Faculty of Science & Technology

First Semester, 2023-2024 Course Handout

Table of Content

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

Course Code	Course Title	L	P	U
MA111	**Mathematics I**	**3**	**0**	**3**

Instructor-in-charge: Dr.ANIMESH KUMAR SHARMA

Learning Outcomes:
After successful completion of the course student will be able to
1. Rank of matrices, test for consistency.
2. Basic concept of Eigen values and Eigen vectors
3. Expansion of series. Maclaurins and Taylors series.
4. Homogeneous function and Euler's theorem.

Text Book (T)	Engineering Mathematics, Dr Hari Arora, S K Kataria & Sons
Reference Book(s) R1	Engineering Mathematics A Tutorial Approach Ravish R Singh, Mukul Bhatt Tata McGraw Hill Education Private Limited, NEW DELHI
Reference Book(s) R2	Higher Engineering Mathematics, Jain & Iyanger, Narosa Pub.
NPTEL Course Link	Engineering Mathematics - I, IIT Kharagpur https://nptel.ac.in/courses/111105121

Lecture Wise Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
1-4	Definition of Matrix	Types of Matrix, Systems of linear equations, Row reduction and Echelon forms, Rank of a matrix and applications.	T l Ch-1244560
5-7	Introduction to linear transformations,	Introduction to linear transformations, Thematrix of a linear transformation, Matrix operations, Determinants.	T l Ch-1244560

8-9	Inverse of a matrix	The inverse of a matrix, Characterizations of invertible matrices	T l Ch-12 441-560
10-12	Eigen values and Eigen vectors	Eigen vectors and Eigen values of a linear transformation, Characteristic polynomial and Cayley–Hamilton theorem.	T l Ch-12 441-560
13-14	Orthogonal transformation	Reduction of a matrix to diagonal form. Orthogonal transformation of symmetric matrix to diagonal form	T l Ch-12 441-560
15-16	Sequence and series	Definition of Sequence and series	T1 Ch-8 237-276
17-18	Condition of convergence	Convergence and divergence of infinite series.	T1 Ch-8 237-276
19-20	Test for convergence	Comparison test, D'Alembert ratio test, Raabe's Test (Higher Ratio Test), Cauchy's root test	T1 Ch- 237-276
21-25	Differential Calculus	Successive differentiations, Leibnitz's theorem, Maclaurin's and Taylor's theorem.	T l Ch-6 155-201
26-31	Indeterminate forms	Indeterminate forms, Cauchy's rules for Indeterminate form, L' Hospital rules	T l Ch-7 202-236
32-40	Multivariable Calculus	Partial differentiation, Homogeneous function, Euler's Theorem, Minima and Maxima, Jacobians.	T l Ch-11 351-440

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	17	11.09.2023	1-10	CB
Test 2	60 Minutes	17	16.10.2023	11- 20	OB
Test 3	60 Minutes	16	20.11.2023	21- 30	CB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	08.12.2023	1- 40	CB

** To be announced in the class

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

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

Date: 02/08/2023   **Dr.ANIMESH KUMAR SHARMA**
                                                          Instructor-in-charge

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

Course Code	Course Title	L	P	U
PH112	**Physics-I**	**3**	**2**	**4**

Instructor-in-charge: DR.ANIL KUMAR VERMA

Learning Outcomes:
Physics I form the first half of a two-semester comprehensive course on core level physics to be taught to all engineering students. The course aims at:- 1. Developing an understanding of the basic principles of physics of Mechanics & Waves motion. 2. Developing the application of concepts to problems of practical interest in oscillation and waves. Improving the concepts and improving the Practical Physics problem solving skills of students

Textbook (s) T1	Mechanics and wave motion by JC Upadhyaya, Himalaya Publishing House
Textbook(s) T2	Oscillation and Waves by Satya Praksh, Pragati Prakshan Meerut
Textbook(s)T3	Waves and Oscillation by JC Upadhyaya, Himalaya Publishing House
Reference Book (s) Reference Book	Mechanics by Prof. DS Mathur, S.Chand Publication
Reference Book2	Handbook of Physics by Walter Beneson et al. Springer Publication
Reference3	D. Haliday, R. Resnick, J. Walker, Fundamentals of Physics, Sixth Edition, John Wiley & Sons, 2001

Lecture wise plan:

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./Page Nos. of Text Book)
1-5	Origin of the Mechanics of particle.	Newton law of motion, Principle of conservation of linear momentum, angular momentum and energy.	T1 (1.4, 2.6, 3.7,3.8,3.9,310,3.11, 3.12) R1 (2.5, 2.6, 2.7, 5, 6)

6-11	Behaviours of the Dynamics of Rigid Bodies	Moment of inertia and its physical significance, Equation of motion, concept of radius of gyration, Theorem of parallel and perpendicular axes, Fly Wheels.	T1 (5.1, 5.2,5.3,5.4, 5.8, 5.11) R1 (11.1, 11.4, 11.5, 11.12, 11.13, 11.14)
12-17	Concept of the Properties of the matters	Elasticity and elastic constant, Stress and Strain, Hooks law, Types of elastic constant and relation among them.	T1(6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7) R1 (13.1, 13.2, 13.3, 13.4, 13.5, 13.6, 13.7, 13.11, 13.12, 13.13, 13.14, 13.15)
18-25	To understand the fundamentals characteristics of the motion	Oscillatory Motion and its types, Simple harmonic oscillator and solution of the differential equation – Physical characteristics of SHM. Examples of SHM, Simple and compound pendulum, measurement of the acceleration due to gravity 'g' using a simple pendulum.	T1 (8.1, 8.2, 8.3, 8.4, 8.5) R1 (7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7)
26-36	Basic ideas about free, damped and forced harmonic motion	Free, forced and Damped harmonic oscillator, solution of the differential equation of damped oscillator. Energy considerations, comparison with un-damped harmonic oscillator, logarithmic decrement, relaxation time, quality factor, differential equation of forced oscillator and its solution, velocity resonance, Coupled oscillators.	T1 (10.1, 10.2, 10.3, 10.4, 10.5, 11.1, 11.2, 11.3, 11.4, 101.5) R1 (8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.7, 8.8, 8.9)

37-42	To understand the characteristics of different kinds of waves.	Types of waves: Mechanical and non-mechanical waves (Transverse and longitudinal waves), Differential wave and its solution, Energy in waves, Superposition of two waves and Lissajous figures. Phase and group velocity and relation between them.	T1 (12.1, 12.2, 12.3, 12.5, 12.7, 12.12, , 12.8, 12.18, 12.19 R1 (10.1, 10.2, 10.8, 10.9, 10.10, 10.13, 10.36, 10.37)

Experiment-Physics I (Lab)

