

*Faculty of Science and  
Technology*

*Second Semester, 2023–2024  
Course Handouts*

## Table of Contents

S. No	Course Code	Course Title	Page No
<b>B.Tech I Year</b>			
1	<b>CS211</b>	Object Oriented Programming	1-3
2	<b>ES123</b>	Environmental Science	4-6
3	<b>ES124</b>	Engineering Mechanics	7-10
4	<b>MA121</b>	Mathematics-II	11-13
5	<b>PH122</b>	Physics-II	14-17
<b>B.Tech II Year</b>			
6	<b>CE221</b>	Analysis of Structures I	18-19
7	<b>CE222</b>	Concrete Technology	20-22
8	<b>CE223</b>	Geotechnical Engineering I	23-25
9	<b>CS314</b>	Operating Systems	26-28
10	<b>CS315</b>	Data Base Management Systems	29-31
11	<b>CS325</b>	Web Technology	32-35
12	<b>EC221</b>	Microprocessor Programming & Interfacing	36-38
13	<b>EC222</b>	Signals & Systems	39-41
14	<b>EC223</b>	Digital Electronics and Computer Organization	42-44
15	<b>ES203</b>	Electrical Science II	45-47
16	<b>MA303</b>	Operations Research	48-52
17	<b>MG201</b>	Principle of Management	53-54
<b>B.Tech III Year</b>			
18	<b>CE321</b>	Hydraulics & Hydraulic Machines	55-61
19	<b>CE322</b>	Design of Steel Structures II	62-64
20	<b>CE323</b>	Water Supply and Waste Water Management	65-67
21	<b>CE324</b>	Highways & Transportation Engineering	68-70
22	<b>CS324</b>	NET and C# Programming	71-73
23	<b>CS325</b>	Software Engineering	74-76
24	<b>CS326</b>	Data Science Using Python	77-80
25	<b>CS327</b>	Theory of Computation	81-83
26	<b>CS415</b>	Artificial Intelligence	84-86

<b>S. No</b>	<b>Course Code</b>	<b>Course Title</b>	<b>Page No</b>
27	<b>EC321</b>	Digital Communications	87-92
28	<b>EC322</b>	Antenna & Wave Propagation	93-95
29	<b>EC323</b>	Microelectronics Circuits	96-98
30	<b>EC324</b>	RF & Microwave Engineering	99-102
31	<b>EC325</b>	Analog Electronics	103-105
32	<b>MKE641</b>	Digital Services and Marketing	106-108

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
CS211	Object Oriented Programming	3	0	3

**Instructor-in-charge: Mr.ASHISH KUMBHARE**

**Learning Outcomes:**

After successful completion of the course student will be able to

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

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

**Lecture-wise-plan:**

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)R1
1	To learn the OOPs fundamentals	What is OOPs? Procedure Oriented Programming vs. Object Oriented Programming.	255
2-4	To learn the OOP's principles	Abstraction Encapsulation, Polymorphism and Inheritance	257-260
5-7	To learn about Classes and Objects	Objects and Instances Class Members	289

<b>Lecture Nos.</b>	<b>Learning Objective</b>	<b>Topics to be covered</b>	<b>Reference (chapter/sec./Page Nos of Text/Ref. Books)R1</b>
8-9	To know about Language Constructs	Programming basics, data type, loops and decisions, Control statements	70-88
10-13	To Learn about Class Member functions and Objects	Classes and Member functions Constructors and destructors	289-324
14-16	To learn about Strings Objects	Creation and Manipulation of Strings String I/O	683-693
17-19	To define and use operators for user defined types	Operator Overloading and multiple overloading with type conversion	384-414
20-23	To learn about Inheritance	Class Single and Multiple Inheritance,	417-425
24-25	To learn about Inheritance	Member Specifiers Derived classes	426-430
26-29	To learn about Polymorphism and need and importance of Virtual Functions	Virtual Function, function call binding, late binding	444-447
30-32	To learn about Polymorphism and need and importance of Virtual Functions	Friend and static function, this operator	332,310-315,297-302
33-34	To learn about handling the file Object	Creating and Manipulating File and Streams	488
35-36	To learn about handling the file Object	Mechanism, try, throw and catch	494
37-38	To learn about handling the file Object	Catching all Exceptions, Multiple catches	495
39-42	To learn about handling the file Object	Programs related to exception handling	506

**Evaluation Scheme:**

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

<b>Evaluation Component</b>	<b>Duration</b>	<b>Weightage</b>	<b>Date</b>	<b>Syllabus (Lec.No.)</b>	<b>Remarks</b>
Test 1	60 Minutes	16	13-02-2024	1-10	CB
Test 2	60 Minutes	17	12-03-2024	11- 24	OB
Test 3	60 Minutes	17	16-04-2024	25- 42	CB
Presentations/Assignments/	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	20-05-2024	1- 42	CB

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

**Make-up Policy:** Make –up will be given only under genuine circumstances for Tests Only However prior and proper intimation to the competent authority is required.

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

**Date: 07/01/2024**

**Mr.ASHISH KUMBHARE  
Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
ES123	Environmental Studies	3	0	3

**Instructor-in-charge: Dr.PRATIK KUMAR JAGTAP**

**Learning Outcomes:**

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

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 Wise Plan:**

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 pollution and 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

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Test 1	60 Minutes	16	12-02-2024	1-10	CB
Test 2	60 Minutes	17	11-03-2024	11- 24	OB
Test 3	60 Minutes	17	15-04-2024	25- 40	CB
Presentations/Assignments/	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	18-05-2024	1- 40	CB

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

**Date: 08/01/2024**

**Dr.PRATIK KUMAR JAGTAP**  
**Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
ES124	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. Analyze the forces acting on rigid body during translation motion

Text Books T1	Engineering Mechanics (Statistics & Dynamics): A.K.Tayal, Umesh Pub, Delhi
Reference Book R1	Engineering Mechanics (Statics and Dynamics):
Reference Book R2	Engineering Mechanics, New Age Pub. Fourth Edition
Reference Book R3	S.Timoshenko and D.H Young Engineering Mechanics
Reference Book R4	<a href="https://www.classcentral.com/course/wayam-engineering-mechanics-14036">https://www.classcentral.com/course/wayam-engineering-mechanics-14036</a>

**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

Lecture Nos.	Learning Objectives	Topics to be covered	Reference
		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	T1, Ch-10
		Shear force and bending moment at any section of a beam Analytical methods and graphical methods	R1, Ch-10
		Force polygon and couple polygon. Reactions at supports.	R2, Ch-07
		Various problems involved	R3, Ch-08
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,

Lecture Nos.	Learning Objectives	Topics to be covered	Reference
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	Kinetics of Particle: Impulse and Momentum	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:**

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Test 1	60 Minutes	16	14-02-2024	1-10	CB
Test 2	60 Minutes	17	13-03-2024	11- 24	OB
Test 3	60 Minutes	17	18-04-2024	25- 40	CB
Presentations/Assignments/	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	24-05-2024	1- 40	CB

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**Date: 08/01/2024**

**Mr.HEMANT KUMAR DEWANGAN  
Instructor-in-charge**

**The ICFAI University, Raipur**  
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Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
MA121	Mathematics II	3	0	3

**Instructor-in-charge: Dr.ANIMESH KUMAR SHARMA**

**Scope & Objective of the course:**

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

Text Book (s) T1	Higher Engineering Mathematics, B.S. Grewal, J.S. Grewal, J.K. Dhanoa, Khanna Publishers, 44 <sup>th</sup> Edition, 2017
Reference book(s) R1	Complex Variables and Applications, J. W. Brown, R. V. Churchill, Mc Graw-Hill, 7th Ed, 2003.
Reference book(s) R2	Complex analysis for Mathematics & Engineering, John H. Mathews & Russel W. Howell, Jones & Bartlett Publishers, 2001.

**Lecture wise Plan:**

Lecture No.	Learning Objective	Topics to be covered	Reference (Ch/Sec/Pg Nos of Text Book)
1-4	To understand algebraic and geometric properties of complex numbers	Complex Numbers, argand Plane, Demoivre's theorem, Roots of complex number	639-642, 647-650, 651-653 (T1)
5-7	To learn the concept of a function of a complex variable and the properties of complex function	Complex Functions, Exponential function of a complex variable, circular functions, Hyperbolic functions,	656-661(T1)
8-10		Real and Imaginary parts of circular and hyperbolic functions, Logarithmic function of a complex variable, Summation of series 'C+iS' method	662-669
11-13	Calculus of Complex functions	Limit of a complex function, derivative of $f(z)$ , C-R equations	672-674

Lecture No.	Learning Objective	Topics to be covered	Reference (Ch/Sec/Pg Nos of Text Book)
14-17	To learn the concept of Riemann Sphere, C-R equations and harmonic	Analytic functions, Harmonic functions, Orthogonal system, Milne-Thomson's Method	674-684
18-21	To learn the concepts of integrals and anti-derivatives of complex valued functions of a single variable	Complex integrations, (line integrals), Cauchy theorem, Cauchy Integral Formula(Without proof)	694-700
22-24	To understand the form of Taylor's and Laurent series for an analytic function of a complex variable	Taylor's and Laurent series, Zero's of analytic function	704-710
25-28	Develop the skill to find the residues, poles and zeros of analytic functions	Residues, Residue theorem, Poles of analytic Functions	710-715
29-31	Evaluation of certain types of definite and improper integrals using the theory of residues	Application of residues, Evaluation of real definite integrals	716-722
32-33	To learn theory of equations	General properties, Intermediate value property, Descarte's rule of signs, Relation between roots and coefficients	1-5
34-36	Develop the skill to find various kind of roots	Transformation of equations, Reciprocal equations	5-8
37-41	Solution of Cubic and Bi-quadratic equations	Cardon's method, Ferrari's method	9-15

### Evaluation Scheme:

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Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	12-02-2024	1-10	CB
Test 2	60 Minutes	17	11-03-2024	11- 24	OB
Test 3	60 Minutes	17	15-04-2024	25- 40	CB
Presentations/Assignments/	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	18-05-2024	1- 41	CB

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

**Date: 10/01/2024**

**Dr.ANIMESH KUMAR SHARMA**  
**Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
PH122	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 (T1)	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 charge distributions.	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

<b>Lecture Nos.</b>	<b>Learning Objective</b>	<b>Topics to be covered</b>	<b>Reference (chapter/sec./Page Nos of Text/Ref. Books)</b>
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 capacitors	Capacitance, Calculating the capacitance, Capacitors in series and parallel, Energy storage in an electric field, Capacitor with	30.1 – 30.6
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 magnetic fields and displacement currents	38.1-38.3

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
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:**

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Test 1	60 Minutes	16	13-02-2024	1-10	CB
Test 2	60 Minutes	17	12-03-2024	11- 24	OB
Test 3	60 Minutes	17	16-04-2024	25- 41	CB
Presentations/Assignments/	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	22-05-2024	1- 41	CB

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

**Date: 09/01/2024**

**Dr.ANIL KUMAR VERMA**  
**Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
CE221	Analysis of Structures I	3	0	3

**Instructor-in-charge: Ms.JYOTI PATEL**

**Course Outcome:**

On completion of the course student will be able to.

1. To understand the methods to analyse slopes and deflection of structures
2. To understand the method of strain energy to analyse deflection of structures.

