Faculty of Science and Technology

Second Semester, 2022 – 23
Course Handouts

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The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2022 – 2023

Course Handout

Course No	Course Title	L	P	U
MA102	**Mathematics II**	**3**	**0**	**3**

Instructor-in-charge: Dr.ANIMESH KUMAR SHARMA

Learning Outcomes:
The Course is designed to provide basic concepts of Linear Algebra and an introduction to the theory of functions of a complex variable.

Textbook(s) T1	Complex Variables and Applications, J.W.Brown, R.V.Churchill, McGraw-Hill, 7th Ed ,2003
T2	Linear Algebra, Kenneth Hoffmann, Ray Kunze, PHI, 2nd ed, 2002.
Reference book(s) R1	An Introduction to Linear Algebra, V.Krishnamurthy, V.P.Mainra, J.L.Arora,, Affiliated East-West Press2002(For additional problems in Linear Algebra).
R2	Introduction to Linear Algebra, Donald J.Wright, McGraw Hill, International Edition1999
R3	Complex analysis for Mathematics & Engineering, JohnH.Mathews & Russel W. Howell, Jones & Bartlett Publishers, 2001.

Lecture-wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./Pg No)
Complex Variables & Applications :			
1-2	To understand algebraic and geometric properties of complex numbers	Review; Regions in the Complex Plane	1-9,10 (T1)
3	To learn the concept of a function of a complex variable and the concept of limit of a function	Functions of Complex Variable, limits. Mappings (Self study)	11,12,13,14
4	To learn the concept of Riemann Sphere, C-R equations and harmonic	Theorems on limits, Continuity	15,16,17
5-7	To learn the concept of Riemann Sphere, C-R equations and harmonic	Derivatives, C-R equations, Analytic Functions, Harmonic functions	18 - 25
8-9	To understand the properties of elementary functions of a complex variable	Exponential, logarithmic functions, complex exponents	28-32
10,11	To understand the properties of elementary functions of a complex var.	Trigonometric, Hyperbolic functions and their inverses	33-35

12	To learn the concepts of integrals and anti-derivatives of complex valued functions of a singlevariable	Contour integrals, Anti derivatives	36-43
13-15	Develop the skill of applying the theorems	Cauchy theorem, Cauchy Integral Formula, Morera's theorem	44,46-48
16	To obtain the concept to froundedness of an entire function in the complex plane and to understand the concept of maximum modulus of analytic functions	Liouville's Theorem, Maximum Modulus Principle	49,50
	Self study	Convergence of sequences and series	51,52
17-18	To understand the form of Taylor's and Laurent series for an analytic function of a complex variable	Taylor's and Laurent series	53-56
19-20	Develop the skill to find the residues, poles and zeros of analytic functions	Residues, Poles and Zeros of analytic Functions	62-69 (Theorem 3 of Sec 68 is Omitted)
21-23	Evaluation of certain types of definite and improper integrals using the theory of residues	Application of residues	71-74,78
Linear Algebra:			
	Self study	Fields	1.1 (TB2)
24	To understand the concept of an equivalent system of linear equations	System of linear equations	1.2 (TB2)
25	To reduce the given matrix to row reduced matrix using elementary row operations	Matrices and Elementary Row Operations	1.3 (TB2)
26	To find solutions of system of homogeneous linear equations AX=0 by reducing the matrix A to row reduce echelon form	Row-Reduced Echelon Matrices	1.4 (T2)and from (R1)* Problem sets 5.7 problems 1,5, 5.8-All problems.
27-28	Determining the invertibility of the matrix using elementary row operations	Matrix Multiplication, Invertible Matrices	1.5,1.6 (T2) and from R1 5.4-problems 2 to 14,16,21
29-30	To understand the definition of vector space, subspace and span of a set.	Vector Space, Subspaces	2.1,2.2 (TB2) and from R1 3.1-All,3.2-All, 3.3-All 3.4-problems 1-5,8, 9, 10
31-32	To understand the definition of linearly independent and dependent sets, basis and dimension of a vector space	Bases and Dimension, Coordinates	2.3,2.4(T2) and from R1 3.5-All,3.6-All
33-35	To understand the concept of row	Row Equivalence and	2.5,2.6(T2)

	equivalence and row space	Computations concerning	and from R1 3.5-Al
36-40	Concept of linear transformations and Matrix representation	Linear Transformations, The Algebra of linear Transformations, Isomorphism, Representation bymatrices	3.1,3.2,3.3,3.4 (TB2)and from R1 4.1-All,4.2 All, 4.3-All4.4 -All, 4.5-All, 4.6-All,4.7-All,5.1-All, 5.2-All,5.3-All,5.5-All
41-42	To find the Eigen values and Eigenvectors of a given linear operator over a field	Matrices, Eigen values, Eigenvectors and from R1 6.8-All	3.4,6.1,6.2 (T2)

* These are the additional problem sets from Linear Algebra (R1) by Krishnamurthy

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	01.02.2023	01-10	CB
Test 2	60 Minutes	17	04.03.2023	11-20	CB
Test 3	60 Minutes	17	06.04.2023	31- 42	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	12.05.2023	01-42	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.

Dr.ANIMESH KUMAR SHARMA
Instructor-in-charge

Date: 15/01/2023

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2022 – 2023

Course Handout

Course No	Course Title	L	P	U
PH102	**Physics II**	**3**	**0**	**3**

Instructor-in-charge: Dr.ANIL KUMAR VERMA

Learning Outcomes:

1. Physics II forms the Second part of a two-semester comprehensive course on core level physics to be taught to all engineering students.
2. The course aims at developing an understanding of the basic principles of physics and the application of concepts to problems of practical interest.
3.The emphasis is on improving the problem solving skills of students

Text Book (T)	Physics, Vol. 2, Robert Resnick, David Halliday and Kenneth S. Krane, Fifth Edition, John Wiley & Sons, 2002.
Reference book(s) R1	Fundamentals of Physics, Robert Resnick, David Halliday and Jearl Walker, Sixth Edition, John Wiley & Sons., 2001

Lecture wise plan

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
1-2	To discuss electric Charges and the fundamental electric force between two charged bodies, Coulomb's law	Coulomb's law, continuous chargedistributions.	25.4, 25.5
3-5	To study electric fields due to charges at rest	Electric field of point charges, continuous charge distributions, field lines, point charge and dipole in an electric field.	26.1 – 26.7
6-8	To discuss Gauss' law and its application	Flux of a vector field, flux of electric field, Gauss' law, its applications, Gauss' law and conductors.	27.1 - 27.6
9-11	To study electrostatics using energy concepts	Electric potential, potential due to point charges and continuous charge distribution, calculating field from potential, potential from field, equipotential surfaces, potential of a charged conductor.	28.1 – 28.9
12-13	To study electrical properties of materials	Types of materials, conductor in an electric field, insulator in an electric field, Ohm's law, Ohmic materials.	29.1 – 29.6
14-16	Definition of Capacitance and how the energy is stored in	Capacitance, Calculating the capacitance, Capacitors in series and parallel, Energy	30.1 – 30.6

	capacitors	storage in an electric field, Capacitor with	
17-20	To study the effect of magnetic field on moving charges	Magnetic interactions, magnetic poles, force on a moving charge, circulating charges, force on a current carrying wire, Hall effect, torque on a current loop	32.1 – 32.6
21-24	To study magnetic fields due to moving charges and currents	Magnetic field due to moving charge, due to current, parallel currents, field of a solenoid, Ampere's law.	33.1 – 33.5
25-28	To discuss Faraday's law of induction and its applications	Faraday's law, Lenz' law, motional emf, induced electric fields	34.1 – 34.4, 34.6
29-30	To study magnetic dipole moments of individual atoms and magnetic form of Gauss' law	Magnetic dipole and force on a magnetic dipole in a non-uniform field, Magnetization, Gauss' law for magnetism	35.1, 35.2, 35.4, 35.7
31-33	Definition of Inductance and its calculations, energy storage in magnetic field	Inductance, Calculating the inductance, Energy storage in a magnetic field	36.1 – 36.4 Excluding 36.3
34-35	To study displacement currents and Maxwell's equations	Equations of electromagnetism, Maxwell's equations, induced magneticfields and displacement currents	38.1-38.3
36-37	Nature of Light	Concept of photons, Thermal radiation, photoelectric effect	45.1-45.3
38-39	Nature of Matter	Matter waves, de Broglie's hypothesis, experimental verification by Davisson and Germer experiment, uncertainty Principle	46.1-46.7 (Excluding 46.3)
40-41	To study atomic spectra of hydrogen atom	Bohr's Model of the hydrogen atom, Ground state of the hydrogen atom, Atomic Spectra	47.4, 47.5

Physics V-Lab (Including Virtual Lab (VL))

S.No	Name of the Experiment
1	To determine the dispersive power of prism using spectrometer
2	To determine the wavelength of a monochromatic light using Newton’s Ring method (VL)
3	To find the grating element using spectrometer
4	To study the AC waveform using CRO
5	To study LCR resonance circuit
6	To study the characteristics of a solar cell
7	To study Magnetic field along the axis of current carrying coil - Stewart and Gee’s method
8	To determine the Hall voltage developed across the sample material. (VL)
9	To draw the static current-voltage (I-V) characteristics of a junction diode. (VL)
10	To verify Newton's Law of Cooling of different materials and different liquids. (VL)

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	04.02.2023	01-10	CB
Test 2	60 Minutes	17	06.03.2023	11-20	CB
Test 3	60 Minutes	17	07.04.2023	31- 41	OB
Lab	Throughout the Semester	10	**	**	CB
Comprehensive Exam	3 Hours	40	15.05.2023	01-41	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.

Dr. ANIL KUMAR VERMA
Instructor-in-charge

Date: 15/01/2023

The ICFAI University, Raipur

Faculty of Science & Technology

First Semester, 2021 – 2022

Course Handout

Course No	Course Title	L	P	U
CH101	**Chemistry**	**3**	**0**	**3**

Instructor-in-charge: Dr.PRATIK KUMAR JAGTAP

Learning Outcomes:

This first level course is offered in the first semester for the students of all branches of engineering.

1. It provides a comprehensive survey of underlying physical principles that govern the properties and behaviorof chemical systems.
2. To understand the basic principles of spectroscopy
3. Mechanistic pathways of organic reactions. Gives an idea about reactions and reagents.

Textbook (s) T1	The Elements of Physical Chemistry, Peter Atkins and Julio de Paula, Fourth edition, Oxford University Press, 2005.
T2	Concise Inorganic Chemistry, J.D.Lee, Black Well Science, OUP, 5th Edition, 1996
T3	Organic Chemistry, R.T. Morrison and R.Boyd, Prentice- Hall, Sixth Edition, 2002.
Reference book (s)R1	Physical Chemistry, Ira N. Levine, Fifth Edition, Tata McGraw-Hill, 2002.
R2	Ernest L Eliel, Stereochemistry of Carbon Compounds, Tata McGraw-Hill Edition, 2002.
R3	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)
01-02	To understand the transformation of energy from heat into work and vice versa	**Thermodynamics** - first law Work& heat, internal energy and enthalpy.	T1 2.1 – 2.8
03-04	To understand the role of enthalpy in chemistry	Thermo chemistry Enthalpy changes accompanying Physical Change and Chemical Change	T1 3.1 – 3.7
04-06	To understand the concept of	**Thermodynamics** – Second Law	T1

	entropy and Gibbs energy	Entropy and second law, absolute entropies and Third law, The Gibb's energy	4.1 – 4.11
07-10	To understand the redox reactions involved in electrochemical cells, cell potentials and applications of standard potentials	**Electrochemistry** - The migration of ions, electrochemical cells, The cell potential. Application of standard potentials	T1 9.2 – 9.13
11 – 12	To understand the dependence of rates of reactions on different reaction conditions	The rates of reactions Empirical chemical kinetics, Reaction rates, Temperature dependence of reaction rates	T1 10.3 – 10.11
13 -14	To understand the basic principles of spectroscopy	Spectroscopy General features of spectroscopy, Further Rotational spectroscopy, Vibrational information spectroscopy, Vibrational Raman spectra of diatomic molecules.	T1 19.1 – 19.15-20.1
15		The Beer-Lambert Law, The Franck-Condon principle	T1 505 & 512
16 - 17	Coordination Chemistry To understand the structure, properties, formation, Stability reactivity of Transition metal complexes.	Werner's work, recent studies on complexes, Effective atomic number	T2 195 – 200
18 - 19		Nomenclature of coordination Compounds	T2 230 – 232
20 - 21		Crystal Field Theory of Octahedral, Complexes, Magnetism and Thermodynamic aspects of crystal field splitting.	T2 204 – 214, 225 – 226
22		Tetragonal distortions of Octahedral Complexes (Jahn-Teller Distortions)	T2: 214 - 217
23 - 24		Square Planar and Tetrahedral Complexes.	T2 217 – 221
25 - 26	Stereo chemistry To understand the perspective and spatial orientations of atoms in an organic molecule.	Enantiomers, Chirality	T3 4.7 – 4.13
27		Configuration, Specification, Reactions of Stereo isomers	T3 4.14 – 4.19

28 -29		Conformational Isomerism, Factors affecting the stability of conformations and stereoisomerism of cyclic compounds	T3, 4.20, 3.3 – 3.5, 13.10 – 13,14
30		Geometric Isomerism	T38.6
31	Organic reaction mechanisms To understand the mechanistic pathways of organic reactions..	Nucleophilic aliphatic substitution reactions	T3 5.7 – 5.11
32		SN^2 Reaction, Stereochemistry	T3 5.12 – 5.14
33 -34		SN1 Reaction, Stereochemistry, Relative stability of carbocations	T3 5.15 – 5.22
35		SN^2 Vs SN^1	T3 5.23
36 - 37	Gives an idea about reactions and reagents	Elimination reactions, E^2 mechanism	T3 8.13 – 8.20
38 – 39		E^1 mechanism	T3 8.21 – 8.25
40 - 41		Electrophilic addition reaction	T3 9.2 – 9.9, 9.11, 9.15 – 9.19

Chemistry I (Lab)

S. No.	Name of Experiment
1	To determine the temporary and permanent hardness in the given water sample by complexometric titration using EDTA as standard solution
2	To determine the chloride content in the given water sample by Mohrs method
3	To determine the percentage of Available Chlorine in the given sample of Bleaching powder. Iodometrically.
4	To detect the presence of functional groups in the given organic compound.
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 NaOH solution using pHmeter
7	To verify the Beers-Lambert Law

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	17	04.02. 2023	1-15	CB
Test 2	60 Minutes	17	06.03. 2023	16- 30	CB
Test 3	60 Minutes	16	07.04.2023	31- 42	OB
Practical	120 Minutes	10	**	Experiments 1-6	CB
Comprehensive Exam	3 Hours	40	17.05.2023	1- 42	CB

** To be announced in the class

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

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

Dr.PRATIK KUMAR JAGTAP
Instructor-in-charge

Date:15/01/2023

The ICFAI University, Raipur

Faculty of Science & Technology

Second Semester, 2022 – 2023

Course Handout

Course No	Course Title	L	P	U
ES102	**Environmental Science**	**3**	**0**	**3**

Instructor-in-charge: Dr. PRATIK KUMAR JAGTAP

Learning Outcomes:

- Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
- To describe the challenges of maintaining Soil quality and solid waste Management
- Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
- Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
- Understanding of earth processes, evaluating alternative energy systems, pollution control and mitigation, natural resource management, and the effects of global warming and climate change.

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Textbook (s) **T1**	Principles of Environmental Science and Engineering, P. Venugopala Rao PHI Learning private limited, Publication)
T2	A Textbook of Environmental Chemistry and Pollution Control by S.S. Dara (S. Chand and Company)
Reference book (s) **R1**	Masters, G.M. Introduction to Environment Engineering and Science (Prentice Hall of India)
R2	Environmental Chemistry by A.K. Dey (Eastern Ltd.).
R3	Environmental Chemistry by B.K. Sharma (Krishna Prakashan).

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
1-3	Observe and describe habitats within ecosystems	Definition, Characteristics of Ecosystem: Structure of Ecosystem	T1:40-44
4-6		Function of ecosystem, Food chain, Food web, Trophic level, Energy flow, ecological pyramids.	T1: 46-54
7-9		Types of ecosystems: Aquatic ecosystems Terrestrial ecosystems	T1:59-71
10-11	To describe the challenges of maintaining Soil quality	Land Pollution, Lithosphere, pollutants	T2 110-120
12-14		Pollutants & their origin and effect, collection of solid waste	T2: 132-147
15-18		Solid waste management, recycling and reuse of solid waste and their disposal techniques (open dumping, sanitary land filling, thermal, composting).	
19 -21	To describe the challenges of maintaining surface and ground water quality.	Aquatic Environment, water pollutants, Eutrophication	R2: 201-220
22-25		Chemical Speciation, monitoring techniques and methodology	R2: 12.11.1 -12.11.12
26-27		Determination of temporary and permanent hardness of water	T1: 251-252
28-30		Waste water treatment	T1: 153-162
31- 33	To understand the sources of air pollutionand describe the types of air pollutants.	Introduction- definition-classification of air pollutants- air quality standards.	T1: 125-131
34-37		Sources, Analysis, Effects and control measures for Sox, NOx, PM and CO	R2:146-172
38-40		Secondary [photochemical smog, acid rain, ozone, PAN (Peroxy Acetyl Nitrate)], Green-house effect, ozone depletion, atmospheric stability and temperature inversion,	T2 27-45

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	02.02.2023	1-12	CB
Test 2	60 Minutes	17	03.03.2023	13- 28	CB
Test 3	60 Minutes	17	05.04.2023	29- 40	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	13.05.2023	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.