S. No.	Name of Experiment
1	To study the Error Analysis and Graph Drawing.
2	To study and measure the acceleration due to gravity "g: using a simple pendulum.
3	To Study of Small Oscillation using a bar Pendulum/ Compound Pendulum.
4	To study and calculate the moment of inertia using Fly Wheel.
5	To study and prove the theorem of moment of inertia.
6	To study and calculate the moment of inertia of a Compound Pendulum.
7	To study and find the frequency and amplitude of a sine wave inputted from a function generator using Cathode Ray Oscilloscope (CRO)
8	To study and find the frequency and amplitude of a square wave inputted from a function generator using Cathode Ray Oscilloscope (CRO)
9	To study and find the frequency and amplitude of a triangular wave inputted from a function generator using Cathode Ray Oscilloscope (CRO)
10	To study and find the frequency of interference of two wave inputted from a function generator using Cathode Ray Oscilloscope (CRO)

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec. No.)	Remarks
Test 1	60 Minutes	16	11.09.2023	1-12	CB
Test 2	60 Minutes	17	16.10.2023	13- 28	OB
Test 3	60 Minutes	17	20.11.2023	29- 42	CB
Lab	Throughout the Semester	10	**	**	CB
Comprehensive Exam	3 Hours	40	11.12.2023	1- 42	CB

** To be announced in the class

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

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

Date: 01/08/2023   **Dr.ANIL KUMAR VERMA**
                                                               Instructor-in-charge

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

Course Code	Course Title	L	P	U
CH113	**Chemistry**	**3**	**2**	**4**

Instructor-in-charge: Dr.PIYUSH KUMAR THAKUR

Learning Outcomes:
This first level course is offered in the first semester for the students of all branches of engineering.   1. It provides a comprehensive survey of underlying physical principles that govern the properties and behavior of chemical systems.   **2.** To understand the basic principles of spectroscopy   **3.** Mechanistic pathways of organic reactions. Gives an idea about reactions and reagents.

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

Leture Wise Plan:

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
1-2	To understand the transformation of energy from heat into work and vice versa	**Thermodynamics** - first law Work & heat, internal energy and enthalpy.	T1:2.1 – 2.8

3-4	To understand the role of enthalpy in chemistry	**Thermo chemistry** Enthalpy changes accompanying Physical Change and Chemical Change	T1:3.1 – 3.7
4-6	To understand the concept of entropy and Gibbs energy	**Thermodynamics** – Second Law Entropy and second law, absolute entropies and Third law, The Gibb's energy	T1: 4.1 – 4.11
7 – 10	To understand the redox reactions involved in electrochemical cells, cell potentials and applications of standard potentials	**Electrochemistry** - The migration of ions, electrochemical cells, The cell potential. Application of standard potentials	T1:9.2 – 9.13
11 – 12	To understand the dependence of rates of reactions on different reaction conditions	The rates of reactions Empirical chemical kinetics, Reaction rates, Temperature dependence of reaction rates	T1: 10.3 – 10.11
13 -14	To understand the basic principles of spectroscopy	**Spectroscopy** General features of spectroscopy, Further Rotational spectroscopy, Vibrational information spectroscopy, Vibrational Raman spectra of diatomic molecules.	T1; 19.1 – 19.15 (20.1)
15		The Beer-Lambert Law, The Franck-Condon principle	T1: 505 & 512
16-17	**Coordination Chemistry** To understand the structure, properties, formation, Stability reactivity of Transition metal complexes	Werner's work, recent studies on complexes, Effective atomic number	T2: 195 – 200

		Nomenclature of coordination Compounds	T2: 230 – 232
18 - 19			
20 - 21		Crystal Field Theory of Octahedral Complexes, Magnetism and Thermodynamic aspects of crystal field splitting.	T2:204 – 21 225 – 226
22		Tetragonal distortions of Octahedral Complexes (Jahn-Teller Distortions)	T2: 214 - 217
23 - 24		Square Planar and Tetrahedral Complexes.	T2: 217 – 221
25 - 26		Enantiomers, Chirality	T3: 4.7 – 4.13
27	**Stereo chemistry** To understand the perspective and spatial orientations of atoms in an organic molecule.	Configuration, Specification Reactions of Stereo isomers	T3:4.14 – 4.19
28 -29		Conformational Isomerism Factors affecting the stability of conformations and stereoisomerism of cyclic compounds	T3: 4.20, 3.3 – 3.5, 13.10 – 13,14
30		Geometric Isomerism	T3:8.6
31		Nucleophilic aliphatic substitution reactions.	T3:5.7 – 5.11
32		SN^2 Reaction, Stereochemistry	T3:5.12 – 5.14
33 -34	**Organic reaction mechanisms** To understand the mechanistic pathways of organic reactions. Gives an idea about reactions and reagents.	SN^1 Reaction, Stereochemistry, Relative stability of carbocations	T3:5.15 – 5.22
35		SN^2 Vs SN^1	T3:5.23
36 - 37		Elimination reactions, E^2 mechanism	T3:8.13 – 8.20
38 – 39		E^1 mechanism	T3:8.21 – 8.25
40 - 41		Electrophilic addition reaction	T3:9.2 – 9.9 9.11, 9.15 – 9.19

Evaluation Scheme:

Chemistry I (Lab)

S. No.	Name of Experiment
1	To determine the temporary and permanent hardness in the given water sample by complexometric titration using EDTA as standard solution
2	To determine the chloride content in the given water sample by Mohr''s method
3	To determine the percentage of Available Chlorine in the given sample of Bleaching powder. Iodometrically.
4	To detect the presence of functional groups in the given organic compound.
5	To detect the presence of elements in the given organic compound.
6	To determine the strength of given HCl solution by titrating it against NaOH solution using pH meter
7	To verify the Beers-Lambert Law

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	12.09.2023	1-15	CB
Test 2	60 Minutes	17	17.10.2023	16- 30	OB
Test 3	60 Minutes	17	21.11.2023	31- 42	CB
Lab	60 Minutes	10		**	CB
Comprehensive Exam	3 Hours	40	15.12.2023	1- 42	CB

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

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

Date: 01/08/2023   **Dr.PIYUSH KUMAR THAKUR**
                                          Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2023-2024
Course Handouts

Course Code	Course Title	L	P	U
ES114	**Thermodynamics**	**3**	**0**	**3**

Instructor-in-charge: Mr.DILIP MISHRA

Learning Outcomes:
After successful completion of the course student will be able to
1. To apply theory and practice of zero, first and second laws of thermodynamics for closed and open systems.
2. To learn the complete concept of entropy, properties of water, entropy generation and entropy change in solid liquid and gases.