**Lecture Wise Plan:**

Lecture Nos.	Learning Objective	Topics to be Covered	Book
1	Determinate structures	Determinate vs indeterminate structures, static indeterminacy,	T1, T2, R1
2-3	Determinate structures	Rules for determining degree of indeterminacy, degree of freedom per node.	T1, T2, R1
4-5	Determinate structures	Kinematic indeterminacy, pin jointed determinate space truss,	T1, T2, R1
6	Determinate structures	Simple and complex space truss	T1, T2, R1
7-8	Determinate structures	Method of tension coefficient	T1, T2, R1
9-11	Deflection and slope	Moment curvature relation, relation between loading , Slope and deflection	T1, T2
12-13	Deflection and slope	Double integration method , macaulay's method	T1, T2
14-16	Deflection and slope	Area moment method, basics of conjugate beam method,	T1, T2

Lecture Nos.	Learning Objective	Topics to be Covered	Book
17-18	Strain Energy	Strain energy due to axial load, bending shear and torsion,	T1
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 & 14 R1
38-41	Approximate analysis of indeterminate structures	Continuous beam for gravity load, rigid frame for vertical load, portal method, cantilever method	Ch. 15, R1

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Evaluation Component	Duration	Weightage	Date	Syllabus (Lec. No.)	Remarks
Test 1	60 Minutes	16	13-02-2024	1-10	CB
Test 2	60 Minutes	17	12-03-2024	11- 24	OB
Test 3	60 Minutes	17	16-04-2024	25- 41	CB
Presentations/Assignments	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	22-05-2024	1- 41	CB

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**Date: 08/01/2024**

**Ms. JYOTI PATEL  
Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
CE222	Concrete Technology	3	0	3

**Instructor-in-charge: Mr.DILIP MISHRA**

**Scope and Objective of the course:**

1. To educate the student about the concept of reinforced cement concrete and different method of design of reinforced concrete.
2. To educate the student about concept of working stress method to analysis and design of beam.
3. To educate the student about concept of limit state method to analysis and design of beam and columns

Text Book(s)T 1	Limit state design of reinforced concrete – B.C. Punmia
Text Book(s) T2	Limit state theory and design of reinforced concrete – V.L. Shah
Reference Book(s) R1	Design of reinforced concrete structure – M.L. Gambhir
Reference Book R2	Design aids for reinforced concrete to I.S.-456-1978

**Lecture-wise-plan:**

Lecture Nos.	Learning Objective	Topics to be covered	Reference/Text Book
1	Basic of working stress method	Properties of concrete and reinforced steel,	T1
2-3	Basic of working stress method	Stress strain curves, permissible stresses, modular ratio	T1
4-5	Basic of working stress method	Numerical related to this chapter	T1
6	Basic of working stress method	Basic for design of working stress method.	T1
7-8	Basic of working stress method	Analysis the singly and doubly reinforced section by working stress methods	T1

<b>Lecture Nos.</b>	<b>Learning Objective</b>	<b>Topics to be covered</b>	<b>Reference/ Text Book</b>
9-10	Limit state method- rectangular beams	Introduction of limit state method, characteristic loads, partial safety factor	T2
11	Limit state method- rectangular beams	Limit state of flexure – assumptions	T2
12-13	Limit state method- rectangular beams	Stress block parameter, neutral axis	T2
14-16	Limit state method- rectangular beams	Bond and development length, shear in beams , design of lintels	T2
17-18	Limit state method- T-Beams and slabs	Properties of T-section, moment of resistance and design of singly reinforced T- Beam.	T1
19	Limit state method- T-Beams and slabs	Dead load imposed load	T1
20-21	Limit state method- T-Beams and slabs	Numericals on slabs.	T1
22-23	Limit state method- T-Beams and slabs	Design of one way slab	T1
24	Limit state method- T-Beams and slabs	Design of two way slab	T1
25	Limit state method- columns	Axially loaded short columns, minimum eccentricity	T2
26-28		Longitudinal and transverse reinforcement , effective length of columns, safe load on columns	T2
29-32	Limit state method- columns	Uniaxial bending and combined bending	T2
33-35	Limit state method – staircases and column footings	Design of stairs – dog legged stair, open newel stair	T1
36-38	Limit state method – staircases	General principle of design of reinforced concrete footing, Proportions of footings.	T1
39-40	Column footings	Function of Foundation, Types of Foundation, Design (Flexure and Shear) of Isolated Column Footing & Combined Footing	T1

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Test 1	60 Minutes	16	13-02-2024	1-10	CB
Test 2	60 Minutes	17	12-03-2024	11- 24	OB
Test 3	60 Minutes	17	16-04-2024	25- 40	CB
Presentations/Assignments/	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	20-05-2024	1- 40	CB

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**Date: 08/01/2024**

**Mr.DILIP MISHRA  
Instructor-in-charge**

# The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2023-2024

## Course Handouts

Course Code	Course Title	L	P	U
CE223	Geotechnical Engineering I	3	0	3

**Instructor-in-charge: Ms.JYOTI PATEL**

### Course Outcome:

Scope and Objective of the course: To provide basic knowledge about geotechnical engineering soil formation, index properties of soil, physical and engineering properties of soil.

To know about the types of soil according their classification, classification system, field identification, study of effective stress, capillary, seepage force etc.

Text Book(s) T1	Soil mechanics and foundation – B.C. Punmia
T2	Soil Engineering in theory and practice (vol-II) – Alam singh
Reference Book(s) R1	Basic and applied soil mechanics – Gopal ranjan and rao
R2	Soil mechanics and foundation Engineering – S. K. Garg

### Lecture-Wise-Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Book
1	Introduction to index properties of soil	Introduction to geotechnical engineering, unique nature of soil, soil formation and soil types, inter relationship of soil.	T1, T2, R1, R2
2-3	Introduction to index properties of soil	Soil mechanics and geotechnical engineering, aim and scope of soil mechanics	T1, T2, R1, R2
4-5	Introduction to index properties of soil	Index properties of soil basic definitions, phase relations,	T1, T2, R1, R2
6	Introduction to index properties of soil	Physical and engineering properties of soil	T1, T2, R1, R2

<b>Lecture Nos.</b>	<b>Learning Objective</b>	<b>Topics to be covered</b>	<b>Book</b>
7-8	Introduction to index properties of soil	Soil grain and properties coarse and fine grained soils, stoke's law, method of fine grained analysis	T1, T2, R1, R2
9-10	Soil classification and effective stress	Indian standard soil classification system, purpose of soil classification,	T1, T2
11	Soil classification and effective stress	Different system of soil classification, field identification	T1, T2
12-13	Soil classification and effective stress	Principle of effective stress and related phenomena, types of soil moisture	T1, T2
14-16	Soil classification and effective stress	Principle of effective stress, capillarity , seepage force and quicksand condition	T1, T2
17-18	Compaction, permeability and seepage Analysis of soil	Clay mineralogy , soil structure , compaction theory, lab compaction test	T1, T2, R1
19	Compaction, permeability and seepage Analysis of soil	Method of compaction control, permeability, darcy law	T1, T2
20-21	Compaction, permeability and seepage Analysis of soil	Lab method for determination, pumping out test for field determination of permeability,	T1, T2
22-23	Compaction, permeability and seepage Analysis of soil	Seepage through soil, exit gradient, confined flow and unconfined flow	T1, T2, R2
24	Compaction, permeability and seepage Analysis of soil	Flow net and their characteristics	T1, T2
25	Stress due to applied loads and consolidation	Stress due to applied load, boussinesq equation of vertical pressure under concentrated load,	T1, T2, R2
26-27	Stress due to applied loads and consolidation	Rectangularly loaded area circular loaded area newmark,s chart	T1, T2, R2
28-29	Stress due to applied loads and consolidation	Westergard,s equation, compressibility, effects of soil type, stress history	T1, T2, R2
30-32	Stress due to applied loads and consolidation	Primary consolidation and secondary consolidation,	T1, T2, R2
33-35	Shear strength and soil Exploration	Introduction , stress at a point and mohr,s stress circle, mohr columb failure criteria	T1, T2
36-38	Shear strength and soil Exploration	Lab test for shear strength determination shear strength parameters	T1, T2

Lecture Nos.	Learning Objective	Topics to be covered	Book
39-40	Shear strength and soil Exploration	Uu, cu cd tests plate load test static and dynamic penetration test , soil exploration , various method of field exploration.	T1, T2

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Presentations/Assignments/	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	27-05-2024	1- 40	CB

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**Date: 08/01/2024**

**Ms.JYOTI PATEL  
Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
CS314	Operating System	3	0	3

**Instructor-in-charge: Dr.PALAK KESHWANI**

**Learning Outcomes:**

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

1. To understand the basic concepts and functions of operating systems
2. To understand process and Threads
3. To analyze Scheduling algorithms.
4. To understand the concept of Deadlocks
5. To analyze various memory management schemes
6. To understand I/O management and File systems.

Text Book T1)	Operating System Concepts, Silberschatz, A and Galvin, P.B 7 <sup>th</sup> edition, Addison, Wesley, 1998
Text Book T2	Operating Systems- A Concept bases approach, Dhamdhare D.M. 2 <sup>nd</sup> edition TMH 2006
Reference Book (R1)	Operating Systems, Stallings W, 4 <sup>th</sup> edition, PHI, 2001
Reference Book R2	The design of the Unix Operating System, Bach, M.J PHI, 1986
Reference Book R3	Moderen Operating System, Tanenbaum, A.S PHI 1996
NPTEL	<a href="https://nptel.ac.in/courses/106/105/106105214/">https://nptel.ac.in/courses/106/105/106105214/</a>

**Lecture wise Plan:**

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
1	To understand operating system, functions and its types	Overview	T1 CH-1
2		Operation System objectives and functions	T1 CH-1

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
3		The Evolution of operating Systems	T1 CH-1
4		Batch, interactive time sharing and real time systems	T1 CH-1
5		Operating System Structure, operating system service,	T1 CH-3
6	To understand the concept of process and its various states	Process overview (State, PCB)	T1 CH-4
7-8		Process Scheduling	T1 CH-4
9		Threads	T1 CH-5
10		Inter Process Communication(IPC)	T1 CH-5
11	To know what is scheduling and its importance	CPU cheduling Overview	T1 CH-6
12-13		Scheduling Algorithms	T1 CH-6
14	To understand the problem of Critical Section and its solution	Critical Section Problem	T1 CH-7
15		Multi Process Solution	T1 CH-7
16		Semaphores	T1 CH-7
17		Classical Problems of Synchronization	T1 CH-7
18-20	To know what is deadlock and its handling	Deadlock Handling	T1 CH-8
21	To understand various memory management schemes and their relative advantages and disadvantages	Memory Management Overview	T1 CH-9
22-23		Paging	T1 CH-9
24		Segmentation	T1 CH-9
25		Segmentation with Paging	T1 CH-9
26		Virtual Memory	T1 CH-10
27		Demand Paging	T1 CH-10
28		Page Replacement	T1 CH-10
29		Page Replacement Algorithms	T1 CH-10
30		Thrashing	T1 CH-10
31	To understand concept of	File Operations	T1 CH-11

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
32-33	files and brief introduction to distributive O.S	Directory and File system Structure	T1 CH-11
34-35		Allocation Methods,	T1 CH-12
36-38		Disk Scheduling	T1 CH-12
39-40		Types, features and uses of distributive O.S	T1 CH-12

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Presentations/Assignments/	Continuous	10	**	**	**
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Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
CS315	Database Management Systems	3	0	3

**Instructor-in-charge: Mr.NAVEEN KUMAR VAISHNAV**

**Scope and Objectives of the course:**

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

1. To understand basic concepts and implementation issues of Database system.
2. To learn ER modeling, Data models, Normalization and Functional dependencies, Relational Algebra, Implementation and Advanced Concepts.
3. To learn the hands-on database operation in SQL interface

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

**Lecture Wise Plan:**

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page No.sof Text/Ref. Books)
1-3	Introduction to Database Systems	Course overview, Overview of modernDBMS, Database Architecture	T1: 1.1-1.13
4-8	About Database	Data Independence, Data Dictionary, Typesof Keys	T1: 2.1-2.13
8-11	Data modeling	Basic elements of ER model, Attributes, Types of Relationship	T1: 7.1-7.10

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page No. of Text/Ref. Books)
12-16	Introduction to SQL constructs	DDL & DML Commands	T1: 3.1-3.9
17-19	Types of Operators and Functions	In, Between, Like, Aggregate Functions	T1: 5.1
20-25	Understanding additional SQL structures	Insert, Delete, Update, View Definition And Use, Temporary Tables, Nested Queries	T1: 4.1-4.5
26-29	Database design through Functional Dependencies & Normalization	Functional dependencies, Normal Forms: 1NF, 2NF, 3NF, BCNF, Multi-valued dependencies: 4NF, 5NF	T1: 8.1-8.9
30-32	Formal Query Languages	Relational algebra operators, Relational algebra queries	T1: 6.1-6.4
33-35	Integrity constraints	Integrity constraints: Not null, unique, check, primary key, foreign key, references, Triggers.	T1: 4.4-4.5
36-38	Database Connectivity	Configuration and setup	Hands-on & Guided by Instructor in Charge

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Presentations/Assignments/	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	27-05-2024	1- 41	CB

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**Instructor-in-charge**

**The ICFAI University, Raipur**  
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Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
CS325	Web Technology	3	0	3

**Instructor-in-charge: Ms.DIVYA SONI**

**Learning Outcome:**

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

1. Understand the basics involved in publishing content on the World Wide Web. This includes the ‘language of the Web’ – HTML, the fundamentals of how the Internet and the Web function, a basic understanding of graphic production with a specific stress on creating graphics for the Web.
2. Understand a general grounding introduction to more advanced topics such as programming and scripting.
3. Expose to the basic tools and applications used in Web publishing.