Dr. PRATIK KUMAR JAGTAP
Instructor-in-charge

Date-15/01/2023

The ICFAI University, Raipur

Faculty of Science & Technology
Second Semester, 2022 – 2023
Course Handout

Course No	Course Title	L	P	U
ES103	**Engineering Mechanics**	**3**	**0**	**3**

Instructor-in-charge: Mr. HEMANT KUMAR DEWANGAN

Learning Outcomes:

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

1. Solve for the resultants of any force system and determine equivalent force system.
2. Determine displacement of completely constrained bodies by principles of virtual work and solve the mechanics problems associated with friction force.
3. Calculate the centroid, first moment and second moment of area.
4. Find the velocity and acceleration of rigid bodies in rectilinear and curvilinear motion.
5. Analyze the forces acting on rigid body during translation motion.

Text books T1	Engineering Mechanics (Statics & Dynamics): A.K.Tayal, Umesh pub., Delhi
Reference Books R1	Engineering Mechanics (Statics & Dynamics): N.H. Dubey, McGraw Hill Education pub., Chennai
R2	S.S. Bhavikatti : Engineering Mechanics, New Age Pub., Fourth Edition.
R3	S. Timoshenko and D.H. Youngh :Engineering Mechanics
Swayam Link	https://www.classcentral.com/course/swayam-engineering-mechanics-14036

Lecture-wise Plan:

Lecture Nos.	Learning Objectives	Topics to be covered	Reference
1-4	Introduction to Engineering Mechanics	Classification of Mechanics, Statics, Dynamics: kinetics & kinematics	T1, Ch-01, pg.1-2
		Different laws of mechanics: Newton's law, law of transmissibility of forces	T1, Ch-01, pg.2-6
		parallelogram law of forces, Free Body Diagram	T1, Ch-02, pg.8-21
5-8	Equilibrium of forces and couple	Equivalent Force System and Equilibrium, Conditions of equilibrium	T1, Ch-02, pg.22-27
		System of Forces, application of solving simple problems	T1, Ch-02, pg.26-27
		Different types of problem to be solved	T1, Ch-02, pg.27-45
9-16	Shear Force and Bending Moment Diagram	Types of supports for beams, Beams subjected to concentrated loads and uniformly distributed loads	

		Shear force and bending moment at any section of a beam Analytical methods and graphical methods	
		Force polygon and couple polygon. Reactions at supports.	
		Various problems involved	
17	Analysis of Plane Trusses	Introduction, Engineering Structures	T1, Ch-9, pg.193
18		Rigid or Perfect Truss	T1, Ch-9, pg.194
19		Truss: Determination of Axial Forces in the Members, Method of Joints	T1, Ch-9, pg.195
20		Various problems involved	T1, Ch-9, pg.195-199
21		The Method of Sections	T1, Ch-9, pg.200-215
22		Various problems involved	T1, Ch-9, pg.216-219
23	Friction	Introduction to Friction, Dry Friction,	T1, Ch-6, pg.122-124
24		Rolling Resistance, Force of Friction on a Wheel	T1, Ch-6, pg.125-147
25		Application of Friction: Belt and Rope Drive	T1, Ch-7, pg.148-149
26		Belt Friction, Centrifugal Tension	T1, Ch-7, pg.154-157
27		Initial Tension in the Belt and Power Transmitted by the Belt	T1, Ch-7, pg.158-165
28	Curvilinear Motion of a Particle	Kinematics: Introduction, Position Vector, Velocity and Acceleration	T1, Ch-15, pg.379
29		Components of Motion: Rectangular Components	T1, Ch-15, pg.380
30		Components of Acceleration and Component of Motion	T1, Ch-15, pg.382-396
31		Kinetics: Introduction, Equation of Motion	T1, Ch-15, pg.399-400
32		D'Alembert's principle, Working Concept-Curvilinear Motion, Motion of Vehicles	T1, Ch-15, pg.401-415
33	Kinetics of a Particle: Work and Energy	Introduction, work of a force, energy of a particle, and energy and its different types	T1, Ch-16, pg.428-433
34		Principle of Work and Energy, Work and Energy Principle of for a system of Particles	T1, Ch-16, pg.433-436
35		Potential Energy and Conservative Forces	T1, Ch-16, pg.437
36		Principle of Conservation of Energy, Power	T1, Ch-16, pg.438-439
37		Introduction, Principle of Impulse and momentum	T1, Ch-17, pg.457-458
38		Conservation of momentum, Problems to be solved	T1, Ch-17, pg.459-466
39		Angular Momentum, Conservation of Angular Momentum	T1, Ch-17, pg.467-469
40		Problems to be solved	T1, Ch-17, pg.471

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	23.03.2022	1-16	CB
Test 2	60 Minutes	17	27.04.2022	17- 27	CB
Test 3	60 Minutes	17	21.05.2022	28- 40	OB
Quiz 1	10 Minutes	5	**	1-20	CB
Quiz 1	10 Minutes	5	**	21-40	CB
Comprehensive Exam	3 Hours	40	13.06.2022	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.

Mr. HEMANT KUMAR DEWANGAN
Instructor-in-charge

Date:15-01-2023

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2022 – 2023

Course Handout

Course No	Course Title	L	P	U
TA201	**Computer Programming-II**	**3**	**0**	**3**

Instructor-in-charge: Dr. RAVI KIRAN

Learning Outcomes:
This course is offered as a technical art subject to engineering students. It focuses on training the students rigorously in the skills of a structured programming language, particularly in C and application of such language in problem solving.

Text Book T1	"Programming with ANSI C", E. Balaguruswamy, TMH 4th edition, 2004.
Reference book(s) R1	"Programming with C", Gottfried, Schaum -TMH, 2nd Edition, 2002.
R2	"A Book on C", Al Kelly & Ira Pohl, Pearsons, 4th Edition, 2001..
R3	"The C Programming Language", Kernighan & Ritchie, 2nd Edition PHI, 2002.

Lecture-wise plan:

Lecture No.	Learning Objective	Topics to be covered	(Ch./Sec./Text Book)
1	Overview of C	History, Sample program, basic structure of C, executing a C program	T1 Ch.1
2-3	Constants, Variables and Data types	Constants, variables, data types, storage classes, declarations, assigning values, etc	T1 Ch.2
4-5	Operators and Expressions	Arithmetic, relational, logical, assignment, increment and decrement bitwise, conditional operators, expressions, operator precedence, type conversions,etc.	T1 Ch.3
6	Input, output operations	Reading, writing characters, formatted i/o, etc	T1. Ch.4
7	Decision making & branching	If statement, if - else, nested if, switch statement, etc	T1 Ch.5
8	Decision making & looping	While loop, do loop, for loop etc	T1 Ch.6
9-10	Arrays	One-dimensional, two-dimensional, multi-dimensional arrays, initialization, etc	T1 Ch.7
11-12	Character arrays & strings	Declaring, initializing, reading, writing strings. Arithmetic operations on characters and string operations, etc	T1 Ch.8
13-15	Low level Programming	Bitwise Operations, Bit fields	R1 Ch.13
16-17	Understanding Functions	Definition of function, function calls, return values	T1 Ch.9
18-20	User Defined Functions	Types of functions, passing arguments, nesting, recursion, passing arrays	T1 Ch.9
21-23	Understanding Structures	Defining structure, accessing structure members, structure initialization, operations on individual members, arrays of structures	T1 Ch.10
24	Structures & Unions	Unions, Structures Vs Unions	T1 Ch.10

25	Dynamic Memory Allocation	Introduction, Dynamic Memory Allocation, Malloc, Calloc, Realloc	T1. Ch.13(13.1-13.6)
26-27	Understanding Pointers	Introduction, accessing address of a variable, declaring pointers, initialization	T1. Ch.11 (11.1-11.5)
28-29	Programming with Pointers	Accessing a variable through pointer, pointer expressions, pointer increments and scale factor	T1. Ch.11 (11.6-11.9)
30-31	Pointers & Arrays	Pointers & Arrays, Pointers & Strings, Array of Pointers	T1. Ch.11 (11.10-11.12)
32-33	Pointers & Functions	Pointers as function arguments, functions returning pointers, pointers & structures	T1. Ch.11 (11.13-11.16)
34-36	File Management	Opening a files, closing a file, I/O operations, Random Access to File, Command line arguments	T1. Ch.12
37-42	Data Structures using C	Implementation of linear linked lists, stacks, queues and binary trees	R2 Ch.10 T1. Ch.13

Evaluation Scheme:

Student evaluation is based on the series of Assessment Tests and 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	06.02.2023	1-10	CB
Test 2	60 Minutes	17	28.02.2023	11- 20	CB
Test 3	60 Minutes	17	08.04.2023	21- 30	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	19.05.2023	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.

Dr. RAVI KIRAN
Instructor-in-charge

Date: 15/01/2023

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2022 – 2023

Course Handout

Course No	Course Title	L	P	U
ES203	**Electrical Sciences II**	**3**	**0**	**3**

Instructor-in-charge: Dr. K.NAGAIAH

Learning Outcomes:

After successful completion of the course student will be able to

1.give an insight to the analysis of single phase and three phase AC circuits

2.introduce the theory and operational aspects of electrical machines

Text Book T1	Basic Electrical Engineering, Nagrath I.J.and Kothari D.P.,TMH, Second Edition, 2002
Reference book(s) R1	Electrical Engineering-Principles and Applications, Allan R.Hambley, PHI-2002.
R2	Theory and Problems of Basic Electrical Engineering, Nagrath I .J.,and Kothari D.P. PHI 2002.

Lecture wise plan

Lecture No.	Learning Objective	Topics to be covered	(Ch./Sec./Text Book)
1-2	Basics of AC circuit analysis	Analysis of AC circuits using phase or method	4.1-4.3
3-4	Concept of complex power and power factor	Complex power and power factor improvement	4.4
5-6	Concepts of three phase circuit analysis	Three phase circuits; Star and delta configuration	6.1 - 6.5
7-8	- do-	Analysis of three phase circuits; Three phase power; Two watt meter method of power measurement	6.6 - 6.8
9-10	Magnetic circuits and their analysis	Concept of Magnetic circuit, Analysis of magnetic circuits; Magnetization characteristic	8.1 - 8.4
11	Concept of magnetic induction and force	Electromagnetic induction and force. Self & mutual inductances	8.5-8.6
12-13	Energy in magnetic circuits and various Losses	Energy stored in magnetic systems and losses	8.7 - 8.9
14-15	Transformer basics	Transformer, principles, types: Ideal transformer	9.1 - 9.3

16-17	Transformer modeling	Transformer circuit model and determination of its parameters using tests	9.4- 9.5
18-19	Transformer Performance	Per unit system, voltage regulation, efficiency	9.6 - 9.8
20	Various Types of transformers	Auto Transformers, 3 phase transformers and Special Transformers	9.9 - 9.11
21- 22	Concepts of rotating machines	Rotating machines and Elementary Synchronous machine	10.1 - 10.3
23-24	Concept of EMF and MMF	EMF and MMF in AC winding	10.4 - 10.5
25	Concept of torque in electric machines	Rotating magnetic field and expression for torque	10.6 - 10.7
26	Operation & constructional features of electric machines	Basic operation and torque production in Synchronous, Induction and DC machines	10.8
27-28	- Do -	Losses & efficiency in electrical machines; cooling; matching of load characteristics	10.9 - 10.11
29-30	Constructional features and circuit model of DC machines	DC machines: constructional features emf & torque Circuit model	11.1 - 11.4
31	Concept of armature reaction and commutation	Armature reaction & commutation; Excitation and magnetization characteristics	11.5 -11.7
32-33	Performance of DC motors	Characteristics and speed control of DC shunt, series and compound motors	11.8
34	- Do-	Starting and Efficiency calculation of DC motors	11.9 -11.10
35-36	Introduction to Synchronous machines	Synchronous machines, characteristics; Synchronous reactance &voltage regulation	12.1 -12.2
37-38	Introduction to Induction machines	Induction machines constructional features, circuit model	12.3
39-40	Characteristics of induction machines, Modeling and performance of induction machines	Torque slip characteristics of induction machine, Tests for determination of circuit model parameters & starting methods	12.3

Evaluation Scheme:

Student evaluation is based on the series of Assessment Tests and 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	31.01.2023	1-13	CB
Test 2	60 Minutes	17	01.03.2023	14- 28	CB
Test 3	60 Minutes	17	03.04.2023	29- 40	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	01.05.2023	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.

Dr. K.NAGAIAH
Instructor-in-charge

Date: 15-01-2023

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2022 – 2023

Course Handout

Course No	Course Title	L	P	U
TA202	**Measurement Techniques**	**2**	**6**	**4**

Instructor-in-charge: Mr.DHARMENDRA KUMAR

Learning Outcomes:

This course gives an introduction to the experimental methods and measurement techniques. The objective of the course is to train the students in the operation of various instruments and equipment and the measurement of various parameters in electric, electronic, mechanical engineering applications.

Textbook(s) T1	Experimental Methods for Engineers, J.P. Holman, TMH, 7thEdition, 2000.
Reference book(s)	
R1	Measurement Systems; Application & Design, E.O. Doebelin, 4th Edition, 2002.
R2	Fundamentals of Momentum, Heat and Mass Transfer Weltay James R.,Charles E. Wicks and Robert E. Wilson John Wiley, 4th Edition, 2002.
R3	Hydraulics & Fluid Mechanics,P.N.Modi and S.M.Seth,Standard Publication
R4	Laboratory Manuals of IcfaiTech, 2003.

Lecture-wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text Book)
1-2	Basic concepts of measurement	Definition of Terms	2.1 - 2.5
		Generalized Measurement System	2.6
		Impedance Matching	2.10
		Experiment Planning	2.11
3-4	Analysis of Experimental data	Causes and Types of errors	3.1 - 3.2
		Error Analysis	3.3
		Uncertainty Analysis	3.4
		Evaluation of uncertainties	3.5
5-6	Method of Least Squares	--	3.11
	Regression Analysis	--	3.12

7-8	Graphical analysis & Curve fitting	Graphical analysis & Curve fitting.	3.16
		Choice of Graph Format	3.17
		General Data Analysis	3.18
9-10	Electrical Measurements	Basic analog meters	4.4
		Basic digital meters	4.5
		Basic input circuits	4.6 (uptoPage 172)
11	Electronic voltmeter	---	4.13
	Digital meters		4.14
12	Oscilloscope	---	4.15
13-15	Transducers	Variable resistance, LVDT, Capacitive Transducers Photo electric effects,	4.19-4.24
		Hall effect	4.29
		Digital Displacement Transducers	4.30
		Comparison of analog & digital	4.31
16-17	Area Measurement	Concepts	5.6
		Graphical measurement - Planimeter	5.7 - 5.8
18-19	Pressure measurement	Mechanical devices	6.3
		Dead weight tester	6.4
		Bourdon tube	6.5
		Diaphragm & bellow gauges	6.6
20-21	Flow Measurements	Flow obstruction	7.1 - 7.3
		Sonic nozzle	7.5
		Anemometers	7.6-7.7(Uptopage316)
22-24	Temperature Measurement	Scales	8.1 - 8.3
		Ideal gas thermometer, Mechanical effects	8.4
		Electrical effects	8.5
		Temperature measurement by radiation	8.6
25-26	Thermal & Transport Property measurements	Thermal conductivity	9.1-9.3
		Calorimetry	9.6-9.8
27-28	Strain & Stress Measurement	Concepts- Resistance strain gauge	10.5-10.8

Laboratory Experiments	No. of Experiments
1. Electrical &Electronics	5
2. Mechanical, Instrumentation & others	5

Evaluation Scheme:

Student evaluation is based on the series of Assessment Tests and 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	31.01.2023	1-13	CB
Test 2	60 Minutes	17	01.03.2023	14- 28	CB
Test 3	60 Minutes	17	03.04.2023	29- 40	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	03.05.2023	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.

Mr.DHARMENDRA KUMAR
Instructor-in-charge

Date:15/01/2023

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2022 – 2023

Course Handout

Course No	Course Title	L	P	U
MG201	**Principles of Management**	**3**	**0**	**3**

Instructor-in-charge: Mr. JITENDRA KUMAR SINGH

Learning Outcomes:

The course aims to provide to the students an insight into the scientific & analytical methods, techniques and tools of economics, a precise and comprehensive coverage of fundamental concepts in economics; and give suitable examples to expose him/her to possibilities of applications of these concepts in business and economic policy.