Textbook(s) T1	Fundamentals of Thermodynamics, Van Wylen, G.J & R E Sonntag, John Wiley, 6th Edition, 2004
Reference book(s) R1	Thermodynamics, P.K. Nag, Tata Mc Graw Hill Publishing Company limited, New Delhi, 3rd Edition, 2004.
R2	Fundamentals of Engineering thermodynamics, Michael J Moran and Howard N Shapiro, John Wiley, 5th Edition, 2004
R3	Thermodynamics, An Engineering Approach Yunus A. Cengel and Michael A Boles. Tata Mc Graw Hill Publishing Company limited, New Delhi,5th Edition, 2006

Lecture Wise Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./Pg No)
1	Basic introduction on thermodynamics	Introduction	Ch1.1-1.7 (T 1)
2-3	Units, concepts and definitions	Thermodynamic system, properties and state, processes and cycles, force, energy, pressure, specific volume, Zeroth law and numerical problems	Ch2.1-2.11 (T 1)
4-6	To study properties of a pure substance	Phase equilibrium, independent property, compressibility factor	Ch3.1-3.4 (T 1)
7-8	To know how to use steam tables	Study of steam tables and numerical problems on it	Ch3.6-3.7 (T 1)

9-10	To know the concept of work	Definition of work, understanding of piston work	Ch4.1-4.5 (T 1)
11-12	To know the concept of heat	Understanding of heat concept, and numerical problems on it	Ch4.6-4.8 (T 1)
13-15	To know the application of first law for closed systems	Definition of first law, first law for a change of state, internal energy and enthalpy	Ch5.1-5.5 (T 1)
16-17	To know internal energy and enthalpy	Specific heat, internal energy and enthalpy of an ideal gas, first law as a rate equation and numerical problems	Ch5.6-5.9 (T 1)
18-20	Application of first law for control volume systems	Conservation of mass in control volume, first law for a control volume, SSSF process and examples on it	Ch6.1-6.4 (T 1)
21-22	To know the transient process	Study of USUF process, numerical problems on it	Ch6.5 (T 1)
23-26	Application of second law of thermodynamics	Heat engines and refrigerators, the Kelvin plank statement, reversible and irreversible processes, study of Carnot cycle and efficiency of a cycle	Ch7.1-7.6 (T 1)
27-28	To know the thermodynamic temperature scale	Thermodynamic and ideal gas temperature scale, numerical problems on it	Ch7.7-7.8 (T 1)
29-30	To know the entropy	Claussius inequality, study of entropy as a property, thermodynamic property relations, entropy change of reversible and irreversible processes, entropy generation and principle of increase of entropy	Ch8.1.-8.8 (T 1)
31-33	To know entropy change in solids, liquids and gases	Entropy change in solid, liquid and gases, polytropic process, entropy as rate equation, numerical problems	Ch8.9-8.12 (T 1)
34-36	Application of second law for control volume systems	Second law for control volume, study of entropy for both reversible and irreversible processes, principle of increase of entropy	Ch9.1-9.4 (T 1)
37-38	To know the concept of efficiency	Understanding efficiency, numerical problems	Ch9.5 (T 1)

| 39-40 | To know the energy analysis of thermodynamic systems | Irreversibility and Availability, second law efficiency, energy balance equation, numerical problems | Ch10.1-10.3 (T 1) |

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	12.09.2023	1-12	CB
Test 2	60 Minutes	17	17.10.2023	13- 27	OB
Test 3	60 Minutes	17	21.11.2023	28- 40	CB
Project/Case study/Presentation	**	10	**	**	**
Comprehensive Exam	3 Hours	40	15.12.2023	1- 40	CB

** To be announced in the class

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

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

Date: 03/08/2023   **Mr.DILIP MISHRA**
                                                                 Instructor-in-charge

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

Course Code	Course Title	L	P	U
TA125	**Workshop Practice**	**2**	**2**	**4**

Instructor-in-charge: Mr.HEMANT KUMAR DEWANGAN

Learning Outcomes:

After successful completion of the course student will be able to:
1. To make the students familiar with the basic manufacturing processes used for producing finished articles out of wood, ferrous and non-ferrous metals.
2. To get the exposure to modern manufacturing courses like the application of non-conventional resources in manufacturing and usage of computes in manufacturing.
3. To get familiar with basics of all manufacturing processes.
4. To acquire knowledge in practical classes (Lab Work) about handling some of the basic general purpose machine tools, carpentry work, foundry, fitting independently.
5. To help in proper "Planning" and time scheduling of work while preparing an object as it avoids unnecessary waste of time, material money and efforts and process.
6. To know the name specification use and other details of "hand tools', "instruments" and "machines".

To help to follow the work safety rules regulations to avoid injury and accident himself/herself.

Textbook(s) T1	Elements of Manufacturing Processes by B.S.Nagendra Parashar,R.K.Mittal,PHI,2003
Reference book(s)R1	Principles of Manufacturing Materials and Processes by J.S.Campbell,TMH
Reference Book R2	Principles of Manufacturing Materials and Processes by J.S.Campbell, TMH, 1999.
Reference Book R3	Materials and Processes in Manufacturing, E.Paul DeGarmo, J.T.Black, PHI, 8th Edition, 2003.
Reference Book R4	Workshop Manual by P Kannaiah & K L Narayana SciTech Publications, 2005.
NPTEL	https://nptel.ac.in/courses/112/105/112105306/

Lecture wise Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec/Page Nos. OfTextBook)
1	Basics of Manufacturing	Manufacturing Concepts	T 1.1toT 1.5

2-3	Properties of Materials	Engineering Materials	T 2.1, 2.4 to T 2.8
4-5	Quality aspects in Manufacturing	Measurements and Quality in Manufacturing	T 3
6-12	Basics of metal cutting operation	Theory of Metal Cutting	T 4.1 to T 4.6, T 4.10 to4.16
13-17	Different operations on lathe	Turning Operations	T 5.1,5.2,5.4, 5.6 to5.11
18-20	Hole making and allied operations	Drilling and Allied operations	T 6
21-22	Production of flat surfaces	Shaping, Planning and slotting operations	T 7
21-23	Production of complex surfaces	Milling Operations	T 8
24-25	Operations to produce fine surface finish	Finishing Operations	T 9.1 to T 9.5
26-28	Joining processes like welding, brazing	Mechanical Joining Processes	T 15.1to T 15.4.2, T 15.5 to T 15.7
29-30	Using non-conventional resources in manufacturing	Non-Conventional Resources in Manufacturing	T 17.1 to T 17.3, T 17.4.3, T 17.4.4

Workshop Practice Lab:

S.No	Name of the Experiment
Carpentry	
1	To perform wood cutting operation.
2	To prepare T-Joint.
3	To prepare half cross lap joint.
Metal Cutting operation (cutting + finishing + drilling + fitting)	
4	Demonstrate use of different fitting tools –like work holding, marking, measuring, cutting, finishing and miscellaneous. Student will also prepare the report with sketch, specifications and applications of fitting tools demonstrated.
5	To prepare square shape object.
6	To perform drill operation on prepared Square shape object.
Lathe Operation	
7	To perform turning operation in lathe machine on steel rod.
Welding Operation	
8	To prepare T-joint (mild steel specimen).
9	To prepare butt joint (mild steel specimen).
Foundry & Furnace	
10	To study the mould of any pattern and casting of simple pattern.