Textbook(s) T1	Deitel, Deitel, Goldberg, "Internet & World Wide Web How to Program", Third Edition, Pearson Education, 2006.
Reference Book(s) R1	Achyut Godbole, Atul Kahate "Web Technologies: TCP/IP, Web/Java Programming, and Cloud Computing", Third Edition, McGraw Hill Education.
Reference Book R2	Raj Kamal, "Internet and Web Technologies", Tata McGraw-Hill. 4.
NPTEL	<a href="https://nptel.ac.in/courses/106/105/106105084/">https://nptel.ac.in/courses/106/105/106105084/</a>
SWAYAM	<a href="https://onlinecourses.swayam2.ac.in/nou20_cs05/preview">https://onlinecourses.swayam2.ac.in/nou20_cs05/preview</a>

**Lecture-wise-plan:**

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
1-3	Internet Concept	Fundamental of Web, History of Web, Web development overview, Domain Name System (DNS),	T1: 1.5-1.6
4-6	Functionality of Internet	DHCP, and SMTP and other servers, Internet service provider (ISP), Client-Server Computing	T1: 1.8, 2.1

<b>Lecture Nos.</b>	<b>Learning Objective</b>	<b>Topics to be covered</b>	<b>Reference (chapter/sec./Page Nos of Text/Ref. Books)</b>
7-10	Protocols and Components of internet	Internet Protocol, TCP/IP Architecture, Web Browser and Web Server.	T1: 2.1, 2.7
11-14	HTML and DHTML:-	HTMLTag, Rules of HTML, Text Formatting and Style, List, Adding Graphics to Html Document,	T1: 4.1- 4.9
15-17	HTML Tables & Frames	Tables and Layout, Linking Documents, Frame, Forms, Project in HTML,	T1: 4.10 - 4.11
18-21	DHTML & CSS	Introduction to DHTML, CSS, Class and DIV, External Style Sheet.	T1: 5.1 - 5.8
22-25	Java Script	JavaScript(JS) in Webpage, Advantage of JavaScript, JS object model and hierarchy ,Handling event ,Operators and syntax of JS	T1: 6.1 – 6.5
26-27	JS Control statements	Switch, do while, break & continue	T1: 7.1 – 7.7
28-29	Java Script Functions	JS Function, Client side JS Vs Server side JS, Recursion	T1: 9.1 – 9.11
30-31	Document Object Model	Introduction, DOM Node & Tree, dynamic styles	T1: 12.1 – 12.6
32-34	Java Script Events	Event on load, Mouse load, More events	T1: 13.1 – 13.9
35-37	XML	Introduction to XML, XML Namespace, DTD	T1: 14.1 – 14.4
38-40	Ajax	Introduction, Traditional Web application vs Ajax, XML and DOM	T1: 15.1 – 15.6

### Web Designing Practical:

S.No	Name of the Experiment
1	HTML page to print Hello World.
2	Web page illustrating text formatting tags available in HTML. (i.e. <h1>, <b>, <u>, <i>).
3	Web page to illustrate three types of lists in HTML.
4	HTML page which displays 3 images at LEFT, RIGHT and CENTER respectively.
5	HTML Code for Table
6	CSS Colors Code
7	Student registration form using <form> tag
8	Web page using CSS Inline style.
9	Web page using CSS Internal style.
10	Web page using CSS External style.
11	Create CD Catalogue Table in XML and display it using XSL Style Sheet.
12	Write JavaScript program to perform the following function: A. To calculate Average of integer number (1 to n) B. To check whether given number is prime or not C. To calculate factorial of n D. To print current date & time

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**Date: 09/01/2024**

**Ms.DIVYA SONI  
Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
EC221	Microprocessor Programming and Interfacing	3	0	3

**Instructor-in-charge: Dr.K NAGAIAH**

**Scope & Objective of the course:**

The course aims at providing a framework to design a microprocessor based system. It shall deal with an introduction to Microprocessors, their architecture, assembly language programming and some interfacing concepts.

Textbook(s) T1	Advanced Microprocessors and peripherals Architecture, Programming and Interfacing, A K Ray, K M. Bhurchandi, IInd Edition, Tata McGraw Hill. 2nd Edition, 2006.
Reference book(s) R1	Microprocessors and Interfacing, Programming and Hardware, Douglas V Hall Tata McGraw Hill, 2003.
R2	Microcomputer systems: The 8086/8088 Family, Architecture, Programming and Design, Yu-cheng Liu, Glenn A. Gibson, PHI, 2nd Edition 2004.
R3	The 8086 Microprocessor: Programming and Interfacing the PC, Kenneth J.Ayala, Penram Publications, 2004.
R4	The 8085 Microprocessor: Programming and Interfacing by Gaonkar, 3rd Edition, Penram Publication, 1999.

**Lecture-wise-plan:**

Lecture Nos.	Learning Objective	Topics to be covered	Reference
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-state Devices, Buffers, Decoders, Encoders, MUX, DEMUX, Latches.	R1, R4

<b>Lecture Nos.</b>	<b>Learning Objective</b>	<b>Topics to be covered</b>	<b>Reference</b>
5-7	Description of 8086 Microprocessor Internal architecture	Registers & other parts in the 8086 EU & BIU	TB 1.1-1.9
8-11	Learning Assembly Language programming	Addressing Modes & instruction set, Data Transfer, Arithmetic instructions	TB 2.2, 2.3.1-2.3.2
12-13	Learning Assembly Language Programming	Logical Instructions	TB 2.3.3
14-16	Learning Assembly Language Programming	String Manipulation / Branch Instructions	TB 2.3.4-2.3.8
17	Learning Assembly Language Programming	Assembler Directives and Operators	TB 2.4
18-19	Learning to write & execute ALP	8086 Assembly Language programming	TB 3.1, 3.3-3.4
20-21	Learning to write subroutines	Stack Structure of 8086, Procedures	TB 4.1-4.2, R1Page(99-102)
22	Concepts of 8086 interrupt structure	Interrupts and interrupt service routines	TB 4.3-4.8
23-24	Description of MACROS & 8086 timing concepts	MACROS , Timings and Delays	TB 4.10-4.11
25-26	Learning to interface memory with 8086	Memory interfacing: semiconductor memory interfacing, Dynamic RAM interfacing	TB 5.1.1, 5.2
27	Learning to interface I/O with 8086	Interfacing I/O ports	TB:5.3
28-30	Description of programmable Input-output interface	8255 Programmable port, Modes of operations: Mode 0, Mode 1 & Mode 2	TB:5.4-5.5
31-32	Description of Programmable Timer	Programmable Interval Timer 8253: Architecture, Operating Modes	TB 6.1.1-6.1.3
33-34	Learning to Program and interface 8253	Programming and interfacing 8253	TB 6.1.4
35-36	Description of Serial Communication Interface	Programmable communication interface 8251; USART	TB 6.4
37	Description of DMA Interface	DMA controller 8257 : Architecture, Operations	TB 7.1

Lecture Nos.	Learning Objective	Topics to be covered	Reference
38-39	Learning DMA transfer techniques	DMA Transfers and operations	TB 7.2
40	Concepts of Multi processing	Introduction to Multi processor systems	TB 8.1-8.2

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**Date: 09/01/2024**

**Dr.K NAGAI AH**  
**Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

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

**Instructor-in-charge: Mrs.BHAVNA CHAUDHARY**

**Learning Outcomes:**

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

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(s) T1	Signal Processing & Linear Systems, Lathi B.P., Berkeley-Cambridge Press, 2000.
Text Book T2	Signals & Systems, Nagarath J, Sharan S.N., Rajan R., & Kumar S., TMH, 2001.
Reference Book R1	Signals & systems, Oppenheim A.V., Willsky A.S., Nawab S.N., PHI, 1998.
Reference Books R2	Signals & Systems, Haykins S., TMH, 1998.

**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

Lecture No.	Learning Objective	Topics to be covered	(Ch./Sec./Text Book)
8-9	On the representation of Signals in vector space	Analogy between vectors & signals, orthogonality, completeness, correlation	T1: 3.1-3.3
10-12	The Fourier analysis of periodic and non-periodic signals	Fourier Series representation, Dirichlet'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
25-26			T2: 3.1-3.2 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 Tests and Quizzes conducted during the course of semester followed by a comprehensive examination.

<b>Evaluation Component</b>	<b>Duration</b>	<b>Weightage</b>	<b>Date</b>	<b>Syllabus (Lec. No.)</b>	<b>Remarks</b>
Test 1	60 Minutes	16	13-02-2024	1-10	CB
Test 2	60 Minutes	17	12-03-2024	11- 24	OB
Test 3	60 Minutes	17	16-04-2024	25- 40	CB
Presentations/Assignments/	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	22-05-2024	1- 40	CB

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**Date: 09/01/2024**

**Mrs.BHAVNA CHAUDHARY**  
**Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
EC223	Digital Electronics and Computer Organization	3	0	3

**Instructor-in-charge: Mr.ROHIT KUMAR**

**Learning Outcomes:**

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

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

**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

<b>Lecture Nos.</b>	<b>Learning Objective</b>	<b>Topics to be covered</b>	<b>Reference (Ch./Sec./Page Nos.ofText Book)</b>
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
33-36	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
37-42	To Understand the concepts of Data Transfer Techniques	Data transfer techniques, Bus interface	T2:Ch11.2-11.4

**Evaluation Scheme:**

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

<b>Evaluation Component</b>	<b>Duration</b>	<b>Weightage</b>	<b>Date</b>	<b>Syllabus (Lec. No.)</b>	<b>Remarks</b>
Test 1	60 Minutes	16	14-02-2024	1-10	CB
Test 2	60 Minutes	17	13-03-2024	11- 24	OB
Test 3	60 Minutes	17	18-04-2024	25- 42	CB
Presentations/Assignments/	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	27-05-2024	1- 42	CB

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**Date: 10/01/2024**

**Mr.ROHIT KUMAR**  
**Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	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  
To give an insight to the analysis of single phase and three phase AC Circuits and to introduce the theory and Operational aspects of electrical machines

Textbook (s) T1	Basic Electrical Engineering, Nagrath I J and Kothari D.P, TMH, Second Edition, 2002
Reference Book (R1)	Electrical Engineering Principles and Application, Allan R.Hambley, PHI- 2002
Reference Book R2	Theory and Problem 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 phasor method	<b>T1</b> 4.1-4.3
3-4	Concept of complex power and power factor	Complex power and power factor improvement	<b>T1</b> 4.4
5-6	Concepts of three phase circuit analysis	Three phase circuits; Star and delta configuration	<b>T1</b> 6.1 - 6.5
7-8	- do-	Analysis of three phase circuits; Three phase power; Two watt meter method of power measurement	<b>T1</b> 6.6 - 6.8
9-10	Magnetic circuits and their analysis	Concept of Magnetic circuit, Analysis of magnetic circuits; Magnetization characteristic	<b>T1</b> 8.1 - 8.4
11	Concept of magnetic induction and force	Electro magnetic induction and force. Self & mutual inductances	<b>T1</b> 8.5-8.6

