Faculty of Science

First Semester, 2023-2024
Course Handout

Table of Content

The ICFAI University, Raipur

First Semester, 2023-2024
Faculty of Science
Course Handouts

Course Code	Course Title	L	P	U
SC110	**Hindi**	**3**	**0**	**3**

Instructor-in-charge: Dr.JAYA SINGH

Learning Outcomes:
1. भाषा के प्रति रूचि उत्पन्न कराना
2. सम्प्रेषण में विकास कराना
3. भाषा को सुदृढ़ बनाना
4. शब्दकोश में विकास कराना
5.भाषा में शुध्दि , अशुद्धि का ज्ञान कराना

पाठ्यपुस्तक	*भारतीयता के अमर स्वर*
संदर्भ पुस्तक (R1)	हिंदी व्याकरण (डॉ.हरदेव बाहरी)/
संदर्भ पुस्तक (R2)	नेट/स्लेटहिंदी भाषा
R3	https://www.bsakari.com , hi.m.wikipedia.org/wiki/pallavan
R4	https://www.learncbse.in, hi.m.wikipedia.org/wiki/pallavan
स्वयं	
NPTEL	

व्याख्यान योजना

व्याख्यान	सीखना	शीर्षक	संदर्भ/अध्याय (/खंड/पृष्ठक्रमांक पाठ्यपुस्तक/ संदर्भग्रंथ)
1-5	पल्लवन, पत्राचार अनुवाद , पारिभाषिक शब्दावली एवं	पल्लवन, पत्राचार अनुवादपारिभाषिक , शब्दावली	T1, P 2/CH -1 ,pg N.31-69
6-8	कहानी कहानी	ख).टेलीफ़ोन(कहानी) – हरिशंकर परसाई अफसर (शरद जोशी)	T1,P.1/CH-2 PG.10-11

9-14	हिंदी वर्तनी संबंधी अशुद्धियाँ ,मानव प्रयोग , व्यंग्य लेखन दूर करना, मुहावरे और लोकोक्तियाँ शब्द	हिंदी वर्तनी संबंधी अशु समश्रुत शब्द , मु मुहावरे और लोकोक्तियाँ	T1, P.2 CH-2 PG 101-136
15-17	व्याकरण संबंधी ज्ञान	वर्णमाला संज्ञा सर्वनाम विशेष क्रिया विशेषण संधि समास अलंकार पर्यायवाची शब्द	T1, P.1 CH-1 PG No.1 &24
18-22	देवनागिरी लिपि नामकरण , विशेषताएँ,	देवनागिरी लिपि – नामकरण स्वरुप ,और विशेषताएँ, अपठित गद्यांश,	T1,P. 2/CH-3 PG No.174 ,180,210, 214
23-25	शुद्धि, वाक्य शुद्धि,हिंदी वर्तनी संबंधी अशुद्धियाँ को समझ सकेंगे	मानक हिंदी ,भाषा ,शब्द शुद्धि, वाक्य शुद्धि,हिंदी वर्तनी संबंधी अशुद्धियाँ	T1,P.1 /CH-1 PG No.12-13 & 21-23
26-29	संक्षेपण हिंदी में संक्षिसि , करण हिंदी में पदनाम	संक्षेपण, हिंदी में , पदनाम सामान्य हिंदी व्याकरण और भाषा प्रवाह	T1, P.2 /CH-5 PG No215-223 &
30-32	कंप्यूटर में हिंदी का अनुप्रयोग	कंप्यूटर में हिंदी का अनुप्रयोग तत्सम और तद्भव शब्द	T1, P.2/ CH-1 PG No. 198-204\
33-35	लेख पर्यावरण के प्रति जागरूकता	आज भी खरे हैं तालाब-मिश्र	T1-P.3/,CH-1PG No. 234-236
36-38	कहानी –बालमनोविज्ञान पर केन्द्रित	कहानी ईदगाह– मुंशी प्रेमचंद छत्तीसगढ़ का सांस्कृतिक वैभव (डॉ.हीरालाल शुक्ल)	T1-P.3,/CH-3 PG No. 237-242
39-42	पुनरावृत्ति	पाठ्यपुस्तक	1-262

Evaluation Scheme:

Student evaluation is based on the series of Tests and Quizzes conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	17	11/09//2023		CB
Test 2	60 Minutes	17	16/10/2023		OB
Test 3	60 Minutes	16	18/11/2023		CB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	8/12/2023		CB

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc.

Date: 01/08/2023   **Dr.JAYA SINGH**
                                                                              Instructor-in-charge

The ICFAI University, Raipur

First Semester, 2023-2024
Faculty of Science
Course Handouts

Course Code	Course Title	L	P	U
SC111	**Physics-I**	**3**	**0**	**3**

Instructor-in-charge: Dr.ANIL KUMAR VERMA

Learning Outcomes:
Physics I form the first half of a two-semester comprehensive course on core level physics to be taught to all B.Sc. students.
The objective of the course is to impart knowledge of the basic tools for the design of digital circuits and to provide methods and procedures suitable for a variety of digital design applications. The course also introduces fundamental concepts of computer organization. The course also provides laboratory practice.

Textbook T1	Digital Design, M.Morris Mano, PHI,3rd Edition, 2002
Textbook T2	The 8085 Microprocessor Architecture, Programming and Interfacing by K, Uday Kumar & B.S. Uma Shankar, Person Publication (2008)
Reference Book R1	Digital and Analogue Techniques by Navneeth Gokhale & Kitag Mahal, 2002
Reference Book R2	Miroporcessor, Architecture, Programming and application with the 8085 by Ramesh Gaonkar
Website	https://www.tutorialspoint.com/microprocessor/microprocessor_8085_instruction_sets.htm

Lecture Wise Plan :

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text Book)
1-3	Provide the basics of Digital electronics	Number Systems – Decimal, Binary,	(1.1-1.4) (T1)
4-6		Octal, Hexadecimal, Number conversion	1.5-1.15, 3.1-3.5 (T1)
6-8		1's and 2's complements, Addition and subtraction by1's and 2's method	4.4-4.8 (T1)
9-13		Boolean Algebra and theorems, Logic Gates, Universal gates, Sum	4.3, 6.1-6.4 (T1)

		of products and product of sums,.	
14-16	To make the students learn about Combinational Circuit Design	Min terms and Max terms, Karnaugh map Minimization techniques	6.6 (T1)
17-20		Design of Half and Full Adders, Half and Full Subtractors	7.3 (T1)
18-19		Multiplexer, De-Multiplexer,	8.1 (T1)
20-21		Decoder, Encoder	8.2-8.3 (T1)
22-23	To make the students learn about Synchronous Sequential Circuits	Flip flops – Latch, SR FF	10.3 (T1)
24-30		JK, T, D, Master/Slave FF – operation and excitation tables, Triggering of FF,	10.5-10.8 (T1)
30-36	Analysis and design of clocked sequential circuits, circuit implementation	Design of Counters- Ripple Counters, Ring Counters, Shift registers, Universal Shift Register.	11.1-11.3, 11.12-11.13 (T1)
37-38	Introduction to 8085	8085 - Microprocessor architecture and its operations,	13.3-13.5 (T1)
39-42	Concept of Assembly level programming and programming practice	Instructions (Data transfer, Arithmetic), 8085 Instructions (Logical, Branch Control operations),	6 – 8 (T2)
		Programming the 8085	(R3)

Physics I (Lab)-

S. No.	Name of Experiment
1	To study and verify the Truth Table of Basic Logic Gates (NOT/OR/AND) using Breadboard.
2	To study and verify the Truth Table of Universal Gates (NAND/NOR) using Breadboard.
3	To create AND gate using NAND/NOR Gate (s).
4	To create OR gate using NAND/NOR Gate (s).
5	To create NOT gate using NAND/NOR Gate (s).
6	Write a Program to Add 2 (8 bit) numbers using assembly level language (8085) with suitable Simulator.
7	Write a Program to Subtract 2 (8 bit) numbers using assembly level language (8085) with suitable Simulator.
8	Write a Program to generate Fibonacci series using assembly level language (8085) with suitable Simulator.
9	Write a Program to Add 2 (16 bit) numbers using assembly level language (8085) with suitable Simulator.
10	Write a program to Store 8-bit data in memory using assembly level language (8085) with suitable Simulator.

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	8	11.09.2023	1-12	CB
Test 2	60 Minutes	8	16.10.2023	13-21	OB
Test 3	60 Minutes	8	20.11.2023	22-33	MCQs (17M)
Lab	Throughout the Semester	20	**	**	CB
Comprehensive Exam	3 Hours	56	11.12.2023	1-42	CB

** To be announced in the class

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc.

Date: 02/08/2023   **Dr.ANIL KUMAR VERMA**
                                                                                     Instructor-in-charge

The ICFAI University, Raipur

First Semester, 2023-2024
Faculty of Science
Course Handouts

Course Code	Course Title	L	P	U
SC112	**Chemistry-I**	**4**	**2**	**5**

Instructor-in-charge: Dr.PRATIK KUMAR JAGTAP

Learning Outcomes:
This first level course is offered in the first semester for the students of bachelor of sciences.
1. Chemical reactions and strategies to balance them.
2. The fundamental properties of atoms, molecules, and the various states of matter.
3. The electronic structure of atoms and its influence on chemical properties.
4. Predict and explain patterns in shape, structure, bonding and hybridization of molecules.
5. Understand the reactivity for hydrocarbons, halocarbons, alkenes, dienes, and arenes.

Textbook (s)T1	Concise Inorganic Chemistry, J.D. Lee, Black Well Science, OUP, 5thEdition, 1996
Textbook T2	Organic Chemistry, Reactions and Reagents, O.P. Agrawal, Krishna's Educationalpublishers, fifty fourth edition, 2016.
Textbook T3	University Chemistry, Bruce M. Mahan and Rollie J. Meyers, AWL publication,fourth edition, 1998.
Reference Book R1	Organic Chemistry, Francis A. Carey, seventh Edition, The McGraw-Hill, 2008.
Reference Book R2	Physical Chemistry, Ira N. Levine, Fifth Edition, Tata McGraw-Hill , 2002
Reference Book R3	Ernest L Eliel, Stereochemistry of Carbon Compounds, Tata McGraw-Hill Edition,2002.
Reference Book R4	Huheey, Keiter & Keiter, Inorganic Chemistry, Pearson Education, 2003.