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	50 Minutes	8	13-09-2023	1-12	CB
Test 2	50 Minutes	8	18-10-2023	13- 23	OB
Test 3	50 Minutes	8	21.11.2023	24- 30	CB
Lab	Throughout the Semester	50		1-10 (Sr. No.)	CB
Comprehensive Exam	3 Hours	26	18-12-2023	1- 30	CB

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

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

Date: 01/08/2023   **Mr.HEMANT KUMAR DEWANGAN**
                                                                   Instructor-in-charge

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

Course Code	Course Title	L	P	U
TA116	**Computer Programming**	**3**	**2**	**4**

Instructor-in-charge: Dr.RAVI KIRAN PATEL

Learning Outcomes:
1. Learn fundamental knowledge of computer hardware and number systems
2. Learn basic terminology used in computer programming
3. Develop ability to write, compile and debug programs in C language
4. Design programs involving decision structures, loops and functions
5. Understand the dynamics of memory by the use of pointers

Textbook(s) T1	1. C programming By Ritchie & Kernighan 2. C Programming By Bala Guruswamy
Reference book(s) R1	Programming with C By Gottfried
R2	C Programming By Yashwant Kanetkar
Laboratory work:	To implement Programs for various kinds of programming constructs in C Language.

Lecture wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./Page Nos. of Text Book)
1-5	Computers Fundamentals	Classification of Computers, Application of Computers, Basic organization of computer, Input and Output Devices, Binary Number System, Computer memory, Computer Software.	On Board
6-10	Algorithms and Programming Languages	Algorithm, Flowcharts, Pseudo code, Generation of Programming Languages.	
11-20	C Language	Structure of C Program, Life Cycle of Program from Source code to Executable, Compiling and Executing C Code, Keywords, Identifiers, Primitive Data types in C, variables, constants, input/output statements in C, operators, type conversion and type casting. Conditional branching statements, iterative statements,	Text-1, Ch,1,2

21-30	Functions:	Declaration, Definition, Call and return, Call by value, Call by reference, showcase stack usage with help of debugger, Scope of variables, Storage classes, Recursive functions, Recursion vs Iteration.	Text-1, Ch 3
31-40	Arrays, Strings and Pointers	One-dimensional, Two-dimensional and Multi-dimensional arrays, operations on array: traversal, insertion, deletion, merging and searching, Inter-function communication via arrays: passing a row, passing the entire array, matrices. Reading, writing and manipulating Strings, Understanding computer memory, accessing via pointers, pointers to arrays, dynamic allocation, drawback of pointers.	Text-1 Ch 4, 5, 6

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec. No.)	Remarks
Test 1	60 Minutes	16	13-09-2023	1-10	CB
Test 2	60 Minutes	17	27-11-2023	11-4	OB
Test 3	60 Minutes	17	20-12-2023	5-6	CB
LAB	Through out	10		**	CB
Comprehensive Exam	3 Hours	40	20-12-2023	1-8	CB

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

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

Date: 03/08/2023   **Dr.RAVI KIRAN PATNAIK**
                                                        Instructor-in-charge

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

Course Code	Course Title	L	P	U
TA202	**Measurement Technique**	**3**	**0**	**3**

Instructor-in-charge: Mr.DILIP MISHRA

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

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

Lecture wise plan:

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

		Graphical analysis & Curve fitting.	
5-6	Method of Least Squares	--	3.11
	Regression Analysis	--	3.12
7-8	Graphical analysis & Curve fitting	Graphical analysis & Curve fitting.	3.16
		Choice of Graph Format	3.17
		General Data Analysis	3.18
9-10	Electrical Measurements	Basic analog meters	4.4
		Basic digital meters	4.5
		Basic input circuits	4.6 (uptoPage 172)
11	Electronic voltmeter	---	4.13
	Digital meters		4.14
12	Oscilloscope	---	4.15
13-15	Transducers	Variable resistance, LVDT, Capacitive Transducers Photo electric effects,	4.19-4.24
		Hall effect	4.29
		Digital Displacement Transducers	4.30
		Comparison of analog & digital	4.31
16-17	Area Measurement	Concepts	5.6
		Graphical measurement - Planimeter	5.7 - 5.8
18-19	Pressure measurement	Mechanical devices	6.3
		Dead weight tester	6.4
		Bourdon tube	6.5
		Diaphragm & bellow gauges	6.6
20-21	Flow Measurements	Flow obstruction	7.1 - 7.3
		Sonic nozzle	7.5
		Anemometers	7.6-7.7(Uptopage316)
22-24	Temperature Measurement	Scales	8.1 - 8.3
		Ideal gas thermometer, Mechanical effects	8.4
		Electrical effects	8.5
		Temperature measurement by radiation	8.6
25-26	Thermal & Transport	Thermal conductivity	9.1-9.3

	Property measurements	Calorimetry	9.6-9.8
27-28	Strain & Stress Measurement	Concepts- Resistance strain gauge	10.5-10.8

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	11.09.2023	1-9	CB
Test 2	60 Minutes	17	16.10.2023	10- 18	OB
Test 3	60 Minutes	17	20.11.2023	19- 28	CB
Lab	Throughout the Semester	10	**	**	CB
Comprehensive Exam	3 Hours	40	08.12.2023	1- 28	CB

** To be announced in the class

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

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

Date: 03/08/2023   **Mr.DILIP MISHRA**
                                                                                 Instructor-in-charge

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

Course Code	Course Title	L	P	U
MA201	**Mathematics III**	**3**	**0**	**3**

Instructor-in-charge: Dr.ANIMESH KUMAR SHARMA

Learning Outcomes:
After successful completion of the course student will be able to
1. Solution of first & first degree differential equation
2. Solve problems on Laplace transform and inverse Laplace transform.
3. Solution of Partial differential equation

Text Book T1	Applied Mathematics, Dr H K Pathak, Shiksha Sahitya Prakashan
Text Book T2	Ordinary & Partial Differential Equation, M D Raisinghania, S Chand & Company, New Delhi
Reference book(s) R1	Higher Engineering Mathematics, Jain & Iyanger, Narosa Pub.

Lecture wise Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books)
1-2	First Order Differential Equations	Basic concepts and genesis of ordinary differential equations	T2 Ch-1 1.3-1.35
3-4	To find the order and degree of a differential equation	Differential equations of first order and first degree.	T2 Ch-2 2.1-2.76
5-8	Second Order Linear Differential Equations	Statement of existence and uniqueness theorem for linear differential equations, General theory of linear differential equations of second order with variable coefficients	T2 Ch-10 10.1-10.58
9-12	Method of variation of parameters	Method of variation of parameters and method of undetermined coefficients, Reduction of order, Coupled linear differential equations with constant coefficients	T2 Ch-7 7.1-7.26

13-16	Definition of Laplace transform	Transform of elementary functions, Properties of Laplace transform, transform of derivative and integrals, Multiplication by t, Division by t,	T1 Ch-3 127-169
17-21	Inverse Laplace transform	Inverse Laplace transforms, Convolution theorem, Unit step function, Unit impulse function, Application to solution of ordinary differential equation.	T1 Ch-4 170-212
22-30	Fourier Series	Euler's formula, functions having points of discontinuity, change of interval, Even and odd functions, Half range series, Harmonic analysis	T1 Ch-1 1-99
31-35	Partial Differential Equation	Formation, Solution by direct integration method, Linear equation of first order	T1 Ch-241-299
36-42	Homogeneous linear equation	Homogeneous linear equation with constant coefficients, Non homogeneous linear equation. Method of separation of variables.	T 1 Ch-6 300-353