Text books T1	Principles of Economics, Case E. Karl & Fair C., Pearson Education, 6th Edition, 2002.
Reference books R1	Economics, Samuelson & Nordhus, TMH, 16th Edition, 1998.
R2	Principles of Economics, Lipsey, RG & K.A.Chrystal,Oxford University Press, 9th Edition,1999.

Lecture-wise Plan

Lecture Nos	Learning Objective	Topics to be covered	Reference
1,2	Exposure to Economics	Introduction to Economics	1, 2
3-5	Basic Framework	Application of Supply & Demand & Elasticity	3, 4
6,7	Consumer Behavior	Demand and Consumer Behavior	5 with appendix
8,9	Producer Behavior	Production & Business Organization	6
10,11	Cost Calculation	Analysis of Costs	7, 8
12,13	Factor Pricing	Input Pricing by marginal productivity	9, 10
14,15	Market Behavior	Perfectly Competitive Markets	11
16,17	Market Behavior	Imperfect Competition and its polar case of monopoly	12
18,19	Market Behavior	Oligopoly and Monopolistic Competition	13
20,21	Public Goods Pricing	Externalities, Public Goods & Imperfect Information	14

22-25	Introduction to Macroeconomics	Macroeconomic concerns and its components	16
26-28	Macroeconomic Variables &their measurement	GDP, Growth, Unemployment & Inflation	17, 18
29-32	Goods Market & Fiscal Policy	Multiplier, Fiscal Policy at work	19, 20
33-37	Monetary Policy and Money Market	Monetary Policy at Work and Money Supply.	21, 22
38-41	Open Economy	Open Economy	30

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	01.02.2023	1-13	CB
Test 2	60 Minutes	17	02.03.2023	14- 28	CB
Test 3	60 Minutes	17	04.04.2023	29- 41	OB
Quizzes	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	05.05.2023	1- 41	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.

Mr.JITENDRA KUMAR SINGH
Instructor-in-charge

Date: 15/01/2023

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

Course No	Course Title	L	P	U
CS222	**Programming with Java**	**3**	**2**	**4**

Instructor-in-charge: Dr.PALAK KESHWANI

Learning Outcomes:

The course exposes the student the concepts of Object-oriented Programming. It also covers the fundamental programming aspects of Java .It includes a practical content as well as weightage for the same in evaluation.

Text BookT1	An Introduction to Object-Oriented Programming with Java, C Thomas Wu, TMH, 2006.
Reference book(s) R1	The Complete Reference Java J2SE, Herbert Schildt, 5th Edition, TMH, 2005
R2	Programming with Java: A Primer, E Balagurusamy, 2nd Edition, TMH, 2006.
R3	Core Java2:Volume I-Fundamentals, CayS.Horstmann,GaryCornel,7th Edition, Pearson Education,2004.

Lecture wise plan

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books) R1
1	Classes, Objects, Messages, Methods, Data values, Inheritance, software engineering life cycle	Introduction to OOP	Chapter1 of T1
2 - 3	First Java program, program components, Edit-Compile-Run cycle	Getting Started with Java	Chapter2 of T1
4	Variables, Expressions, Constants, Math class	Numerical Data	Chapter3 of T1
5 - 6	Defining & using a class, arguments & parameters, Passing objects to a method, Constructors, Information hiding	Defining your own class-I	Chapter4 of T1
7 - 9	Returning an Object from a Method, Overloaded Methods & Constructors, Class variables and Methods	Defining your own class-II	Chapter7 of T1
10 - 12	Catching exceptions, Propagating exceptions, Assertions	Exceptions and Assertions	Chapter8 of T1
13 - 14	Java thread model, creating a thread, synchronization.	Multithreading	Chapter 11 of R1
15 - 17	Characters, Strings, Pattern Matching &	Characters and Strings	Chapter 9

	Regular Expression, Comparing Strings		of T1
18 - 19	Basics, Arrays of objects, Passing Arrays to Methods	Arrays	Chapter 10 of T1
20 - 22	Searching, Sorting, Heapsort	Sorting & Searching	Chapter 11 of T1
23 - 25	Low-level File I/O,High-level File I/O, Object I/O	File I/O	Chapter 12 of T1
26 - 27	Classes with Inheritance, Polymorphism, Inheritance & Member Accessibility, Inheritance & Constructors	Inheritance and Polymorphism	Chapter 13 of T1
28 - 30	Delegation-based event model, AWT classes, applet programming	Event Driven Programming, Applet Programming	Chapter 14 of T1 &Chapter 14 of R2

Apart from the above 30 lectures, this course includes eight two-hour laboratory experiments or tests where each student will be asked to write programs in Java environment for the given problems, execute them and get results.

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	02.02.2023	1-10	CB
Test 2	60 Minutes	17	03.03.2023	11- 20	CB
Test 3	60 Minutes	17	05.04.2023	21- 30	OB
Lab	Throughout the Semester	10		**	CB
Comprehensive Exam	3 Hours	40	10.05.2023	1- 30	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.

Dr.PALAK KESHWANI

Date: 15/01/2023 **Instructor-in-charge**

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2022 – 2023

Course Handout

Course No	Course Title	L	P	U
CS223	**Discrete Structures for Computer Science**	**3**	**0**	**3**

Instructor-in-charge: Dr.ANIMESH KUMAR SHARMA

Learning Outcomes:
Discrete mathematics is the study of discrete sets. Material usually includes Logic, Graph Theory & Boolean Algebra.

Textbook(s)T1	Discrete Mathematical Structures, Kolman, Busby & Ross: PHI, 5th Edition, 2006.
Reference book(s) R1	Elements of Discrete Maths, C.L.Liu: Tata McGraw Hill, 2nd edition, 2001.
R2	Discrete Mathematics for Computer Science, Gary Haggard & John Schlipf, Cengage, Thomson 2006.

Lecture-wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./Page Nos.of Text Book)
1- 4	To understand Mathematical structures and operations.	Statement of Addition Principle, Sequences, Strings, Characteristic Function, Matrices, Boolean matrix operations Mathematical Structures.	1.2,1.3,1.5,1.6
5- 8	To verify the correctness of programs in computer science.	Logic, Logical Operations, Quantifiers, Conditional Statements, Methods of Proof, Mathematical Induction.	Ch. 2
9-11	To learn the principles used in the analysis of Algorithms.	Pigeonhole Principle, Recurrence Relations	3.3, 3.5
12- 14	To learn the geometric and algebraic methods of representing objects.	Graphs, Euler Paths & Circuits, Hamiltonian Paths &Circuits	8.1-8.3
15-16	To understand map coloring problems.	Colouring Graphs, Chromatic polynomial	8.6
17-20	To learn the theoretical and Computational aspects of discrete structures of relations.	Relations & Directed Graphs, Paths in relations & directed, Equivalence relation &partitions	Ch. 4
21-22	To develop Flow Charts, etc.	Closure & transitive closure, Warshall Alg.	Ch. 4
23-25	To learn about Boolean Algebra.	Partially Ordered Sets, Lattices, Hasse diagram	6.1-6.3
26-28	To understand the logical representations.	Boolean Algebra, & Boolean Expressions	6.4, 6.5

29-31	To learn the construction of data bases of logical flows.	Trees & their representations, labeled trees	7.1,7.2
32-34	To learn the construction of language compilers.	Undirected trees, spanning trees, Minimal Spanning Trees, Prim & Kruskal algorithms for minimal spanning tree in a connected graph	7.4, 7.5
34-35	To study finite state machines.	Definition of group & semi group	9.2,9.4
36-40	To understand phrase structure grammars.	Languages & finite state machines	10.1,10.3,10.4
41-42	To learn about computer science applications.	Functions for Computer Science	5.2

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	02.02.2023	1-12	CB
Test 2	60 Minutes	17	03.03.2023	13-26	CB
Test 3	60 Minutes	16	05.04.2023	27-42	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	08.05.2023	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.

Dr.ANIMESH KUMAR SHARMA
Instructor-in-charge

Date: 15-01-2023

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

Course No	Course Title	L	P	U
CS221/EC221	Microprocessor Programming and Interfacing	3	2	4

Instructor in charge: Mrs. BHAVNA CHAUDHARY

Learning Outcomes:

After successful completion of the course student will be able to

1. Having the knowledge of the 8086 instruction set and ability to utilize it in programming.
2. Able to analyze, specify, design, write and test assembly language programs
3. Able to interface various devices to the microprocessor.
4. Capable to design and develop both the hardware and software for **microprocessor based systems**

Text Book T	Advanced Microprocessors & Peripherals by A K Ray & KM Bhurchandi, 2/e,TMH, Delhi
Reference book(s) R1	Microprocessors & Interfacing by Douglas V Hall Revised 3/e, Tata McGraw-Hill, New Delhi , 2012
Reference book(s) R2	Micro computer systems: 8086/8088 family by Liu,Gibson, PHI, 2/e.
R3	Microprocessors and Microcontrollers by S K Mandal , 1/e,TMH , New Delhi
MIT	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-823-computer-system-architecture-fall-2005/lecture-notes/
Stanford University	http://cpudb.stanford.edu/p55-danowitz.pdf
Harvard University	https://online-learning.harvard.edu/course/computer-architecture-0
SWAYAM	https://www.classcentral.com/course/swayam-microprocessors-and-microcontrollers-9894
NPTEL	https://nptel.ac.in/courses/108/103/108103157/
MOOC	https://www.mooc-list.com/course/computer-system-design-advanced-concepts-modern-microprocessors-edx

Lecture-wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Chapter/Sec./Page Nos. of Text/Ref. Books)
1	Description of Microcomputer / Microprocessor	Overview of Microcomputer structure and operation	R1 / R2
2	Overview of basic computer mathematics	Computer Number systems, Codes, Arithmetic operations on Binary, Hex and BCD Numbers	R1 Page(1-10)

3-4	Review of Digital Logic devices for Microprocessor system design	Basic digital devices: Tri-sate Devices, Buffers, Decoders, Encoders, MUX, DEMUX, Latches.	R1, R4
5-7	Description of 8086 Microprocessor Internal architecture	Registers&otherpartsinthe8086EU &BIU	T 1.1-1.9
8-11	Learning Assembly Language programming	Addressing Modes & instruction set, Data Transfer, Arithmetic instructions	T 2.2, 2.3.1-2.3.2
12-13	Learning Assembly Language Programming	Logical Instructions	T 2.3.3
14-16	Learning Assembly Language Programming	String Manipulation / Branch Instructions	T 2.3.4-2.3.8
17	Learning Assembly Language Programming	Assembler Directives and Operators	T 2.4
18-19	Learning to write & execute ALP	8086 Assembly Language programming	T3.1, 3.3-3.4
20-21	Learning to write subroutines	Stack Structure of 8086, Procedures	T 4.1-4.2, R1 Page (99-102)
22	Concepts of 8086 interrupt structure	Interrupts and interrupt service routines	T 4.3-4.8
23-24	Description of MACROS & 8086 timing concepts	MACROS , Timings and Delays	T4.10-4.11
25-26	Learning to interface memory with 8086	Memory interfacing: semiconductor memory interfacing, Dynamic RAM interfacing	T 5.1.1, 5.2
27	Learning to interface I/O with 8086	Interfacing I/O ports	T:5.3
28-30	Description of programmable Input-output interface	8255 Programmable port, Modes of operations: Mode0, Mode1 & Mode2	T:5.4-5.5
31-32	Description of Programmable Timer	Programmable Interval Timer 8253: Architecture, Operating Modes	T 6.1.1-6.1.3
33-34	Learning to Program and interface 8253	Programming and interfacing 8253	T 6.1.4
35-36	Description of Serial Communication Interface	Programmable communication interface 8251; USART	T 6.4
37	Description of DMA Interface	DMA controller 8257 : Architecture, Operations	T 7.1
38-39	Learning DMA transfer techniques	DMA Transfers and operations	T 7.2
40	Concepts of Multi processing	Introduction to Multiprocessor systems	T 8.1-8.2

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 (Lecture No)	Remarks
Test 1	60 Minutes	16	01.02.2023	01-10	CB
Test 2	60 Minutes	17	02.03.2023	11-20	CB
Test 3	60 Minutes	17	04.04.2023	31- 40	OB
Lab	Throughout the Semester	10	**	**	CB
Comprehensive Exam	3 Hours	40	06.05.2023	01-40	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.

Mrs. BHAVNA CHAUDHARY
Instructor-in-charge

Date: 15/01/2023

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2022 – 2023

Course Handout

Course Code	Course Title	L	P	U
EC222	**Signals and Systems**	**3**	**0**	**3**

Instructor-in-charge: Dr. K.NAGAIAH

Learning Outcomes: The course is preparatory course and covers the basic principles of signal processing. It shall deal with the representation of signals and systems and basic transforms used in signal processing and introduce the outlines of analog and digital filters. The students are required to review the following concepts covered in the earlier mathematics courses: Fourier series, Laplace Transforms, functions and complex variable theory.

Text Book T	B.P. Lathi, , "Principles of Signal Processing and Linear Systems" Oxford International version 1st Ed. 2011
Reference book(s) R1	Luis F. Chaparro, Elsevier, "Signals and Systems Using Matlab". 1st International Ed, 2011.
Reference book(s) R2	A Nagoor Kani, Mc Graw Hill, "Signals and Systems" New Delhi 3rd Ed. 20`11,
SWAYAM	https://swayam.gov.in/nd1_noc20_ee15/preview
NPTEL	https://nptel.ac.in/courses/108104100/
MIT	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-003-signals-and-systems-fall-2011/lecture-videos/

Lecture-wise plan:

Lecture No.	Learning Objective	Topics to be covered	(Ch./Sec./Text Book)
1	To classification of signals and study the basic signal operations.	Introduction to Signals, Classification, basic operations	T1: 1.2-1.3 T2: 1.2
2	Some basic signals used for analysis	Basic signal models	T1:1.4-1.5 T2:1.5,2,2
3	To study the classification, representation and analysis of continuous time systems .	Classification of systems	T1: 1.6,-1.8 T2: 1.3
4		Time domain analysis of Continuous Time systems	T1: 2.1-2.3 T2: 2.4
5-6		Linear Convolution	T1: 2.4-2.5 T2: 2.3
7		Stability of the response of continuous time systems	T1: 2.6-2.7
8-9	On the representation of Signals in vector space	Analogy between vectors & signals, orthoganality, completeness, correlation	T1: 3.1-3.3
10-12	The Fourier analysis of periodic and non periodic signals	Fourier Series representation, Drichlet's condition, spectrum	T1:3.4-3.5,3.7 T2: 2.5
13-15		Fourier Transform, existence, properties.	T1:4.1-4.3 T2:2.6-2.9

16-17	The Laplace transform method to represent signals and systems	Laplace Transform, its properties, ROC etc	T1: 6.1-6.2 T2: 2.13-2.18
18-20	Analysis of systems in the Fourier and Laplace domains	Analysis of Continuous LTI using transforms, stability of systems in Fourier and Laplace domains	T1: 6.3-6.4 T2: 2.20-2.21
21-22	Sampling of Continuous signals	The Sampling Theorem	T1:5.1
23-24	Introduction to the representation of Discrete time signals and systems and basic operations	Discrete time signals and systems Difference equation representation of system and their solution Response of a system to an input Discrete time convolution	T1: 8.1-8.2, 8.4-8.5 T2: 3.1-3.2
25-26			T1:9.1-9.3
27-28			T1: 9.4- 9.6 T2: 3.3
29-30	Introduction to the Z-transform to Represent the discrete signals/systems and the influence of the ROC	Z-transforms and its properties. Inverse Z-transforms Analysis of discrete systems using Z-transform	T1: 11.1-11.2 T2: 3.5-3.6
31-32			T1: 11.1.1 T2: 3.7
33-34			T1: 11.3 T2:3.8-3.10
35-37	Discrete Fourier Series and Transforms and application to convolutions	Discrete Fourier Series and Discrete Fourier Transform and properties Linear and circular convolution using the DFT	T1: 10.1-10.3, T2: 4,1-4,3
38-39			T1: 10.6, 5.2
40	Algorithms for computing the Discrete Fourier Transform	Fast Fourier Transform Decimation in Time and in Frequency.	T1: 5.3 T2: 4.5

Evaluation Scheme:

Student evaluation is based on the series of Assessment Tests and 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	17	02.02.2023	1-13	CB
Test 2	60 Minutes	17	03.03.2023	14- 28	CB
Test 3	60 Minutes	16	05.04.2023	29- 40	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	08.05.2023	1- 40	CB

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Dr. K.NAGAIAH
Instructor-in-charge

Date: 15/01/2023

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

Course No	Course Title	L	P	U
EC223	**Digital Electronics and Computer Organization**	**3**	**2**	**4**

Instructor-in-charge: Dr.K.KISHORE KUMAR

Learning Outcomes:

After successful completion of the course student will be able to

1. To apply the principles of Boolean algebra to manipulate and minimize logic expressions.
2. To use K-maps to minimize and optimize two-level logic functions up to 5 variables.
3. Two-level logic functions with AND, OR, NAND, NOR and XOR gates with minimum number of gate delays or literals.
4. To design combinational circuits using Encoders, Decoders, Multiplexers and De multiplexers.
5. To analyze the operation of sequential circuits built with various flip-flops.
6. The operation of latches, flip-flops, counters and registers
7. To understand the various memory devices