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos.ofText Book)
1-3	The fundamental properties of atoms, molecules, and the various states of matter	Idea of de-Broglie matter waves, Heisenberg uncertainty principle , Radial and angular wave functions and probability distribution curves	T1:10 – 21
4-5		Atomic orbitals, Bohr theory	T1:4 – 10

		Aufbau and Pauli exclusion principles, Hund's multiplicity rule, effective nuclear charge.	T1: 21 – 24
6-8			
9-14	To understand the periodic behavior of elements	**Periodic Properties** Atomic and ionic radii, ionization energy, electron affinity and electronegativity definition, methods of determination or evaluation, trends in periodic table and applications in predicting and explaining the chemical behavior	T3:656 – 678
15–16	Predict and explain patterns in shape, structure, bonding and hybridization of molecules	Hybridization,	T1: 81 – 89
17-18		Bond lengths and bond energy	T2: 15 – 29
19-20		Hydrogen bonding, Van der Waals interactions.	T2: 81 – 94
21-23	.	Resonances, hyper conjugation, aromaticity, inductive and field effects.	T2: 32 – 59
24-25	Understand the physical properties and chemical reactions of alkanes	IUPAC nomenclature of branched and unbranched alkanes, Isomerism in alkanes	R1: 64-76
26-27		physical properties and chemical reactions of alkanes,	R1: 80-82
28-29		Cycloalkanes – Nomenclature, methods of formation, chemical reactions	R1: 77-78 R1: 80-82
30-31		Ring strain in small rings (cyclopropane and cyclobutane	R1: 111-112

S. No.	Name of Experiment
1.	Qualitative analysis of mixture containing 08 radicals including two less common metals fromamong the following by semi micro method
Basic radicals:	AgI, PbII, BiIII, CuII, CdII, AsIII, SbIII, SnII, FeIII, AlIII, CrIII, ZnII, MnII, CoII, NiII, BaII, CaII, MgII, NaI, KI, CeIV, ThIV, ZrIV, WVI, TeIV, TiI, MoVI, UVI, VV,BeII, LiI, AuI, PtIV,
Acid radicals:	Carbonate, sulphide, sulphate, nitrite, nitrate, acetate, chloride, fluoride, bromide, iodide, borate, sulphonate, oxalate, phosphate, silicate, thiosulphate,
2.	To detect the presence of functional groups in the given organic compound.
3.	To detect the presence of elements in the given organic compound.
4.	To determine the strength of given HCl solution by titrating it against NaOH solution.
5.	To verify the Beers-Lambert Law

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	8	12.09.2023	1-12	CB
Test 2	60 Minutes	8	17.10.2023	13-21	OB
Test 3	60 Minutes	8	23.11.2023	22-33	CB
Lab	Throughout the Semester	20	**	**	CB
Comprehensive Exam	3 Hours	56	13.12.2023	1-42	CB

** To be announced in the class

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 02/08/2023   **Dr.PRATIK KUMAR JAGTAP**
                                                    Instructor-in-charge

The ICFAI University, Raipur

First Semester, 2023-2024
Faculty of Science
Course Handouts

Course Code	Course Title	L	P	U
SC113	**Mathematics-I**	**3**	**0**	**3**

Instructor-in-charge: Dr.S S DUBEY

Learning Outcomes:
After successful completion of the course student will be able to 1. Convergence of sequence and series. **2.** Basic concept of limit and continuity. **3.** Expansion of function. **4.** Linear system of equation, rank of matrices.

Text Book T1	Differential Calculus, by Shanti Narayan& P K Mittal, S Chand & Com Ltd.
Text Book T2	Engineering Mathematics, Dr. Hari Arora, S K Kataria & Sons
Text Book T3	Applied Mathematics, N P Bali, University Science Press

Lecture wise plan :

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
1-2	Sequence and series	Definition of Sequence and series	T2 Ch-8 237-276
3-4	Condition of convergence	Convergence and divergence of infinite series.	T2 Ch-8 237-276
5-6	Test for convergence	Comparison test, D'Alembert ratio test, Cauchy's root test	T2 Ch- 237-276
7-9	Integration	Integration of irrational algebraic functions and transcendental functions, Reduction formulae, Definite integrals.	T3 Ch 11 188-309
10-13	Concept of Limit and Continuity	Limit and Continuity ε-δ definition of limit of a real valued function, Limit at infinity and infinite limits;.	T1 Ch-2 69-117
14-19	Types of discontinuity; Uniform continuity.	Continuity of a real valued function, Properties of continuous functions, Intermediate value theorem, Geometrical interpretation of continuity, Types of discontinuity; Uniform continuity.	T1 Ch-2 114-117
20-24	Differentiability of a real valued function	Differentiability of a real valued function, Geometrical interpretation of differentiability, Relation between differentiability and continuity	T1 Ch-4 134-194

25-27	Differentiability of a real valued function	Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theor	T1 Ch-4 134-194
28-32	Differential Calculus	Successive differentiations, Leibnitz's theorem, Maclaurin's and Taylor's theorem.	T 1 Ch-5 204-246
33-34	Definition of Matrix	Types of Matrix, Systems of linear equations, Row reduction and echelon forms, Linear independence, The rank of a matrix and applications.	T 2 Ch-12 441-560
35-37	Introduction to linear transformations,	Introduction to linear transformations, The matrix of a linear transformation, Matrix operations, Determinants.	T 2 Ch-12 441-560
38-40	Inverse of a matrix	The inverse of a matrix, Characterizations of invertible matrices	T 2 Ch-12 441-560
41-43	Eigen values and Eigen vectors	Eigen vectors and Eigen values of a linear transformation, Characteristic polynomial and Cayley–Hamilton theorem, Minimal polynomial.	T 2 Ch-12 441-560

Evaluation Scheme:
Student evaluation is based on the series of Tests and Quizzes conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	8	13.09.2022	1-12	CB
Test 2	60 Minutes	8	17.10.2022	13- 28	OB
Test 3	60 Minutes	8	23.11.2022	29- 43	CB
Quizzes (2)	20 Minutes each	20	**	**	CB
Comprehensive Exam	3 Hours	56	15.12.2022	1- 43	CB

** To be announced in the class

Make-up Policy: Make up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 04/08/2023   **Dr.S.S Dubey**
                                                         Instructor-in-charge

The ICFAI University, Raipur

First Semester, 2023-2024
Faculty of Science
Course Handouts

Course Code	Course Title	L	P	U
SC114	**Computer Science-I**	**3**	**0**	**3**

Instructor-in-charge: Mrs.NISHA THAKUR

Learning Outcome –
1. After successful completion of the course student will be able to:
2. To understand basic concepts and implementation of Computer Organization.
3. To understand about Number Systems, logic gates, Boolean algebra and Advanced Concepts.
4. To understand about Combinational & Sequential Circuits and its working architecture.

Textbook T1	Computer Fundamental, Pradeep K. Sinha Sixth Edition BPB Publication.
Reference Book(s) R1	Computer Architecture & Organization by Moriss Manno, 3rd edition, Print ice Hall of India Pvt Ltd.
R2	Digital Computer electronics: An Introduction to microcomputers by Albert Malvino and Jerald Brown, Tata Mcgraw Hill.
NPTEL	http://www.nptelvideos.in/2012/11/computer-organization.html
SWAYAM	https://onlinecourses.swayam2.ac.in/cec19_cs06/preview

Lecture-wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Chapter/sec./Page Nos of Text/Ref. Books)
1-2	Introduction to Computer Organization	Computer system concepts, Computer architecture	T1 : Chap 1, Chap 2
3-6	Concept of Data	Concept of data & data Storage, Types of programming languages	T1 : Chap 12
5-9	Computer Number Systems	Decimal numbers, binary numbers, Octal, Hexadecimal	T1 : Chap 3
10-12	Binary arithmetic & Conversion	binary arithmetic, 1's and 2's complements, inter-conversion of number system	T1 : Chap 5
13-17	Digital codes	Binary coded decimal(BCD), Gray code, Excess-3 code, Format of ASCII code.	T1 : Chap 4

20-25	Logic Gates	Positive and negative logics, NOT gate, OR gate, AND gate, NAND gate, NOR gate, EX-OR andEX-NOR gates	T1 : Chap 6
26-28	Circuit diagram and Universal Gates	Truth table, Circuit diagram, universal property of NAND and NOR gates.	T1 : Chap 6
29-32	Boolean Algebra	Boolean operation, logic expressing, rules and laws of Boolean algebra,	T1 : Chap 6
32-36	Simplification & K-Map	Demorgan's theorems, simplification of Boolean expression using Boolean algebra techniques, Karnaugh map techniques	R1 : 1.4
37 - 40	Combinational & Sequential Circuits	Half adder, Full adder, Multiplexer, Flip-Flops, Registers, Shift registers, counters	R1 : 1.5-1.7

Evaluation Scheme:

Student evaluation is based on the series of Tests and Quizzes conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	12/9/2023	1-10	CB
Test 2	60 Minutes	17	17/10/2023	11- 24	CB
Test 3	60 Minutes	17	22/11/2023	25- 42	OB
Lab	Continuous	10		**	CB
Comprehensive Exam	3 Hours	40	13/12/2023	1- 40	CB

Make-up Policy: Make up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc.

Date: 01/08/2023   **Mrs.NISHA THAKUR**
                                                            Instructor-in-charge

The ICFAI University, Raipur

First Semester, 2023-2024
Faculty of Science
Course Handouts

Course Code	Course Title	L	P	U
SC115	**Biology – I**	**3**	**0**	**3**

Instructor-in-charge: Dr.AMENA BANO KHANANI

Learning Outcomes:
1. This course is offered in the first semester for the first year students of bachelor of sciences. 2. To understand the general aquatic plant character like algae. 3. To understand the cellular structure of fungi. 4. To understand the character and structure of bryophyte and pteridophyta. 5. To understand the cellular structure of gymnosperm

Textbook (s)T1	Structure, classification , reproduction of algae and bryophyte, B. R. Vashishtha Botany for degree student's bryophyte.
Textbook T2	General Character, classification, economical features of Mastigomycotina, Unified Botany – 1st year
Textbook T3	General features of classification, reproduction in cycas pinus and ephedra, B.P. Pandey, Botany for degree students, Bsc 2nd year
Textbook T4	Comparative account of cycas, pinus, N.C. Kumar Botany Volume-1

Lecture-wise plan:

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
1-2	To understand the general aquatic plants character like algae	Introduction of plant diversity and general characteristic of plant and algae cellular structure and reproduction of volvox	T1: 118-198, 330-379, 468
3-5		Introduction, systematic classification of , thalus structure of , vegetative, asexual and sexual structure of oedogonium. Introduction classification reproduction in vaucheria	
6-7		Classification thallus structure reproduction and life cycle of ,Ectocarpus and polysyphonia.	
8-12	To understand the cellular structure of fungi	General Characters, clsassification and economic important features and life cycle of Mastigomycotina Phytopthora; Zygomycotina- Mucor	T2: 59-87

13-15		Ascomycotina- Saccharomyces; Bsidiomycotina- Puccinia, Deuteromycotina- Collectotrichum	
16– 18	To understand the structure and character of bryophyta	General account of Lichens	T1: 1-17 33-41
19-20		Outline of Classification and importance of bryophtyes. Structure, reproduction and classification of Hepaticopsida (Marchantia)	
21-23		Structure, reproduction, and classification of Anthocerotopsida(Anthoceros), Bryopsida (Funaria)	T1: 226-248 322-360
24-25	To understand the cellular structure of pteridophyta	General Character of Psilopsida, Lycopsida	T1: 226-248 322-360
26-27		General Character and structure of reproduction pteropsida,	
28-29		General character Structure and reproduction in Lycopodium, Selaginella.	
30-31		General character Structure and reproduction in Equisetum and Marsilea.	
32-35	To understand the cellular structure in gymnosperms	General feature of Gymnosperm and their classification. Reproduction in cycas.	T3: 49-84
36-40		General character classification and reproduction in Pinus and Ephedra.	T3:85-129 130-163

Evaluation Scheme:
Student evaluation is based on the series of Tests and Quizzes conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	8	13.09.2022	1-15	CB
Test 2	60 Minutes	8	17.10.2022	16- 30	OB
Test 3	60 Minutes	8	23.11.2022	31- 40	CB
Lab	60 Minutes	20	**	**	CB
Comprehensive Exam	3 Hours	56	15.12.2022	1- 40	CB

** To be decided in the class

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc.