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	11-09-2023	1-12	CB
Test 2	60 Minutes	17	16-10-2023	13- 28	OB
Test 3	60 Minutes	17	22-11-2023	29- 42	CB
Lab	Throughout the Semester	10	**	**	CB
Comprehensive Exam	3 Hours	40	11-12-2023	1- 42	CB

** To be announced in the class

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

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

Date: 03/08/2023   **Dr.ANIMESH KUMAR SHARMA**
                                                              Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2023-2024
Course Handouts

Course Code	Course Title	L	P	U
TA204	**Technical Report Writing**	**3**	**0**	**3**

Instructor-in-charge: Dr.SHUBHRA TIWARI

Learning Outcomes:

After successful completion of the course student will be able to
1. Understand the concept, importance and types of technical written communication.
2. Learn the usage of effective technical report writing and draw benefit from it.
3. Explore skills and ability to develop career in technical writing.
4. Understanding the application of various technical reports writing.
5. Nuances, legal aspects and ethics in technical writing.

Text books T1	
Reference books R1	Technical Report Wrting by Kieran Morgan
R2	Managing Your Documentation Projects by JoAnn T Hackos
R3	The Insider's Guide to Technical Report Writing by Krista Van Laan
R4	Technical Report Writing and Research Methodology (English, Paperback, Dr. Naushad Alam, Dr. Quadri Javeed Ahmad Peer, Dr. Banarsi Lal)

Lecture wise Plan:

Lecture Nos	Learning Objective	Topics to be covered	Reference
1	Understanding technical comm	Technical report Writing - Definition & Purpose	"Chapter 1 - Introduction to Technical Writing" in "Open Technical Communication" on Open ALG (manifoldapp.org)
2,3	Nature of technical comm	Characteristics of Technical report writing	https://alg.manifoldapp.org/read/open-technical-communication/section/0debb16b-f623-4033-a47b-973d65ab0961
4	Focused technical comm	Qualities of good technical report	Microsoft Word - The qualities of a good technical report..doc (tamu.edu)

5	Rhetorical awareness	Rhetorical Awarenss in Tech Comm	1.3 Understanding the Rhetorical Situation – Technical Writing Essentials (bccampus.ca)
6,7	Correctness of technical comm	Legal & Ethical Communication	"Chapter 3 - Ethics in Technical Communication" in "Open Technical Communication" on OpenALG (manifoldapp.org)
8,9	Understand oral technical comm	Oral & Presentation	"2.12 - Oral Presentations" in "Open Technical Communication" on OpenALG (manifoldapp.org)
10,11	Technical documents- details	Parts/ Components of Tech Documents	Components of a Technical Document | Technical Communication Center
12,13	Why is technical comm important?	Description & Importance of Tech Comm	What is the importance of technical report writing? – MVOrganizing
14,15	Detailed rules of technical comm	Implicit & Explicit Rules of Comm: Definition & Examples	"2.14 - Technical Definitions and Descriptions" in "Open Technical Communication" on OpenALG (manifoldapp.org)
16	Know the types of tech documents	Types of Tech Documents	"2.2 - Types of Technical Documents" in "Open Technical Communication" on OpenALG (manifoldapp.org)
17,	Understand need of technical comm	Establishing Goals in Tech Writing	SMART Goals for Technical Writers | by Kesi Parker | Technical Writing is Easy | Medium
18,19,20	Process orientation of technical comm	Technical Writing Process: Pre-writing, Writing and Re-writing	https://study.com/academy/lesson/the-technical-writing-process-prewriting-writing-rewriting.html
21	Practical presentation	Project Work & Presentation	Practical session
22,23	Process orientation of technical comm	Technical re-writing & Editing	Ten Best Practices for Technical Writing and Editing | PerfectIt™ | Proofreading Software for Professionals. (intelligentediting.com)
24	Technical writing - user orientation	Usability Testing & Tech Writing	Usability Testing | Usability.gov
25	Usage of reusables in tech writing	Prototypes & Wireframes	A Comprehensive Guide To Wire framing And Prototyping — Smashing Magazine
26,	Understand types of tech reports	Formal & Informal Tech Reports	"2.2 - Types of Technical Documents" in "Open Technical Communication" on OpenALG (manifoldapp.org)

27,28,29	Practical presentation	Project Work & Presentation	Practical session
30,31	Understand business reports	Business Reports & Proposals	"2.3 - Business Plans" in "Open Technical Communication" on OpenALG (manifoldapp.org)
32	Tech writing- customer orietation	Technical Correspondence	"2.1 - Business Correspondence and Resumes" in "Open Technical Communication" on OpenALG (manifoldapp.org)
33,34	Tech writing- resumes/ cover letters	Writing Resumes & Cover Letters	"2.1 - Business Correspondence and Resumes" in "Open Technical Communication" on OpenALG (manifoldapp.org)
35,36,37, 38	Types of tech documents	Technical Instructions, Manual Writing, Proposal Writing	"2.6 - Instructions" in "Open Technical Communication" on OpenALG (manifoldapp.org)
39,40	Practical presentation	Project Work & Presentation	Practical session

Classroom Practical :

S.No	Name of the Practical
1	Applications and types of technical documents
2	Preparation and presentation of various technical documents
3	Projects and presentations on the basis of technical report writing structure

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	12-09-2023	1-15	CB
Test 2	60 Minutes	17	17-10-2023	16- 29	OB
Test 3	60 Minutes	17	22-11-2023	30- 40	CB
Lab	Throughout the Semester	10		**	CB
Comprehensive Exam	3 Hours	40	13-12-2023	1- 40	CB

** To be announced in the class

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

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

Date: 03/08/2023   **Dr.SHUBHRA TIWARI**
                                                                 Instructor-in-charge

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

Course Code	Course Title	L	P	U
ES201	**Electrical Science-I**	**3**	**0**	**3**

Instructor-in-charge: Dr.ANIL KUMAR VERMA

Learning Outcomes:
After successful completion of the course student will be able to
1. To understand the electrical circuits principles, operation and applications of the mesh and nodal analysis & network theorems.
2. To learn and develop the working principle of diodes, transistors FET & MOSFETS.
3. To understand the working and analysis of amplifiers, feedback amplifiers, oscillators and Boolean Functions

Textbook(s) T1	Fundamentals of Electrical Engineering, Leonard S. Bobrow, Oxford University Press, 2nd Edition.1996.
Textbook(s) T2	Principles of Electronics By V.K. Mehta and Rohit Mehta
Reference Book R1	Engineering circuit analysis, W.H.Hayt , J.E. Kemmerly, McGraw Hill company, 6th Edition, 2000.
R2	Electronic Devices & Circuits, Millman & Halkias McGraw Hill, 2002.
R3	Electrical Engineering: Principles and Applications, Alan R. Hambley, Publisher, 2nd Edition 2003.
R4	Basic Electric Circuit Analysis, David E Johnson et al, John Wiley, 5th Edition 2002.
R5	Introductory circuits for Electrical and Computer Engineering, James W Nilsson and Susan A Riedel, PHI, 2002.