Text books T1	Digital Design, M. Morris Mano, Pearson, 5th Edition, 2013
Reference books R1	Fundamentals of Logic Design, Charles H. Roth, Jr., Cengage Learning,7th Edition, 2014
R2	Modern Digital Electronics, R. P. Jain, TMH, 4th Edition, 2010
Swayam Link	https://onlinecourses.swayam2.ac.in/cec21_cs16/preview

Lecture-wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./Page Nos.ofText Book)
1-2	To understand the basics of Boolean Algebra	Digital systems, Binary Logic, Theorems & Properties of Boolean Algebra	T1:1.1,1.9;2.3
3-4	To learn the concepts of SOP, POS Forms	Boolean functions, Canonical forms, Digital Logic Gates, ICs	T1:2.4-2.8
4-5	Concepts of Number systems, their conversions and usages	Binary, Octal, Hexa decimal numbers, Complement, Signed Binary Numbers and codes	T1:1.2-1.7
6-7	To learn the simplification of Boolean functions	K-Maps (4,5 Variables) don't care conditions, NAND & NOR, X-OR Functions	T1:3.1-3.3,3.5-3.8
7-8	To understand the basics of HDL	Hardware Description Language	T1:3.9
9-10	To learn the concepts of combinational circuits & their design	Combinational circuits, Analysis and design procedure	T1:4.1-4.3

11-12	To learn the concepts of combinational circuits & their design	Adders, Subtractors	T1:4.4-4.6
13-15	To learn the concepts of combinational circuits & their design	Comparators, Decoders, Encoders, MUXs, DEMUXs	T1:4.7-4.10
16-18	To learn the concepts of sequential circuits	Sequential Circuits, Latches, Flip-Flops	T1:5.1-5.3
19-21	To understand the concepts of sequential circuits, their analysis.	Analysis of clocked sequential circuits, HDL for sequential Circuits, State Reduction and Assignment	T1:5.4-5.6
22-24	To Understand the design of sequential circuits	Shift Registers, synchronous Asynchronous counters, Ripple Counters	T1:6.1-6.5
25-27	Implementation of Boolean functions using these programmable devices	RAM, ROM, PLA, PAL	T1:7.2,7.5-7.7
28-32	To learn the concepts of Logic Families	Logic Families,TTL, MOS, CMOS Logic families	T1:10.1-10.3, 10.5,10.7-10.10
33-34	To understand the arithmetic operations of Binary numbers	Multiplication and Division Algorithms	T2:10.3,10.4
35-38	To Understand the concepts of Memories.	Memory hierarchy & different types of memories, Auxiliary and Cache Memory	T2:Ch12.1, 12.2,12.3,12.5
39-42	To Understand the concepts of Data Transfer Techniques	Data transfer techniques, Bus interface	T2:Ch11.2-11.4

List of Experiments:

S. No.	Name of the Experiment (on Hardware)
1	Realization of Boolean Functions with Logic Gates
2	Adders and Subtrators with Logic Gates and IC's
3	Multiplexers and Demultiplexers
4	Encoders & Decoders
5	BCD-to seven segment decoder
6	Study of various Flip-Flops using logic gates & ICs
7	4-Bit shift register, 4-Bit Universal shift register
8	Up/Down Decode Counter, Divide by 16 Counter

S.No.	Name of the Experiment (on software VHDL, Suggested book for VHDL is *"A VHDL Primer"* by J.Bhaskar Pearson Education India)
1	Logic Gates (NOT, AND, NAND, OR, NOR, XOR)
2	Half Adder, Full Adder, Half Substrata and Full Substrata
3	Encoders & Decoders (Basic)
4	Multiplexers and De multiplexers (Basic)
5	Flip-Flops (RS,D) and D-Latch
6	Divide by 16 Counter

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	02.02.2023	1-12	CB
Test 2	60 Minutes	17	03.03.2023	13- 28	CB
Test 3	60 Minutes	17	05.04.2023	29- 42	OB
Lab	Throughout the Semester	10	**	**	CB
Comprehensive Exam	3 Hours	40	10.05.2023	1- 42	CB

** To be announced in the class

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Dr. K.KISHORE KUMAR
Instructor-in-charge

Date: 15/01/2023

The ICFAI University, Raipur

Faculty of Science and Technology
Second Semester, 2022-2023
Course Handout

Course No.	Course Title	L	P	U
CE221	**Analysis of Structures I**	**3**	**0**	**3**

Instructor-in-charge: Mr.ABHISHEK MISHRA

Scope and Objective of the Course:

The Prime responsibility of a structural engineer is to ensure that structures transmit the service loads safely and efficiently. In performing this primary function, in the structure internal forces gets develop along with the displacements. The object of the structural analysis is to determine these internal forces and corresponding displacement of the structure.

Textbook(s)	Hibbler, R. C., Structural Analysis, Sixth Edition, Pearson Education, New Delhi, 2008.
Reference Book(s) R1	Leet, K. M., and Uang Chia-Ming, "Fundamentals of Structural Analysis," Mc-Graw Hill Publication, New Delhi
R2	Gupta, S.P., Pandit, G. S. and Gupta Rajesh. Theory of Structures (Vol. I & II), TMH, New Delhi, 1999.
R3	C. H. Norris et al., Elementary Structural Analysis, McGraw Hill, 1976.
R4	C. S. Reddy, Basic Structural Analysis, TMH, 2nd Ed., 1996.

Lecture-wise Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
1-3	Basic Concepts	Introduction, Shear force, Bending moment, Torsional moment, Axial force.	T4,Ch. 1 R1
4-5	Fundamental of Structural Analysis	Degree of indeterminacy	T2, Ch.3 R1
16-20	Cables and Arches	Characteristics of cables, three hinged arches, two hinged arches	T5, Ch. 6 & 7 R1
21-22	Force Method	Three moment theorem, Method of consistent deformation	T9, R2

23-27	Displacement Method deflection Slope equations	Analysis and determination of displacements of the indeterminate trusses, beams and frames	T10, Ch. 12 R1
28-32	Moment distribution Method	Analysis of rigid jointed structures. Symmetrical and unsymmetrical, with sway and without sway	T11,Ch.13 R1
33-37	Moving loads and influence lines	Influence lines for determinate and indeterminate structures	T6,9,Ch.8 & 14R1
38-43	Approximate analysis of indeterminate structures	Continuous beam for gravity load, rigid frame for vertical load, portal method, cantilever method	Ch. 15, R1

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	01.02.2023	1-12	CB
Test 2	60 Minutes	17	02.03.2023	13-22	CB
Test 3	60 Minutes	17	04.04.2023	23-32	OB
Quiz	60 Minutes	10	**	**	CB
Compressive marks	60 Minutes	40	06.05.2023	1-43	CB

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Mr.ABHISHEK MISHRA
Instructor-in-charge

Date: 15-01-2023

The ICFAI University, Raipur

Faculty of Science and Technology
Second Semester, 2022-2023
Course Handout

Course No.	Course Title	L	P	U
CE222	**Concrete Technology**	**3**	**2**	**4**

Scope and Objective of the Course: The course introduces students to concrete as a structural material. The syllabus is deigned to present the properties of cement

classification of aggregate. Students will be accustomed with the use designing concrete mix and strength of concrete.

Text Book T1	Concrete Technology: M.S. Shetty, S. Chand & Co, New Delhi T2
T2	Concrete Technology, Nevelle, Pearson Education, New Delhi
Reference Books: R1	Concrete Technology: M.L. Gambhir, Tata McGraw Hill Co, New Delhi
R2	Text Book of Concrete Technology; P.D. Kulkarni, Tata McGraw Hill, New Delhi

Lecture-wise Plan:

Lecture No.	Learning objective	Topic to be covered	Reference (Text Book)
1-3	Cement as construction materials	Cement and its manufacturing process, wet process and dry process, Chemical Composition of Cement, Hydration of Cement,	**T1**
4-6	Types of Cement	Types of Portland Cement-Ordinary Portland Cement, Rapid hardening, low-heat, Sulphate resisting, Very High Strength Cement, Portland slag, Portland pozzolana, super sulphate cement, white cement.	**T1**
7-10	Various Tests on Cement	Field Testing, Fineness Test, Standard Consistency, Setting Time, Strength Test, Soundness Test, Heat of Hydration, Test Certificate of Cement	**T1**
11-12	Aggregates and its Testing	Classifications, Source, Size, Shape and Texture, Strength,	**T1**
13	Water Quality	Quality of water for concrete, Use of Sea water	**T1**
14-15	Admixtures	Admixtures, plasticizers, Super plasticizers,	**T1, R1**

16-18	Fresh Concrete	Fresh Concrete, Workability, Measurement of Workability, Slump and Compacting Factor Test, Flow Table Tests, Segregation and Bleeding, Setting Time,	**R1, R2**
19-22	Manufacture & Placement of Concrete	Process of Manufacturing of Concrete, Batching, Mixing, Transporting and placing. Compaction of Concrete, and Vibration of Concrete & vibrators. Curing methods, Maturity.	**T1**
23-26	Strength of Concrete Strength	Water Cement ratio, Strength, Bond strength, High Strength Concrete, Ultra High Strength Concrete, High Performance Concrete, Self-Compacting concrete, Durability of concrete	**T1**
27-28	Behaviour of Concrete	Elasticity, Creep & Shrinkage of Concrete Durability of Concrete,	**R1**
29-32	Testing of Hardened concrete	Compression Test, Flexural Strength, Tensile Strength, Test Cores and Non-Concrete Destructive Tests	**T1**
33-34	Mix Design Requirements	Concrete Mix Design, Variables in Proportioning, Methods of Proportioning, Calculation of Standard Deviations & Coefficient of Variations,	**R2**
35-38	Procedure of Mix Design	Average Design Strength & Specified Minimum Strength, Indian Standard Concrete Mix Proportioning-guidelines	**T2**
30-40	Example	Illustrated Examples of Concrete Mix Design	**R1**

Practical:

S. No.	Name of Experiment
1	To determine the compressive strength of concrete as per IS:516
2	To determine the tensile strength of concrete by flexural test as per IS:516
3	To determine the tensile strength of concrete by split tensile test as per IS:516.
4	To test the concrete specimens by the non-destructive test methods namely rebound hammer test.
5	To test the concrete specimens by the non-destructive test methods namely ultrasonic pulse velocity test.
6	To determine the static modulus of elasticity of hardened concrete in compression.

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	02.02.2023	1-10	CB
Test 2	60 Minutes	17	03.03.2023	11-18	CB
Test 3	60 Minutes	17	05.04.2023	19-28	OB
LAB	60 Minutes	10	**	**	CB
Compressive marks	60 Minutes	40	08.05.2023	1-40	CB

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Mr.ABHISHEK MISHRA

Date: 15-01-2023 **Instructor-in-charge**

The ICFAI University, Raipur

Faculty of Science and Technology
Second Semester, 2022-2023
Course Handout

Course No.	Course Title	L	P	U
CE223	**Geotechnical Engineering, I**	**3**	**2**	**4**

Instructor-in-charge: Mr.ABHISHEK MISHRA

Scope and Objective of the Course:
This course deals with study of soil as construction material, its behavior and its engineering properties under stress. Without the knowledge of soils and their use as a foundation material, it is very difficult to plan, start, or estimate any civil construction work. The present course is intended to cover the most essential aspects of soil as an engineering material, and the application of principles derived to the basic design aspects of various foundation systems, introducing the experimental aspects in form of Laboratory work. Concept of soil exploration, Environmental engineering and Geotechnical earthquake engineering is very briefly covered.

Text Book(s) **T1**	Gulhati, SK, and Datta, Geotechnical Engineering, Tata McGraw-Hill Publishing Company Ltd, 2005.
T2	Moondra H S and Rajiv Gupta, Lab Manual for Civil Engg, CBS, 2nd ed., 2000.
Reference Book(s) **R1**	C.Venkata Ramaiah, Geotechnical Engineering, New age international publications,1995.
R2	Ranjan Gopal, A.S.R Rao, Basic and applied soil Mechanics, New age international (P) Limited 2000

Lecture-wise Plan:

Lectue No.	Learning objective	Topic to be covered	Reference
1	Origin and classification of soils	Introduction, soil origin, soil classification	**T1**
2	Three phase system	Weight, Volume, density and unit weight relations	**T1**
3-7	Effective Stress & Permeability	Effective stress principle, under hydrostatic and steady state conditions, permeability and its measurement	**T1**
8-10	Compressibility & consolidation	Compressibility characteristics, 1 –D consolidation theory, mount and time for consolidation	**T1**
11-12	Shear strength	Shear strength and its measurement, shear strength parameters	**T1**

13-16	Engineering properties of soils	Engineering properties of natural on-land, offshore, manmade and partially saturated	**T1, R1**
17	Location characterization	Site investigation methods, drilling techniques, sampling techniques, insitu field testing	**R1, R2**
18	Flow Analysis	1-D, 2-D steady state flow, flow nets	**T1**
19	Settlement analysis	Immediate settlement, consolidation settlement, total settlement, settlement from field tests	**T1**
20	Foundations	Shallow foundations, deep foundations, types of piles	**R1**
21	Bearing capacity analysis	Failure mechanism, generalized bearing capacity eqn, bearing capacity from field tests, bearing capacity of deep foundations, axial pile capacity, pile group	**T1**
22-23	Slope stability analysis	Stability of infinite, finite slopes, stability number, method of slices, critical failure surface	**R2**
24-26	Earth pressure analysis	Lateral earth pressure, Rankine & Coulomb theories, culmann method, tension crack	**T2**
27-32	Engineering Design	Design of shallow, deep foundations, types of earth structures, components of earth dams, types of earth retaining structures	**R1**
33-35	Ground engineering	Ground improvement and modification, insitu densification, grouting, reinforced soil, geosynthetics	**R1**
36-39	Geoenvironment Engineering	Genesis, contamination, landfills, Geotechnical reuse of waste material	**T1**
40-42	Soil dynamics	Soil behavior under dynamicloads, Earthquake Geotechnics	**R2**

Practical

S. No.	Name of Experiment	Refer to Manual
1	To determine the water content of the soil by the oven drying method.	**T2**
2	To determine the field density or unit weight of soil by the core cutter method.	**T2**
3	To determine the specific gravity of soil using the pycnometer method.	**T2**
4	To determine the percentage of various size particles in a soil sample, its coefficient of curvature and uniformity coefficient.	**T2**
5	To determine the liquid and plastic limits of a given soil sample.	**T2**
6	To determine the coefficient of permeability of a given soil sample by variable head permeability test and constant head permeability test.	**T2**

7	To determine the Optimum Moisture Content (OMC) and maximum dry density of a soil sample by the standard Proctor compaction test.	**T2**
8	To determine the settlements due to primary consolidation of soil by conducting one dimensional test to determine	**T2**
9	To determine the shear strength parameters of a given soil sample by the Direct Shear Test	**T2**
10	To find the shear of the soil by Untrained Trixie Test	**T2**

Evaluation Scheme:

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Evaluation Component	Duration	Weightage	Date	Syllabus	Remarks
Test 1	60 Minutes	16	02.02.2023	1-12	CB
Test 2	60 Minutes	17	03.03.2023	13-21	CB
Test 3	60 Minutes	17	05.04.2023	22-32	OB
LAB	60 Minutes	10	**	**	CB
Compressive marks	60 Minutes	40	10.05.2023	1-43	CB

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Mr.ABHISHEK MISHRA
Instructor-in-charge

Date: 15-01-2023

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2022-2023

Course Handout

Course Code:	Course Title:	L	P	U
ME221	**Hydraulic and Hydraulic Machines**	**3**	**2**	**4**

Instructor-in-charge: Mr. HEMANT KUMAR DEWANGAN

Learning Outcomes:

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

Understanding of Fluid Mechanics: Learning outcomes may include acquiring a comprehensive understanding of the fundamental principles of fluid mechanics, including the properties of fluids, fluid statics, and fluid dynamics. This includes an understanding of how fluids behave under different conditions, such as pressure, velocity, and flow rates.

Proficiency in Hydraulic Systems: Learning outcomes may include gaining proficiency in the design, operation, and maintenance of hydraulic systems, including hydraulic circuits, components, and equipment. This may involve understanding hydraulic symbols, schematics, and diagrams, as well as being able to calculate and analyze hydraulic parameters, such as pressure, flow rate, and power.

Knowledge of Hydraulic Machines: Learning outcomes may include gaining knowledge of various types of hydraulic machines, such as hydraulic pumps, motors, and actuators. This may involve understanding their principles of operation, performance characteristics, and applications in different industries, such as manufacturing, construction, and transportation.

Application of Fluid Power Theory: Learning outcomes may include applying fluid power theory to practical engineering problems, such as designing hydraulic systems for specific applications, troubleshooting hydraulic systems, and analyzing the performance of hydraulic machines. This may involve using mathematical equations, simulation software, and experimental methods to analyze and optimize hydraulic systems and machines.