Date: 04/08/2023   **Dr.AMENA BANO KHANANI**
                                                          Instructor-in-charge

The ICFAI University, Raipur

First Semester, 2023-2024
Faculty of Science
Course Handouts

Course Code	Course Title	L	P	U
SC210	**English Language-II**	**3**	**0**	**3**

Instructor-in-charge: Dr. RITU BENJAMIN

Learning Outcomes: After successful completion of the course student will be able to

1. Understand and speak English
2. Write correct English.
3. Write effective formal letters
4. Participate in Group discussion and put their points effectively. Understand and develop a liking for learning English

Textbook T1	
Reference books R1	English Language Skills-I by Aruna Koneru
Reference books R2	English Language Skills-II by Aruna Koneru
Reference books R3	Soft Skills- K. Alex

Lecture-wise Plan

Lecture Nos	Learning Objective	Topics to be covered	Reference
1	Learning to pronounce words	Word Accent,	R1, R2, R3
2		Word Accent,	R1, R2, R3
3-6	Learning to read sentences correctly	Sentence Accent	R1, R2, R3
7-8	Learning to participate in debate	Effective Speech, Debate	R1, R2, R3
9-11	Learning discussion strategy	Group Discussion	R1, R2, R3
12-16	Learning writing skills	Writing Paragraphs, Note Making, Precise writing and Summary writing.	R1, R2, R3
17-21	Mastering formal communication	Enquiries and Quotation letters,	R1, R2, R3

		Orders and acknowledgement letters, Complaint and adjustment letter, Sales letter and circulars.	
22	Learning correct English	Learning Spelling,	R1, R2, R3
23		Punctuation,	R1, R2, R3
24		Common Error in English	R1, R2, R3
25	Learning to master English	English for competitive examination (For written test & interview skill	R1, R2, R3
26-40	Practical sessions (presentation & participation)	Students practical for practicing debate, group discussion, presentation, writing effective letters	Practical session

Classroom Practical

S. No	Name of the Practical
1	Debate, Group Discussion &Presentation
2	Preparation and presentation on subject based and current topic
3	Writing practice for formal communication

Evaluation Scheme:
Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec. No.)	Remarks
Test 1	60 Minutes	16	11.09.2022	1-11	CB
Test 2	60 Minutes	17	16.10.2022	12- 21	OB
Test 3	60 Minutes	17	20.11.2022	22- 40	CB
Practical	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	40	08.12.2022	1- 40	CB

** To be announced in the class

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 03/08/2023   **Dr.RITU BENJAMIN**
                                                             Instructor-in-charge

The ICFAI University, Raipur

First Semester, 2023-2024
Faculty of Science
Course Handouts

Course Code	Course Title	L	P	U
SC211	**Physics-III**	**3**	**2**	**5**

Instructor-in-charge: Dr.ARUN KUMAR SINGH

Learning Outcomes:
Physics III form the first half of a two-semester comprehensive course on core level physics to be taught to all Bachelor of Science (Mathematics) students.
The course aims at:-
1. Developing an understanding of the basic principles of Optics
2. Developing the detailed knowledge about the interference, diffraction and polarization.
3. Improving the concepts geometrical optics also.

Textbook (s) T1	Unified Physics for B.Sc. 1st by R.P. Goyal, ShivlalAgrawal & Company
Textbook T2	Engineering Physics by Dattu Prasad Ramanlal Joshi, McGraw Hill (Seventh Reprint) 2016
Reference Book R1	Physics for Degree Students B.Sc. First Year by C.L. Arora, S. Chand Publication
Reference Book R2	A Textbook of Engineering Physics, by Avadhanulu M.N. & Kshirsagar P.G., 2010 Edition

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text Book)
1-3	To learn Basics of Waves and Interference	Wave Motion: Plane and Spherical Waves. Longitudinal and Transverse Waves	T1 (5.1)
4-5		Plane Progressive (Travelling) Waves. Wave Equation.	T1 (5.2)
6-8		Particle and Wave Velocities. Superposition of two perpendicular Harmonic Oscillations	T1 (5.5, 6.1, 6.2)
9-12		Graphical and Analytical Methods. Lissajous Figures (1:1 and 1:2) and their	T1 (6.4, 6.5)

		Interference: Division of amplitude and wave front. Young's double slit experiment	T2 (1.1 – 1.9)
13-15		Interference: Division of amplitude and wave front. Young's double slit experiment	T2 (1.1 – 1.9)
16-17	Understanding formation of interference patterns and its application	Fresnel's Bi-prism. Phase change on reflection	T2 (1.10)
18-19		Stokes' treatment. Interference in Thin Films, parallel and wedge-shaped films	T2 (1.12-1.13)
20-21		Newton's Rings: Measurement of wavelength and refractive index.	T2 (1.16)
22-23	Understanding formation of Diffraction patterns and its application	Fraunhoffer diffraction: Single slit.	T2 (2.1-2.5)
24-27		Fraunhoffer diffraction: N slit.	T2 (2.6)
28-33		Resolving power of grating	T2 (2.7)
34-35	Understanding ray optics for a system of lenses	Geometrical Optics, Cardinal points of an coaxial optical system, Newton formula	R2 (40.1-40.9)
36-39	Learning about the Polarization and its application	Polarized light, Polarization by Reflection, Brewster's law, Malus Law, Double refraction, Uniaxial and Biaxial Crystals	T2 (4.1-4.6)
40-42		Light propagation in Uniaxial Crystals, Principal Section, Principal Plane, Nicole Prism, Types of Polarized light, Phase Retardation	T2 (4.7-4.9)

Experiments: Physics I (Lab)

S. No.	Name of Experiment
1	To study and find the refractive index of the material of prism using spectrometer.
2	To study and determine the dispersive power of prism using spectrometer.
3	To study and determine the grating element of a grating using spectrometer.
4	To study and find the frequency and amplitude of a sine wave inputted from a function generator using Cathode Ray Oscilloscope (CRO)
5	To study and find the frequency and amplitude of a square wave inputted from a function generator using Cathode Ray Oscilloscope (CRO)
6	To study and find the frequency and amplitude of a triangular wave inputted from a function generator using Cathode Ray Oscilloscope (CRO)
7	To study and find the frequency of interference of two wave inputted from a function generator using Cathode Ray Oscilloscope (CRO)
8	To study the Lissajous figure of frequency ratio of 1:1 inputted from a function generator using Cathode Ray Oscilloscope (CRO)
9	To study the Lissajous figure of frequency ratio of 1:2 inputted from a function generator using Cathode Ray Oscilloscope (CRO)
10	To study the Lissajous figure of frequency ratio of 2:1 inputted from a function generator using Cathode Ray Oscilloscope (CRO)

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	8	13.09.2023	1-12	CB
Test 2	60 Minutes	8	17.10.2023	13-26	OB
Test 3	60 Minutes	8	22.11.2023	27-42	CB
Lab	Throughout the Semester	20	**	**	CB
Comprehensive Exam	3 Hours	56	15.12.2023	1-42	CB

*To be decided

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc.

Date: 01/08/2023   **Dr.ARUN KUMAR SINGH**
                                                            Instructor-in-charge

The ICFAI University, Raipur

First Semester, 2023-2024
Faculty of Science
Course Handouts

Course Code	Course Title	L	P	U
SC212	**Chemistry-III**	**4**	**2**	**5**

Instructor-in-charge: Dr.PRATIK KUMAR JAGTAP

Learning Outcomes:
This course is offered in the first semester for the Second year students of bachelor of sciences.
1.Pinpoint the historical aspects of development of quantum mechanics
2.Understand and explain the differences between classical and quantum mechanics
3.Understand the idea of wave function
4.Understand the uncertainty relations
5.Explain thermodynamically the operation of a concentration cell, and be able to predict the concentration in the cell based on the cell potenti

Textbook (s) T1	The Elements of Physical Chemistry, Peter Atkins and Julio de Paula,Fourth edition, Oxford University Press, 2005.
Text book T2	Concise Inorganic Chemistry, J.D. Lee, Black Well Science, OUP, 5th Edition,1996
Text book T3	Organic Chemistry, R.T. Morrison and R. Boyd, Prentice- Hall, Sixth Edition,2002.
Text Book T4	Physical Chemistry, G.K. Vemulapalli, PHI learning private limited, 2002.
Reference book (s)R1	Physical Chemistry, Ira N. Levine, Fifth Edition, Tata McGraw-Hill, 2002.
Reference Book R2	Ernest L Eliel, Stereochemistry of Carbon Compounds, Tata McGraw-HillEdition, 2002.
Reference Book R3	Huheey, Keiter & Keiter, Inorganic Chemistry, Pearson Education, 2003.

Lecture Wise Topic:

LectureNos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ PageNos. of Text book)
1-3	To understand the transformation of energy fromheat into work and vice versa	**Thermodynamics** - first lawWork & heat, internal energyand enthalpy.	T1:2.1 – 2.8

4-6	To understand the role of enthalpy in chemistry	**Thermo chemistry** Enthalpy changes accompanyingPhysical Change and Chemical Change	T1:3.1 – 3.7
7-10	To understand the concept of entropy and Gibbs energy	**Thermodynamics** – Second Law Entropy and second law, absolute entropies and Third law, The Gibb's energy	T1: 4.1 – 4.11
11 - 14	To understand the redox reactions involved in electrochemical cells, cell potentials and applications of standard potentials	**Electrochemistry** - The migration of ions, electrochemical cells, The cellpotential. Application of standard potentials	T1:9.2 – 9.13
15– 18	Principles of quantum mechanics to calculate observables on known wavefunctions.	Elementary Quantum Mechanics-l Black body radiation, Planck's radiationlaw, photoelectric effect	R1: 591 – 594
19 -20		Bohr's model of hydrogen atom andits defects.	T2: 4-10
21-24		De Broglie Hypothesis, Heisenberg's uncertainty principle, Sinusoidal wave equation,	R1: 595-599
25- 28	Solve time-dependent and time- independent Schrödinger equationfor simple potentials.	Schrodinger's wave equation and itsimportance, Postulates of quantum mechanics.	T4: 366-373
29 – 30		Particle in a one dimension box.	R1: 606-610
31-33		Quantum numbers and their importance, radial wave function,angular wave function.	T2: 15-20
34-35		Molecular orbital theory (basic idea) , Criteria for forming M.O. and A.O wave functions,	T2: 98- 117
36 - 38		Physical picture of bonding and and ant bonding wave function, Concept of л,л*,ϭ,ϭ* orbitals and their	

		characteristics, Construction of M.O's by LACO-H2 ion	T2: 89 – 98
39 – 40		Hybrid orbitals-sp,sp2 , sp3 Introduction to valence bond model of H2	T2: 80-87

Chemistry III (Lab)

S. No.	Name of Experiment
1	To determine the enthalpy of neutralization of strong acid (hydrochloric acid) and strong base (sodium hydroxide).
2	T To determine the composition of a given binary mixture (ethanol-water) from the study of the viscosity-composition curve at lab temperature.
3	To determine the strength and normality of given acid solution (approx. N10 HCL) by titrating it against standard 0.5 Na OH solution conduct metrically.
4	To determine the strength of given weak acid (CH_3COOH) solution by titrating it against standard base (Na OH) solution conduct metrically.
5	To detect the presence of elements in the given organic compound.
6	To determine the strength of given HCL solution by titrating it against Na OH solution using Ph meter
7	To standardize the given acid solution like (HCL) pH metrically
8	To determine the strength of given mono basic acid (like HCL) potentiometric ally
9	Determine experimentally the partition coefficient of I2 in CCI4 and water.
10	To determine the enthalpy of neutralization of a weak acid (say acetic acid) versus strong base (say Na OH) and determine the enthalpy of ionization of the weak acid.