<b>Lecture No.</b>	<b>Learning Objective</b>	<b>Topics to be covered</b>	<b>(Ch./Sec./Text Book)</b>
12-13	Energy in magnetic circuits and various Losses	Energy stored in magnetic systems and losses	<b>T1</b> 8.7 - 8.9
14-15	Transformer basics	Transformer, principles, types: Ideal transformer	<b>T1</b> 9.1 - 9.3
16-17	Transformer modelling	Transformer circuit model and determination of its parameters using tests	<b>T1</b> 9.4- 9.5
18-19	Transformer Performance	Per unit system, voltage regulation, efficiency	<b>T1</b> 9.6 - 9.8
20	Various Types of transformers	Auto Transformers, 3 phase transformers and Special Transformers	<b>T1</b> 9.9 - 9.11
21- 22	Concepts of rotating machines	Rotating machines and Elementary Synchronous machine	<b>T1</b> 10.1 - 10.3
23-24	Concept of EMF and MMF	EMF and MMF in AC winding	<b>T1</b> 10.4 - 10.5
25	Concept of torque in electric machines	Rotating magnetic field and expression for torque	<b>T1</b> 10.6 - 10.7
26	Operation & constructional features of electric machines	Basic operation and torque production in Synchronous, Induction and DC machines	<b>T1</b> 10.8
27-28	- Do -	Losses & efficiency in electrical machines; cooling; matching of load characteristics	<b>T1</b> 10.9 - 10.11
29-30	Constructional features and circuit model of DC machines	DC machines :constructional features emf & torque Circuit model	<b>T1</b> 11.1 - 11.4
31	Concept of armature reaction and commutation	Armature reaction & commutation; Excitation and magnetization characteristics	<b>T1</b> 11.5 -11.7
32-33	Performance of DC motors	Characteristics and speed control of DC shunt, series and compound motors	<b>T1</b> 11.8
34	- Do-	Starting and Efficiency calculation of DC motors	<b>T1</b> 11.9 -11.10
35-36	Introduction to Synchronous machines	Synchronous machines, characteristics; Synchronous reactance & voltage regulation	<b>T1</b> 12.1 -12.2

Lecture No.	Learning Objective	Topics to be covered	(Ch./Sec./Text Book)
37-38	Introduction to Induction machines	Induction machines constructional features, circuit model	T1 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	T1 12.3

### Evaluation Scheme:

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Evaluation Component	Duration	Weightage	Date	Syllabus (Lec. No.)	Remarks
Test 1	60 Minutes	16	12-02-2024	1-10	CB
Test 2	60 Minutes	17	11-03-2024	11- 24	OB
Test 3	60 Minutes	17	15-04-2024	25- 40	CB
Presentations/Assignments/	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	16-05-2024	1- 40	CB

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**Date: 09/01/2024**

**Dr.K NAGIAH**  
**Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	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 T1	Sharma, SD Operations Research, Kedar Nath Ram Nath and Co (15 Edition), 2010
Reference Book R1	Taha H.A Operations Research An Introduction” Prentice Hall, (7 <sup>th</sup> Edition), 2002
Reference Book R2	Hiller, F.S Lieberman, G.J Nag, B.Basu, P. Introduction to Operations Research” McGraw Hill (10 <sup>th</sup> Edition), 2017
Reference Book R3	Operations Mangement, FED Unoi
Reference Book R4	Ravindran, a Philips, D.T and Solberg, J.J, Operation Research Principles and Practice John Willey and Sons, 2 <sup>nd</sup> Edition
Reference Book R5	Operation Mangaement, Lee J Krajweski and Larry P.Ritzman
Reference Book R6	Operation Management, Russel and Tyalor, 4 <sup>th</sup> Edition
Swayam Link	<a href="https://onlinecourses.swayam2.ac.in/cec20_ma10/preview">https://onlinecourses.swayam2.ac.in/cec20_ma10/preview</a>

**Lecture-wise-plan:**

<b>Lecture No.</b>	<b>Learning objectives</b>	<b>Topics to be covered</b>	<b>Refer to Chapter, See (Book)</b>
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, pg.158-203
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 $(2 \times n)$ Game	T1, Unit-4, ch-19, pg.20-61

Lecture No.	Learning objectives	Topics to be covered	Refer to Chapter, See (Book)
17		Graphical Method for Solving ( $m \times 2$ ) 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 ( $M M 1$ ):( $\infty$  FCFS)	T1, Unit-4, ch-23, pg.230-231
28		Model I. (General): ( $M M 1$ ): ( $\infty$  FCFS), and Model II. ( $M M 1$ ): ( $N$  FCFS)	T1, Unit-4, ch-23, pg.232-257
29		Model III - ( $M M s$ ): ( $\infty$  FCFS), and Model IV - ( $M Ek 1$ ): ( $\infty$  FCFS)	T1, Unit-4, ch-23, pg.258-268
30	Network Analysis	Networking Modeling	T1, Unit-4, ch-25, pg.316-322

Lecture No.	Learning objectives	Topics to be covered	Refer to Chapter, See (Book)
31		Critical Path Method (CPM)	T1, Unit-4, ch-25, pg.323-349
32		Program Evaluation & Retention Technique (PERT)	T1, Unit-4, ch-25, 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:

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Evaluation Component	Duration	Weightage	Date	Syllabus (Lec. No.)	Remarks
Test 1	60 Minutes	16	12-02-2024	1-10	CB
Test 2	60 Minutes	17	11-03-2024	11- 24	OB
Test 3	60 Minutes	17	15-04-2024	25- 40	CB
Presentations/Assignments/	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	18-05-2024	1- 40	CB

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**Date: 10/01/2024**

**Mr.HEMANT KUMAR DEWANGAN  
Instructor-in-charge**

# The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2023-2024

Course Handouts

Course Code	Course Title	L	P	U
MG201	Principal of Management	3	0	3

**Instructor-in-charge: Ms.SONAKSHI KHANDELWAL**

### 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.

<b>Text books</b> <b>T1</b>	Principles of Economics, Case E. Karl & Fair C., Pearson Education, 6th Edition, 2002.
<b>Reference books</b> <b>R1</b>	Economics, Samuelson & Nordhus, TMH, 16th Edition, 1998.
<b>R2</b>	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 Behaviour	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

Lecture Nos	Learning Objective	Topics to be covered	Reference
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 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	14-02-2024	1-10	CB
Test 2	60 Minutes	17	11-03-2024	11- 24	OB
Test 3	60 Minutes	17	15-04-2024	25- 41	CB
Presentations/Assignments/	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	16-05-2024	1- 41	CB

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**General:** It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc. The student is required to refer the books and journals in the library and attend all presentation sessions and submit assignments to enhance the subject knowledge

**Date: 10/01/2024**

**Ms.SONAKSHI KHANDELWAL  
Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
CE321	Hydraulic and Hydraulic Machines	3	0	3

**Instructor-in-charge: Mr. HEMANT KUMAR DEWANGAN**

**Learning Outcomes:**

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

1. Understand fundamental principles of fluid mechanics, encompassing fluid properties, statics, dynamics, and behavior under varied condition.
2. Attain proficiency in designing, operating, and maintaining hydraulic systems, encompassing circuits, components, and calculation of parameters like pressure and flow rate.
3. Acquire knowledge of hydraulic machines pumps, motors, actuators including their operational principles, performance, and applications across industries
4. Apply fluid power theory to engineering challenges, designing systems, troubleshooting, and optimizing hydraulic machinery through mathematic
5. Develop safety and environmental consciousness in hydraulic operations, identifying hazards, implementing safety measures, and safeguarding against accidents and environmental harm.

Textbook (s) T1	Hydraulics and Fluid Mechanics Including Hydraulic Machines” by Dr.P.N Modi and Dr. S.M Seth
Reference Book(s) R1	Hydraulic and Fluid Mechanics, Including Hydraulics Machines” ny R.K Bansal
Reference Book R2	Introduction to fluid Mechanics and Fluid Machines” by S.K. Som and Gautam Biswwas
Reference Book R3	Fluid Mechanics and Hydraulic Machines: Problems and Solutions” by K.Subramanya
Reference Book R4	Hydraulic Machines: Turbines and Pumps” by Jagdish Lal:
NPTTEL	<a href="https://nptel.ac.in/courses">https://nptel.ac.in/courses</a>

**Lecture-wise-plan:**

Lecture No.	Learning Objectives	Topics to be Covered	References (T1)
1	The basics of hydraulics and	- Introduction to hydraulics, Advantages and limitations of hydraulics, Applications of	Chapter 1: "Introduction to Hydraulics"

<b>Lecture No.</b>	<b>Learning Objectives</b>	<b>Topics to be Covered</b>	<b>References (T1)</b>
	hydraulic machines	hydraulics, Basic principles of hydraulic systems	
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"

<b>Lecture No.</b>	<b>Learning Objectives</b>	<b>Topics to be Covered</b>	<b>References (T1)</b>
14	Hydraulic system maintenance and troubleshooting	- Preventive maintenance of hydraulic systems, Troubleshooting and diagnostics, Repair and maintenance techniques	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, Performance characteristics, Selection and sizing of hydraulic turbines	Chapter 16: "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	- Importance of filtration in hydraulic systems, Types of hydraulic filters, Filtration	Chapter 23: "Hydraulic System Filtration and Contamination Control"

<b>Lecture No.</b>	<b>Learning Objectives</b>	<b>Topics to be Covered</b>	<b>References (T1)</b>
	contamination control	efficiency and performance, Contamination control techniques	
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"

<b>Lecture No.</b>	<b>Learning Objectives</b>	<b>Topics to be Covered</b>	<b>References (T1)</b>
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"

Lecture No.	Learning Objectives	Topics to be Covered	References (T1)
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	Determine 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 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 velocity distribution in a pipe using an electromagnetic flow meter
Experiment 9	Investigation of hydraulic jump in open channel flow and determination of energy characteristics
Experiment 10	Analysis of water hammer phenomenon in pipelines and determination of surge pressures and velocity

### Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec. No.)	Remarks
Test 1	60 Minutes	16	12-02-2024	1-10	CB
Test 2	60 Minutes	17	11-03-2024	11- 24	OB
Test 3	60 Minutes	17	15-04-2024	25- 40	CB
Presentations/Assignments/	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	18-05-2024	1- 40	CB

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

**Make-up Policy:** Make –up will be given only under genuine circumstances for Tests Only  
However prior and proper intimation to the competent authority is required.

**General:** It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc. The student is required to refer the books and journals in the library and attend all presentation sessions and submit assignments to enhance the subject knowledge

**Date: 09/01/2024**

**Mr.HEMANT KUMAR DEWANGAN**  
**Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
CE322	Design of Steel Structure-II	3	0	3

**Instructor-in-charge: Ms.JYOTI PATEL**

**Learning Outcomes:**

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

1. To educate the student about the behavior of plate girders.
2. To understand the behavior of members subjected to combined forces.
3. To understand the behavior of column bases and gantry girders.
4. To understand the behavior of eccentric and moment connections.