Safety and Environmental Awareness: Learning outcomes may include developing a strong awareness of safety and environmental considerations in hydraulic and hydraulic machine operations. This may involve understanding the hazards associated with hydraulic systems, such as high pressures, fluid leaks, and contamination, and learning how to implement safety measures, such as proper maintenance, inspection, and operation procedures, to prevent accidents and protect the environment.

Text Book(s) T1	"Hydraulics and Fluid Mechanics Including Hydraulic Machines" by Dr. P.N. Modi and Dr. S.M. Seth
R1	"Hydraulic and Fluid Mechanics, Including Hydraulics Machines" by R.K. Bansal
R2	"Introduction to Fluid Mechanics and Fluid Machines" by S.K. Som and Gautam Biswas
R3	"Fluid Mechanics and Hydraulic Machines: Problems and Solutions" by K. Subramanya
R4	"Hydraulic Machines: Turbines and Pumps" by Jagdish Lal:
R5	"Introduction to Fluid Power" by James Johnson:
R6	"Hydraulics and Pneumatics: A Technician's and Engineer's Guide" by Andrew Parr:
NPTEL	https://nptel.ac.in/courses

Lecture-wise Plan

Lecture No.	Learning Objectives	Topics to be Covered	References (T1)
1	The basics of hydraulics and hydraulic machines	- Introduction to hydraulics, Advantages and limitations of hydraulics, Applications of hydraulics, Basic principles of hydraulic systems	Chapter 1: "Introduction to Hydraulics"
2	Fluid properties and hydrostatics	- Properties of fluids, Pascal's law, Hydrostatic pressure, Forces on submerged surfaces	Chapter 2: "Fluid Properties and Hydrostatics"
3	Fluid flow and energy concepts	- Types of fluid flow, Continuity equation, Bernoulli's equation, Energy conservation in fluid flow	Chapter 3: "Fluid Flow and Energy Concepts"
4	Flow measurement and pipe networks	- Flow measurement techniques, Types of pipe networks, Analysis of pipe networks	Chapter 4: "Flow Measurement and Pipe Networks"
5	Hydraulic pumps	- Classification of pumps, Pump performance characteristics, Pump selection and sizing	Chapter 5: "Hydraulic Pumps"
6	Hydraulic actuators	- Classification of actuators, Hydraulic cylinders, Hydraulic motors	Chapter 6: "Hydraulic Actuators"
7	Control valves and their types	- Classification of control valves, Pressure control valves, Flow control valves, Directional control valves	Chapter 7: "Control Valves"
8	Hydraulic systems and their components	- Components of hydraulic systems, Fluid reservoirs, Filters and strainers, Heat exchangers	Chapter 8: "Hydraulic Systems and Components"
9	Hydraulic system design and analysis	- Hydraulic system design considerations, Hydraulic circuit design, Analysis of hydraulic systems	Chapter 9: "Hydraulic System Design and Analysis"
10	Hydraulic fluid and contamination control	- Properties of hydraulic fluids, Types of hydraulic fluids, Contamination control, Filtration techniques	Chapter 10: "Hydraulic Fluid and Contamination Control"
11	Hydraulic seals and their applications	- Types of hydraulic seals, Seal materials and selection, Applications of hydraulic seals	Chapter 11: "Hydraulic Seals"
12	Hydraulic accumulators	- Types of hydraulic accumulators, Accumulator sizing and selection, Applications of hydraulic accumulators	Chapter 12: "Hydraulic Accumulators"
13	Hydraulic fluid power control systems	- Open-loop and closed-loop control systems, Proportional and servo control systems, Electro-hydraulic systems	Chapter 13: "Hydraulic Fluid Power Control Systems"
14	Hydraulic system maintenance and troubleshooting	- Preventive maintenance of hydraulic systems, Troubleshooting and diagnostics, Repair and maint.	Chapter 14: "Hydraulic System Maintenance and Troubleshooting"
15	Hydraulic system safety and environmental considerations	- Safety precautions in hydraulic systems, Environmental concerns and regulations, Waste disposal and pollution prevention	Chapter 15: "Hydraulic System Safety and Environmental Considerations"
16	Hydraulic turbines	- Classification of hydraulic turbines, Operating principles of hydraulic turbines,	Chapter 16: "Hydraulic Turbines"

		Performance characteristics, Selection and sizing of hydraulic turbines	
17	Hydraulic pumps as turbines	- Pump as turbine (PAT) concept, Applications of PATs, Performance characteristics of PATs	Chapter 17: "Hydraulic Pumps as Turbines"
18	Hydrostatic transmissions	- Principles of hydrostatic transmissions, Components of hydrostatic transmissions, Advantages and limitations of hydrostatic transmissions	Chapter 18: "Hydrostatic Transmissions"
19	Hydraulic system modelling and simulation	- Mathematical modelling of hydraulic systems,Simulation techniques for hydraulic systems, Application of modelling and simulation in hydraulic system design	Chapter 19: "Hydraulic System Modeling and Simulation"
20	Hydraulic system optimization and control	- Optimization techniques for hydraulic systems, Control strategies for hydraulic systems, Advanced control techniques for hydraulic systems	Chapter 20: "Hydraulic System Optimization and Control"
21	Cavitation in hydraulic systems	- Basics of cavitation, Cavitation in hydraulic systems, Effects of cavitation on hydraulic components, Prevention and mitigation of cavitation	Chapter 21: "Cavitation in Hydraulic Systems"
22	Water hammer and its control	- Introduction to water hammer, Causes and effects of water hammer, Water hammer analysis and calculations, Control measures for water hammer	Chapter 22: "Water Hammer and Its Control"
23	Hydraulic system filtration and contamination control	- Importance of filtration in hydraulic systems, Types of hydraulic filters, Filtration efficiency and performance, Contamination control techniques	Chapter 23: "Hydraulic System Filtration and Contamination Control"
24	Hydraulic system maintenance and troubleshooting	- Preventive maintenance of hydraulic systems, Troubleshooting and diagnostics, Repair and maintenance techniques	Chapter 24: "Hydraulic System Maintenance and Troubleshooting"
25	Hydraulic system safety and environmental considerations	- Safety precautions in hydraulic systems, Environmental concerns and regulations, Waste disposal and pollution prevention	Chapter 25: "Hydraulic System Safety and Environmental Considerations"
26	Hydraulic system testing and performance evaluation	- Testing of hydraulic components, Performance evaluation of hydraulic systems, Test equipment and procedures	Chapter 26: "Hydraulic System Testing and Performance Evaluation"
27	Hydraulic system reliability and failure analysis	- Reliability concepts in hydraulic systems, Failure analysis and root cause identification, Maintenance strategies for hydraulic systems	Chapter 27: "Hydraulic System Reliability and Failure Analysis"
28	Electro-hydraulic systems and their applications	- Basics of electro-hydraulic systems, Applications of electro-hydraulic systems	Chapter 28: "Electro-Hydraulic Systems"
29	Proportional and servo control systems	- Principles of proportional and servo control, Proportional and servo valves, Applications of proportional and servo control systems	Chapter 29: "Proportional and Servo Control Systems"

30	Hydraulic system design considerations	- Factors affecting hydraulic system design, Design considerations for hydraulic systems, System layout and component selection, Cost considerations in hydraulic system design	Chapter 30: "Hydraulic System Design Considerations"
31	Hydraulic system integration and application examples	- Integration of hydraulic systems with other systems, Case studies and examples of hydraulic system applications in various industries	Chapter 31: "Hydraulic System Integration and Application Examples"
32	Hydraulic system troubleshooting techniques	- Troubleshooting techniques for hydraulic systems, Diagnosis and resolution of common hydraulic system problems, Troubleshooting tools and equipment	Chapter 32: "Hydraulic System Troubleshooting Techniques"
33	Hydraulic system maintenance strategies	- Maintenance strategies for hydraulic systems, Predictive, preventive, and corrective maintenance, Maintenance planning and scheduling	Chapter 33: "Hydraulic System Maintenance Strategies"
34	Hydraulic system efficiency and energy conservation	- Importance of system efficiency in hydraulic systems, Methods to improve system efficiency, Energy conservation techniques in hydraulic systems	Chapter 34: "Hydraulic System Efficiency and Energy Conservation"
35	Hydraulic system noise and vibration control	- Sources of noise and vibration in hydraulic systems, Effects of noise and vibration on system performance, Noise and vibration control techniques	Chapter 35: "Hydraulic System Noise and Vibration Control"
36	Hydraulic system troubleshooting case studies	- Case studies of real-world hydraulic system troubleshooting, Analysis and resolution of complex hydraulic system problems	Chapter 36: "Hydraulic System Troubleshooting Case Studies"
37	Hydraulic system safety standards and regulations	- International safety standards for hydraulic systems, Compliance with safety regulations, Risk assessment and safety measures in hydraulic systems	Chapter 37: "Hydraulic System Safety Standards and Regulations"
38	Hydraulic system simulation software	- Overview of hydraulic system simulation software, Hands-on training on hydraulic system simulation software, Application of simulation software in hydraulic system design and analysis	Chapter 38: "Hydraulic System Simulation Software"
39	Emerging trends in hydraulic systems	- Latest advancements in hydraulic system technology, Future trends and innovations in hydraulic systems, Impact of emerging technologies on hydraulic system design and applications	Chapter 39: "Emerging Trends in Hydraulic Systems"
40	Recap and review of the course	- Recap of key concepts and topics covered, Review of course objectives and learning outcomes, Q&A session and discussion	N/A

List of Experiments:

Experiment 1: Measurement of flow rate and pressure in a pipe using a Venturi meter
Experiment 2: Determination of head loss in a pipe due to friction using Darcy's equation
Experiment 3: Study of different types of losses in pipe flow, including sudden expansion and sudden contraction
Experiment 4: Performance analysis of centrifugal pumps, including determination of pump characteristics such as head, power, and efficiency
Experiment 5: Study of positive displacement pumps, including reciprocating and gear pumps, and determination of their performance characteristics
Experiment 6: Investigation of open channel flow, including measurement of water surface profiles, velocity distribution, and determination of channel roughness coefficients
Experiment 7: Study of different types of weirs, including rectangular, triangular, and trapezoidal weirs, and determination of their discharge coefficients
Experiment 8: Determination of flow rate and velocity distribution in a pipe using an electromagnetic flow meter
Experiment 9: Investigation of hydraulic jump in open channel flow and determination of energy dissipation characteristics
Experiment 10: Analysis of water hammer phenomenon in pipelines and determination of surge pressures and velocities.

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	1 Hour	16	01.02.2023	1-14	CB
Test 2	1 Hour	17	02.03.2023	15-27	CB
Test 3	1 Hour	17	04.04.2023	28-40	OB
Lab	1 Hour	10	--	1-10 (List of Experiments)	CB
Comprehensive Exam	3 Hours	40	06.05.2023	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.

Mr.HEMANT KUMAR DEWANGAN
Instructor-in-charge

Date:15-01-2023

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2022 – 2023

Course Handout

Course No	Course Title	L	P	U
ME222	**Design of Machine Elements**	**3**	**0**	**3**

Instructor-in-charge: MR. DILIP MISHRA

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

1. To apply theory and practice of Design of Mechanical Elements to real life design applications.
2. To learn the qualitative analysis using failure theories, equations to illustrate the concepts and to gain the knowledge of different joints, bearings, gears and other fixed and flexible machine elements.
3. To understand the working and analysis of shear force and bending moment, design fundamentals, application of strength of material principles, selection of components, selection of materials for a given application.

Textbook T	Mechanical Engineering design, J E Shigley, Eighth Edition, Mc-Graw Hill, 2008.
Reference book (s) R1	V B Bhandari, Design Of Machine Elements, Tata Mc-Graw Hill publishing Co, Second Edition 2007.
R2	Robert L Norton, Machine Design an integrated approach, Third edition, Pearson Education Asia, 2006
R3	Robert C Juvinall, Kurt M Marshek, Fundamentals of machine component design, 4th edition, John Wiley & Sons, Inc, Singapore, 2005.
NPTEL	https://nptel.ac.in/courses/112/105/112105125/

Lecture wise plan

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./Page Nos. of Text Book)
1	Fundamentals of mechanical design	Mech. engineering design, stress & strain, design factor and factor of safety, etc.	Ch1 T1
2-3	Engineering materials and their properties	Types of materials, Material selection, properties, etc	Ch.2 T1
4-7	Load and Stress analysis	Equilibrium, FBD, SF & BM diagrams, Normal stresses and shear stresses for beams in bending, torsion and stress concentration, etc	Ch.3 T1
8-10	Theories of Failure and failure resulting from static loading	Failure theories, max shear stress theory and distortion energy theory for ductile materials, etc	Ch.5 T1

11-13	Fatigue failure resulting from variable loading	SN diagram, endurance limit, Low cycle and high cycle fatigue, fluctuating stresses, cumulative Fatigue damage, etc	Ch 6 T1
14-16	Detailed design of non-permanent joints	Screws, Fasteners, Bolted connections, etc.	Ch.8 T1
17-19	Detailed design of permanent joints	Symbols, types of welded joints, stresses in welded joints in torsion and bending, etc	Ch.9 T1
20-22	Detailed design of Mechanical Springs	Stresses in helical springs, spring materials, critical frequency of helical springs, etc	Ch.10 T1
23-25	Detailed design of Rolling-contact bearings	Types and life of bearings, selection of ball and cylindrical roller bearing, etc	Ch.11 T1
26-29	Detailed design of Journal bearings	Types of Lubrication, hydrodynamic theory, thrust bearings, etc	Ch.12 T1
30-32	Detailed design of Gears	Types of gears, force analysis on spur, bevel, helical and worm gearing, etc	Ch.13 T1
33-34	Detailed design of Shafts	Shaft materials, shaft layout, shaft design for stress, critical speeds for shaft, etc	Ch.7 T1
35-37	Design of flexible machine elements	Flexible Machine elements	Ch.17 T1
38-40	Numerical	Rigid and Flexible Machine elements	-

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	02.02.2023	1-12	CB
Test 2	60 Minutes	17	03.03.2023	13- 27	CB
Test 3	60 Minutes	17	05.04.2023	28- 40	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	08.05.2023	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.

Mr.DILIP MISHRA

Date: 15-01-2023 **Instructor-in-charge**

The ICFAI University, Raipur

Faculty of Science & Technology

Second Semester, 2022 – 2023

Course Handout

Course Code	Course Title	L	P	U
ME223	**Heat and Mass Transfer**	**3**	**2**	**4**

Instructor-in-charge: Mr. HEMANT KUMAR DEWANGAN

Learning Outcomes:

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

1. Apply knowledge of heat transfer for understanding, formulating and solving engineering problems.
2. Acquire knowledge and hands-on competence in applying the concepts of heat and mass transfer in the design and development of mechanical systems.
3. Demonstrate creativeness in designing new systems components and processes in the field of engineering in general and mechanical engineering in particular.
4. Identify, analysis, and solve mechanical engineering problems useful to the society.
5. Work effectively with engineering and science teams as well as with multidisciplinary designs.