Evaluation Scheme:

Student evaluation is based on the series of Tests and Quizzes conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Lec.No	Remarks
Test 1	60 Minutes	8	12.09.2023	1-15	CB
Test 2	60 Minutes	8	16.10.2022	16- 30	OB
Test 3	60 Minutes	8	21.11.2022	31- 40	CB
Lab	60 Minutes	20	**	**	CB
Comprehensive Exam	3 Hours	56	11.12.2022	1- 40	CB

** To be decided in the class

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However priorand proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribedAssessment Tests, Tests and Comprehensive Examinations, etc.

Date: 01/08/2023   **Dr.PRATIK KUMAR JAGTAP**
                                                               Instructor-in-charge

The ICFAI University, Raipur

First Semester, 2023-2024
Faculty of Science
Course Handouts

Course Code	Course Title	L	P	U
SC213	**Mathematics –III (Differential Equation)**	**3**	**0**	**3**

Instructor-in-charge: Dr.S S DUBEY

Learning Outcomes:
After successful completion of the course student will be able to
1. Solution of first & first degree differential equation.
2. Solution of Exact differential equations.
3. Second Order Linear Differential Equations
4. Basic concept power series method.

Text Book T	Ordinary & Partial Differential Equation, M D Raisinghania, S Chand & Company, New Delhi
Referencebook(s) R1	B. Rai, D. P. Choudhury & H. I. Freedman (2013). A Course in Ordinary Differential Equations (2nd edition)
Reference Book R2	Daniel A. Murray (2003). Introductory Course in Differential Equations, Orient.

Lecture wise plan

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
1-4	First Order Differential Equations	Basic concepts and genesis of ordinary differential equations,	T 1 Ch-1 1.3-1.35
5-8	To find the order and degree of a differential equation	Differential equations of first order and first degree.	T1 Ch-2 2.1-2.76
9-14	Homogeneous Linear differential Equation	Equations in which variables are separable, Homogeneous equations, Linear differential equations and equations reducible to linear form	T1 Ch-2 2.6
15-19	Exact differential equations	Exact differential equations, Integrating factor, First order higher degree equations solvable for x, y and p.	T1 Ch-2 2.12

20-21	Picard's method of successive approximations	Picard's method of successive approximations and the statement of Picard's theorem for the existence and uniqueness of the solutions of the first order differential equations.	T1 (Part-II) Ch-1 1.3-1.25
22-26	Second Order Linear Differential Equations	Statement of existence and uniqueness theorem for linear differential equations, General theory of linear differential equations of second order with variable coefficients;.	T1 Ch-10 10.1-10.58
27-30	Method of variation of parameters	Method of variation of parameters and method of undetermined coefficients, Reduction of order, Coupled linear differential equations with constant coefficients	T1 Ch-7 7.1-7.26
31-33	Higher Order Linear Differential Equations	Principle of superposition for a homogeneous linear differential equation, Linearly dependent and linearly independent solutions on an interval, Wronskian and its properties	T1 Ch-10 10.1-10.58
34-38	Series Solutions of Differential Equations	Power series method, Legendre's equation, Legendre polynomials, Rodrigue's formula, Orthogonality of Legendre polynomials, Frobenius method,	T1 CH7,7.1-7.6, Ch-9 9.1-9.50
39-43	Bessel's equation, & Recurrence relations.	Bessel's equation, Bessel functions and their properties, Recurrence relations.	T1 Ch-11 11.1-11.45

Evaluation Scheme:

Student evaluation is based on the series of Tests and Quizzes conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	(Lec. No.)	Remarks
Test 1	60 Minutes	8	12.09.2022	1-12	CB
Test 2	60 Minutes	8	17.10.2022	13- 28	OB
Test 3	60 Minutes	8	22.11.2022	29-43	CB
Quizzes (2)	20 Minutes each	20	**	**	CB
Comprehensive	3 Hours	56	13.12.2022	1-43	CB

** To be announced in the class

Make-up Policy: Make up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc.

Date: 01/08/2023   **Dr.S S DUBEY**
                                                             Instructor-in-charge

The ICFAI University, Raipur

First Semester, 2023-2024
Faculty of Science
Course Handouts

Course Code	Course Title	L	P	U
SC214	**Computer Science-III DBMS**	**3**	**0**	**3**

Instructor-in-charge: Dr.BHARTI PATEL

Scope & Objective of the Course:
After successful completion of the course student will be able to:
1. To understand basic concepts and implementation issues of Database System.
2. To learn ER-modeling, Data models, Normalization and Functional dependencies, Relational Algebra, Implementation and Advanced Concepts.
3. To learn the hands-on database operations in SQL interface.

Textbook T1	Database System Concepts, Silberschatz A, Korth HF, and SudarshanS,TMH,2002
Reference book(s) R1	Database Management Systems, Ramakrishna R.& Gehrke J, 3rd Edition, Mc-GrawHill,2002
R2	Database Systems-The Complete book, HectorG Molina, Jeffrey D.Ullmanand Jennifer Widom, Pearson Education, 2002
NPTEL	https://nptel.ac.in/courses/106/105/106105175/
SWAYAM	https://onlinecourses.swayam2.ac.in/cec19_cs05/preview

Lecture wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page No.s of Text/Ref. Books)
1-3	Introduction to Database Systems	Course overview, Overview of modern DBMS, Database Architecture	T1: 1.1-1.13
4-8	About Database	Data Independence, Data Dictionary, Types of Keys	T1: 2.1-2.13
8-11	Data modeling	Basic elements of ER model, Attributes, Types of Relationship	T1: 7.1-7.10
12-16	Introduction to SQL constructs	DDL & DML Commands	T1: 3.1-3.9
17-19	Types of Operators and Functions	In, Between, Like, Aggregate Functions	T1: 5.1

20-25	Understanding additional SQL structures	Insert, Delete, Update, View Definition And Use, Temporary Tables, Nested Queries	T1: 4.1-4.5
26-29	Database design through Functional Dependencies & Normalization	Functional dependencies, Normal Forms: 1NF,2NF, 3NF, BCNF, Multi-valued dependencies:4NF,5NF	T1: 8.1-8.9
30-32	Formal Query Languages	Relational algebra operators, Relational algebra queries	T1: 61.-6.4
33-35	Integrity constraints	Integrity constraints: Not null, unique, check, primary key, foreign key, references, Triggers.	T1: 4.4-4.5
36-38	B Tree, B+Tree	Introduction and operations of B Tree, B+ Tree	T1: 12.1-12.8
39-40	Latest Technologies	Introduction to Hadoop, Big-Data, Data warehouse	T1: 14.1-14.10

Evaluation Scheme:

Student evaluation is based on the series of Tests and Quizzes conducted during the course of semester followed by a comprehensive examination.

Component	Duration	Weightage (%)	Date	Syllabus (Lecture No)	Remarks
Test 1	60 Minutes	16	11/09/2023	1-16	CB
Test 2	60 Minutes	17	16/10/2023	17- 29	OB
Test 3	60 Minutes	17	21/11/2023	30-40	CB
Lab	2 Hours	10	**	**	CB
Comprehensive Exam	3 Hours	40	11/12/2023	1- 40	CB

** To be announced in the class   OB* = Open Book   CB = Closed Book
** To be announced in the class

Make-up Policy: Make up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc.

Date: 01/08/2023   **Dr.BHARTI PATEL**
                                                                  Instructor-in-charge

The ICFAI University, Raipur

First Semester, 2023-2024
Faculty of Science
Course Handouts

Course Code	Course Title	L	P	U
SC215	**Biology-II**	**3**	**0**	**3**

Instructor-in-charge: Dr.AMENA BANO KHANANI

Learning Outcomes:
This course is offered in the first semester for the second year students of bachelor of sciences. • Explain the different parts of flowering plants. • Discuss about the primary and secondary growth of flowering plants.

Textbook T1	Struture development and reproduction in flowering plants : Dr. A. K. Sharma, Dr. Rajeshwari
	Anatomy of flowering plants ; Paula Rudall
	Developmental Biology of Flowering Plants ; V. Raghavan

Structure Development and Reproduction in Flowering Plants

The Basic Body plan of flowering plant :
Modular type of growth, diversity in plant form in annuals, bieannials and perennials; Convergence of evolution of tree habit in gymnosperm, monocotyledons and dicotyledons ; tree largest and longest lived organisms.

The Shoot System :
the shoot apical meristem and its histological organization ; vascularization of primary shoot in monocotyledons and dicotyledons ; formation of internodes, branching pattern ; monopodial and sympodial growth ; canopy architecture ; cambium and its functions ; formation of secondary xylem, a general account of wood structure in relation to conduction of water and minerals.

Leaf :
origin, development, arrangement and diversity in size and shape ; internal structure in relation to photosynthesis and water loss ; adaptations to water stress ; senescence and abscission.

The root system :

the root apical meristem ; differentiation of primary and secondary tissues and their roles ; structural modification for storage, respiration, reproduction and for interaction with microbes.

Flower :

a modified shoot ; structure, development and varieties of flower, functions, structure of anther and pistil, the male and female gemetophytes ; types of pollination ; attractions and rewards for pollinators ; pollen-pistil interaction, self incompatibility, double fertilization, formation of seed-endosperm and embryo ; fruit development and maturation.

Evaluation Scheme:

Student evaluation is based on the series of Tests and Quizzes conducted during the course of semester followed by a comprehensive examination.

Component	Duration	Weightage (%)	Date	Syllabus (Lecture No)	Remarks
Test 1	60 Minutes	16	13/09/2023		CB
Test 2	60 Minutes	17	17/10/2023		OB
Test 3	60 Minutes	17	22/11/2023		CB
Lab	2 Hours	10	**		CB
Comprehensive Exam	3 Hours	40	13/12/2023		CB

** To be announced in the class   OB* = Open Book   CB = Closed Book

Make-up Policy: Make up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc.