Text Book(s) T1	Design of steel structure – N. Subramanian
Text Book T2	Limit state of Design of steel structure – S.K. Duggal
Reference Book (s) R1	Design of steel structure – K. S. Sai Ram
Reference Books R2	Limit state of Design of steel structure – V. L. Shah

**Lecture-wise-plan:**

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./Pg No)
1	Plate girders with solid webs	Components of a plate girder, typical section.	T1
2-3	Plate girders with solid webs	Proportioning of the section, design bending strength.	T1
4-5	Plate girders with solid webs	Design shear strength, stiffened web panels	T1
6	Plate girders with solid webs	Minimum web thickness, bearing stiffeners, load carrying stiffeners	T1
7-8	Plate girders with solid webs	numerical	T1

<b>Lecture Nos.</b>	<b>Learning Objective</b>	<b>Topics to be covered</b>	<b>Reference (Ch./Sec./Pg No)</b>
9-10	Members subjected to combined forces	Combined shear & bending	T2
11	Members subjected to combined forces	Combined axial forces & bending moment	T2
12-13	Members subjected to combined forces	Section strength, overall member combinations.	T2
14-16	Members subjected to combined forces	Design of members subjected to combined forces	T2
17-18	Column bases and gantry girders	Types of column bases	T1
19	Column bases and gantry girders	Slab bases, gusset base	T1
20-21	Column bases and gantry girders	Moment resisting base plates.	T1
22-23	Column bases and gantry girders	Loads and load combinations	T1
24	Column bases and gantry girders	Typical sections, design of gantry girders	T1
25-26	Eccentric and moment connections	Analysis of bolt / weld groups.	T1
27-28	Eccentric and moment connections	Connection configuration , beams to column connections	T1
30-32	Eccentric and moment connections	Beam to beam connections, web splice and its connections.	T1
33-34	Roof trusses	Types of roof trusses	T1
35-38	Roof trusses	Dead , imposed and wind load, load combination	T1
39-40	Roof trusses	Design of purlins, analysis & design of roof trusses	T1

**Evaluation Scheme:**

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

<b>Evaluation Component</b>	<b>Duration</b>	<b>Weightage</b>	<b>Date</b>	<b>Syllabus (Lec. No.)</b>	<b>Remarks</b>
Test 1	60 Minutes	16	13-02-2024	1-10	CB
Test 2	60 Minutes	17	12-03-2024	11- 24	OB
Test 3	60 Minutes	17	13-04-2024	25- 40	CB
Presentations/Assignments/	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	20-05-2024	1- 40	CB

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**Date: 09/01/2024**

**Ms.JYOTI PATEL  
Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
CE323	Water Supply and Waste Water Management	3	0	3

**Instructor-in-charge: Mr.DILIP MISHRA**

**Scope & Objective of the course:**

1. Comprehensive understanding of water supply and wastewater engineering principles.
2. Study of water treatment processes and technologies.
3. Analysis of design, operation, and maintenance of water and wastewater infrastructure.
4. Equip students with fundamental knowledge of water supply systems and wastewater management.

Text Book(s) T1	Garg, S.K. Environmental Engineering, Vol.I Khanna Publishers, New Delhi, 2010
Text Book (s)T2	Modi, P.N., Water Supply Engineering, Vol.I Standard BookHouse, New Delhi, 2016.
Reference Book(s) R1	Punmia B.C, Ashok Jain and Arun Jain, Water Supply Engineering, Laxmi Publications (P) Ltd., New Delhi 2010
Reference Book R2	Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.

**Lecture-wise-plan:**

Lecture Nos.	Learning Objective	Topics to be covered	Reference/ Text Book
1	Introduction of water resources	Estimation of surface water resources, Estimation of subsurface water resources	T1
2-3	Water Quality	Predicting demand for water, Impurities of water and their significance	T1
4-5	Different Analysis of Water	Physical analysis of water, Chemical analysis of water, Bacteriological analysis of water	T1
6	Minimum Standards for water quality	Waterborne diseases, Standards for potable water	T1

<b>Lecture Nos.</b>	<b>Learning Objective</b>	<b>Topics to be covered</b>	<b>Reference/ Text Book</b>
7-8	Schemes for intake of water	Intake of water: Pumping schemes, Intake of water: Gravity schemes	T1
9-10	Operations & Processes of water treatment	Unit operations in water treatment, Processes in water treatment	T2
11	Principles and functions	Principles of water treatment plant units, Functions of water treatment plant units	T2
12-13	Design of treatment plants	Design of water treatment plant units,	T2
14-16	Use of Aerators	Aerators in water treatment, Flash mixers in water treatment,	T2
17-18	Coagulation in plant	Coagulation in water treatment, Flocculation in water treatment,	T1
19		Clariflocculator in water treatment	T1
20-21	Plate settlers	Plate settlers in water treatment, Tube settlers in water treatment	T1
22-23	Sand filters	Pulsator clarifier in water treatment, Sand filters in water treatment,	T1
24	Desalination of Water	Disinfection of water, Softening of water, Removal of iron and manganese	T1
25		Defluoridation of water, Desalination process, Residue management in water treatment,	T2
26-28	Construction aspect of water treatment devices	Construction aspects of water treatment, Operation aspects of water treatment,	T2
29-32	Maintenance and storage Aspects	Maintenance aspects of water treatment	T2
33-35		Storage reservoirs: types and capacity, Balancing reservoirs: location and capacity,	T1
36-38	Distribution Systems	Distribution system layout, Hydraulics of pipelines,	T1
39-40		Pipe fittings in distribution systems, Valves in distribution systems	T1

**Evaluation Scheme:**

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

<b>Evaluation Component</b>	<b>Duration</b>	<b>Weightage</b>	<b>Date</b>	<b>Syllabus (Lec. No.)</b>	<b>Remarks</b>
Test 1	60 Minutes	16	13-02-2024	1-10	CB
Test 2	60 Minutes	17	12-03-2024	11- 24	OB
Test 3	60 Minutes	17	16-04-2024	25- 40	CB
Presentations/Assignments/	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	22-05-2024	1- 40	CB

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**Date: 09/01/2024**

**Mr.DILIP MISHRA  
Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
CE324	Highways and Transportation Engineering	3	0	3

**Instructor-in-charge: Ms.JYOTI PATEL**

**Course Outcome:**

Scope and Objective of the course: Be familiar with principles of highway planning and Geometric Design  
Fundamental concepts of Traffic Engineering  
Learning Different Highway materials and their testing.

Textbook(s)T1	Principle and practices of Highway Engineering - Kadiyali
T2	Highway Engineering – S. K. Khanna
Reference Book(s) R1	Highway Engineering – S. C. Rangawala
Reference Book R2	Air-port planning and design – Khanna and Arora

**Lecture-wise-plan:-**

Lecture Nos.	Learning Objective	Topics to be covered	Book
1	Principle of highway planning	Road development and planning and india, highway alignment , requirements	T1. T2, R1
2-3	Principle of highway planning	Engineering survey for highway location maps and drawing,	T1. T2, R1
4-5	Principle of highway planning	Elements of transportation engineering	T1. T2, R1
6	Principle of highway planning	Geometric Design, cross section elements of horizontal and vertical alignment.	T1. T2, R1
7-8	Principle of highway planning	Highway drainage , surface and subsoil drainage	T1. T2, R1

<b>Lecture Nos.</b>	<b>Learning Objective</b>	<b>Topics to be covered</b>	<b>Book</b>
9-10	Traffic Engineering	Introduction to traffic flow theory speed density , speed flow and flow density relation	T1, T2, R1
11	Traffic Engineering	Data collection techniques for traffic parameters and delay studies, parking facilities etc.	T1, T2, R1
12-13	Traffic Engineering	Traffic control devices, prevention of road accidents, rotary intersection, highway lightning	T1, T2, R1
14-16	Traffic Engineering	Highway materials, behavior of highway materials, properties of sub grade and pavement component materials, test on materials	T1, T2, R1
17-18	Pavement Design	Study of rigid and flexible pavement,	T1. T2, R1
19 -21	Pavement Design	Basic concepts of pavement analysis and design,	T1. T2, R1
22-24	Pavement Design	Stress in rigid pavements , I. R. C. recommendations.	T1. T2, R1
25-26	Pavement Construction Technique and Quality control	Types of pavements water bond macadam	T1. T2, R1
27-28	Pavement Construction Technique and Quality control	Bituminous and cement concrete pavements, pavement failure	T1. T2, R1
29-30	Pavement Construction Technique and Quality control	Joints in cement concrete pavements, modern materials in pavement	T1. T2, R1
31-32	Airport Planning	Definition of terms related to airport engineering , factor affecting site selection	T1, R2
33-35	Airport Planning	Obstruction , various survey for site selection, zoning laws, classification of obstruction,	T1, R2
36-38	Airport Planning	Runway orientation Basic runway length and its correction,	T1, R2
39-40	Airport Planning	Geometric design , runway configuration taxiway layout geometric	T1, R2

**Evaluation Scheme:**

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

<b>Evaluation Component</b>	<b>Duration</b>	<b>Weightage</b>	<b>Date</b>	<b>Syllabus (Lec. No.)</b>	<b>Remarks</b>
Test 1	60 Minutes	16	12-02-2024	1-10	CB
Test 2	60 Minutes	17	11-03-2024	11- 24	OB
Test 3	60 Minutes	17	15-04-2024	25- 40	CB
Presentations/Assignments/	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	16-05-2024	1- 40	CB

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

**Date: 09/01/2024**

**Ms.JYOTI PATEL  
Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
CS324	NET and C Programming	3	0	3

**Instructor-in-charge: Dr.RAMESH KUMAR YADAV**

**Learning Outcomes:**

1. The learning objectives of this course are to:
2. Gain a thorough understanding of the philosophy and architecture of Web applications using C#.NET
3. Acquire a working knowledge of Web application development using Web Forms and Visual Studio 2019
4. Optimize an C#.NET Web application using configuration, security, and caching
5. Access databases using ADO.NET and LINQ
6. More recent C# .NET features
7. Implement rich client applications using C#.NET AJAX
8. Customize Web applications through the use of HTTP handlers and modules

Text Book T1	C# 6.0 and the .NET 4.6 Framework by Andrew Troelsen and Philip Japikse
Text Book T2	Programming Entity Framework by Julia Lerman
Reference Book(s) R1	Pro ASP.Net MVC 5 (Expert's Voice in ASP.Net)by Adam Freeman

**Lecture-wise-plan:**

Lecture No	Learning Objective	Topics to be covered	Reference (Chapter/sec.page Nod of Text/Ref)
1-5	To understand the basics of .NET	Introduction to .NET NET Executables and the CLR A .NET Testbed for C# Programming Visual Studis	T1 Ch-11.4,1.5, T2,Ch1.6,1.9
6-10	To learn the concepts of webform architecture	Web Forms Architecture Page Class Web Forms Life Cycle Web Forms Event Model	T2 Ch-2 2.1,2.4,2.7,2.9

Lecture No	Learning Objective	Topics to be covered	Reference (Chapter/sec.page Nod of Text/Ref)
16-20	C# Overview for the Sophisticated Programmer	C# .NET First C# Console Application Namespaces Data Types Conversions Control Structures Subroutines and Functions Parameter Passing Strings Arrays Console I/	T1 Ch-33.1,3.7 T2 Ch3 5.6,3.8
21-23	Object-Oriented Programming in C#	C# .NET Classes Access Control Methods and Properties Asymmetric Accessor Accessibility Static Data and Methods Inheritance Overriding Methods Abstract Classes	T1 Ch-44.7, 4.4 T2 Ch4 4.8,4.10
24-25	C# and the .NET Framework	Components Interfaces System. Object .NET and COM Collections I Enumerable and I Enumerator	T1 Ch-55.5,5.9
26-30	Introduction to Windows Forms	Creating Windows Applications Using Visual Studio Partial Classes Buttons, Labels and Textboxes Handling Events List box Controls	T2 Ch-55.3,5.7
31-40	Using Visual Studio	Overview of Visual Studio	
		Creating a Console Application	T1 Ch-5,Ch6
		Project Configurations	5.7, 6.4,7.2
		Debugging	T2 Ch6 6.9,7.4,7.9

**Evaluation Scheme:**

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

<b>Evaluation Component</b>	<b>Duration</b>	<b>Weightage</b>	<b>Date</b>	<b>Syllabus (Lec. No.)</b>	<b>Remarks</b>
Test 1	60 Minutes	16	14-02-2024	1-10	CB
Test 2	60 Minutes	17	13-03-2024	11- 24	OB
Test 3	60 Minutes	17	18-04-2024	25- 40	CB
Presentations/Assignments/	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	27-05-2024	1- 40	CB

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**Make-up Policy:** Make –up will be given only under genuine circumstances for Tests Only However prior and proper intimation to the competent authority is required.