T1	Heat Transfer – S.P. Sukhatme – TMH,Delhi
T2	Heat & Mass Transfer – D.S. Kumar – S.K. Kataria & Sons,Delhi
R1	Heat transfer- C P Arora, TMH,Delhi
R2	Heat & Mass Transfer – R, Yadav, Central Publishing House, Allahabad
R3	Heat & Mass Transfer – R.K. Rajput, S.Chand, Delhi
R4	Heat & Mass Transfer – P.K. Nag, TMH, Delhi
R5	Heat Transfer – J.P. Holman – TMH, Delhi
R6	Heat Transfer – A Practical Approach – Yunus A. Cengel – McGraw Hill ,Delhi
NPTEL	https://nptel.ac.in/courses

Lecture-wise Plan

Lecture Nos.	Learning Objectives	Topics to be covered	Reference (chapter/sec/pg. no.)
1-4	Introduction to Heat Transfer	Heat transfer, Difference between heat transfer and thermodynamics	T1
		Various modes of heat transfer, Fourier's, Newton's and Stefan Boltzman's Law,	T1
		Combined modes of heat transfer, thermal diffusivity, Overall heat transfer coefficient.	T1

		The thermal conductivity of solids, liquids and gases, factors influencing conductivity	T1
5-9	Conduction	Heat conduction without heat generation: Derivation of general differential equation of heat conduction in Cartesian co-ordinate.	T1
		One dimensional steady state conduction, linear heat flow through a plane and composite wall,	T1
		heat conduction without heat generation in cylinder and sphere,	T1
		critical thickness of insulation. Conduction with heat generation in flat wall and solid cylinder	T1
		Numerical Problems and Solutions	T1
10-13	Heat transfer from extended surface (Fins)	Types of fins, Fin equation for uniform cross sectional area (rectangular profile)	T2
		Solution for infinite length, negligible heat loss from fin tip, finite long and heat transfer from fin tip.	T2
		Fin effectiveness and efficiency	T2
		Error in temperature measurement from thermometer.	T2
14-16	Transient/Unsteady State Heat Conduction	Lumped system analysis, criteria for lumped system analysis	T2
		Solution of transient heat conduction in large plane wall, long cylinders and sphere through Heisler`s chart.	T2
		Numerical Problems and Solutions	T2
17-19	Forced Convection	Physical Mechanism of Forced Convection, Dimensional analysis for forced convection, velocity and Thermal Boundary layer	T2
		Flow over plates, Flow across cylinders and spheres, Flow in tubes, Reynold's analogy.	T2
		Numerical Problems and Solutions	T2
20-22	Natural Convection	Physical Mechanism of Natural Convection	T2
		Dimensional analysis of natural convection	T2
		empirical relationship for natural convection	T2
23-26	Two Phase Heat Transfer	Boiling heat transfer, Pool boiling, boiling regimes and boiling curve	T2
		heat transfer correlations in pool boiling. Condensation heat transfer, Film condensation	T2
		derivation for the average heat transfer coefficient 'h' for the case of laminar	T2

		film condensation over vertical plate	
		,Heat transfer correlation for inclined plates, vertical tubes, Horizontal bank tubes	T2
27-29	Introduction to Mass Transfer	Mass and mole concentrations, molecular diffusion, eddy diffusion	T2
		Molecular diffusion from an evaporating fluid surface, Introduction to mass transfer in laminar and turbulent convection	T2
		Combined heat and mass transfer, the wet and dry bulb thermometer	T2
30-34	Heat Exchangers	Different types of heat exchangers	T2
		Determination of heat exchanger performance	T2
		Concept of Heat exchanger transfer units	T2
		Heat exchanger transfer units, Analysis restricted to parallel and counter flow heat exchanger	T2
		LMTD and NTU method problem and solutions	T2
35-40	Thermal Radiation	Introduction, absorbtivity, reflectivity & transmissivity	T1
		Concept of black body &greybody. Emissive power of surface, Kirchoff's law, emissivity	T1
		Concept of shape factor.	T1
		Numerical Problems and Solutions	T1
		Radiat heat exchange between two parallel grey surface and concentric cylinders.	T1
		Errors in temperature measurement due to radiation. Concept of irradiation and radiosity.	T1

List of Experiments (At least Ten experiments are to performed by each student):

1. To Determine Thermal Conductivity of Insulating Powders.
2. To Determine Thermal Conductivity of a Good Conductor of Heat (Metal Rod).
3. To Measure the thermal Conductivity of Liquid.
4. To determine the transfer Rate & Temperature Distribution for a Pin Fin.
5. To Measure the Emissivity of the Test plate Surface.
6. To Determine Stefan Boltzman Constant of Radiation Heat Transfer.
7. To Determine the Surface Heat Transfer Coefficient For Heated Vertical Cylinder in Natural Convection.
8. Determination of Heat Transfer Coefficient in Drop Wise & Film Wise condensation.
9. To Determine Critical Heat Flux in Saturated Pool Boiling.
10. To Study Performance of Simple Heat Pipes.
11. To Study and Compare LMTD and Effectiveness in Parallel and Counter Flow Heat

12. To Find the Heat transfer Coefficient in Forced Convection in a tube.
13. To determine the total thermal conductivity and thermal resistance of the given compound resistance in series.
14. To find out the thermal conductivity of given slab material.
15. To determine the individual thermal conductivity of different lagging in a lagged pipe.
16. To study the rates of heat transfer for different materials and geometries
17. To understand the importance and validity of engineering assumptions through the lumped heat capacity method.
18. Testing and performance of different heat insulators.

List of Equipments/Machines required:
1. Thermal conductivity of insulating powder apparatus
2. Thermal conductivity of metal bar apparatus
3. Thermal conductivity of liquid apparatus
4. Transfer rate and temperature distribution for a pin fin apparatus
5. Emissivity of the test plate surface apparatus
6. Stefen-Boltzman constant of radiation of heat transfer apparatus
7. Surface heat transfer coefficient for heated vertical cylinder in natural convection apparatus
8. Heat transfer coefficient in drop wise and film wise condensation apparatus
9. Critical heat flux in saturated pool boiling apparatus
10. Performance of different heat pipe apparatus
11. Heat transfer rate through heat exchanger apparatus
12. Heat transfer coefficient in forced convection of air in a tube apparatus
13. Heat transfer through composite wall apparatus
14. Thermal conductivity of insulating slab apparatus
15. Heat transfer through lagged pipe apparatus
16. Unsteady state heat transfer apparatus
17. Testing and performance test rig for heat insulators.

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	1 Hour	16	02.02.2023	1-13	CB
Test 2	1 Hour	17	03.03.2023	14-26	CB
Test 3	1 Hour	17	05.04.2023	27-40	OB
Lab	1 Hour	10	--	1-18 (List of Experiments)	CB
Comprehensive Exam	3 Hours	40	10.05.2023	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

Mr.HEMANT KUMAR DEWANGAN
Date: 15-01-2023 **Instructor-in-charge**

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2022 – 2023

Course Handout

Course No	Course Title	L	P	U
MA303	**Operations Research**	**3**	**0**	**3**

Instructor-in-charge: Mr.HEMANT KUMAR DEWANGAN

Learning Outcomes:

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

1. Identify and develop operational research models from the verbal description of the real system.
2. Understand the mathematical tools that are needed to solve optimization problems.
3. Use mathematical software to solve the proposed models.
4. Develop a report that describes the model and the solving technique, analyze the results and propose recommendations in language understandable to the decision-making processes in Management Engineering.
5. Learn the concepts, models, tools and techniques, to manage operations in manufacturing and service organizations.

Textbook(s) T1	Sharma, S.D., "Operations Research", Kedar Nath Ram Nath & Co. (15th Edition), 2010.
Reference book(s) R1	Taha, H.A., "Operations Research – An Introduction", Prentice Hall, (7th Edition), 2002.
R2	Hillier, F.S., Lieberman, G.J. , Nag, B., Basu, P., "Introduction to Operations Research", McGraw Hill (10th Edition), 2017.
R3	Operations Management, FedUni
R4	Ravindran, A. , Phillips, D. T and Solberg, J. J. , "Operations Research: Principles and Practice", John Willey and Sons, 2nd Edition, 2009.
R5	Operations Management, Lee J Krajweski and Larry P.Ritzman/ Person Education Delhi 6th edition
R6	Operations Management, Russel &Taylor, 4th Edition
SwayamLink	https://onlinecourses.swayam2.ac.in/cec20_ma10/preview

Lecture-wise Plan:

Lecture No.	Learning objectives	Topics to be covered	Refer to Chapter,See (Book)
1	Linear Programming Problem	Mathematical Formulation of LPP	T1, Unit-2, ch-3, pg.3-26
2		Graphical Method for Solving LPP	T1, Unit-2, ch-3, pg.26-53
3		Simplex Method for Solving LPP and Big-M Method	T1, Unit-2, ch-5, pg.67-95
4		Some Special Cases in LPP	T1, Unit-2, ch-5, pg.95-125
5		Duality, and Solving LPP using Duality in Simplex Method	T1, Unit-2, ch-7,

6	Transportation	Mathematical Formulation of LPP	T1, Unit-2, ch-11, pg.262-267
7		Initial BFS of Transportation Problem	T1, Unit-2, ch-11, pg.269-278
8		Optimality Test by Stepping Stone Method and, and	T1, Unit-2, ch-11, pg.278-351
9		MODI Method	T1, Unit-2, ch-11, pg.278-351
10		Some Special Cases of Transportation Problem	T1, Unit-2, ch-11, pg.278-351
11	Assignment	Initial BFS of Assignment Problem	T1, Unit-2, ch-12, pg.352-353
12		Johnson's job of sequencing rules	T1, Unit-2, ch-12, pg.353-403
13		Solution by Hungarian Method, and Travelling Salesman Problem	T1, Unit-2, ch-12, pg.353-403
14	Game Theory	Basic Concept and Terminologies	T1, Unit-4, ch-19, pg.3-5
15		Two-person Zero-sum Game, and Game with Pure and Mixed Strategies	T1, Unit-4, ch-19, pg.20-61
16		Dominance Principle, Arithmetic Method, and Graphical Method for Solving (2× n) Game	T1, Unit-4, ch-19, pg.20-61
17		Graphical Method for Solving (m×2) Game and Solution of Game by Simplex Method	T1, Unit-4, ch-19, pg.20-61
18	Job Sequencing	Basic Terminologies and Assumptions of Job Sequencing	T1, Unit-4, ch-24, pg.299-300
19		Processing of n Jobs through 2 and 3 Machines	T1, Unit-4, ch-24, pg.300-315
20		Processing n Jobs through m Machines, and Processing 2 Jobs through m Machines - Graphical	T1, Unit-4, ch-24, pg.300-315
21	Inventory Theory	Economic Order Quantity and EOQ Models without Shortage	T1, Unit-4, ch-20, pg.62-71
22		EOQ models with Shortage and EPQ Models with/without Shortages	T1, Unit-4, ch-20, pg.72-100
23		Newsboy Problem and Probabilistic Inventory Model with Instantaneous Demand and No Set up Cost	T1, Unit-4, ch-21, pg.143-172
24		Probabilistic Inventory Model with Uniform Demand and No Set up Cost, and Buffer Stock in Probabilistic Inventory Model	T1, Unit-4, ch-21, pg.143-172
25		Problems regarding different models	T1, Unit-4, ch-21, pg.173-175
26	Queuing Theory	Basic Characteristics of Queuing System and Probability Distribution of Arrivals	T1, Unit-4, ch-23, pg.215-229
27		Probability Distribution of Departures and Model I (M|M|1):(∞|FCFS)	T1, Unit-4, ch-23, pg.230-231
28		Model I. (General): (M|M|1): (∞|FCFS), and Model II. (M|M|1): (N|FCFS)	T1, Unit-4, ch-23, pg.232-257
29		Model III - (M|M|s): (∞|FCFS), and Model IV - (M|Ek|1): (∞|FCFS)	T1, Unit-4, ch-23, pg.258-268
30	Network Analysis	Networking Modeling	T1, Unit-4, ch-25, pg.316-322
31		Critical Path Method (CPM)	T1, Unit-4, ch-25, pg.323-349
32		Program Evaluation & Retention Technique	T1, Unit-4, ch-25,

		(PERT)	pg.349-382
33		Project Crashing	T1, Unit-4, ch-25, pg.349-382
34		LP and Dual LP Solutions to Network Problem	T1, Unit-4, ch-25, pg.349-382
35	Dynamic Programming	Basic Concept and Terminology, and Dynamic Programming Models I and II	T1, Unit-5, ch-33, pg.72-77
36		DP Model III, Solution of Discrete DP Problem and Solution of LPP by DP	T1, Unit-5, ch-33, pg.82
37-38	Supply Chain Management	Introduction, Business Drivers in Supply Chain performance	R3, ch-16, pg.217-232
39-40	Just-In-Time (JIT) Manufacturing System	Introduction, The Concept of the JIT System	R3, ch-18, pg.253-261

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	50 Minutes	17	23.02.2022	1-13	CB
Test 2	50 Minutes	17	24.03.2022	14- 25	CB
Test 3	50 Minutes	16	28.04.2022	26- 40	OB
Quiz 1	10 Minutes	5	**	1-20	CB
Quiz 2	10 Minutes	5	**	21-40	CB
Comprehensive Exam	3 Hours	40	16.05.2022	1- 40	CB

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Mr.HEMANT KUMAR DEWANGAN

Date-15/01/2023 **Instructor-in-charge**

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2022 – 2023

Course Handout

Course No	Course Title	L	P	U
EC313	RF and Microwave Engineering	3	0	3

Instructor-in-charge- Mrs.BHAVANA CHAUDHARY

Scope & Objective of the course:

The course aims at introducing radio frequency (RF) and microwave engineering. The topics covered would include basics of high frequency engineering, high frequency sources, devices, propagation and applications. Some communication and non-communication applications of microwave will be discussed.

Textbook(s)T1	Microwave Engineering , David Pozar , John Wiley & Sons, Edition, 1999.
T2	Microwave Devices and Circuits, Sumuel Y. Liao, PHI, 3rd. Ed, 2003.
Reference book(s) R1	Foundation for Microwave Engineering, R.E .Collins, Wiley-IEEE Press, 2nd Ed. 2001.
R2	Electromagentic waves and Radiating Systems, Jordan and Balmain, TMH, 4th. Ed, 1999
R3	Electronic Communication Systems, Kennedy, 3rd Edition, McGraw hill, 1995.

Lecture-wise plan:

LectureNos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text Book)
1	Introduction to Microwave engineering.	Frequency bands; Microwave and RF Engg, Problems & limitations athigh frequencies, advantages	T1:1.1 T2: 1.1
2-5	Study of different phenomenon affecting microwave propagation.	Propagation of wave in free space, atmospheric effect, ground effects, plasma effects.	R3: Ch.16, 17
6-8	To study guided waves on surfaces	Modes of surface waves, striplines andmicro striplines	T1: 3.6-3.8T2:11
9-11	To understand the concepts of impedance and the representation of incident, reflected and transmitted waves for microwave passive network analysis	Concepts of impedance, equivalent voltages currents, impedance & admittance matrix, S-matrix, ABCD parameters.	T1: 4.1-4.4 R1: 4.1-4.2 R1: 4.5-4.10
12-13		Signal flow graphs and circuit analysis	T1:4.5R1:4.10

14-16	To study various microwave resonators	Resonant circuits, Transmission line resonators, cavity resonators, dielectric resonators, excitation of resonators	T1: 6.1-6.5, 6.7 T2: 4.3 R1:7.1-7.2, R1:7.4,7.6
17-21	To study microwave components	Dividers, circulators, isolators, Directional couplers, and other hybrid components.	T1: 7.1-7.9 T2: 4.4-4.6 R1: 6.4 -6.6, 6.10
22-24	Overview of design and principle of semiconductor devices used as microwave sources and circuit elements	Microwave HBTs, FETS, MESFETS	T2: 5.2-5.3; T2:6.1-6.4;
25-26		Transferred electron devices, GUNN effect, GUNN diodes	T2:7.1-7.5
27-28		Avalanche Transit time devices, IMPATT, TRAPATT, BARITT	T2:8.1-8.4
29-32	Overview of design and principle of high power sources of microwave like Klystron Magnetron & amplifiers using TWTs..	Klystrons, Multicavity Klystrons, Reflex KlystronsTWTs,	T2: 9.2-9.5
33-34		Magnetrons	T2:10.1
35-36	An introduction to design of Microwave antennas	Antennas special problems and design at microwave frequencies	Class notes
37-38	To study the RF and Microwave Comm. Systems.	Microwave and RF systems, transmitters and receivers.	R2:T1:121
39-40	To study EMI & EMC	An introduction to Electromagnetic Interference and Compatibility	Class Notes
41-42	Other microwave applications such as Radar, Radiometry, microwave ovens etc.	Radar equations and various types of radars such as pulse, Doppler, RCS, etc. Microwave ovens, and Radiometry.	R2:T1:12.3-12.4, T1:12.6

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	31.01.2023	01-10	CB
Test 2	60 Minutes	17	01.03.2023	11-20	CB
Test 3	60 Minutes	17	03.04.2023	31- 41	OB
Lab	Throughout the Semester	10	**	**	CB
Comprehensive Exam	3 Hours	40	01.05.2023	01-41	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.

Mrs. BHAVANA CHAUDHARY
Instructor-in-charge

Date:15-01-2023

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2022 – 2023

Course Handout

Course No	Course Title	L	P	U
EC321	**Digital Communication**	**3**	**2**	**4**

Instructor-in-charge: Dr. K.NAGAIAH

Learning Outcomes:

The objective of the course is to understand basic elements of a communication system. Analyze base band signals in time domain and in frequency domain understand various analog modulation and demodulation techniques and analyze the performance of modulation and demodulation techniques in various transmission environment.

Text Book T1	Modern Digital and Analog Communication Systems by B P Lathi, Z Ding International 4th edition, Oxford University Press
Reference book(s) R1	Principles of Communication Systems by Herbert Taub, Donald L Schilling & Goutam Saha,3rd Edition , Tata McGraw-Hill**.**
Reference book(s) R2	Communication Systems by Simon Haykin 4th edition, Wiley India.
R3	Communication Systems: Analog and Digital by R.P. Singh, S.D. Sapre, McGraw Hill 3rd Ed., 2012.
R4	Electronics & Communication System – George Kennedy and Bernad Davis, 4th Edition TMH 2009.