Date: 01/08/2023   **Dr.AMENA BANO KHANANI**
                                                      Instructor-in-charge

The ICFAI University, Raipur

First Semester, 2023-2024
Faculty of Science
Course Handouts

Course Code	Course Title	L	P	U
HSC212	**Chemistry**	**3**	**0**	**3**

Instructor-in-charge: Dr.PRATIK KUMAR JAGTAP

Learning Outcomes:
This course is offered in the first semester for the second year students of bachelor of sciences.
1. To understand the basic principles of spectroscopy
2. Recognize spectroscopy in microwave, Rotational spectra of rigid diatomic molecules,selection rules, interaction of spectral lines.
3. Explain vibration of diatomic molecules, the vibrational spectra of diatomic molecules.
4. Explain working principle, taking spectra and outline of UV spectroscopy device.
5. understands the physical principles underlying the NMR phenomenon and realizes the possibilities of NMR spectroscopy in analyzing the structures of molecules

Textbook (s) T1	Organic Spectroscopy, William Kemp, Third Edition, Palgrave 1991.
Textbook T2	Spectroscopy, H. Kaur, Tenth Edition, Pragati Prakashan 2015.
Reference Book (s) R1	Fundamentals of molecular spectroscopy. Colin N. Banwell and Elaine M. MccashMcGraw-Hill, 2016.
Reference Book2	Applied Electran Spectroscopy for chemical analysis Ed. H. Windawi and F. I.Willey Interscience.2018

Lecture-wise plan:

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
1-2	To understand thebasic principles of spectroscopy	**Unifying Principles:** Electromagnetic radiation, interaction of electromagnetic radiation with matter absorption, emission, transmission, reflection, dispersion, polarization and scattering.	T2: 1-29

3-5		Natural line width and natural boarding, transition probability, results of the time dependent perturbation theory, transition moment, selection rules,	
6-7		Intensity of spectral lines. Born-Oppenheimer approximation, rotational, vibration & electronic energy levels.	
8-12	To understand the Rotational spectra of rigid diatomic molecules, selection rules, interaction of spectral lines	**Microwave Spectroscopy:** Classification of molecules, rigid rotor model, effect of isotopic substitution on the transition frequencies, non- rigid rotor, stark effect, nuclear & electron spin interaction and effect of external field. Applications.	R1:31 – 52
13-15		**Photoelectron Spectroscopy:** Basic principles, photo- electric effect, ionization process, Photoelectron spectra of simple molecules. Auger electron spectroscopy –basic idea.	T2: 636-649
16-18	Study of Vibrating diatomic molecule, energy levels of a diatomic molecule, simple harmonic and harmonic oscillator.	Infrared Spectroscopy: Review of linearharmonic oscillator, vibrational energiesof diatomic molecules.	T1: 19 – 27
19-20		force constant and bond strengths, harmonicas,Vibration rotational spectroscopy, P, Q, R, Branches.	T2: 120-130
21-23		Selection rules, normal modes of vibration, groupfrequencies, overtones, hot bands, factors affecting the band	T2: 132 – 159
24-25	Understand the scattering of light and	**Raman Spectroscopy:** Classical and quantumtheories of Raman effect Selection rules	R1:100-124

		Molecular Spectroscopy: Energy levels, molecular orbital, vibronic transitions, vibrationalprogressions and geometry of the excited states	T2: 258-262
26-27	Understand the electronic spectra of diatomic molecules		
28-29		Frank - Condon principle, electronic spectraof poly atomic molecules and spectra of transition metal complexes	T2: 263- 277
30-31			
		Charge- transfers spectra, Electronic spectra andapplication.	T2: 311 – 314
32-34	Understands the physical principles underlying the NMR phenomenon and realizes the possibilities of NMR spectroscopy in analyzing the structures of molecules	**Nuclear Magnetic Resonance** Spectroscopy: Nuclear spin resonance, saturation, shielding ofmagnetic nuclei.	T1: 101-155
35-37		Chemical shifts and its measurements, factorsinfluencing chemical shifts	
38		Deshielding, spin-spin interactions.	
39-40		Factors influencing coupling constant 'J" Classification, basic ideas about instrument.	

Chemistry H$_1$ (Lab)

S. No.	Name of Experiment
1	To determination of λ max by Job's method.
2	To verify the Beers-Lambert Law for $KMnO_4$
3	To determine the percentage of Available Iron in the given sample by calorimetrically.
4	To determine the composition of a given binary mixture (ethanol-water) by calorimetrically.
5	Determination of copper by colorimetric method.
6	Study of mole ratio method by colorimetric method.
7	To verify the Beers-Lambert Law for $K_2Cr_2O_7$.

Evaluation Scheme:
Student evaluation is based on the series of Tests and Quizzes conducted during the course of semesterfollowed by a comprehensive examination

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	8	14.09.2022	1-15	CB
Test 2	60 Minutes	8	18.10.2022	16- 30	OB
Test 3	60 Minutes	8	24.11.2022	31- 40	CB
Lab	60 Minutes	20	**	**	CB
Comprehensive Exam	3 Hours	56	18.12.2022	1- 40	CB

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However priorand proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribedAssessment Tests, Tests and Comprehensive Examinations, etc.

Date: 01/08/2023   **Dr.PRATIK KUMAR JAGTAP**
                                                          Instructor-in-charge

The ICFAI University, Raipur

First Semester, 2023-2024
Faculty of Science
Course Handouts

Course Code	Course Title	L	P	U
HSC213	**Mathematics**	**3**	**0**	**3**

Instructor-in-charge: Ms.YOGITA CHANDRAKAR (VF)

Learning Outcomes:

After successful completion of the course, student will be able to Know
        1. About SETs.
        2. Metric Spaces.
        3. Compactness and Connectedness of SETs.

Text Book (T)	Mathematical Analysis , S C Malik and Savita Arora.
Reference book(s)	S.Kumaresan(2011). Topology of Metric Spaces.
Reference book(s)	Set Theory and Metric Spaces by Irving Kaplansky.

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
1-10	Set Theory	Definitions of Set, finite and Infinite set,Countable and Uncountable Set, Zorn'slemma , Cantor's theorem, POSET.	T /Ch-1/1-43
11-22	Metric Spaces	Definitions and examples of Metric spaces. Point Set Topology of Metric spaces	T /Ch-19/ 706-731
23-30	Complete Metric Spaces andContinuous Functions.	Cauchy and Convergent sequences,Completeness of Metric spaces, Dense sets, Continuous and Uniformlycontinuous functions	T/ Ch-19/732-754
31-35	Compactness	Compact Spaces, sequential compactness, BWP, Heine-Borel theorem, Totally bounded sets, Equivalence of compactness and sequential compactness, continuousfunction on compact spaces.	T/ Ch-19/ 755-771

36-41	Connectedness	Separated sets, connected and disconnected sets, continuous functionson connected sets,	T/ Ch-19/ 772-780

Evaluation Scheme:

Student evaluation is based on the series of Tests and Quizzes conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	17	14.09.2022	1-12	CB
Test 2	60 Minutes	17	18.10.2022	13- 28	OB
Test 3	60 Minutes	16	24.11.2022	29- 41	CB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	18.12.2022	1- 41	CB

Date: 03/08/2023   **Ms.YOGITA CHANDRAKAR**
                                                           Instructor-in-charge

The ICFAI University, Raipur

First Semester, 2023-2024
Faculty of Science
Course Handouts

Course Code	Course Title	L	P	U
HSC214	**Object Oriented Program**	**3**	**0**	**3**

Instructor-in-charge: Mr.ASHISH KUMBHARE

Learning Outcomes:
After successful completion of the course student will be able to
1. Isolate and fix common errors in C++ programs
2. Manipulate various C/C++ Data types, such as arrays, strings, and pointers
3. Use memory appropriately, including proper allocation/deallocation procedures
4. Apply object-oriented approaches to software problems in C++
5. Understand and use the basic programming constructs of C/C++ Write small-scale C++ programs using the above skills

TextBook T1	E. Balagurusamy – Object Oriented Programming with C++, Fifth edition, Tata McGraw Education Hill, 2011.
T2	Ashok N. Kamthane, Object oriented Programming with ANSI & Turbo C++, First Edition, Pearson India
Reference Book(s) R1	Herbert Schildt , The complete reference C++Fourth Edition Tata McGraw- Hill

Lecture wise plan :

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)R1
1	To learn the OOPs fundamentals	What is OOPs? Procedure Oriented Programming vs. Object Oriented Programming.	255
2-4	To learn the OOP's principles	Abstraction Encapsulation, Polymorphism and Inheritance	257-260
5-7	To learn about Classes and Objects	Objects and Instances Class Members	289
8-9	To know about Language Constructs	Programming basics, data type, loops and decisions, Control statements	70-88
10-13	To Learn about Class Member functions and Objects	Classes and Member functions Constructors and destructors	289-324

14-16	To learn about Strings Objects	Creation and Manipulation of Strings String I/O	683-693
17-19	To define and use operators for user defined types	Operator Overloading and multiple overloading with type conversion	384-414
20-23	To learn about Inheritance	Class Single and Multiple Inheritance,	417-425
24-25	To learn about Inheritance	Member Specifiers Derived classes	426-430
26-29	To learn about Polymorphism and need and importance of Virtual Functions	Virtual Function, function call binding, late binding	444-447
30-32	To learn about Polymorphism and need and importance of Virtual Functions	Friend and static function, this operator	332,310-315,297-302
33-34	To learn about handling the file Object	Creating and Manipulating File and Streams	488
35-36	To learn about handling the file Object	Mechanism, try, throw and catch	494
37-38	To learn about handling the file Object	Catching all Exceptions, Multiple catches	495
39-42	To learn about handling the file Object	Programs related to exception handling	506

SN	List of Practical
1.	Write a C++ program to demonstrate conditional statements.
2.	Write a C++ program to demonstrate looping statements.
3.	Write a C++ program to demonstrate Class and Object.
4.	Write a C++ program to demonstrate constructor.
5.	Write a C++ program to demonstrate Friend function.
6.	Write a C++ program to demonstrate function overloading.
7.	Write a C++ program to demonstrate Operator overloading.
8.	Write a C++ program to demonstrate Single and Multiple Inheritance.
9.	Write a C++ program to demonstrate Multilevel and Hierarchical Inheritance.
10.	Write a C++ program to demonstrate Exception Handling.

Evaluation Scheme:

Student evaluation is based on the series of Tests and Quizzes conducted during the course of semester followed by a comprehensive examination

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec. No.)	Remarks
Test 1	60 Minutes	17	14.09.2022	1-12	CB
Test 2	60 Minutes	17	18.10.2022	13- 26	OB
Test 3	60 Minutes	16	24.11.2022	27- 42	CB
Lab	60 Minutes	10	**	**	CB
Comprehensive Exam	3 Hours	40	18.12.2022	1- 42	CB

** To be announced in the class

Make-up Policy: Make up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc.

Date: 01/08/2023   **Mr.ASHISH KUMBHARE**
                                                                      Instructor-in-charge

Course Code	Course Title	L	P	U
HSC215	**Honors Biology**	**3**	**0**	**3**

Instructor-in-charge: Dr.AMENA BANO KHANANI

| **Learning Outcomes:** |
| This course is offered in the first semester for the second year students of bachelor of sciences. |
| •Explain plant pathology |
| •Discuss the pathogens and there infections in plants(Microorganism) which caused disease in plants. |

Text Book (T)	Plant Pathology fifth edition: GEORGE N. AGRIOS
Text Book (T)	Mycology and Plant Pathology: Y.S. Paul
Text Book (T)	Introduction to principle of plant pathology: R.S. Singh
Text Book (T)	Fundamentals of Plant Pathology: Sanjeev Kumar

General principles of Plant pathology, diseases caused by microorganisms.

History and Principle of Plant Pathology –
milestone in phytopathology with particular reference to india. Major epidermis and their social impacts. Historical developments of chemicals, legislative, culture and biological protection measure including classification of plant diseases.

Physiological and Molecular Plant Pathology-
Altered metabolism of plants under biotic and abiotic stresses. Molecular mechanisms of pathogenesis;elicitors, recognition phenomenon, penetration, invasion, primary disease determinant. Enzymes and toxins in relation to plant disease. Mechanisms of resistance, structural and biochemical defense mechanisms. R-genes, Phytoanticipins. Phytoalexins. PR proteins, HRGP. Antiviral proteins.SAR and ISR. Active hydrogen radicals.

Mycology-
Classification of fungi. Life cycle of important phytopathogenic fungi. Economic mycology, edible fungi and entomogenous fungi. Mycorrhizal associations. Cell organells, their morphology, functions and chemical composition.