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

**Date: 08/01/2024**

**Dr.RAMESH KUMAR YADAV**  
**Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
CS325	Software Engineering	3	0	3

**Instructor-in-charge: Ms.SNEHAL YADAV**

**Scope and Objective of the Course:**

1. Student will learn to apply fundamental software engineering concepts, design, analysis and testing methodologies while incorporating the software engineering quality metrics to produce high quality correct software in a scheduled amount of time
2. Students will learn object-oriented methodologies for proving programs are correct and methods of testing programs to demonstrate correctness.
3. Students will learn to use the Unified Modeling Language (UML) programming to achieve course goals.

**Lecture-wise-plan:**

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./ Page Nos.ofText Book)
1-2	Key concepts, software characteristics	Introduction	Chapter 1 (T1)
3-4	Generic framework activities, agility	Generic View of Process	Chapter 2 (T1)
5-7	Perspective models, RAD, spiral model	Process models	Chapter 3 (T1)
8-9	Philosophy & a set of guidelines	An agile view of process	Chapter 4 (T1)
10-12	Practice encompasses the technical activities	Software Engineering Practice	Chapter 5 (T1)
13-15	It provides with a solid approach for addressing requirements challenges	Requirements Engineering	Chapter 7 (T1)
16-18	Diagrammatic forms, provides view of one or more model elements	Analysis Modeling	Chapter 8 (T1 & R1)

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./ Page Nos.ofText Book)
19-21	Design is the place where software quality is established	Design Engineering	Chapter 9 (T1 & R1)
22-25	The preliminary blue print from which software is constructed	Architectural Engineering	Chapter 10(T1 & R1)
26-28	Design guide lines for avoiding errors as procedural design evolves	Component level Design	Chapter 11(T1 & R1)
29-31	User scenarios will be created and screen layouts will be developed	User Interface Design	Chapter 12(T1 & R1)
32-34	Different strategies for testing software.	Testing Strategies	Chapter 13 (T1)
35-37	Software Maintenance	Characteristics of Software management, types of maintenance, Software reverse Engineering	
38-40	Estimation	Estimation of Maintenance Cost. Emerging trends and various tools.	

### Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec. No.)	Remarks
Test 1	60 Minutes	16	12-02-2024	1-10	CB
Test 2	60 Minutes	17	11-03-2024	11- 24	OB
Test 3	60 Minutes	17	15-04-2024	25- 40	CB
Presentations/Assignments/	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	16-05-2024	1- 40	CB

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

**Make-up Policy:** Make –up will be given only under genuine circumstances for Tests Only  
However prior and proper intimation to the competent authority is required.

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

**Date: 07/01/2024**

**Mrs.SNEHAL YADAV**  
**Instructor-in-charge**

# The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2023-2024

Course Handouts

Course Code	Course Title	L	P	U
CS326	Data Science Using Python	3	0	3

**Instructor-in-charge: Dr.RAVI KIRAN PATNAIK**

### 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. Apply various Python data structures to effectively manage various types of data.
2. Developing the application of concepts to problems of practical interest using Python.
3. Design applications applying various operations for data cleansing and transformation
4. Describe the various areas where data science is applied

Text Book (s) T1	<ol style="list-style-type: none"><li>1. Introducing Data Science, Davy Cielen, Arno D. B. Meysman, Mohamed Ali, Manning Publications Co., 1st edition, 2016</li><li>2. Programming through Python, M. T. Savaliya, R. K. Maurya, G. M. Magar, STAREDU Solutions</li></ol>
Reference Book (s) R1	<ol style="list-style-type: none"><li>1. Introduction to linear algebra - by Gilbert Strang</li><li>2. Applied statistics and probability for engineers – by Douglas Montgomery</li><li>3. Mastering python for data science, Samir Madhavan</li><li>4. Pandas for everyone: Python Data Analysis, Daniel Y. Chen, Pearson</li><li>5. Introducing Data Science: Big Data, Machine Learning, and More, Using Python Tools, Davy Cielen, Arno D.B. Meysman, et al., Manning</li><li>6. Applied Data Science with Python and Jupyter: Use powerful industry-standard tools to unlock new, actionable insights from your data</li></ol>

**Lecture-wise-plan:**

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text Book)
1-10	Learn about the Basics Data Science and related information	Introduction of data science What is data, What is data science, Fundamentals of data science, Data science life cycle, Why data science is important, Applications of data science, Why Python is necessary for data science Data: quantitative and qualitative, attributes variables	T1
11-20		Getting started with Python Jupyter/pycharm/spyder or any other python tool set up and installation. Basics of Python including data types, operators, variables, expressions, control structures using sample dataset, objects and functions. Python sequence data structures including String, Array, List, Tuple, Set, and Dictionary. Introduction to various python libraries for data science	T2
21-30	Understanding the use of basic statistical techniques for preprocessing of a dataset.	Basic data Processing Introduction to Data Frames in Pandas, Learning to access elements with indexes, Re-indexing in pandas Series and Data frames, Data preparation .Numerical Computing with NumPy, Going from Python list to Numpy arrays, working with multi-dimensional array, array operations. Several scientific numerical routines through SciPy	T1
31-35		Statistics for data science, machine learning, Median, Mean, Mode, Percentile Math	T1

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text Book)
36-42		Exploratory data analysis and Data preprocessing (data loading, dealing with missing values and outliers, data wrangling, filtering data, Data Normalization , Data Formatting ,data cleaning), Web scraping with beautiful soup.	T2
		Data Visualization Basic visualizations with Matplotlib, Advanced visualizations with Seaborn, Plotting images, graphs and grids of charts	

### 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	13-02-2024	1-10	CB
Test 2	60 Minutes	17	12-03-2024	11- 24	OB
Test 3	60 Minutes	17	16-04-2024	25- 42	CB
Presentations/Assignments/	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	20-05-2024	1- 42	CB

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

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

**Date: 08/01/2024**

**Dr.RAVI KIRAN PATNAIK**  
**Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
CS327	Theory of Computation	3	0	3

**Instructor-in-charge: Dr.PALAK KESHWANI**

**Learning Outcomes:**

**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 and conduct mathematical proofs for computation and algorithms.

Text Book T1	Introduction to Automata Theory Languages, and Computation, by J.E.Hopcroft, R.Motwani & J.D.Ullman (3rd Edition) – Pearson Education
Text Book T2	Theory of Computer Science (Automata Language & Computations), by K.L.Mishra& N. Chandrashekhar, PHI
Reference Book(s) R1	Sipser, M. (2006). <i>Introduction to the Theory of Computation</i> (2 <sup>nd</sup> ed.). Boston, MA: Thompson Course Technology.

**Lecture-wise-plan:**

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
1-5	To understand the basics of Automata	Introduction to Automata(Introduction and motivation, infinite sets, proofs, Closures, Alphabets, languages, and representations)	T 1 Ch-1 1.4,1.5,1.6,1.9
6-10	To learn the concept of FiniteAutomata	Finite Automata (Deterministic finite automata, Non-deterministic finiteautomata, Closure properties and equivalences, Regularity)	T2 Ch-2 2.1,2.2,2.3,2.9

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
11-15	To learn the concepts of Regular-Expression & DFA	Regular Expressions and Languages,	T1 Ch-3 3.2,3.4 T2 Ch3 3.6,3.8
16-20	To learn the concepts of Regular-Languages	Properties of Regular Languages	T1 Ch-4, 4.5, 4.6 T2 Ch4, 4.8,4.10
21-25	To understand concept of CFG	Context-Free Grammars and Languages	T1 Ch-5 5.7,5.8
26-30	To understand concept of CFG	Applications of Context-Free Grammars	T2 Ch-5 5.4,5.8
31-40	To learn the concepts of PDA and its uses, NP concept	Pushdown Automata Languages of PDA Deterministic Pushdown Automata Properties of Context-Free Languages The complexity class P, The complexity class NP	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 (Lec. No.)	Remarks
Test 1	60 Minutes	16	13-02-2024	1-10	CB
Test 2	60 Minutes	17	12-03-2024	11- 24	OB
Test 3	60 Minutes	17	16-04-2024	25- 40	CB
Presentations/Assignments/	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	22-05-2024	1- 40	CB

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

**Make-up Policy:** Make –up will be given only under genuine circumstances for Tests Only However prior and proper intimation to the competent authority is required.

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

**Date: 08/01/2024**

**Dr.PALAK KESHWANI  
Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
CS415	Artificial Intelligence	3	0	3

**Instructor-in-charge: Dr.BHARATI PATEL**

**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

Text Book(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 No.s	Learning Objective	Topics to be covered	Reference (Ch/Sec./Page No.of Text Book)
1-3	Overview and Search Techniques	Introduction to AI, Problem Solving, State Space search	15-32
4-5	Overview and Search Techniques	Blind Search: Depth first search, Breadth First Search,	48-60
6	Overview and Search Techniques	Informed Search: Heuristic function, Hill Climbing search.	71-77
7-9	Overview and Search	Best first search, A* and AO* Search	81-87
10	Overview and Search	Best First Search	88-95
11-12	Overview and Search Techniques	Constraint Satisfaction, Game tree	135-148
13-15	How to do Knowledge Representation	Introduction to KR, Knowledge agent, Predicate logic	155-159

<b>Lecture No.s</b>	<b>Learning Objective</b>	<b>Topics to be covered</b>	<b>Reference (Ch./Sec./Page No.of Text Book)</b>
16-17	How to do Knowledge Representation	WFF, Inference rule and 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 representation	360-371
27	How to do Handling uncertainty and Learning	Source of Uncertainty, Probabilistic inference	373-375
28-29	How to Handling uncertainty and Learning	Bayes theorem Limitation of native Bayesian system, Bayesian Belief Network (BBN)	380-386
30	How to Handling uncertainty and Learning	Inference with BBN, Dempster-shafer Theory	389-405
31-32	How to handling uncertainty and Learning	Leaning Concept of Learning, Learning model, learning decision tree, paradigms of machine learning	410-413
33-34	How to handling Uncertainty and Learning	Fuzzy Logic, Fuzzy function Fuzzy measure, Non monotonic reasoning	420-434
35-36	How to Handling Uncertainty and Learning	Learning: Concept of Learning, Learning Model, Learning decision tree, Paradigms of machine Learning	435-447
37-40	How to Handling uncertainty and Learning	Supervised and 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.

<b>Evaluation Component</b>	<b>Duration</b>	<b>Weightage</b>	<b>Date</b>	<b>Syllabus (Lec. No.)</b>	<b>Remarks</b>
Test 1	60 Minutes	16	12-02-2024	1-10	CB
Test 2	60 Minutes	17	11-03-2024	11- 24	OB
Test 3	60 Minutes	17	15-04-2024	25- 40	CB
Presentations/Assignments/	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	18-05-2024	1- 40	CB

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**Date: 08/01/2024**

**Dr.BHARATI PATEL**  
**Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
EC321	Digital Communication	3	2	4

**Instructor-in-charge: Dr.K NAGAIAH**

**Learning Outcomes:**

After successful completion of the course student will be able to

1. Analyze digital and analog signals with respect to various parameters like bandwidth, noise etc.
2. Demonstrate generation and reconstruction of different Pulse Code Modulation schemes like PCM, DPCM etc.
3. Acquire the knowledge of different pass band digital modulation techniques like ASK, PSK etc.
4. Calculate different parameters like power spectrum density, probability of error etc of Base Band signal for optimum transmission.
5. Analyze the concepts of Information theory, Huffman coding etc to increase average information per bit.
6. Generate and retrieve data using block codes and analyze their error detection and correction capabilities.