Lecture wise plan

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
1	To understand the concept of communication.	**FOURIER TRANSFORM** Introduction to communication system, Need for modulation	T 1:1,1.2,1.3
2	To know the importance of FM	Frequency Division Multiplexing, Amplitude Modulation	T1: 3.1,T1:5.1
3	To understand the importance of TD & FD	Definition, Time domain and frequency domain description.	T1: 3.2
4-6	To understand the concept of Fourier Transform	Introduction to Fourier Transform and Inverse Fourier Transform. Properties of Fourier Transform	T1: 1-4.1,1-4.2
7-9	To know the concept of PSD	. Spectrum Analysis using Fourier Transform Power spectral density (PSD).	T1: 1-4.3
10-12	To understand the AM concepts	**AMPLITUDE MODULATION** Single tone modulation, power relations in AM waves	T1: 3.1, 3.2
13-14	Know the concept of Generation of AM	Generation of AM waves, square law Modulator, Switching modulator	T1: 3.2

15-16	Know the concept of Detection of AM	Detection of AM Waves, Square law detector, Envelope detector,	T1:4.1- 4.5
17	Know the concept of suppressed carrier	Double side band suppressed carrier modulators	T1:4.1- 4.5
18	Know the concept of DSBSC	Generation of DSBSC Waves, Balanced Modulators	T1:4.1- 4.5
19-20	To understand the Types of DSBSC	Ring Modulator, Coherent detection of DSB-SC Modulated wave COSTAS Loop.	T1:4.1- 4.5
21-22	To understand the concept of Angle modulation	**ANGLE MODULATION** Basic concepts, Frequency Modulation:	T1: 5.1,5.2,5.3
23-25	To understand the spectrum analysis methods	Single tone frequency modulation Spectrum Analysis of Sinusoidal FM Wave Narrow band FM, Wide band FM	T1: 5.1,5.2,5.3
26-28	To know the concept of FM detection methods	Constant Average Power, Transmission bandwidth of FM Wave Detection of FM Waves: Balanced Frequency discriminator	T1: 5.1,5.2,5.3
29-30	To understand the comparison of AM & FM	Zero crossing detector, Phase locked loop, Comparison of FM and AM.	T1: 5.1,5.2,5.3
31-33	To understand the concept of Noise in communication	**NOISE** Resistive Noise Source (Thermal),Arbitrary Noise Sources, Effective Noise Temperature,	T1: 2.1,2.2,2.3, 2.4,2.5 R1:7.2,R_2:2.10
34-35	Impact of noise in cascaded circuits	Average Noise Figures, Average Noise Figure of cascaded networks	T1: 2.1,2.2,2.3, 2.4,2.5
36-37	Properties and representation of Noise	Narrow Band noise, Quadrature representation of narrow band noise & its properties	T1: 2.1,2.2,2.3, 2.4,2.5R1:8.2-8.4,9.2 R_2:2.11-2.13
38-39	To understand the Noise in impact on AM DSB & SSB	Noise in Analog communication System Noise in DSB and SSB System Noise in AM System,	T1: 2.1,2.2,2.3, 2.4,2.5

List of Experiments:

Digital Communication Laboratory: (List of Experiments)

1	Analog Signal Sampling And Reconstruction
2	Pulse code Modulation and Demodulation
3	Study of A/D and D/A converter , PRBS Generator
4	Delta Modulation and Demodulation
5	Adaptive Delta Modulation and CVSD
6	Carrier Modulations & Demodulations (ASK,FSK,PSK)
7	Binary Phase Keying(BPSK) Modulation and Demodulation
8	Differential phase Shift Keying(DPSK) Modulation and Demodulation
9	Quadrature Phase Shift Keying(QPSK) Modulation and Demodulation
10	Differential Quadrature Phase Shift Keying (DQPSK) Modulation and Demodulation
11	Time Division Multiplexer circuit Design
12	Convolution encoder and Viterbi decoder
13	Study of BPSK and other bandpass signal using MATLAB Code
14	MATLAB Assignment

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	01.02.2023	1-13	CB
Test 2	60 Minutes	17	02.03.2023	14- 26	CB
Test 3	60 Minutes	17	04.04.2023	27- 39	OB
Lab	Throughout the Semester	10	**	**	CB
Comprehensive Exam	3 Hours	40	05.05.2023	1- 39	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.

Dr. K.NAGAIAH
Instructor-in-charge

Date:15-01-2023

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2022-2023

Course Handout

Course No	Course Title	L	P	U
EC322	**Antennas and Wave Propagation**	**3**	**2**	**4**

Instructor-in-charge: Mrs. BHAVNA CHAUDHARY

Learning Outcomes:

The objective of the course is to introduce the fundamental principles of antenna theory and apply them to the analysis, design and measurements of antennae. The knowledge acquired in this course will be more useful in Wireless, RADAR, Mobile Communications and others.

Textbook(s) T1	Antenna and Wave Propagation ,R L Yadava ,PHI Learning1st Edition
Reference book(s)	
R1	Antennas and Wave Propagation , John D Kraus ,R J Marhefka, A S Khan, TMH ,4th Edition
R2	Antennas and Wave Propagation A P Harish, M Sachidananda, Oxford University Press, 1st Edition,
R3	Antennas and Wave Propagation G S N Raju,Pearson,1st Edition

Lecture-wise plan:

Lecture No.	Learning Objective	Topics to be covered	(Ch./Sec./Text Book)
1	Fundamental concepts of Radiation	Concept of radiation, Radiation pattern, Radiation resistance	T(1),R_1(2)
2-3	Antenna basics	Directivity, Gain, Intensity, Beam area, Beam Efficiency, HPBW,FNBW	R_1(2) ,T(3)
4-5	Antenna aperture	Effective aperture, aperture efficiency	T(3),R_1(2),R_2(2)
6-7	Linear Wire antennas	Hertzian dipole, Half-wave dipole Folded dipole, Monopole	T(5),R_1(3,4)
8-10	Antenna arrays	Point sources, different configurations of arrays, Binomial array	T(4),R_1(5)
11-12	VHF,UHF antennas	V- antenna , Rhombic, Yagi- Uda, Log-Periodic, Loop, Helical antenna	T(5,6,9,10,12) R_1(7,8),R_2(6)
13-16	Microwave antennas	Parabolic reflector, feed systems, field distributions, Horn, Slot, Lens & Micro strip antenna	T(7,8,11,13) R_1(9,14)
17-19	Measurement of antenna Parameters	Measurement of radiation pattern, Gain, Impedance, Current, Reflectivity	T(17),R_1(21)
20-22	Antennas for special applications	Ground plane antenna ,Sleeve, turnstile, Omni directional antenna, submerged antennas	R_1(15)
23-25	Basics of Wave propagation	general classification, different modes of wave propagation, Ray and Mode concept	T(14),R_1(22)

26-27	Reflections and refractions in wave propagation	Multi hop Propagation	T(14),R_1(25)
28-29	Ground wave propagation	Plane earth reflection ,Surface wave tilt, impact of Imperfect Earth, Earth's behavior at different frequencies	T(14),R_1(23)
30-31	Space Wave propagation	Curvature of Earth, Shadowing effect, Super refraction, Scattering phenomena, Tropospheric propagation, M-curves, LOS distance	T(15),R_1(24)
32-33	Losses in space wave propagation	Fading, Path loss calculation	R_1(24),T(16)
34-35	Sky wave propagation	Structural details of Ionosphere , Absence and presence of Earth's magnetic field, GMF	T(16),R_1(25)
36-37	Measures of Ionosphere Propagation	Refractive index, Critical frequency, angle of incidence, MUF, OF	T(16),R_1(25)
38-39	Calculations in Ionosphere	LUF, Virtual Height, Skip Distance	R_1(25),T(16)
40	Abnormalities in Ionosphere	Attenuation factor, SID, Ionospheric Storms, Sun spot cycle	R_3(9)

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	01.02.2023	1-12	CB
Test 2	60 Minutes	17	02.03.2023	13-27	CB
Test 3	60 Minutes	17	04.04.2023	28-38	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	06.05.2023	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.

Mrs. BHAVNA CHAUDHARY
Instructor-in-charge

Date: 15/01/2023

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2022-2023

Course Handout

Course No	Course Title	L	P	U
EC324	**RF and Microwave Engineering**	**3**	**2**	**4**

Instructor-in-charge: Mrs. BHAVNA CHAUDHARY

Learning Outcomes:

The course aims at introducing radio frequency (RF) and microwave engineering. The topics covered would include basics of high frequency engineering, high frequency sources, devices, propagation and applications. Some communication and non-communication applications of microwave will be discussed.

Textbook(s) T1	Microwave Engineering, David Pozar, JohnWiley & Sons, Edition, 1999.
Reference book(s)	
R1	Microwave Devices and Circuits,Sumuel Y.Liao, PHI,3rd.Ed,2003.
R2	Foundation for Microwave Engineering, R.E.Collins,Wiley-IEEE Press, 2nd Ed.2001.
R3	Electromagenticwaves and Radiating Systems, Jordan and Balmain, TMH, 4th.Ed, 1999

Lecture-wise plan:

Lecture No.	Learning Objective	Topics to be covered	(Ch./Sec./Text Book)
1	Introduction to Microwave engineering.	Frequency bands; Microwave and RFEngg, Problems & limitations at high frequencies, advantages	T1:1.1 T2:1.1
2-5	Study of different phenomenon affecting microwave propagation.	Propagation of wave in free space, atmospheric effect, ground effects, plasma effects.	R3:Ch.16,17
6-8	To study guided waves on surfaces	Modes of surface waves, striplines and microstriplines	T1:3.6-3.8T2:11
9-11	To understand the concepts of impedance and there presentation of incident, reflected and transmitted waves for microwave passive network analysis	Concepts of impedance, equivalent voltages currents, impedance &admittance matrix, S-matrix, ABCD parameters.	T1:4.1-4.4 R1:4.1-4.2 R1:4.5-4.10
12-13		Signal flow graphs and circuit analysis	T1:4.5R1:4.10
14-16	To study various microwave resonators	Resonant circuits, Transmission line resonators, cavity resonators, dielectric resonators, excitation of resonators	T1:6.1-6.5,6.7 T2:4.3R1:7.1-7.2,R1:7.4,7.6
17-21	To study microwave components	Dividers, circulators, isolators, Directional couplers, and other hybrid components.	T1:7.1-7.9T2: 4.4-4.6R1:6.4 -6.6,6.10
22-24	Overview of design and principle of semiconductor devices used as microwave sources and circuit elements	Microwave HBTs, FETS,MESFETS	T2:5.2-5.3; T2:6.1-6.4;
25-26	Overview of design and principle	Transferred electron devices,	T2:7.1-7.5

	of semiconductor devices used as microwave sources and circuit elements	GUNN effect, GUNN diodes	
27-28	Overview of design and principle of semiconductor devices used as microwave sources and circuit elements	Avalanche Transit time devices, IMPATT,TRAPATT,BARITT	T2:8.1-8.4
29-32	Overview of design and principle of high power sources of microwave like Klystron Magnetron & amplifiers using TWTs.	Klystrons, Multicavity Klystrons, Reflex Klystrons TWTs,	T2:9.2-9.5
33-34		Magnetrons	T2:10.1
35-36	An introduction to design of Microwave antennas	Antennas special problems and design at microwave frequencies	Class notes
37-38	To study the RF and Microwave Comm. Systems.	Microwave and RF systems, transmitters and receivers.	R2:T1:121
39-40	To study EMI &EMC	An introduction to Electromagnetic Interference and Compatibility	Class Notes
41-42	Other microwave applications such as Radar, Radiometry, microwave Ovens etc.	Radar equations and various types of radars such as pulse, Doppler, RCS, etc.Microwave ovens, and Radiometry.	R2:T1:12.3-12.4,T1:12.6

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	02.02.2023	01-10	CB
Test 2	60 Minutes	17	03.03.2023	11-20	CB
Test 3	60 Minutes	17	05.04.2023	31- 4	OB
Lab	Throughout the Semester	10	-----	**	CB
Comprehensive Exam	3 Hours	40	08.05.2023	01-42	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.

Mrs. BHAVNA CHAUDHARY
Instructor-in-charge

Date: 15/01/2023

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2022-2023

Course Handout

Course No	Course Title	L	P	U
EC325	**Analog Electronics**	**3**	**2**	**4**

Instructor-in-charge: Dr. K.KISHORE KUMAR

Learning Outcomes

After successful completion of the course student will be able to

1. To design the circuits using operational amplifiers for various applications.
2. To analyze and design amplifiers, active filters using Op-amp.
3. To develop skills required for designing and testing integrated circuits
4. To apply the gain-bandwidth concept and frequency response of the three basic amplifiers.
5. To design the combinational logic circuits for different applications

Textbook(s) T1	L.K. Maheshwari and M.M.S. Anand, Analog Electronics, 1st Ed., PHI, 2005.
Reference book(s)R1	Sedra and Smith, Microelectronics Circuits, Oxford Univ. Press, New York, 2014.
R2	I.S.Franco, Design with Operational Amplifiers and Analog Integrated Circuits, 3rdedition, TMH, New Delhi, 2003.
R3	Ramakanth A.Gayakwad, Op-Amps and Linear Integrated Circuits, 4th Ed, Pearson Education 2006.
Swayam	https://swayam.gov.in/nd1_noc20_ee13/preview

Lecture-wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./Page Nos.of Text Book)
1-2	Review of fundamental Concepts	Circuit Theorems & Analysis Basic Electronic devices	T1: 1.1, 1.2 T1: 1.3
3-7	Focuses on the basics of Ideal and Practical Operational Amplifier	An Ideal Op-amp Basic Configurations of Op-amps Practical Op-amp Frequency Compensation	T1: 2.1-2.3 T1: 2.4 T1: 2.5.1 T1: 2.5.2
8-11	Application of Opamp in Analog Electronic Systems.	Instrumentation Amplifier, Programmable Gain Amplifier Negative Feedback Amplifiers Inductance Simulation	T1: 3.2 T1: 3.4 T1: 3.5 T1: 3.6
12-16	Practical realization of Active Filters	Basic Theory of Filters Realization of Active Filters	R1: 7.1-7.10
17-24	Application of Opamp in realization of Non-linear functions	Logarithmic Amplifier Analog Multipliers Applications	T1: 5.2 T1: 5.3.1-5.3.6 T1: 5.4

		Precision Circuits Comparators Schmitt Triggers Analog Switch Sample-and-Hold Circuits, Analog Multiplexers	T1: 5.5 T1: 5.6.1-5.6.2 T1: 5.6.4 T1: 5.7.1-5.7.3 T1: 5.8 T1: 5.9.1-5.9.2
25-30	Generation of Various types of signals using Op-amps	Sinusoidal Oscillators Non-sinusoidal Oscillators Function Generator Phase Locked Loop	T1: 6.2 T1: 6.3 T1. 6.5 T1: 6.6
31-34	Use of Op-amps in Voltage Regulation	Voltage Regulator Circuits Switched capacitor voltage converters Switching Regulators	T1: 7.1-7.3 T1: 7.4.5 T1: 7.4.6(part)
35-36	IC Power Amplifiers	Fixed gain, Bridge Amplifiers	R1: 14.8
37	Tuned Amplifiers	Basic Principle, Tuned circuits	R1: 12.11
38-40	Data Converters	DAC & ADC circuits	R1: 9.7-9.9
41-42	IC sensors and Analog Systems	Evolution of sensors, classification of sensors, Introduction to MEMS Typical IC Sensors	T1: 11.1-11.6

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	02.02.2023	1-12	CB
Test 2	60 Minutes	17	03.03.2023	13- 28	CB
Test 3	60 Minutes	17	05.04.2023	29- 42	OB
Lab	Throughout the Semester	10	**	**	CB
Comprehensive Exam	3 Hours	40	10.05.02023	1- 42	CB

** To be announced in the class

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Dr. K.KISHORE KUMAR
Instructor-in-charge

Date: 15/01/2023

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2022-2023

Course Handout

Course No	Course Title	L	P	U
CS415	**Artificial Intelligence**	**3**	**0**	**3**

Instructor-in-charge: Dr.K.NAGAIAH

Learning Outcomes

1. Introduce the basic principles of AI towards problem solving, inference, perception, knowledge representation and learning.
2. Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural Networks and other machine learning models.
3. Experiment with a machine learning model for simulation and analysis.
4. Explore the current scope, potential, limitations, and implications of intelligent systems.
5. To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language.

Textbook(s) T1	Artificial Intelligence by Elaine Rich and Kevin Knight, Tata McGraw Hill.
Reference book(s)R1	Principles of Artificial Intelligence by Nils J.Nilsson, Narosa Publishing house.