Plant bacteriology-

Identification and Classification of bacteria. Morphology, ultrastructure and chemical composition of prokaryotic cell in relation to function. Bacteriophage; lytic and lysogenic cyces. Economic use of prokaryotes. Morphology, biochemical charcteristics, reproduction of phytoplasma.

Plant Virology –

Nature, composition and architecture of virus and viroids. Properties of viruses. Nomenclature and classification of viruses. Mycoviruses and baculoviruses. Assay of plant viruses including biological, physical, chemical and molecular methods. Behaviour of viruses in plants including infection, replication and movement. Transmission of virus.

Evaluation Scheme	Duration	Weightage	Date	Syllabus	Remarks
Test 1	60 Minutes	16	14-09-2023		CB
Test 2	60 Minutes	17	18-10-2023		OB
Test 3	60 Minutes	17	23-11-2023		CB
Practical	Throughout the semester	10	**		---
Comprehensive Exam	3 Hours	40	18-12-2023		CB

Date: 02/08/2023   **Dr.AMENA BANO KHANANI**
                                          Instructor-in-charge

The ICFAI University, Raipur

First Semester, 2023-2024
Faculty of Science
Course Handouts

Course Code	Course Title	L	P	U
SC310	**Foundation Course English**	**3**	**0**	**3**

Instructor-in-charge: Mr.ZAFIR KHAN (VF)

Learning Objectives
After successful completion of the course students will be able to 1. To take up the leadership responsibilities. 2. To improve communication skill and self-confidence by arranging and conducting the interviews. 3. To improve time management skill by adhering to research timetable and making amendments in the timetable whenever its necessary to do so. 4. To build self-esteem and self-confidence.

Reference Books R1	Social and Personality Development by David R Shaffer
R2	Education and Personality Development by P. Krishnan Manoharan
R3	The Power of Positive Thinking by Norman Vincet

Lecture Wise Plan:

Lecture Nos	Learning Objective	Topics to be Covered	Reference
1	Introduction to Personality Development	Introduction to Personality Development	**R1, R2,R3**
2	To know different determinants which contribute in personality development	Determinants of personality development	R1,R2,R3
3-6	To know and understand their strength and weakness	Analyzing strength and weakness, corporate theories related to it	R1,R2.R3
7-8	Effectively built their body language	Body Languages	R1,R2,R3
9-11	To communicate effectively with others	Communication Skills	R1,R2,R3

12-16	Introduce leadership quality, tem building and performance appraisal	Techniques in personality developments Stage2	R1,R2,R3
17-21	Motivation, Introspection and self-assessment, Interpersonal relationships, stress management	Techniques in personality developments Stage 3	R1,R2,R3
22	To know about time management	Time managements, importance and needs	R1,R2,R3
23	Learn about conflict management	Conflict managements	R1,R2,R3
24		Levels of conflict	R1,R2,R3
25	Managing conflict	Managing conflict	R1,R2,R3
26-40	Practical session, presentation and participation	Practical sessions presentation & participation	

Class Room Practical :

S. No.	Name of the practical
1	Debate, Group discussion and presentation
2	Communication skills training

Evaluation Scheme:

Student evaluation is based on the series of Tests and Practical session conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec. No.)	Remarks
Test 1	60 Minutes	16	11.09.2022	1-11	CB
Test 2	60 Minutes	17	16.10.2022	12-21	OB
Test 3	60 Minutes	17	20.11.2022	22-40	CB
Practical	Throughout the Semester	10	**	-----	CB
Comprehensive Exam	3 Hours	40	8.12.2022	1-40	CB

Make-up Policy: up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual of students to attend all sessions, to take prescribed assessment tests, tests and comprehensive examinations, etc.

Date: 03/08/2023   **Mr.ZAFIR KHAN**
                                                             Instructor-in-charge

The ICFAI University, Raipur

First Semester, 2023-2024
Faculty of Science
Course Handouts

Course Code	Course Title	L	P	U
SC311	**Physics-V**	**3**	**0**	**3**

Instructor-in-charge: Dr.ARUN KUMAR SINGH

Learning Outcomes:
Physics V form the first half of a two-semester comprehensive course on core level physics to be taught to all B.Sc. students. The course aims at:- 1. Developing an understanding of the basic principles of Elasticity and rigid mechanics & fluid mechanics. 2. Developing the application of concepts to problems of practical interest. Improving the concepts and improving the problem solving skills of students.

Textbook (s) **T1**	Unified Physics for B.Sc. 1st by R.P. Goyal, Shivlal Agrawal& Company
Reference book (s) **R1**	Physics for Degree Students B.Sc. First Year by C.L.Arora, S. Chand Publication

Lecture Wise Plan:

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
1-3	Understanding Basics of Elasticity and its modulus(s)	Elasticity, Effect of temperature and impurities on elasticity of a substance; Small deformation; Stress and strain; Hooke's Law; Elastic constants for an isotropic solid	Page 308-311 (T1)
4-5		Young's modulus, Modulus of Rigidity, Poisson's ratio	Page 311-314 (T1)
6-8		Relationship between the various elastic moduli	Page 315-319 (T1)
9-10		Limiting values of Poisson's ratio, experimental determination of Poisson's ratio	Page 319-321 (T1)

13-15		Torsion of a cylinder, strain energy of twisted cylinder, Determination of modulus of rigidity of a thin rod by static method	Page 321-325 (T1)
16-17		Torsion pendulum, Bending of beam and bending moment	Page 325-326, 328-330 (T1)
18-19	Learning about Bending and torsion of cylindrical shaped objects and practical examples	Cantilever, transverse oscillation of cantilever, beam supported at its ends and loaded in the middle	Page 331-333 (T1)
20-21		Determination of Young's modulus of a bean by bending method, determination of Young's modulus, modulus of rigidity and Poisson's ratio of material of a wire by Searle's method.	Page 334-336 (T1)
21-23		Rotational and Irrigational flow, Equation of continuity, Energy of a flowing fluid, Euler's equation of motion for a non-viscous fluid and its integration	Page -352-357 (T1)
24-27	Understanding Basic fluid mechanics and fluid flow equations	Bernoulli's theorem, applications based on Bernoulli's theorem-Venturimeter, Torricelli's theorem, Shape of the wings of the aero plane. Viscous flow of fluids	Page 357-361 (T1)
28-33	Learning about Viscosity and related laws	Effect of pressure and temperature on the coefficient of viscosity, Flow of liquid through a capillary tube, Poiseuille's formula, , experimental determination of coefficient of viscosity of a liquid –constant pressure difference method, variable pressure method. Two capillaries connected in series and parallel. Motion of spherical body in viscous fluid, derivation of Stock's law using dimensional method, expression	Page 366-373 (T1)

		for terminal velocity, falling of rain drops, falling of soldier with parachute.	
34-35		Intermolecular forces, cohesive and adhesive forces, with some example in daily life, Surface tension, explanation of surface tension using intermolecular forces. Surface energy	Page 366-373 (T1)
36-39	Understanding surface tension, related terminologies	Effect of temperature and impurities on the surface tension, some other examples of surface tension-small drop of a liquid are spherical while bigger are flat, Angle of contact	Page 387-393 (T1)
40-42		Pressure difference between the two sides of a curved liquid surface, to derive an expression for excess of pressure on the curved surface, excess pressure inside spherical drop, excess pressure inside an air bubble. Determination of surface tension of a liquid using capillary rise method	Page 394-400 (T1)

Evaluation Scheme: Physics I (Lab)

S. No.	Name of Experiment
1	To determine the weight of unknown object using parallelogram law of vector edition.
2	To find the value of Young's modulus of a wire using Searle's Apparatus.
3	To find the value of Poisson's ratio of a rubber
4	To verify Newton's law of cooling.
5	To find the moment of inertia of a fly wheel.
6	To determine the frequency of alternating current using a sonometer and an electromagnet.

Evaluation Scheme:

Student evaluation is based on the series of Tests and Lab Tests conducted during the course of semester followed by a comprehensive examination

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	8	11.09.2022	1-12	CB
Test 2	60 Minutes	8	17.10.2022	13-26	OB
Test 3	60 Minutes	8	23.11.2022	27-42	CB
Lab	Throughout the Semester	20	**	-	CB
Comprehensive Exam	3 Hours	56	15.12.2022	1-42	CB

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc.

Date: 03/08/2023   **Dr.ARUN KUMAR SINGH**
                                                                   Instructor-in-charge

The ICFAI University, Raipur

First Semester, 2023-2024
Faculty of Science
Course Handouts

Course Code	Course Title	L	P	U
SC312	**Chemistry-V**	**3**	**0**	**3**

Instructor-in-charge: Ms.YUKTI DEWANGAN (VF)

Learning Outcomes:
This course is offered in the first semester for the Third year students of bachelor of sciences.

1. Explain the fundamentals of analytical chemistry and steps of a characteristic analysis.

2. Expresses the role of analytical chemistry in science.

3. Compare qualitative and quantitative analyses.

4. Expresses the quantitative analysis methods.

5. Expresses the qualitative analysis methods.

Textbook (s) T1	Textbook of quantitative Chemical Analysis, Vogel's, Sixth Edition, Pearson Education, 2003.
T2	Research methodology methods and techniques, C.R. Kothari and GauravGarg, New Age international publishers, 2019.
T3	University Chemistry, Bruce M. Mahan and Rollie J. Meyers, AWL publication, fourth edition, 1998.
Reference book (s) R1	Physical Chemistry, Ira N. Levine, Fifth Edition, Tata McGraw-Hill , 2002.
R2	Huheey, Keiter & Keiter, Inorganic Chemistry, Pearson Education, 2003.

Lecture Wise Plan :

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
1-3	To understand the data analysis for analytical data	Accuracy and precision, Error, types of error, systematic and random errors, minimization of errors.	T1:104-107
4-7		Mean and standard deviations, reliability of results, confidence interval, comparison of results, student T test, F test, Comparison of two samples (Paired T test),	T2: 8.1-8.2 9.3
8-9		Correlation and regression, correlation coefficient and liner regression, Sampling, the basis of sampling, sampling procedure, sampling statistics.	T2:14.2 – 14.3
10-11	To understand the concept of Acid-bases and Buffer solutions	Acid-base theories, Definition of pH and pH scale (Sorenson and operational definitions).	T3: 208-217
12-14		pH at elevated temperatures, pH for aqueous solutions of very weak acid and base, pH for salts of weak acid and weak bases, polyprotic acids.	T3:218 – 253
15		Hard and soft acids, bases.	R2: 344-353
16 -19	To understand the Volumetric analysis of chemicals	Introduction, Titrimetric analysis, classifications of reactions in titrimetric analysis, standard solutions. Preparation of standard solutions, primary and secondary standards,	T1: 292-295
20-21		Indicators, theory of indicators, Acid–base titrations in non-aqueous	T1: 296 – 316
22-25	To understand the quantitative analysis of chemicals	Gravimetric Analysis, Impurities in precipitates, Gravimetric calculations,	T1:398-403

