रण चार्ट, ऑसी और ए आर एल वक्रों का निर्माण।

(ब) गतिशील माध्य और घातीय भारित गतिशील माध्य चार्ट्स का निर्माण : कुसुम चार्ट।

(स) विभिन्न क्षमता सूचकांको की गणना।

(द) स्वीकृति प्रतिचयन विधि द्वारा गुणों का निष्कर्ष निकालना।

(य) स्वीकृति प्रतिचयन विधि द्वारा चरों का निष्कर्ष निकालना।

Outcome: Students will aquired with

(a) construction of various control charts, OC and ARL curves.
(b) Construction of moving average and exponentially weighted moving average charts; Cu-sum charts.
(c) Computation of various capability indices.
(d) Drawing conclusion through acceptance sampling plan by attributes.
(e) Drawing conclusion through acceptance sampling plan by variables.

Unit I

औद्योगिक अनुसंधान में सांख्यिकीय विधियों का महत्व, दृश्य गंजिंग के अनुरूप वस्तुओं और लाटें गुणों का विनिर्देष, गिनती और मापन, निरिक्षण के प्रकार , सहय सिमा का निर्धारण । नियंत्रण आरेख का समान्य प्रमेप, गुणवत्ता में रिवर्तन का कारण, नियंत्रण सीम उप समहिकरण, नियंत्रण से बाहर मानदंड का सारांश । गुणों का आरेखण, np चार्ट, p- चार्ट, c- चार्ट, u- चार्ट, चरों का आरेख $\bar{X}$ और R चार्ट का अभिकल्पना के साथ p चार्ट, अध्ययन की प्रक्रिया क्षमता ।

Importance of statistical methods in industrial research and practice, specification of items and lot qualities corresponding to visual gauging, count and measurements, types of inspection, determination of tolerance limits. General theory of control charts, causes of variation in quality, control limits, sub-grouping, summary of out of control criteria. Charts for attributes, np chart, p-chart, c-chart, u- chart. Charts for variables, $\bar{X}$ and R charts, design of $\bar{X}$ and R charts, versues p chrts, process capability of studies.

Unit II

समह स्विकार्यता का स्विकार्य प्रतिचयन समास्या की अवधारणा, अच्छे और बुरे समुह का निर्धारण , उत्पादक और उपभोक्ता का जोखिम, सभी गणों के लिए एकल और द्वि प्रतिचयन की योजनाऐं , उनके ocफलन ,AQL,LTPD,AOQL की अवधारणा , निरिक्षण की औसत मात्रा औरASN फलन , निरिक्षण योजनाओं में सुधार, चरों के लिए प्रतिदर्श निरिक्षण योजना , भारतिय प्रसामान्य तालिका भाग – I (अनुप्रयोगों के साथ) IS2500 भाग I

Principle of acceptance sampling-problem of lot acceptance, stipulation of good and bad lots, Producer's and consumers risks, single and double sampling plans for all attributes , their OC functions, concepts of AQL, LTPD, AOQL, Average amount of inspection and ASN function, rectifying inspection plans, sampling inspection plans for variables, Indian Standard Tables Part-I(including applications),IS 2500 Part I.

Unit III

गणनात्मक तकनीक : अंतर सारणी और अंतरगणन की विधियों : न्यूटन की अग्र एवं पश्च अंतरगणन सूत्र ,लैग्रांज का अंतरगण सूत्र विभाजित अंतर अंतरगणन सूत्र, संख्यात्मक अवकलन और समाकलन दृ ट्रेपेजॉइडल ,सिम्पसान का एक तीन सूत्र,गैर रेखीय समीकरणों के पुररावृत्त समाधान ।

Computational Techniques: Difference tables and methods of interpolation: Newton's forward and backward interpolation formula, Lagrange's method of interpolation, divided difference interpolation formula. Numerical differentiation and integration. Trapezoidal, Simpson's one – third formulae, iterative solutions of non-linear equations.

Unit IV

रेखिय प्रोग्रमिंग: उत्तल समुच्चय का प्रारंभिक सिद्धांत , सामान्य रेखिय प्रोग्रामिंग का परिभाषा , एल पी पी का समीकरण ल पी पी के उदाहरण, विभिन्न क्षेत्रों में आने वाली समास्याएँ, ग्राफिकल और सिम्प्लेक्स विधि द्वारा एल पी पी का हल । कृत्रिम चर । एल पी पी मे द्वंद्व समस्या , परिवहन समस्या (गैर अपभ्रष्ट और संतुलित मामलों के लिए), असाइनमेंट समस्या।

Linear Programming: Elementary theory of convex sets, definition of general linear programming problems (LPP), formulation problems of LPP, examples of LPP. Problems occurring in varios fields, Graphical and Simplex methods of solving an LPP, artificial variables, duality of LPP, Transportation Problem (non-degenerate and balanced cases only), Assignment Problems.