Lecture Wise Plan:

Lecture No.	Learning Objective	Topics to be covered	(Ch./Sec./Text Book)
1-2	To understand the concept of basic circuit Elements	Introduction to Basic Circuit theory & Circuit elements	T1(1.1,1.2), R1(1.1 - 1.6)
3-4	To understand the concept of basic electrical laws	Kirchhoff's Current & Voltage Laws	T1(1.3, 1.4), R1(2.2-2.6)

5	To understand the concept of basic sources	Independent & Dependent Sources	T1(1.8)
6-7	To understand the methods of circuit Analysis	Mesh & Nodal Analysis Ideal Amplifier (op-amp) application	T1(2.1,2.3, R1(3.1 – 3.7)
8-9	To understand the network theorems	Thevenins & Nortons theorem	T1(2.4), R1(4.5 -4.8)
10-11	To understand the concept of basic theorems	Linearity, Superposition, Maximum power transfer theorems	T1(2.5,2.6), R1(4.1 – 4.4)
12	To study the circuits having energy storage elements	Energy storage elements (Inductors & Capacitors) their relationships & their natural responses	T1(1.6, 1.7), R1(6.1 -6.5)
13-14	To study forced and free response of a circuit	First order & second order System responses	T1(3.2, 3.3), R1(7.1 -7.6)
15	To study basics of semiconductors,	Semiconductors: intrinsic and doped; p-n junction	T1(6.2)
16-17	To study operation and characteristics of ordinary junction diodes and Zener Diodes	Junction Diode & its characteristics	T1(6.3,6.4,6.5) T1(6.6)
18-20	To understand the concept of rectifiers and filters	Rectifier circuits & filters Application of diode	T1(6.3,6.4,6.5) T1(6.6)
21	To study operation and characteristics Zener Diodes	Zener Diode & its characteristics	T1(6.3,6.4,6.5) T1(6.6)
22-23	To study operation of transistors	Introducing transistors To study operation of transistors	T1(7.1)
24-25	To study the different types of configurations of transistors	pnp and npn transistors and their characteristics & operation	T1(7.2,7.3) T1(9.1)
26-27	To study operation of FETs	FETS, their operation & characteristics	T1(8.1)
28-29	To understand the concept of MOSFETs & CMOS	MOSFETS & its characteristics CMOS its Characteristics (No application of CMOS)	T2 Chapter 19 (506-553)
30-31	To understand biasing operation	Biasing the BJT	T1(9.1)
32-34	To study the AC model concepts	AC Model of BJT (Low frequency model)BJT Amplifier, Common emitter configuration	T2 chapter 8

35-36	To Understand the feedback amplifiers	Concept on Feedback & application	T2 Chapter 13 (335-363)
37-40	To understand the digital logic basics	Digital logic gates & its Truth Tables, Boolean Algebra & Boolean Functions	T2 Chapter (729- 773)
41	To understand the operation of digital circuits	Basic digital circuits	T2 Chapter (729-773)
42	To understand the operation of Two port network	Understanding of Two port Network	T2 Chapter (729-773)

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec. No.)	Remarks
Test 1	60 Minutes	16	12.09.2023	1-10	CB
Test 2	60 Minutes	17	17.10.2023	11- 20	OB
Test 3	60 Minutes	17	21.11.2023	21- 30	CB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	15.12.2023	1- 42	CB

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

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

Date: 03/08/2023   **Dr.ANIL KUMAR VERMA**
                                                                                        Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2023-2024
Course Handouts

Course Code	Course Title	L	P	U
CS211	**Object Oriented Programming**	**3**	**2**	**4**

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

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

Lecture wise Plan:

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

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

Object Oriented Programming Lab:

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

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec. No.)	Remarks
Test 1	60 Minutes	17	13/09/2022	1-12	CB
Test 2	60 Minutes	17	18/10/2022	13- 26	OB
Test 3	60 Minutes	16	22/11/2022	27- 40	CB
Lab	60 Minutes	10	**	**	CB
Comprehensive Exam	3 Hours	40	18/12/2022	1- 40	CB

** To be announced in the class

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

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

Date: 03/08/2023   **Mr.ASHISH KUMBHARE**
                                                                        Instructor-in-charge

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

Course Code	Course Title	L	P	U
CS212/EC211	**Digital Logic Design**	**3**	**2**	**4**

Instructor-in-charge: Mrs.BHAVANA CHAUDHARY

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

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

Lecture Wise Plan:

Lecture Nos	Learning Objective	Topics to be covered	Reference
1	Introduction to digital systems	Digital systems, Analog systems Vs Digital systems	T1:1.1
2-5	Concepts of Number systems, their conversions and usages	Binary, Octal, Hexadecimal numbers, 1's and 2's Complements	T1:1.2-1.5
6-8	Binary Systems	Signed Binary Numbers, Binary codes	T1:1.6-1.7

9-10	To understand the basics of Boolean Algebra	Binary Logic, Theorems & Properties of Boolean Algebra	T1:1.9; 2.3-2.4
11-13	To learn the concepts of SOP,POS Forms	Boolean functions, Canonical forms Digital Logic Gates and ICs	T1:2.1,2.5-2.9
13-15	To learn the simplification of Boolean functions	K-Maps (3 &4 Variables), Don't care conditions, AND & NOR	T1:3.1-3.3, 3.5-3.8
16-20	To learn the concepts of combinational circuits & their design	Combinational circuits, Analysis and design procedure, Adders, Sub tractors	T1:4.1-4.6
21-25	To learn the concepts of combinational circuits & their design	Multipliers,Comparators,Decoders and Encoders,MUXs and DEMUXs	T1:4.7 -4.11
26- 29	To learn the concepts of sequential circuits	Sequential Circuits, Latches and Flip-Flops	T1:5.1-5.4
30 -32	To understand the concepts of synchronous sequential circuits, their analysis.	Analysis of clocked sequential circuits, State Reduction & Assignment	T1:5.5-5.8
33-37	To Understand the design of sequential circuits	Shift Registers, Synchronous Counters Asynchronous counters, Ripple Counters	T1:6.1-6.5
38-39	To understand the Memory & Programmable logic	Introduction to Memories, RAM and ROM	T1:7.1-7.2,7.5
40-42	Implementation of Boolean functions using these programmable devices	RAM&ROM,PLA&PAL	T1:7.6-7.7

Digital Logic Design Virtual Lab

S.No	Name of the Experiment
1	Verification of Gates
2	Implementation Of Boolean Functions Using Logic Gates
3	Implementation of Half Adder and Full Adder using NAND and Basic Gates
4	Half Subtractor
5	Full Subtractor
6	Comparators
7	Implementation of Multiplexers and Demultiplexers
8	Implementation of Decoders
9	SR & D-TYPE Flip-Flops
10	JK & T-TYPE Flip-Flops