26-28		Precipitation equilibria (Solubility product, common ion effect), organic precipitation.	
29-30	To understand the different types of titration	Introduction, Types of EDTA titrations, Methods of End Point Detection	T1: 326-345
31-33		Indicators (b) Instrumental methods of End point detection (Spectrophotometric, Potentiometric, High frequency titrator),	T1: 345, 373
34 - 36		Types of Complexometric Titrations (a) Direct Titration (b) Back Titration (c) Replacement titration (d) Indirect Titration (e) Applications of Complexometric Titrations.	T1: 335-343
37	To understand separation method and types of chromatography	Conventional column chromatography Introduction, stationary phase, mobile phase	T1:244-259
38-39		advantages and limitations of column chromatography	T1:213– 218
40		Ion exchange chromatography: Introduction, ion exchange equilibria,	T1:219 – 228

Chemistry –V (LAB)

S. No.	Name of Experiment
1	Determination of concentration of Mg^{2+} ions by EDTA using Eriochrome Black as indicator.
2	To determine the strength of ferrous ammonium sulphate (Mohr's salt) solution by using external indicator
3	Determination of the strength of given unknown oxalic acid solution by titrating it against Potassium permanganate.
4	To prepare a standard N/20 copper sulphate solution and then determine the strength of sodium thiosulphate solution iodometrically.
5	Determination of concentration of Ca^{2+} ions by EDTA using Eriochrome Black – T as indicator.
6	Preparation of acetate buffer solution (pH range 3- 6)
7	Estimation of Barium in given sample by Gravimetric Analysis
8	Estimation of Copper in given sample by Gravimetric Analysis

Evaluation Scheme:

Student evaluation is based on the series of Tests and Quizzes conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	12.09.2023	1-15	CB
Test 2	60 Minutes	17	16.10.2023	16- 30	OB
Test 3	60 Minutes	17	21.11.2023	31- 40	CB
Lab	60 Minutes	10		**	CB
Comprehensive Exam	3 Hours	40	11.12.2023	1- 40	CB

Make-up Policy: Make –up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 01/08/2023   **Ms.YUKTI DEWANGAN (VF)**
                                                              Instructor-in-charge

The ICFAI University, Raipur

First Semester, 2023-2024
Faculty of Science
Course Handouts

Course Code	Course Title	L	P	U
SC313	**Mathematics- V Linear Agebra**	**3**	**0**	**3**

Instructor-in-charge: Dr.S S Dubey

Learning Outcomes:
After successful completion of the course student will be able to
1. The concept of linear independence of vectors over a field, the idea of a finite dimensional vector space.
2. Basis of a vector space and dimension of vector space.
3. Basic concept of linear transformations, the Rank-Nullity theorem.
4. The concept inner product space and orthogonally

Text Book T	Linear Algebra by K P Gupta, Pragati Prakashan Revised Edition 2016
Reference book(s) R1	Stephen H. Friedberg, Arnold J. Insel & Lawrence E. Spence (2003). Linear Algebra (4thedition). Prentice-Hall of India Pvt. Ltd.
Reference book(s) R2	Vivek Sahai & Vikas Bist (2013). Linear Algebra (2nd Edition) Narosa Publishing House

Lecture Wise Plan :

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
1-6	To define vector space	Definition and examples vector spaces, Subspace, Linear span, Quotient space and direct sum of subspaces,	T 1 Ch-2 4-45
7-10	Dimension of vector spaces	Linearly independent and dependent sets, Bases and dimension. Rank and nullity of a linear transformation and rank-nullity theorem.	T1 Ch-3,Ch-4 46-72, 73-113

11-16	Properties of Linear Transformations	Isomorphism of vector spaces, Dual and second dual of a vector space, linear transformation,	T1 Ch-5 114-177
17-21	Eigen values and Eigen vectors	Eigen vectors and Eigen values of a linear transformation, Characteristic polynomial and Cayley−Hamilton theorem, Minimal polynomial.	T1 Ch 11 380-419
22-27	Concept of Inner Product Spaces	Inner product spaces and orthogonally, Cauchy−Schwarz inequality, Gram−Schmidt orthogonalisation, Diagonalisation of symmetric matrices.	T1 Ch-10 301-379
28-33	Ad joint of a Linear Transformation	Adjoint of a linear operator; Hermitian, unitary, normal linear transformations.	T1 Ch-10 301-379
34-37	Canonical Forms	Jordan canonical form, Triangular form,	T1 Ch-8 257-282
38-42	Invariant subspaces	Trace and transpose, Invariant subspaces	T1 Ch-9 283-300

Evaluation Scheme:

Student evaluation is based on the series of Tests and Quizzes conducted during the course of semester followed by a comprehensive examination

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec. No.)	Remarks
Test 1	60 Minutes	17	13.09.2022	1-12	CB
Test 2	60 Minutes	17	17.10.2022	13- 28	OB
Test 3	60 Minutes	16	22.11.2022	29- 42	CB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	13.12.2022	1- 42	CB

Make-up Policy: Make up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc.

Date: 04/08/2023   **Dr.S S Dubey**
                                                                          Instructor-in-charge

The ICFAI University, Raipur

First Semester, 2023-2024
Faculty of Science
Course Handouts

Course Code	Course Title	L	P	U
SC314	**Computer Science-V (DSA)**	**3**	**0**	**3**

Instructor-in-charge: Dr.BHARTI PATEL

Learning Outcomes:

This course introduces the core principles and techniques for Data structures. Students will gain experience in how to keep a data in an ordered fashion in the computer. Students can improve their programming skills using Data Structures Concepts. After successful completion of the course student will be able to

1. Explore basic data structures such as stacks and queues.
2. Introduce a variety of data structures such as Linked list, Trees, search trees, Graphs
3. Introduce sorting and searching algorithms.

Textbook(s) T1	Fundamentals of Data Structures by Ellis Horowitz & SartajSahni, Computer Science press.
Reference Book(s) Reference Book R	Data Structures using C by A. K. Sharma, Pearson Education
Reference Book R2	Data structures and Algorithm Analysis in C, 2nd edition, M.A.Weiss, Pearson.
Reference Book R3	Data structures and Program Design in C, 2nd edition, R.Kruse, C.L.Tondo and B.Leung, Pearson
NPTEL Link	https://nptel.ac.in/courses/106/102/106102064/
SWAYAM Link	https://onlinecourses.swayam2.ac.in/cec19_cs04/preview

Lecture Wise Plan :

Lecture Nos.	Learning Objective	Topics to be covered	Reference(Ch./Sec./Page Nos.of Text Book)
1-3	To learn Introduction of Data structure and its types	Introduction of Data structure, Data types: primitive, non-primitive data types, Linear and nonlinear data structure.	T1 CH-1 1.1, 1.3, 1.4
4-6	To learn application of array and various searching techniques	Array concept (one dimension, two dimension), Linear and Binary Search Algorithms,	T1 CH-2 2.4

6-7	To learn various sorting techniques	Sorting Algorithms: Bubble Sort, Insertion Sort, Selection Sort	T1 CH-7 7.1, 7.2
8-10	To learn various sorting techniques using Divide and Conquer strategy.	Quick Sort, Merge Sort & Radix sort	T1 CH-7 7.3, 7.4, 7.5
11	To learn introduction to linear data structure stack.	Stack concept	T1 CH-3 3.1
12-13	To learn various stack operations.	Operations PUSH, POP, TRAVERSE, is full, is empty.	T1 CH-3 3.1, 3.2
14-17	To learn Applications of stack	Infix, Prefix, Postfix representation, Conversion using stack	T1 CH-3 3.3
18-19	To learn introduction to linear data structure Queue and its types.	Introduction, and Types of Queues, Priority Queue, Circular queue, Double Ended Queue,	T1 CH-3 3.1
20	To learn various Queue operations.	Operations (INSERT, DELETE, TRAVERSE)	T1 CH-3 3.1, 3.2
21-22	To learn introduction to linear data structure Linked list and its types.	Linked List, Singly and Doubly Linear link lists, Singly and doubly circular linked list	T1 CH-4 4.1
23-24	To learn various linked List operations	Operations on linked lists insert, delete, Applications of linked lists.	T1 CH-4 4.8,4.9
25-26	To learn introduction to Nonlinear data structure Tree and its types.	Definition of trees and their types, Binary trees, Properties of Binary trees,.	T1 CH-5 5.1, 5.2
27-30	To learn various operations and traversal technique.	Insertion, deletion, Searching and traversal algorithm, Preorder, post order, in-order traversal) , BFS, DFS	T1 CH-5 5.3, 5.4, 5.5
31-32	To learn various applications of tree	Binary Search Trees, Implementations, AVL Trees, B tree,	T1 CH-5 5.6, 5.7
33	To learn introduction to Nonlinear data structure Graph and its types.	Definition of Graph and their types	T1 CH-6 6.1
34-35	To learn various applications of Graph	Adjacency and incident (matrix & linked list) representation of	T1 CH-6 6.2

		graphs, Weighted Graphs,	
36-38	To learn various operations and traversal technique.	Shortest path Algorithm, Spanning tree, Minimum Spanning tree,	T1 CH-6 6.3, 6.4
39-40	To learn various operations and traversal technique.	Kruskal and prims algorithms.	T1 CH-6 6.3, 6.4

Evaluation Scheme: Computer Science V (Lab)

S. No.	Name of Experiment
1	Write a program to perform the Matrix addition, Multiplication Operation. [Menu Driven]
2	Write a program to search the element using sequential search.
3	Write a program to search the element using binary search.
4	Write a program to implement bubble sort.
5	Write a program to implement selection sort.
6	Write a program to implement insertion sort.
7	Write a program to implement the concept of Stack with Push, Pop, Display and Exit operations.
8	Write a program to implement the concept of Queue with Insert, Delete, Display and Exit operations.
9	Write a program to create a single linked list and display the node elements in reverse order.
10	Write a program to create the tree and display the elements.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec. No.)	Remarks
Test 1	60 Minutes	8	12.09.2022	1-12	CB
Test 2	60 Minutes	8	16.10.2022	13- 26	OB
Test 3	60 Minutes	8	21.11.2022	27- 40	CB
Lab	-	20	**	**	CB
Comprehensive Exam	3 Hours	56	11.12.2022	1- 40	CB

Make-up Policy: Make up will be given only under genuine circumstances for Tests Only However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 03/08/2023   **Dr.BHARTI PATEL**
                                                             Instructor-in-charge

The ICFAI University, Raipur

First Semester, 2023-2024
Faculty of Science
Course Handouts

Course Code	Course Title	L	P	U
HSC311	**Honors Course-III Physics**	**3**	**0**	**3**

Instructor-in-charge: Dr.ARUN KUMAR SINGH

Learning Outcomes:
 (Physics H3) form the first half of a two-semester comprehensive course on core level physics to be taught to all the students of B.Sc. (H).
 The course aims at:-
1. Developing an understanding of the basic principles of Photonics.
2. Developing the application of concepts to problems of practical interest.
3. Improving the concepts and improving the problem solving skills of students.