UnitV

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.Brownless K.A. (1960): Statistical Theory and Methodology in Science and Engineering, John Wiley and Sons.
2.Grant E.L. (1964): Statistical Quality Control, McGraw Hill.
3. Ducan A.J. (1974): Quality Control and Industrial Statistics, Traporewala and Sons.
4. Gauss S.I. (1975) : Linear Programming Methods and Applications, McGraw Hill.
5. Montgomery, D.C. (1985): Introduction to Statistical Quality Control; Wiley.
6. Rajaraman, V. (1981) : Computer Oriented Numerical Methods, Prentice Hall.
7.Shanti Narayan (1993). Mathematical Analysis, S. Chand and Co.
8. Sastry S.S. (1987): Introductory Methods of Numerical Analysis, Prentice Hall
9. Taha H.A.(1982) Operational research :An Introduction ;Macmillan

ADDITIONAL REFERENCES:

1. Biswas Suddhendu (1996): Statistics of Quality Control,Sampling Inspection and Reliability,new Age international Publishers,New delhi.
2. Browker H.A. and Liberman G.T. (1962): Engineering Statistics, Prentece Hall.
3. Despande J.V. (1981). Text Book of Mathematical Analysis, Tata McGraw Hill.
4. Crowden, D.J. (1960): statistical Methods in Quality Control, Asia publishing Society
5. Garwin W.W. (1960): Introduction to Linear Programming, McGraw Hill.
6. Kanti Swarup,Gupta,P.K. and Singh,M.M. (1985):Operations Research;Sultan chand & sons.
7. Mahajan M. (2001) Statistical Quality Control, Dhanpat Rai & Co. (P. Ltd.).
8. Rao S.S. (1984) : Optimization Theory and Applications, Wiley Eastern.
9. Somasundaram, D. and Choudhari, B.(1996). A First Course in Mathematical Analysis, Narosa Publishing House.
10. Wagner H.M. (1973) Principle of O.R. with Applications to Managerial Decisions; Prentice Hall.

11. Wetherill ,G.B (1977) Sampling Inspection and Quality Control; Halsted Press.

Paper III
प्रयोगात्मक (प्रश्नपत्र I तथा II पर आधारित)
Practical (Based on papers I and II)

1. मृत्यू एवं जन्म के मापों की गणना की गणना, जीवन तालिकाओं का निर्माण , गोम्पर्ट्स वक्र द्वारा मृत्यु दर का ग्रेजुएशन

   Computing measures of mortality and fertility, construction of life tables, graduation of mortality rates by Gompertz curve, fitting of Logistic curve.

2. लास्पेयर्स , पांशी , मार्शल –एडवर्थ और फिशर विधि द्वारा सूचकांक संख्या का निर्माण ।

   Construction of index numbers by Laspeyre's, Paasche's, Marshell,-Edgeworth and Fisher method.

3. समय श्रृंखला मे रूझान का निर्धारण, मौसमी सूचकांकों का निर्माण ।

   Determination of trend in a time series, construction of seasonal indices.

4. $\bar{X}$, R, np, p और c –चार्ट का आरेखण ,एकल एवं द्वि प्रतिचयन विधि द्वारा OC वक्र का निर्माण ।

   Drawing of $\bar{X}$ -R, np, p and c –charts. Drawing of OC curve for single and double sampling plans.

5 अंतर तालिकाओं का निर्माण , न्यूटन के अग्र एवं पश्च अंतरगणन, विभाजित अंतर अंतरगणन एवं लैग्रांज का अंतरगणन विधि द्वारा मानों की गणना करना , ट्रैपेज्वाइडल और सिम्पसन एक –तिहाई सूत्र द्वारा समाकलन का संख्यात्मक गणना करना ।

   Construction of difference tables. Use of Newton's, Lagrange's methods of interpolation and divided difference formulae, numerical evaluation of integrals using Trapezoidal and Simpson's one-third formulae, solution to non-linear equation by Newton-Raphson iterative method.

6 LPP एवं इसके ड्यूअल का निर्माण, LPP कर अरेखन एवं सिम्पलेक्स विधि द्वारा गणना, परिवहन एवं कार्यभार की समस्या ।

   Formulation of LPPs and their duals. Solving LPPs by graphical and simplex methods, transportation and assignment problems.

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

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: *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 [illegible] Agriculture Microbiology*** • ***- develop critical thinking and understanding of Environmental [illegible] 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 Hours
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
APSGMNS Govt. PG. College Kawardha (C.G.)