Lecture-wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./Page Nos.of Text Book)
1-3	Overview & Search Techniques:	Introduction to AI, Problem Solving, State space search,	15-32
4-5	Overview & Search Techniques:	Blind search: Depth first search, Breadth first search,	48-60
6	Overview & Search Techniques:	Informed search: Heuristic function, Hill climbing search.	71-77
7-9	Overview & Search Techniques:	Best first search, A* & AO* Search.	81-87
10	Overview & Search Techniques:	Constraint satisfaction, Game tree	88- 95
11-12	Overview & Search Techniques:	Evaluation function, Mini-Max search, Alpha-beta pruning, Games of chance.	135-148
13-15	How to do Knowledge Representation	Introduction to KR, Knowledge agent, Predicate logic	155-159
16-17	How to do Knowledge Representation	WFF, Inference rule & theorem proving forward chaining, backward chaining, resolution	160-190
18	How to do Knowledge Representation	Propositional knowledge, Boolean circuit agents.	200-221

19-20	How to do Knowledge Representation	Rule Based Systems, Forward reasoning	230-241
21-22	How to do Knowledge Representation	Conflict resolution, backward reasoning: Use of Back tracking, Structured KR	317-329
23-24	How to do Knowledge Representation	Semantic Net - slots, inheritance, Frames- exceptions and defaults attached predicates	330-354
25-26	How to do Knowledge Representation	Conceptual Dependency formalism and other knowledge representations.	360-371
27	How to Handling uncertainty & Learning:	Source of uncertainty, Probabilistic inference	373-375
28-29	How to Handling uncertainty & Learning:	Bayes' theorem, Limitation of naïve Bayesian system, Bayesian Belief Network (BBN)	380-386
30	How to Handling uncertainty & Learning	Inference with BBN, Dempster-Shafer Theory	389-405
31-32	How to Handling uncertainty & Learning	Fuzzy Logic, Fuzzy function, Fuzzy measure, Non monotonic reasoning:	410-419
33-34	How to Handling uncertainty & Learning	Dependency directed backtracking, Truth maintenance systems.	420-434
35-36	How to Handling uncertainty & Learning	Learning: Concept of learning, Learning model, learning decision tree, Paradigms of machine learning,	435-447
37-40	How to Handling uncertainty & Learning	Supervised & Unsupervised learning, Example of learning, Learning by induction, Learning using Neural Networks.	448-460

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	01.02.2023	1-12	CB
Test 2	60 Minutes	17	02.03.2023	13-26	CB
Test 3	60 Minutes	17	04.04.2023	27-40	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	05.05.2023	1-40	CB

** To be announced in the class

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Dr.K.NAGAIAH
Instructor-in-charge

Date: 15/01/2023

The ICFAI University, Raipur

Faculty of Science and Technology
Second Semester, 2022-2023
Course Handout

Course No	Course Title	L	P	U
CS223	**Discrete Structures for Computer Science**	**3**	**0**	**3**

Instructor-in-charge: Dr.ANIMESH KUMAR SHARMA

Learning Outcomes:
Discrete mathematics is the study of discrete sets. Material usually includes Logic, Graph Theory & Boolean Algebra.

Textbook(s) T1	Discrete Mathematical Structures, Kolman, Busby & Ross: PHI, 5th Edition, 2006.
Reference book(s) R1	Elements of Discrete Maths, C.L.Liu: Tata McGraw Hill, 2nd edition, 2001.
R2	Discrete Mathematics for Computer Science, Gary Haggard & John Schlipf, Cengage, Thomson 2006.

Lecture-wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./Page Nos.of Text Book)
1- 4	To understand Mathematical structures and operations.	Statement of Addition Principle, Sequences, Strings, Characteristic Function, Matrices, Boolean matrix operations Mathematical Structures.	1.2,1.3,1.5,1.6
5- 8	To verify the correctness of programs in computer science.	Logic, Logical Operations, Quantifiers, Conditional Statements, Methods of Proof, Mathematical Induction.	Ch. 2
9-11	To learn the principles used in the analysis of Algorithms.	Pigeonhole Principle, Recurrence Relations	3.3, 3.5
12- 14	To learn the geometric and algebraic methods of representing objects.	Graphs, Euler Paths & Circuits, Hamiltonian Paths &Circuits	8.1-8.3
15-16	To understand map coloring problems.	Colouring Graphs, Chromatic polynomial	8.6
17-20	To learn the theoretical and Computational aspects of discrete structures of relations.	Relations & Directed Graphs, Paths in relations & directed, Equivalence relation &partitions	Ch. 4
21-22	To develop Flow Charts, etc.	Closure & transitive closure, Warshall Alg.	Ch. 4
23-25	To learn about Boolean Algebra.	Partially Ordered Sets, Lattices, Hasse diagram	6.1-6.3

26-28	To understand the logical representations.	Boolean Algebra, & Boolean Expressions	6.4, 6.5
29-31	To learn the construction of data bases of logical flows.	Trees & their representations, labeled trees	7.1,7.2
32-34	To learn the construction of language compilers.	Undirected trees, spanning trees, Minimal Spanning Trees, Prim & Kruskal algorithms for minimal spanning tree in a connected graph	7.4, 7.5
34-35	To study finite state machines.	Definition of group & semi group	9.2,9.4
36-40	To understand phrase structure grammars.	Languages & finite state machines	10.1,10.3,10.4
41-42	To learn about computer science applications.	Functions for Computer Science	5.2

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	02.02.2023	1-12	CB
Test 2	60 Minutes	17	03.03.2023	13-26	CB
Test 3	60 Minutes	16	05.04.2023	27-42	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	08.05.2023	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.

Dr.ANIMESH KUMAR SHARMA
Instructor-in-charge

Date-15/01/2023

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2022-2023

Course Handout

Course No	Course Title	L	P	U
CS326	**Data Science using Python**	**3**	**2**	**4**

Instructor-in-charge: Ms.SNEHA THAKUR

Learning Outcomes:

Data Science using Python is an application oriented course which forms the first half of a two-semester comprehensive course on core level to be taught to all the students B.Tech.
The course aims at:-

1. Developing an understanding of the basic principles of Data Science and its implementation in research work.
2. Developing the application of concepts to problems of practical interest using Python.
3. Improving the concepts and improving the problem solving skills of students.

Text Book T1	Statistics (wikibooks.org)
Reference book(s) R1	Lecture Series from Youtube (Channel-Codebasics) (YouTube links are provided)

Lecture wise plan

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
1-3	Learn about the Basics Statistical Methods and related information	Statistical Methods: Definition and scope of Statistics, concepts of statistical population and sample. Data: quantitative and qualitative, attributes variables	https://nptel.ac.in/courses/110/106/110106064/ (Module-01)
4-5		Scales of measurement nominal, ordinal, interval and ratio. Presentation: tabular and graphical.	13-16
6-8	Understanding the use of basic statistical techniques for preprocessing of a dataset.	Descriptive vs Inferential Statistics, Statistics for data science, Log normal distribution Math	https://www.investopedia.com/terms/l/log-normal-distribution.asp & https://www.youtube.com/watch?v=dX5pw_sQUmc
9-12		Statistics for data science, machine learning, Median, Mean, Mode, Percentile Math	23-32 &https://www.youtube.com/watch?v=t4LOv9h-FJM
13-15		Statistics for data science, machine learning, Normal Distribution, Z Score, t Score	https://www.youtube.com/watch?v=okhrFgaUwio
16-17		Z test and t test for interpretation of Math, Statistics for data science, machine learning	
18-19	Understanding prediction	Introduction to Machine	https://www.youtube.com/watch?v=

	for univariate and multivariate dataset	Learning, Linear Regression Single Variable	8jazNUpO3lQ&list=PLeo1K3hjS3uvCeTYTeyfe0-rN5r8zn9rw&index=2
20-21		Linear Regression Multiple Variables, Gradient Descent and Cost Function	https://www.youtube.com/watch?v=J_LnPL3Qg70&list=PLeo1K3hjS3uvCeTYTeyfe0-rN5r8zn9rw&index=3 & https://www.youtube.com/watch?v=vsWrXfO3wWw&list=PLeo1K3hjS3uvCeTYTeyfe0-rN5r8zn9rw&index=4
21-23		Training and Testing Data	https://www.youtube.com/watch?v=fwY9Qv96DJY&list=PLeo1K3hjS3uvCeTYTeyfe0-rN5r8zn9rw&index=7
24-27		Logistic Regression (Binary Classification), Decision Tree	https://www.youtube.com/watch?v=zM4VZR0px8E&list=PLeo1K3hjS3uvCeTYTeyfe0-rN5r8zn9rw&index=8 & https://www.youtube.com/watch?v=PHxYNGo8NcI&list=PLeo1K3hjS3uvCeTYTeyfe0-rN5r8zn9rw&index=10
28-33		Support Vector Machine (SVM)	https://www.youtube.com/watch?v=FB5EdxAGxQg&list=PLeo1K3hjS3uvCeTYTeyfe0-rN5r8zn9rw&index=11
34-35	Learning about the minimization of factors for effective predictions	Eigen Systems, Factor Analysis, Notation	Printed Notes Contents
36-42	Understanding the various Tests	Principal Components Analysis (PCA) Exploratory Factor Analysis	Printed Notes Contents
40-42		Hypothesis Testing, P-value, using one & two sample Z-test and one & two sample T-test	Printed Notes Contents

Data Science (Lab)

S. No.	Name of Experiment
1	Program to display the addition, subtraction, multiplication and division of two number using console application
2	Program to display the first 10 natural numbers and their sum using console application.
3	Write a program to manage the session.
4	Program to display the addition using the windows application.
5	Write a program to convert input string from lower to upper and upper to lower case.
6	Write a program to simple calculator using windows application.
7	Write a program working with Page using ASP.Net.
8	Write a program working with forms using ASP.NET.
9	Write a program to connectivity with database.
10	Write a program to access data source through ADO.NET.

Evaluation Scheme:

Student evaluation is based on the series of Tests and labs 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	01.02.2023	1-12	CB
Test 2	60 Minutes	8	02.03.2023	13-26	CB
Test 3	60 Minutes	8	04.04.2023	27-42	OB
Lab	Throughout the Semester	20	**	**	CB
Comprehensive Exam	3 Hours	56	06.05.2023	1-42	CB

**** To be announced in class**

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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.

Ms.SNEHA THAKUR
Date: 15/01/2023 **Instructor-in-charge**

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2022-2023

Course Handout

Course No	Course Title	L	P	U
CS327	**Block chain Technology**	**3**	**2**	**4**

Instructor in charge: Ms.SNEHAL YADAV

Learning outcome:

The learning objectives of this course are to:

1. Introduce students to the mathematical foundations of computation including automata theory; the theory of formal languages and grammars; the notions of algorithm, decidability, complexity, and computability.
2. Enhance/develop students' ability to understand Ethereum, Hyperledger Fabric, Distributed Application Development (smart contracts development, backend development, API)
3. By the end of the course, students will be able to Understand how blockchain systems (mainly Bitcoin and Ethereum) work,
   - To securely interact with them,
   - Design, build, and deploy smart contracts and distributed applications,

Textbook(s) T1	Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).
T2	Blockchain Explained: A Pragmatic Approach by Srihari Kapu
Reference book(s) R1	Mastering Blockchain by Imran Bashir

Lecture-wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
1-5	Overview of Blockchain Technology	Defining Blockchain and Distributed Ledger, Blockchain Properties Decentralized, Transparent, Immutable and secure. Blockchain Applications. Types of Blockchain: Public, private, and consortium based block chain, When to use, and when not to use Blockchain, History of Blockchain.	T l Ch-l 1.4,1.5,1.6,1.9
6-10	Introduction to computing models and P2P networking	Centralized, Decentralized and Distributed Systems, Decentralization vs distributed, P2P systems, propertied of P2P systems, P2P communication architecture. P2P network applications: File sharing, P2P network for blockchain	T2 Ch-2 2.1,2.2,2.3,2.9
16-20	Foundational Concepts Blockchain Data Structure	Cryptographic Hash Functions, Digital Signatures, Public Keys as Identities, Hash Pointers and Hash chain and Merkel tree, Consensus mechanisms	T1 Ch-3 3.2,3.4 T2 Ch3 3.6,3.8
21-23	Blockchain	Decentralized Identity management, Transactions, incentivising and mining. Distributed Consensus (PoW),	T1 Ch-4 4.5, 4.6

	Characteristics	Cryptocurrency as the first blockchain application. Mechanics of Bitcoin, Bitcoin Scripts, Storing and Using Bitcoins, Mining in Bitcoin.	T2 Ch4 4.8,4.10
24-25	Other Consensus Mechanisms	Proof of storage, proof of stake algorithms for adjusting difficulty and retargeting. Limitations of Bitcoin, alternative crypto currencies.	T1 Ch-5 5.7,5.8
26-30	Smart Contracts and Ethereum	History, Purpose and types of smart contracts, Introduction to Ethereum, bitcoin vs Ethereum stack. P2P network in Ethereum, consensus in Ethereum, scripts in Ethereum, Smart contracts (Ethereum Virtual Machine). Concept - Developing and executing smart contracts in Ethereum. State and data structure in Ethereum.	T2 Ch-5 5.4,5.8
31-40	Private and Consortium based Blockchain: Hyperledger	Need for the consortium. Hyperledger stack, Multi chain blockchain. Innovation in Hyperledger, smart contracts, and distributed applications in hyperledger.	T1 Ch-5,Ch6 5.9, 6.4,7.1 T2 Ch6 6.8,7.4,7.9

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 (Lecture No)	Remarks
Test 1	60 Minutes	16	02.02.2023	1-12	CB
Test 2	60 Minutes	17	03.03.2023	13- 28	CB
Test 3	60 Minutes	17	05.04.2023	29- 40	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	10.05.2023	1- 40	CB

** To be announced in the class

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Ms.SNEHAL YAEDAV
Instructor-in-charge

Date-15/01/2023

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2022-2023

Course Handout

Course Code	Course Title	L	P	U
CS323	Computer Networks	3	2	3

Instructor-in-charge: Mr.NAVEEN VAISHNAV

Learning Outcomes:

Data communication and networking are changing the way we live and do the things today. They rely on computer networks and internet works. This course focuses on networking fundamentals, standards and various underlying protocols to make the network connected for text, audio, video. The security aspect of network is also emphasized. As a result, the technology advances make it possible to communicate faster and offer more services thru IEEE standards and TCI/IP and other protocols

Textbook(s) **T1**	Data Communication and Computer Networking,B.A.Forouzan,TMH,2006
T2	Computer Networks, A.S.Tanenbaum, Pearson Education/Prentice Hall of India, 4th Edition, 2004.
Reference book(s) **R1**	Data Communications, Computer Networks and Open Systems, Halsall Fred, Addition-Wesley, 4th Edition, 2004
R2	An Engineering Approach to Computer Networks, S.Kesha, Pearson Education, (2004)

Lecture-wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./Pg No)
1	Introduction to Computer Networking	Introduction to Networks, Computer Networking	T1: Ch-1
2-3	Use of Hardware and Software	Uses of computer networks, network hardware, network software	T2: Ch-1
4-5	Introduction to OSI, TCP/IP	Introduction to Reference Models OSI, TCP/IP Layers	T1: Ch-2, T2: Ch-1
6	Analog and digital Transmissions	Types of Signals: Analog and digital, Analog signals, Digital signals, Transmission impairment	T1: Ch-3
7-8	Coding and Sampling in Transmission	Line coding, block coding, 0sampling, transmission mode	T1: Ch-4
9-10	Transmission in Physical Layer	Types of Transmission media: Guided media and Unguided media	T1: Ch-7, T2: Ch-2
11	Data Link Layer	Data Link Layer Design Issues	T2: Ch-3
12-13	Errors and their significance	Error Detection And Correction	T1: Ch-10, T2: Ch-3
14-16	Data Link Layer Protocols	Data link Control and Protocols: Elementary Data Link Protocols, Sliding Window Protocols	T1: Ch-11, T2: Ch-3

17-18	MAC	Multiple Access Protocols	T1: Ch-13, T2: Ch-4
19	Design of Network Layer	Network Layer Design Issues	T2: Ch-5
20-21	Types of Routing	Routing Algorithms	T1: Ch-19, T2: Ch-5
22-23	Removing Congestion on Network	Congestion Control Algorithms	T1: Ch-23, T2: Ch-5
24	Internetworking	Quality Of Service, Internetworking	T1: Ch-23
25	Protocols of Transport Layer	The Transport Service	T1: Ch-22, T2: Ch-6
26-27		Elements of Transport Protocols, A Simple Transport Protocol	T1: Ch-22, T2: Ch-6
28-29	Internet Transport Protocols	The Internet Transport Protocols: UDP, The Internet Transport Protocols: TCP	T1: Ch-22
30-34	Services of Application Layer	DNS--Domain Name System, Electronic Mail, The World Wide Web	T1:Ch-25,26, 27,T2:Ch-7
35-38	Security on Networks	Cryptography, Symmetric-Key Algorithms	T1: Ch-29,31, T2: Ch-8
39-40	Algorithms	Public-Key Algorithms	T2: Ch-8

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	31.01.2023	01-10	CB
Test 2	60 Minutes	17	01.03.2023	11-20	CB
Test 3	60 Minutes	17	03.04.2023	31- 40	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	01.05.2023	01-40	CB

** To be announced in the class

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.

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Mr. NAVEEN VAISHNAV
Instructor-in-charge

Date: 15-01-2023

The ICFAI University, Raipur

Faculty of Science and Technology
Second Semester, 2022-2023
Course Handout

Course Code	Course Title	L	P	U
IP401	**Internship Program**	**0**	**0**	**16**

Instructor-in-charge: Mr. DILIP MISHRA

This course is run during one of the two semesters in the final year and a part of the adjoining summer vacation, total duration being five and a half month. Students will be working at industries on the live projects in supervision of the Institute faculty**.**

Mr. DILIP MISHRA
Instructor-in-charge

Date: 15-01-2023