Textbook(s) T1	1. Ajoy Ghatak, Optics, Tata McGraw Hill, New Delhi (2005) (AG). 2. R. P. Goyal, Unified Physics BSc I Year, Shivlal Agrawal and Company (RPG).
Reference book(s) R1	1. J. Wilson and J. F. B. Hawkes, Optoelectronics: An Introduction, Prentice Hall India (1996). (WH) 2. B. L. Theraja, Basic Electronics, S. Chand and Company, New Delhi, (2005). (BLT)

Lecture Wise Plan:

Lecture no.	Learning objectives	Topics to be covered	Reference (Ch./Sec/ Page Nos.of Text Book)
1-12	To Understand concepts of light	Theory of Light, Photon nature of light, Light as Electromagnetic wave, Maxwell's Wave equation.	AG1.2, 1.3, 1.5, AG20.1, 20.2
		Polarization of Light, Malus' Law, Principle of superposition, Interference, Diffraction,	AG1.12, RPG-175, RPG-122, 175
13-19	To learn the Optoelectronics devices	Photoelectric Effect, The Compton Effect, The photon mass	AG22.4, AG22.6, 22.9
		Light Emitting Diodes: Construction, materials and	BLT232-241

		operation, types and uses, Solar Cell, Photovoltaic Device Principles, Photodiode, Phototransistor	
20-27	To study the beam interferometry	Multiple Reflections from a Plane Parallel Film, The Fabry-Perot Etalon, The Fabry Perot Inetrferometer,	AG14.2, 14.3, 14.5
		Resolving Power, The line width, The Spatial Coherence, Coherence Time and Line Width	14.7, 15.3, 15.4, 15.10
28-35	To study the light action in fiber optics	Total internal reflection, The Optical fiber, Coherent Bundle, Numerical Aperture, Attenuation in Optical Fiber, Single Mode and Multimode fibers,	AG24.6, 24.7, 24.9, 24.10, 24.11, 24.12
		Pulse dispersion in Opticalfiber, Waveguide dispersion, Fiber Optic Sensors	24.14, 24.18, 24.21
36-42	To give brief introduction of light as a Laser	Interaction of radiation and matter, Einstein coefficients, Condition for amplification, laser cavity, threshold for laser oscillation, Semiconductor laser diode, Ruby Laser, He-Ne Laser, Optical Resonator	AG23.15, 23.9, 23.10, 23.11

Physics H3 (Lab)

S.No	Name of Experiment
1.	To verify the law of Malus for plane polarized light.
2.	To determine wavelength of sodium light using Newton's Rings.
3.	To determine the resolving power and Dispersive power of Diffraction Grating.
4.	Diffraction experiments using a laser.
5.	To determine the specific rotation of scan sugar using polarimeter.
6.	To determine characteristics of LEDs and Photo- detector
7.	To measure the numerical aperture of an optical fiber

Evaluation Scheme:

Student evaluation is based on the series of Tests (Any one will be open book Test) and Quizzes conducted during the course of semester followed by a comprehensive examination

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	13.09.2022	1-12	CB
Test 2	60 Minutes	17	18.10.2022	13- 19	OB
Test 3	60 Minutes	17	24.11.2022	20- 35	CB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	18.12.2022	1- 42	CB

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General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc

Date: 03/08/2023   **Dr.ARUN KUMAR SINGH**
                                              Instructor-in-charge

The ICFAI University, Raipur

First Semester, 2023-2024
Faculty of Science
Course Handouts

Course Code	Course Title	L	P	U
HSC312	**Chemistry**	**3**	**0**	**3**

Instructor-in-charge: Dr.PIYUSH KUMAR PATEL

Learning Outcomes:
This course is offered in the First semester of the Third Year students of Bachelor of Science
1. Designed to understand stereochemistry of organic compounds.
2. To learn and apply various concepts of stereochemistry and fundamental principles ofstereoselectivity in organic chemistry.
3. Comprehend and Predict the role of reaction intermediates in organic reactions and heterocyclic reaction mechanisms
4. Evaluate the stability of various conformers of acyclic and cyclic systems using steric,electronic and stereoelectronic effects

Correlate various Heterocyclic compounds in organic transformations and to learn their applications

Textbook(s) T1	Kalsi, P. S. Stereochemistry Conformation and Mechanism; NewAge International, 2005.
T2	Stereochemistry of Organic compounds by D. Nasipuri.
T3	Heterocyclic chemistry vol. II by R. R. Gupta, M. Kumar and V. Gupta.
Reference Book (s) R1	Stereochemistry of Organic compounds by E L Eliel
R2	Advanced Organic Chemistry by F A Carey and R J Sundberg
R3	Organic Chemistry by Morrison and Boyd, 6th ed.
R4	Acheson, R.M. Introduction to the Chemistry of Heterocyclic compounds,John Welly & Sons ` 1976).

Lecture Nos.	Learning Objectives	Topics to be covered	Reference (Ch./Sec./Page Nos. of Text Book)
1		Stereochemistry and stereoisomerism	T1:10 – 21
2-3		Optical activity, Plane-polarized light, the polarimeter	T1:4 – 10
4		Specific rotation, Production of Enantiomerism	T1: 21 – 24
5-6	**Stereochemistry:To understand the basics principles of Stereochemistry**	Chirality, the chiral centre, enantiomers, the racemic modification	T3:656 – 678
7		Configuration, Specification of configuration: R and S	T1: 81 – 89
8		Sequence rules, Diastereomers, Meso structures	T2: 15 – 29
9-10		Molecular representations- Wedge, Fischer, Newman and Saw-Horse formulae.	T2: 81 – 94
11		Optical isomerism: Optical activity	T2: 32 – 59
12-		wave nature of light, plane polarised light,	R1: 64-76
13		Specification of configuration, Synthesis and optical activity	R1: 80-82
14-15		Chiral molecules- definition and criteria(Symmetry elements)	R1: 77-78 R1: 80-82
16	**Stereochemistry:To understand the concept of Chirality and Stereoisomers**	Definition of enantiomers and diastereomers Explanation of optical isomerism with examples Glyceraldehyde, Lactic acid,	R1: 111-112
17		Reaction of chiral molecules: Bond-breaking	R1: 182-188
18		Generation of second chiral center, Reaction of chiral molecules with optically active reagent. Resolution.	R1: 189-205
19	**Stereochemistry: To analyse the structure and geometry of stereoisomers**	D,L and R,S configuration methods and E,Z- configuration with examples.	R1: 355-359
20		Mechanism of free radical chlorination. Free rotation about C-C single bond	R1: 364-372

		Conformation, Torsional Strain Conformation of n-butane Vander Waals repulsion	T1:81-89
21			
22		Factors affecting stability of conformation, Conformation of cycloalkanes	T2:15-29
23		Stereoisomerism of cyclic compunds: Cis-and trans-isomers Steroisomerism of cyclic compounds Conformational analysis	T2:81-94
24		Classification and nomenclaute	T2:32-59
25	**Heterocyclic Compounds Fundamental Concepts**	Stucture, aromaticity in 5-numberred and 6-membered rings containing oine heteroatom	R1:64-76
26-30		Synthesis, reactions and mechanism of substitution reactions of: Ruran Pyrrole(Pall-Knorr synthesis, Knorpyrrole synthesis, Hantzsch synthesis Thiophene, Pyridine	R1:80-82
31		Structure of Pyridine, sources of Pyridine Compounds	
32-33		Reactions of pyridine, Electrophilic subsitituion in pyridine	
34-35	**Heterocylic Compounds: React6ion Mechanis and Name reactions**	Nucleophilic substitution in pyridine basicity of pyridine	
36-37		Reduction of pyridine, Quinoline. The skarup synthesis	
38		Isoquinoline. The bischler	
39		Knorr Pyrrole synthesis, Vilsmeier	
40		Stucture of furan, Reactiviey and orientation effect	

Evaluation Scheme: Chemistry (Lab)

S. No.	Name of Experiment
1	Two steps preparations 1. Acetophenone → Acetophenone phenyl hydrazine → 2-phenyl indole. 2-naphthol → 1-phenyl azo-2-naphthol → 1-amino-2-naphthol
2	Preparation of acetanilide from aniline and acetic acid using Zn dust. (Purification by column chromatography)
3	Preparation of 1-nitronaphthalene from naphthalene. (Purification by steam distillation)
4	Separation of a ternary mixture (S-S-S, S-S-L, S-L-L and L-L-L) (for solid mixture: water insoluble/ soluble including carbohydrates) based upon differences in the physical and the chemical properties of the components.
5	Identification of the two components (indicated by the examiner) using micro-scale technique.
6	Preparation of derivatives (any one of separated compound)
7	Combined spectral identification: Interpretation of spectral data of organic compounds (UV, IR, PMR, CMR and Mass spectra).

Evaluation Scheme:

Evaluation Component	Duration	Weightage	Date	(Lec. No.)	Remarks
Test 1	60 Minutes	16	13.09.2023	1-15	CB
Test 2	60 Minutes	17	18.10.2023	16- 30	OB
Test 3	60 Minutes	17	22.11.2023	31- 40	CB
Lab	60 Minutes	10		**	CB
Comprehensive Exam	3 Hours	40	20.12.2023	1- 40	CB

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Date: 03/08/2023   **Dr.PIYUSH KUMAR THAKUR**
                                                  Instructor-in-charge

The ICFAI University, Raipur

First Semester, 2023-2024
Faculty of Science
Course Handouts

Course Code	Course Title	L	P	U
HSC313	**Mathematics**	**3**	**0**	**3**

Instructor-in-charge: Ms.YOGITA CHANDRAKAR (VF)

Learning Outcomes:
After successful completion of the course student will be able to
1. Find Laplace Transformations.
2. Find Inverse Laplace Transformations.
3. Convert ODEs with BVP to Integral equations.
4. Fourier series, Fourier Sine and Cosine Series.
5. Fourier Transformations, Fourier Sine and Cosine Transformations.

Text Book (T)	Fourier Series and Integral Transforms .Dr. S. Sreenadh, S. Ranganatham, Dr. M.V.S.S.N. Prasad, Dr. V. Ramesh Babu.
Reference Book(s)	James wards Brown & Ruel V. Churchill (2011).Fourier series and Boundary value Problems. McGraw-Hill Education.
Reference Book(s)	J. K. Goyal And K. P. Gupta Laplace and Fourier Transforms.

Lecture wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
1-7	Laplace Transforms	Definition of L.T., Linearity property of LT, Change of scale property of LT, Shifting theorem, LT of Integral and Derivatives, LT of Periodic function.	T /Ch-2/ 131-199
8-15	Inverse Laplace Transforms	Definition of Inverse L.T., Linearity property of ILT, Change of scale property of ILT, Shifting theorem, ILT of Integral and Derivatives, Convolution theorem.	T /Ch-2/ 200-276
16-20	Fourier Series	Definition of Fourier series, Fourier Sine and Cosine Series	T/ Ch-1/ 3-127
21-31	Fourier Transforms and Inverse Fourier Transforms	Definition of FT and IFT, Linearity property of FT, Change of scale property of FT ,Shifting theorem, FT of Integral and Derivatives, Modulation theorem, Fourier Sine and	T/ Ch-3/ 279-357

		Cosine Transformations, Inverse Fourier Sine and Cosine Transformations.	
32-40	Applications of Laplace and Fourier Transforms	Relation between LT and FT, solutions of ODEs And Integral equations.	T/ Ch-4/ 361-449

Evaluation Scheme:

Student evaluation is based on the series of Tests and Quizzes conducted during the course of semester followed by a comprehensive examination.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec. No.)	Remarks
Test 1	60 Minutes	17	18.09.2022	1-12	CB
Test 2	60 Minutes	17	18.10.2022	13- 28	OB
Test 3	60 Minutes	16	24.11.2022	29- 40	CB
Quizzes (2)	20 Minutes Each	10	**	**	CB
Comprehensive Exam	3 Hours	40	18.12.2022	1- 40	CB

** To be announced in the class

Make-up Policy: Make up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.

General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc.

Date: 03/08/2023   **Ms.YOGITA CHANDRAKAR**
                                                   Instructor-in-charge