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	13-09-2023	1-12	CB
Test 2	60 Minutes	17	18-10-52023	13- 28	OB
Test 3	60 Minutes	17	27-11-2023	29- 42	CB
Lab	Throughout the Semester	10	**	**	CB
Comprehensive Exam	3 Hours	40	20.12.2023 18-12-2023	1- 42	CB

** To be announced in the class

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

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

Date: 04/08/2023   **Mrs.BHAVNA CHAUDHARY(VF)**
                                                        Instructor-in-charge

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

Course Code	Course Title	L	P	U
EC212	**Electronic Device and Circuits**	**3**	**0**	**3**

Instructor-in-charge: Mr.ROHIT KUMAR(VF)

Learning Outcomes:
After successful completion of the course student will be able to
1. Understand the basic electronic devices and its working principles and applications.
2.Learn the concepts of Amplifiers, rectifiers methods and their applications
3.Relate small-signal models of BJTsto their behavior in practical electronic circuits
4. Use the knowledge of small signal models to design electronic circuits to predict & measure the performance of electronic circuits.

Text books	
T1	Electronic Devices and Circuits ,R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall,9th Edition, 2006
Reference books	
R1	Electronic Devices & Circuits, Millman & Halkias McGraw Hill, 2002
R2	Electronic Devices and Circuits,David.A.Bell,Oxford University Press,India5th Edition, 2008
R3	Electronic Devices & Circuits ,S. Shalivananan, N.Suresh Kumar, A.Vallava Raj, Tata McGraw Hill, 2003.

Lecture wise Plan :

Lecture Nos	Learning Objective	Topics to be covered	Reference
1-3	Introduction to semiconductor physics	Classification of Materials , Semiconductor Materials, n –type and p-type semiconductors	1.1-1.5
4-6	Introduction to two terminal PN Junction Diode	PN junction construction working ,VI characteristics ,Symbol	1.6-1.10
7-9	Applications of PN Junction Diode-Rectifiers	Rectifier Circuits, Types of Rectifiers , Half wave and Full wave rectifiers	2.7-2.8
10-11	Applications of PN Junction Diode-Clippers	Clippers Circuits, series and parallel clipper circuits with and without biasing voltage	2.9

12-13	Introduction to Zener Diode	Zener Diode construction, working , VI characteristics, symbol	1.14
14-17	Introduction to Bipolar Junction Transistor	BJT construction, working, characteristics, Current components, Types and symbols	3.1-3.3
18- 19	Configurations of BJT	Common Base circuit, Common Emitter circuit and Common Collector circuits	3.4 -3.7
20-21	Common Base Configuration	Transistor alpha, Input and Output characteristics of transistor in Common Base	3.4
22-24	Common Emitter and Common Collector Configuration	Input and Output characteristics of transistor in Common Emitter, and Common collector configurations	3.6-3.7
25-26	BJT Applications	BJT as an amplifier and switch, Regions of operation of BJT	3-5
27-28	DC Biasing of BJTs	Introduction to DC Load line analysis ,DC Load line and Bias point	4.1-4.2
29-31	Introduction to BJT Biasing	Base Bias, Collector-to-base bias and Voltage-divider bias and their comparisons	4.3-4.6
32-35	Introduction to Field Effect Transistors	FET construction, working, characteristics, Types and symbols	5.1-5.3
36-38	Introduction to MOSFETs	MOSFET construction, working, characteristics, Types and symbols	5-6-5.8
39-40	Introduction to special purpose Electronics devices	Voltage variable capacitor devices, Thermistors	20.3,20.11
41-42	Introduction to special purpose Electronics devices	Schottky, PIN ,current limiting diodes and power switching & control devices	R2:22.4

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	09.09.2023	1-12	CB
Test 2	60 Minutes	17	20.10.2023	13- 28	OB
Test 3	60 Minutes	17	20.11.2023	29- 42	CB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	17.12.2023	1- 42	CB

** To be announced in the class

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

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

Date: 03/08/2023   **Mr.ROHIT KUMAR(VF)**
                                                       Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2023-2024
Course Handouts

Course Code	Course Title	L	P	U
CE211	**Fluid Mechanics**	**3**	**2**	**4**

Instructor-in-charge: Mr.DILIP MISHRA

Learning Outcomes:
This introductory course on Fluid Mechanics covers the basic principles of fluid mechanics and equations of conservation of mass, momentum and energy in the context of numerous and diverse real-world engineering problems. It helps students develop an intuitive understanding of the subject by emphasizing the fundamental principles and their applications

Textbook(s) T1	Hydraulics and Fluid Mechanics, P.N. Modi and S.M.Seth, Standard, Book House,New Delhi, 1998
Reference book(s) R1	Fluid Mechanics-Fundamentals and Applications, Yunus A. Cengel and John M.Cimbala, Tata McGraw-Hill Companies. New Delhi, 2006
R2	Fluid Mechanics, A.K.Mohanty, Prentice-Hall of India, New Delhi, 2007
R3	Fluid Mechanics, F.M.White, Tata McGraw-Hill Companies, New Delhi, 2008.

Lecture wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./Pg No)
1	Properties of fluid	Fluid Properties and Fluid Statics: Concept of fluid and flow	**T.**1,1.2,1.4,1.5,1.6,1.8,1.9,1.10,1.11
2		Numerical	
3	Fluid pressure and its measurement	Fluid pressure and its measurement	**T.**1,2.2,2.3,2.4,2.5,2. 6
4		Fluid pressure at a point, variation of pressure in a fluid, Pascal's law	
5		Absolute, gage and vacuum pressure, manometers, mechanical gages	
6	Hydrostatic forces on surfaces	Hydrostatic forces on surfaces, Total pressure and centre of pressure	**T.**3.1,3.2,3.3,3.4,3.5
7		Total pressure on plane surface, pressure diagram, total pressure on curved surface with numerical	

8		Applications of total pressure and centre of pressure with numerical	
9	Buoyancy and floatation	Buoyancy and floatation Concepts, Buoyant force, centre of buoyancy, metacentre and metacentric height	**T.**4.1,4.2,4.3,4.4,4.5, 4.6
10		Numerical	
11		Stability of submerged and floating bodies, time period of transverse oscillation of a floating body	
12		Numerical	
13	Liquids in relative equilibrium	Liquids in relative equilibrium-Concepts, Fluid subjected to linear acceleration	**T.**5.2,5.3,5.4,5.5
14		liquid container subjected to constant horizontal and vertical acceleration and constant rotation	
15		Numerical	
16	Fundamentals of fluid flow	Fundamentals of fluid flow, Velocity of fluid particles, types of fluid flow	**T.**6.2,6.3,6.4,6.5,6.6, 6.7,6.8,6.9,6.10,6.12 ,6.13,6.14,6.15
17		description of the flow pattern, basic principles of fluid flow, continuity equation	
18		acceleration of a fluid particle, rotational and irrotational motion, circulation and vorticity, velocity potential	
19		stream lines, equipotential lines and flow net, use of the flow net and its limitations	
20		Numericals	
21	Equations of motion and energy	Equations of motion and energy, Forces acting on the moving fluid,	**T.**7.2,7.3,7.4,7.5,7.6, 7.7,7.8
22		Euler's equation of motion, Bernoulli's equation with numerical	
23		kinetic energy correction factor, pressure velocity relationship with numerical	
24	Flow measurement devices	Flow measurement devices-introduction, Venturimeter, orificemeter, nozzlemeter,	**T.**7.10,7.11,7.12,7.1 3,7.14,7.16,7.17
25		Rotameter, elbow meter, pitot tube, vortex motion, radial flow with numerical	
26	Impulse momentum	Impulse momentum equation and its application	**T.**8.2,8.4