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

Dr. D.K. Srivastava
HOD Microbiology
Govt. E.R.R. PG Sc. College
Bilaspur

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

Dr. Seema Anil Belorkar
Subject Expert
MB BT, ABVV, Bilaspur

Dr. Rashmi Parihar
Subject Expert
Govt. E.R.R. PG Science College, Bilaspur

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

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

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

Prof. D.V. Kulkarni
CBoS Chairperson
Head, Microbiology & Bioinformatics
UTD ABVV Bilaspur

Part A: Introduction

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

1	Course Code	**MICRO - 6T**	
2	Course Title	**Immunology and Medical Microbiology**	
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 • ***- understand about immunological process within the human system.*** • ***- learn about the immune reactions and their applications*** • ***- understand about the mechanism of diseases and their diagnosis*** • ***-know about the concepts of medical microbiology and the pathogenes[illegible]*** • ***-understand the concepts of clinical bacteriology and clinical mycolog[illegible]***	
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)	Periods [illegible]
I	**History and development of Immunology and Immune system:** Concept of Innate and adaptive immunity, Immune cells- Stem cells, T cells, B cells NK cells Macrophage, Neutrophil, Eosinophil, Basophil, Mast cell, Dendritic cell. Immune organs- Bone marrow, Thymus, Lymph node, Spleen, GALT, MALT, CALT, Antigens; Characteristics, Haptens. Antibodies; Structure, types and properties of antibodies.	12 / 08
II	**Immunological Reactions:** Immunological techniques: Agglutination, precipitation, Compliment fixation test, ELISA and their applications. Hypersensitivity and its types- Type I. II, III, IV and diseases mediated by them. **Compliment system:** Classical and alternative pathway.	12 / 08
III	**Historical development in Medical Microbiology** History and contribution of scientists in development of medical microbiology. Koch and River's postulates, normal microbial flora of human body and role of resident flora **Pathogenesis:** Host parasite relationship, Portal of entry of pathogens, De-polymerizing enzymes	12 / 08

IV	**Clinical Bacteriology:** Pathogenic bacteria- morphological characteristics, epidemiology, pathogenesis, laboratory diagnosis and treatment of pathogenic bacteria; *Staphylococcus aureus, group A Streptococcus, Pneumococci, E. coli, Salmonella, Corynebacterium Mycobacterium* and drug resistance.	12 / 08
V	**Clinical Mycology:** Superficial subcutaneous cuteness and systemic mycosis. Morphological characteristics, epidemiology, pathogenesis, laboratory diagnosis and treatment of following pathogenic fungi; *Trichophyton, Histoplasma capsulatum and Candida albicans.*	12 / 08
Keywords	***Immune system, Immunological reactions, Compliment system, Medical Microbiology, Pathogenesis, Clinical Bacteriology, Clinical Mycology***	

PART – C

Learning Resources: Text Books, Reference Books and Others

Suggested Readings:

Text Books Recommended

1. Abbas AK, Lichtman AH, Pillai S. (2007). Cellular and Molecular Immunology. 6th edition Saunders Publication, Philadelphia.
2. Delves P, Martin S, Burton D, Roitt IM. (2006). Roitt's Essential Immunology.11th edition Wiley-Blackwell Scientific Publication, Oxford.
3. Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.
4. Murphy K, Travers P, Walport M. (2008). Janeway'sImmunobiology. 7th edition Garland Science Publishers, New York.
5. Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8th edition. University Press Publication
6. Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. (2013) Jawetz, Melnick and Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication
7. Goering R., Dockrell H., Zuckerman M. and Wakelin D. (2007) Mims' Medical Microbiology 4th edition. Elsevier
8. Willey JM, Sherwood LM, and Woolverton CJ. (2013) Prescott, Harley and Klein's Microbiology 9th edition. McGraw Hill Higher Education
9. Madigan MT, Martinko JM, Dunlap PV and Clark DP. (2014). Brock Biology of Microorganisms. 14th edition. Pearson International Edition
10. Madigan MT, Martinko JM and Parker J. (2014). Brock Biology of Microorganisms. 14th edition Pearson/ Benjamin Cummings

Online Resources –

https://docs.google.com/file/d/0B0lzh6GclA_DdUxuWFhMWDNOSFE/edit?pli=1&resourcekey=0-Gxm4B8zdfp683ID7LbysmA

https://www.academia.edu/23738538/Immunology_Lecture_Notes_Immune_Responses

https://www.libraryofbook.com/books/lecture-notes-medical-microbiology-and-infection

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
H.O.D Microbiology
APSCMNS Govt.
P.G. College Kawardha
(C.G.)