Text Book(s) T1	Digital communications- Simon Haykin, John Wiley, 2005
Text Book T2	Digital and analog communication systems- Sam Shanmugam, John Wiley, 2005
Reference Book R1	Principles Of Communication Systems- Herberet Taub, Donald L Schilling, Goutham saha, 3rd edition, Mc Graw Hill 2008
Reference Book R2	Digital Communications 3rd Ed - I. A. Glover, P. M. Grant, 2nd Edition, Pearson Edu., 2008
Reference Book R3	Communication Systems ---- B.P.Lathi, BS Publications, 2006
Reference Book R4	Digital Communication – Theory, Techniques, and Applications – R.N.Mutagi, 2nd Edition, 2013

**Lecture-wise-plan:**

<b>Lecture No.</b>	<b>Learning Objective</b>	<b>Topics to be covered</b>	<b>(Ch./Sec./Text Book)</b>
1	Elements of digital communication systems	Analyze the elements of digital communication system, the importance and Applications of Digital Communication	T1- Back ground and preview page 1-24
2	Concepts of digital communication systems	Differentiate analog and digital systems, the advantages of digital communication systems over analog systems. The importance and the need of sampling theorem in digital communication systems.	Back ground and preview page 1-24
3	Concepts of digital communication systems	Conversion of analog signal to digital signal and the issues occur in digital transmission techniques like Bandwidth- S/N trade off.	Back ground and preview page 1-24
4-5	Concepts of digital communication systems	Compute the power and bandwidth requirements of modern communication systems. Analyse the importance of Hartley Shannon law in calculating the BER and the channel capacity.	Back ground and preview page 1-24
6-8	Pulse Code Modulation	Explain the generation and reconstruction of PCM. To Analyze the effect of Quantization noise in Digital Communication. Analyse the different digital communication schemes like Differential PCM systems (DPCM), Delta modulation, and adaptive delta modulation.	T1 chapter-3
9-10	Pulse Code Modulation	Compare the digital communication schemes like Differential PCM systems (DPCM), Delta modulation, and adaptive delta modulation. Illustrate the effect of Noise in PCM and DM systems	T1 chapter-3

Lecture No.	Learning Objective	Topics to be covered	(Ch./Sec./Text Book)
11-14	Digital Modulation Techniques	Describe and differentiate the different shift keying formats used in digital communication. Compute the power and bandwidth requirements of modern communication systems modulation formats like those employing ASK, PSK, FSK, and QAM. Explain the different modulators like ASK Modulator, Coherent ASK detector, non-Coherent ASK detector, Band width frequency spectrum of FSK, Non-Coherent FSK detector, Coherent FSK detector Analyze the need and use of PLL in FSK Detection	T1 chapter-6
15-16	Digital Modulation Techniques	Differentiate the different keying schemes -BPSK, Coherent PSK detection, QPSK & Differential PSK	T1 chapter-6
17	Base Band Transmission and Optimal reception of Digital Signal	Identify the need of pulse shaping for optimum transmission and get the knowledge of Base band signal receiver model.	T1 chapter-4
18	Base Band Transmission and Optimal reception of Digital Signal	Analyze different pulses and their power spectrum densities	T1 chapter-4
19-20	Base Band Transmission and Optimal reception of Digital Signal	Calculation of Probability of error, optimum receiver, Optimum of coherent reception and understand the Signal space representation and calculate the probability of error.	T1 chapter-4
21-22	Base Band Transmission and Optimal reception of Digital Signal	Explain the Eye diagram and its importance in calculating error. Describe cross talk and its effect in the degradation of signal quality in digital communication.	T1 chapter-4

<b>Lecture No.</b>	<b>Learning Objective</b>	<b>Topics to be covered</b>	<b>(Ch./Sec./Text Book)</b>
23-25	Source coding methods	Compute problems on Source coding methods like - Huffman code, variable length codes used in digital communication. Explain Source coding and drawbacks of Lossy source Coding and how to increase the average information per bit.	T1 chapter-9
26-28	Linear Block Codes	Illustrate the different types of codes used in digital communication and the Matrix description of linear block codes. Analyze and find errors, solve the numerical in Error detection and error correction of linear block codes Explain cyclic codes, the difference between linear block codes and cyclic codes.	T1 chapter-10
29-32	Linear Block Codes	Compute problems based on the representation of cyclic codes and encoding and decoding of cyclic codes. Solve problems to find the location of error in the codes i.e., syndrome calculation.	T1 chapter-10
33	Convolution Codes	Identify the difference between the different codes digital communication	T1 chapter-10
34-35	Convolution Codes	Describe Encoding & decoding of Convolutional Codes Solve problems on error detection & correction using state Tree and trellis diagrams.	T1 chapter-10
36-37	Convolution Codes	Solve problems based on Viterbi algorithm.	T1 chapter-10
38-40	Convolution Codes	Compute numerical on error calculations and compare the error rates in coded and uncoded transmission	T1 chapter-10

### 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 Modulation and Demodulation (ASK,FSK,PSK)
7	Binary Phase Keying (BPSK) Modulation and Demodulation
8	Differential Quadrature Phase Shift Keying (DQPSK) Modulation and Demodulation
9	Quadrature Phase Shift Keyring (QPSK) Modulation and Demodulation
10	Differential Quadrature Phase Shift Keyring (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:

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Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	12-02-2024	1-10	CB
Test 2	60 Minutes	17	11-03-2024	11- 24	OB
Test 3	60 Minutes	17	15-04-2024	25- 38	CB
Presentations/Lab	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	18-05-2024	1- 40	CB

\*\* To be announced

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**Date: 08/01/2024**

**Dr.K NAGIAH  
Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
EC322	Antennas and Wave Propagation	3	0	3

**Instructor-in-charge: Mrs.BHAVANA CHAUDHARY**

**Objective and Scope**

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 Communication and others

Text book T1	Antenna and Wave Propagation ,R L Yadava ,PHI Learning 1 <sup>st</sup> Edition
Reference Book R <sub>1</sub>	Antennas and Wave Propagation , John D Kraus ,R J Marhefka, A S Khan, TMH ,4 <sup>th</sup> Edition
Reference Book R <sub>2</sub>	Antennas and Wave Propagation A P Harish, M Sachidananda, Oxford University Press, 1 <sup>st</sup> Edition,
Reference Book R <sub>3</sub>	Antennas and Wave Propagation G S N Raju, Pearson, 1 <sup>st</sup> Edition

**Lecture-wise-plan:**

Lecture No.	Learning Objective	Topics to be covered	Reference
1	Fundamental concepts of Radiation	Concept of radiation, Radiation pattern, Radiation resistance	T(1),R <sub>1</sub> (2)
2-3	Antenna basics	Directivity, Gain, Intensity, Beam area, Beam Efficiency, HPBW, FNBW	R <sub>1</sub> (2) ,T(3)
4-5	Antenna aperture	Effective aperture, aperture efficiency	T(3),R <sub>1</sub> (2),R <sub>2</sub> (2)
6-7	Linear Wire antennas	Hertzian dipole, Half-wave dipole, Folded dipole, Monopole	T(5),R <sub>1</sub> (3,4)
8-10	Antenna arrays	Point sources, different configurations of arrays, Binomial array	T(4),R <sub>1</sub> (5)

Lecture No.	Learning Objective	Topics to be covered	Reference
11-12	VHF,UHF antennas	V- antenna , Rhombic, Yagi- Uda, Log-Periodic, Loop, Helical antenna	T(5,6,9,10,12) R <sub>1</sub> (7,8),R <sub>2</sub> (6)
13-16	Microwave antennas	Parabolic reflector, feed systems, field distributions, Horn, Slot, Lens& Micro strip antenna	T(7,8,11,13) R <sub>1</sub> (9,14)
17-19	Measurement of antenna Parameters	Measurement of radiation pattern, Gain, Impedance, Current, Reflectivity	T(17),R <sub>1</sub> (21)
20-22	Antennas for special applications	Ground plane antenna ,Sleeve, turnstile, Omni directional antenna, submerged antennas	R <sub>1</sub> (15)
23-25	Basics of Wave propagation	general classification, different modes of wave propagation, Ray and Mode concept	T(14),R <sub>1</sub> (22)
26-27	Reflections and refractions in wave propagation	Multi hop Propagation	T(14),R <sub>1</sub> (25)
28-29	Ground wave propagation	Plane earth reflection ,Surface wave tilt, impact of Imperfect Earth, Earth's behaviour at different frequencies	T(14),R <sub>1</sub> (23)
30-31	Space Wave propagation	Curvature of Earth, Shadowing effect, Super refraction, Scattering phenomena, Tropospheric propagation, M-curves, LOS distance	T(15),R <sub>1</sub> (24)
32-33	Losses in space wave propagation	Fading, Path loss calculation	R <sub>1</sub> (24),T(16)
34-35	Sky wave propagation	Structural details of Ionosphere , Absence and presence of Earth's magnetic field, GMF	T(16),R <sub>1</sub> (25)
36-37	Measures of Ionosphere Propagation	Refractive index, Critical frequency, angle of incidence, MUF, OF	T(16),R <sub>1</sub> (25)
38-39	Calculations in Ionosphere	LUF, Virtual Height, Skip Distance	R <sub>1</sub> (25),T(16)
40	Abnormalities in Ionosphere	Attenuation factor, SID, Ionosphere Storms, Sun spot cycle	R <sub>3</sub> (9)

**Evaluation Scheme:**

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<b>Evaluation Component</b>	<b>Duration</b>	<b>Weightage</b>	<b>Date</b>	<b>Syllabus (Lec.No.)</b>	<b>Remarks</b>
Test 1	60 Minutes	16	13-02-2024	1-10	CB
Test 2	60 Minutes	17	12-03-2024	11- 24	OB
Test 3	60 Minutes	17	16-04-2024	25- 38	CB
Presentations/Lab	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	20-05-2024	1- 40	CB

\*\* To be announced

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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 Examination, etc.

**Date: 09/01/2024**

**Mrs.BHAVANA CHAUDHARY  
Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
EC323	Micro Electronics	3	0	3

**Instructor-in-charge: Mrs.BHAVNA CHAUDHARY**

**Learning Outcomes:**

After successful completion of the course student will be able to

1. To develop the student with the principles, operation and applications of the analog building blocks like diodes, BJT, FET for performing various functions.
2. To learn the qualitative analysis using models, equations to illustrate the concepts and to gain the knowledge of existing analog circuits.
3. To understand the working and analysis of amplifiers, feedback amplifiers and oscillators

Text Book T1	A.S.Sedra & K.Smith, <i>Microelectronic Circuits</i> , 5 <sup>th</sup> edition, Oxford higher education, 2009.
Reference Book R1	Robert L.Boylestad and Louis Nashelsky, <i>Electronic Devices and Circuit Theory</i> , 10th edition, Pearson, New Jersey, Columbus, ohio, 2011
Reference Book R2	Jacob Millman, CCHalkias, SatyabrataJit, <i>Electronic Devices and Circuits</i> , 3rd edition, TMH, New Delhi, 2011.
Reference Book R3	S. Shalivananan, N.Suresh Kumar, A.VallavaRaj, <i>Electronic Devices &amp; Circuits</i> , Tata McGraw Hill, New Delhi,2003

**Lecture-wise-plan:**

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
1,2.	Characteristics and type of amplifiers.	Amplifiers, Circuit Models, Frequency response of amplifiers	T 1 Ch-1 1.4,1.5,1.6
3,4	BJT Structure, I-V Characteristics, working as a switch and amplifier	Device structure &Physical operation, I-V Characteristics, BJT as an Amplifier & switch	T1 Ch-5 5.1,5.2,5.3
5,6	Analysis of BJT circuits under DC conditions	BJT circuits at DC	T1 Ch-5 5.4