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

Dr. D.K. Shrivastava HOD
Govt. ERR PG Sc
College, Bilaspur

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

Dr. K. K. Dalal
Govt. T.C.L. P.G. College
Jaspur

Dr. Sneh Kana Nagal
HOD - Microbio
Govt. M.K.G. College
Mahasamund.

Dr. Seema Anil Belorkar
Subject Expert
Microbiology & Bioinfor
ABVV, Bilaspur

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

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

Prof DSV Ganesh
CBoS Chairperson
Head Microbiology & Biotechnology
UTD ABVV Bilaspur

Part A: Introduction

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

1	Course Code	**MICRO - 3P**	
2	Course Title	**Applied Microbiology**	
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 • ***- conduct experiments and evaluate results in microbial isolations from environment.*** • ***- demonstrate several aspects in industrial microbes and their products*** • ***- perform and analyze statistical models in biology*** • ***- understand about the immune system.*** • ***- perform basic diagnostic tests for pathogenic microbes***	
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

Group	Topics (Course contents)	No. of Period/ Hour
A	1. Isolation of Bacterial Microflora from Air by Settle Plate Technique 2.Isolation of Bacterial Microflora from Agriculture Soil, Rhizosphere, Phyllosphere, 3. Isolation of Fungi Microflora fromAir by Settle PlateTechnique 4.Isolation of Fungi Microflora fromAgriculture Soil, Rhizosphere, Phyllosphere. 5. Isolation, Identification and preservation of any five fungal strains. 6. Isolation of rhizobium from root nodules. 7. Qualitative assaying of Microbial Enzymes- Catalase, Proteases, Cellulase, Amylase, Gelatinase. 8. Bacterial Analysis of Water- Presumptive, Confirmed andCompleted test. 9. Composting of vegetable and fruit peels and using it on garden plants. 10. Demonstration of Bacterial Antagonism 11. Demonstration of fermentation. 12.Demonstration of Acetic Acid production in lab. 13.Demontration of Wine Production from Grapes. 14. Cultivation of edible mushroom. 15. Calculation of Mean Median and Mode.	15 / 10

B	1. Identification of human blood groups. 2. Perform Total Leukocyte Count of the given blood sample. 3. Perform Differential Leukocyte Count of the given blood sample. 4. Separate serum from the blood sample (demonstration). 5. Perform immune diffusion by Ouchterlony method. 6. Identify bacteria (any three of *E. coli, Salmonella, Pseudomonas, Staphylococcus, Bacillus*) using laboratory strains on the basis of cultural, morphological and biochemical characteristics: IMViC, TSI, nitrate reduction, urease production and catalase tests 7. Study of composition and use of important differential media for identification of bacteria: EMB Agar, McConkey agar, Mannitol salt agar, Deoxycholate citrate agar, TCBS 8. Study of bacterial flora of skin by swab method 9. Perform antibacterial sensitivity by Kirby-Bauer method 10. Determination of minimal inhibitory concentration (MIC) of an antibiotic. 11. Analysis of soil - pH, moisture content, water holding capacity, percolation, capillary action. 12. Isolation of microbes (bacteria & fungi) from soil (28°C & 45°C). 13. MBRT of milk samples and their standard plate count. 14. Microbial fermentation for the production and estimation of ethanol	15 / 10
Keywords	***Isolation, Identification, Immunity, Disease, Diagnosis, Fermentation***	

PART – C

Learning Resources: Text Books, Reference Books and Others

Suggested Readings:

Text Books Recommended

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.
12. Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.
13. Murphy K, Travers P, Walport M. (2008). Janeway'sImmunobiology. 7th edition Garland Science Publishers, New York.
14. Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8th edition, University Press Publication
15. Aneja K. R., Laboratory Manual Of Microbiology And Biotechnology, Medtech; 1st edition, 2017

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:	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 Janjgir

Dr. Richa Mishra
Member
HOD Microbiology
APSGMNS Govt. P.G. College Kawardha (C.G.)

Dr. D.K. Shrivastava
Member
HOD Microbiology
G.J.E.R.R. P.G. Sc. College, Bilaspur

Dr. Sadhana Jaiswal
Member
HOD Microbiology
Govt. N.P.G. College of Science, Raipur

Rashmi
Dr. Rashmi Parihar
Subject Expert
Dept. of Microbiology
Govt. E.R.R. PG. Science College, Bilaspur.

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

Seema Anil Belorkar
Subject Expert,
Microbiology & Bioinformatics
BVV Bilaspur.

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

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

Prof DSV Kaliyadebkar
CBoS chairperson
Head Microbiology & Bioinformatics
GGD AMU, Bilaspur