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
7,8	Biassing and small signal models of BJT	Biassing in BJT amplifier circuits, Small signal operation & Models	T1 Ch-5 5.5, 5.6
9,10	BJT as a single stage amplifier and its high frequency models.	Single stage BJT Amplifiers BJT Internal capacitances & High frequency model	T1 Ch-5 5.7,5.8
11,12	Structure and I-V Characteristics of MOSFET.	Device structure & Physical operation, I-V Characteristics	T1 Ch-4 4.1,4.2
13,14	Working of MOSFET as amplifier, switch and its circuits at DC.	MOSFETS Circuits at DC, MOSFET as an amplifier and as a switch	T1 Ch-4 4.3, 4.4
15-17	Biassing and small signal models of MOSFET.	Biassing in MOS amplifier circuits, Small signal operation & Models	T1 Ch-4 4.5, 4.6
18,19	MOSFET as a single stage amplifier and its high frequency models.	Single stage MOS Amplifiers, MOSFET Internal capacitances & High frequency model	T1 Ch-4 4.7, 4.8
20 -22	To Understand the concept of Differential Amplifiers.	The MOS Differential pair.	TI Ch-7 7.1
23,24	Operation of MOS Differential amplifier.	Small signal operation of MOS Differential pair	T1 Ch-7 7.2
25,26	Practical characteristics of MOS Differential pair.	Non-ideal characteristics of MOS Differential pair.	T1 Ch-7 7.4
27,28	Effect of active load on MOS differential amplifier.	MOS Differential amplifier with active load.	T1 Ch-7 7.5
29,30	To Understand the concept of Feedback concept	General Feedback structure, Properties of Negative feedback, Four basic feedback topologies	T1 Ch-8 8.1,8.2,8.3
31,32	Analysis of Series-Shunt & Series-Series feedback amplifier	Series-Shunt and Series-Series feedback amplifier	T1 Ch-8 8.4,8.5,
33,34	Analysis of Shunt-Shunt & Shunt-Series feedback amplifier.	Shunt-Shunt and Shunt-Series feedback amplifier.	T1 Ch-8 8.6
35-37	To Understand the concept of power amplifiers and output stages	Classification of output stages, Class A and Class B output stage.	TI Ch-14 14.1, 14.2, 14.3

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
38-40	Overview of class AB Output stage	Class AB output stage and its biasing.	TI Ch-14 14.4,14.5
41-42	To learn the concepts power transistors	Power BJT's and MOS power transistors.	TI Ch-14 14.6,14.9

### Evaluation Scheme:

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Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	17	13-02-2024	1-12	CB
Test 2	60 Minutes	17	12-03-2024	13- 28	OB
Test 3	60 Minutes	16	16-04-2024	29- 42	CB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	22-05-2024	1- 42	CB

\*\* To be announced in the class

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**Date: 09/01/2024**

**Mrs.BHAVANA CHAUDHARY**  
**Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
EC324	RF and Microwave Engineering	3	0	3

**Instructor-in-charge: Mr.ROHIT KUMAR**

**Learning Outcomes:**

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

1. Understand and remember basic concepts and applications of microwave systems.
2. Analyze and solve problems related to microwave transmission lines.
3. Design, analyze and solve problems related to microwave waveguide
4. Analyze, test and use, maintain various microwave components.
5. Design simple microwave strip lines, couplers, Microwave filters.

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

**Lecture-Wise-Plan:**

Lecture Nos.	Learning Objective	Topics to be covered	Referen ce(Ch./ Sec./Pa ge Nos. of Text Book)
1	Introduction to Microwave engineering.	Frequency bands; Microwave and RF Engg, 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

<b>Lecture Nos.</b>	<b>Learning Objective</b>	<b>Topics to be covered</b>	<b>Reference(Ch./Sec./Page Nos. of Text Book)</b>
6-8	To study guided waves on surfaces	Modes of surface waves, strip lines and micro strip lines	T1:3.6-3.8 T2:11
9-11	To understand the concepts of impedance and there presentation of incident	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	To reflected and transmitted waves for microwave passive network analysis.	Signal flow graphs and circuit analysis	T1:4.5 R1:4.10
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	Over view of design and principle of semiconductor devices used as microwaves sources and circuit elements	Microwave HBTs, FETS, MESFETS	T2:5.2-5.3; T2:6.1-6.4;
25-26	To study microwave diodes	Transfer red electron devices, GUN N effect, GUN N diodes	T2:7.1-7.5
27-28	To study avalanche diodes	Avalanche Transit time devices, IMPATT, TRAPATT, BARITT	T2:8.1-8.4
29-32	To design high power sources of microwave like Klystron Magnetron & amplifiers using TWTs	Klystrons, Multi cavity Klystrons, Reflex Klystrons TWTs	T2:9.2-9.5
33-34	Overview of design and principle of high power sources of microwave	Magnetrons	T2:10.1

Lecture Nos.	Learning Objective	Topics to be covered	Reference(Ch./Sec./Page Nos. of Text Book)
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.	Micro wave and RF systems, transmitters and receivers.	R2:T1:12 1
39-40	To study EMI &EMC	An introduction to Electromagnetic Interference and Compatibility	Class Notes
41-42	Other microwave applications such as Radar, Radio metry, 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

#### List of Experiment:

S.No.	Name of the Experiment
1	To find Scattering matrices of Tees: E plane, H plane and Magic Tee.
2	Study of Microwave Components and Instruments
3	Determination of VSWR of a Given Load.
4	To find parameters of Directional coupler.
5	Characteristics of Reflex Klystron oscillator, finding the mode numbers and efficiencies of different modes.
6	Characteristics of Gunn diode oscillator, Power Output Vs Frequency, Power Output Vs Bias Voltage.
7	Scattering parameters of Circulator
8	Attenuation measurement

**Evaluation Scheme:**

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

<b>Evaluation Component</b>	<b>Duration</b>	<b>Weightage</b>	<b>Date</b>	<b>Syllabus (Lec.No.)</b>	<b>Remarks</b>
Test 1	60 Minutes	16	12-02-2024	1-10	CB
Test 2	60 Minutes	17	11-03-2024	11- 24	OB
Test 3	60 Minutes	17	15-04-2024	25- 38	CB
Presentations/Lab	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	16-05-2024	1- 40	CB

\*\* To be announced

OB=Open Book Exam

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**Date: 09/01/2024**

**Mr.ROHIT KUMAR**  
**Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
EC325	Analog Electronics	3	0	3

**Instructor-in-charge: Mr.ROHIT 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 band with concept and frequency response of the three basic amplifiers
5. To design the combinational logic circuits for different applications.

Text Books(T1)	L.K. Maheshwari and M.M.S. Anand, Analog Electronics, 1 <sup>st</sup> Ed., PHI, 2005.
Reference book(s) R1	Sedra and Smith, Microelectronics Circuits, Oxford Univ. Press, New York, 2014.
Reference book(s) R2	I.S.Franco, Design with Operational Amplifiers and Analog Integrated Circuits, 3rd edition, TMH, New Delhi, 2003.
Reference book(s) R3	Ramakanth A.Gayakwad, Op-Amps and Linear Integrated Circuits, 4th Ed, Pearson Education 2006.

**Lecture-wise-plan:**

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Chapter/Sec./Page Nos. of Text/Ref. Books)
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

<b>Lecture Nos.</b>	<b>Learning Objective</b>	<b>Topics to be covered</b>	<b>Reference (Chapter/Sec./Page Nos. of Text/Ref. Books)</b>
8-11	Application of O pamp 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 O pamp in realization of Non-linear functions	Logarithmic Amplifier Analog Multipliers Applications Precision Circuits Comparators Schmitt Triggers Analog Switch Sample-and-Hold Circuits, Analog Multiplexers	T1: 5.2 T1: 5.3.1-5.3.6 T1: 5.4 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

**List of Experiment:**

S.No.	Name of the Experiment
1	Voltage regulator using operational amplifier.
2	Function generator using operational amplifier (sine, triangular & square wave)
3	Study of basic properties of Operational Amplifier: Inverting and Non-Inverting Amplifiers
4	Study of Differentiator and Integrator using Operational Amplifier
5	Log and antilog Operational amplifiers
6	Inverting and Non Inverting Voltage comparator using IC 741
7	Wien bridge oscillator using operational amplifier
8	A stable and Mono stable multi vibrator using IC 555
9	Voltage to current converters using IC 741

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Test 2	60 Minutes	17	13-03-2024	11- 24	OB
Test 3	60 Minutes	17	18-04-2024	25- 42	CB
Presentations/Lab	Continuous	10	**	**	**
Comprehensive Exam	3 Hours	40	27-5-2024	1- 42	CB

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**Date: 09/01/2024**

**Mr.ROHIT KUMAR**  
**Instructor-in-charge**

**The ICFAI University, Raipur**  
Faculty of Science and Technology  
Second Semester, 2023-2024  
Course Handouts

Course Code	Course Title	L	P	U
MKE641	Digital Services and Marketing	3	0	3

**Instructor-in-charge: Dr.RAVI KIRAN PATNAIK**

**Learning Outcomes:**

After the successful completion of the course, the student shall be able to:

1. Understand digital marketing, importance there of, meaning of web site and levels of website, difference between blog, portal and website.
2. Understand the working of SEO (Search engine optimization) on page optimization, off page optimization, and will learn to prepare reports
3. Learn about SMO (Social media optimization) like Face book, twitter, LinkedIn, Tumblr, Printerest and other social media services optimization.
4. Understand paid tools like google ad words, display advertising techniques
5. Learn and apply hands on experience on tools useful to SEO for analysis on website traffic, keyword analysis and learn email marketing and ad designing.

Textbook (s) T1	Ahuja Vandana Digital Marketing, Oxford University press (2016) ISBN:9780199455447 Sainy Romi, Nargundkar Rajendra Digital Marketing: cases from India, Notion Press (2018) ISBN 9781644291931, 1644291932
Reference book (s) R1	Stephanie Daimond, Author of Facebook Marketing for Dummies, a Wiley brand
Suggested equivalent online courses:	<a href="https://onlinecourses.swayam2.ac.in">https://onlinecourses.swayam2.ac.in</a>

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text Book)
1-10	Learn about the Basics digital marketing	Meaning of Digital Marketing, Differences from Traditional Marketing, Returns of Investments on Digital Marketing vs. Traditional Marketing, E Commerce, tools used for successful marketing, SWOT Analysis of Business for Digital Marketing, Meaning	T1

<b>Lecture Nos.</b>	<b>Learning objectives</b>	<b>Topics to be covered</b>	<b>Reference (Ch./Sec./ Page Nos. of Text Book)</b>
		of Blogs, Websites, Portal and their differences, Visibility, Visitor, Engagement, conversion process, Retention, Performance Evaluation.	
11-20	Learn about the SEO	Search Engine Optimization (SEO):  On page optimization techniques, off page optimization Techniques, Preparing Reports, Creating search Campaigns, Creating Display Campaigns.	T2
21-30	Learn about the SMO, SEM and Traffic Analysis	Social Media Optimization (SMO):  Introduction to Social Media Marketing, Advanced Facebook Marketing, Word press Blog Creation, Twitter Marketing, LinkedIn Marketing, Instagram Marketing, social media Analytical Tools.	T1
31-35		Search engine Marketing:  Meaning and Use of Search Engine Marketing, Tools used-Pay Per Click, Google Ad words, Display Advertising Techniques, Report Generation	T1

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text Book)
36-42		Website Traffic Analysis, Affiliate Marketing and Ad Designing:  Google Analytics, Online Reputation Management, Email Marketing, Affiliate Marketing, Understanding Ad Words Algorithm, Advertisement Designing	T2

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Test 3	60 Minutes	17	18-04-2024	25- 38	CB
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Comprehensive Exam	3 Hours	40	24-05-2024	1- 42	CB

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Date: 09/01/2024

**Dr.RAVI KIRAN PATNAIK**  
Instructor-in-charge