27	equation and its application	Numerical	
28	Flow through orifices and mouth pieces	Classification of orifices and mouth pieces, head losses of flowing liquid due to sudden change in velocity	**T.**9.2,9.4,9.8
29		Numerical	
30	Flow over notches and weirs	Classification of notches and weirs, calibration of rectangular weir or notch, empirical formula for discharge over rectangular weirs, flow over trapezoidal weir or notch	**T.**10.2,10.3,10.4,10.5,10.8
31		Numerical	
32		Flow through pipes, Reynolds's experiment ,laws of fluid friction, Froude's experiment, Darcy-Weisbach equation,	
33	Flow through pipes	ther formulae for head loss due to friction in pipes, other energy losses in pipes,	**T.**11.2,11.3,11.4,11.5,11.6,11.7,11.8,11.9,11.10,11.14,11.21,11.22
34		Hydraulic grade line and energy grade line, flow through long pipes with numerical	
35		pipes in series, branched pipes, water hammer in pipes, pipe networks	
36		Numerical	
37	Boundary layer theory	Boundary layer equation, laminar boundary layer, turbulent boundary layer	**T.**12.4,12.6,12.7
38		Numerical	
39	Laminar flow	Laminar flow, Hagen-Poiseulle law,	**T.**13.3,13.8,13.10
40		laminar flow of fluid in open channel, Stoke's law with numerical	
41	Turbulent flow inpipes	Turbulent flow in pipes, Shear stress in turbulent flow, formation of boundary layer in pipes,	**T.**14.2,14.3,14.4
42		hydro dynamically smooth and rough boundaries with numerical	
43	Open channel flow	Classification of open channel flows, Froude number and wave speed, uniform flow in channel,	**R1.**13.1,13.2,13.5,13.6,13.8
44		best hydraulic cross-section, hydraulic jump with numerical	

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	13.09.2023	1-12	CB
Test 2	60 Minutes	17	18.10.2023	13- 27	OB
Test 3	60 Minutes	17	22.11.2023	28- 44	CB
Lab		10	**	**	**
Comprehensive Exam	3 Hours	40	18.12.2023	1- 44	CB

** To be announced in the class

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

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

Date: 02/08/2023   **Mr.DILIP MIHSRA**
                                                       Instructor-in-charge

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

Course Code	Course Title	L	P	U
CE212	Geodesy	3	2	4

Instructor-in-charge: Ms.JYOTI PATEL(VF)

Learning Outcomes:
After successful completion of the course student will be able to
This course introduces the students to various basic techniques of surveying and leveling viz chain, compass, Theodolite, tachometry, traversing, etc. along with fundamentals of few advanced surveying techniques. Students will be exposed to the use of various surveying instruments specially levels, Theodolite, and total stations, by conducting field work.

Textbook(s) T1	Purnmia B.C., Ashok Jain & Arun Jain; Surveying; Laxmi Publishers, New Delhi Vol I and II; (2005)
T2	Arora K.R.; Surveying, Standard Publisher; Vol I, II and III
Reference book(s) R1	Roy S.K.; Fundamentals of Surveying, PHI Learning Private Limited (1999)
R2	Duggal S.K.; Surveying; Tata McGraw-Hill, New Delhi Volume II (1996)

Lecture No.	Learning Objective	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text Book
1-2	Basic concept of Geodesy	Introduction, definition, scope, concepts,methods and classification of Surveying	T1- Vol I 1.1, 1.2, 1.4, 1.5, 1.6, 1.7, 1.10, 1.11
3-4	Errors in measurement	Types of errors, accuracy and precision ofmeasurements, measures of precision, weights of measurement, rounding off of errors;	2.2, 2.3, 2.5, 2.6
5-6	Linear Measurements	Methods, accessories, ranging	3.1, 3.2, 3.3, 3.5, 3.7
7-8	Chain Survey	Steps in chain survey, field work and plotting, obstacles in chaining, errors	4.1, 4.4, 4.5, 4.7, 4.8, 4.9

		Instrument, principles, Bearings, types ofcompass, errors	5.1, 5.2, 5.3, 5.4, 5.8, 5.9
9-10	Compass Survey	Instrument, principles, Bearings, types ofcompass, errors	5.1, 5.2, 5.3, 5.4, 5.8, 5.9
11-14	Theodolite	Theodolites, types, main parts, definitions, fundamental operations and measurements, Electronic Theodolite	6.1, 6.2, 6.5, 6.6, 6.7, 6.9
15-17	Traversing	Traversing- Types- open and closed,Compass traversing, Theodolite traversing, measurements of traverse angles, measurements of lengths,	7.2, 7.4, 7.5, 7.6, 7.7, 7.9, 7.10
18-20	Leveling;	Definition, leveling instruments, Engineer's levels-dumpy level, tilting level, automatic level, leveling staff, curvature and refraction, principles ofleveling, differential leveling, reciprocal leveling, digital leveling, errors in leveling and its adjustments,	9.1, 9.2, 9.4, 9.6, 9.7, 9.8, 9.10, 9.11, 9.12, 9.13, 9.15, 9.17
21-23	Contouring	Contour Interval, Characteristics Interpolation, Gradient, Use of contourmaps	10.2, 10.3, 10.5, 10.6, 10.7
24-25	Plane Table Surveying	Accessories, operations, Methods of Plane Tabling, Intersection, Traversing, Three Point Problem, Two Point Problem, Errors,	11.1, 11.2, 11.4, 11.5, 11.6, 11.7, 11.8, 11.9, 11.10
26-28	Calculation of area& volume	General, Determination of areas through different methods, Determination ofVolume by various methods	12.1, 12.2, 12.3, 12.9, 13.1, 13.2, 13.3, 13.4, 13.8
29-31	Trigonometric leveling	Trigonometric leveling- Elevation & Height measurement	15.1, 15.2
32-35	Electromagnetic Distance Measurement (EDM)	Electronic Distance measurements, concepts, principles, instruments, Introduction and use of total station in surveying	24.1, 24.2, 24.4, 24.8

36-38	Curves	Basic definitions, classifications circularcurves and setting of curves; compound and reverse curves; short radius curve, transition curves; vertical curves	T1 Vol II 1.1, 1.2, 1.3, 1.5, 2.3, 3.2, 3.5, 4.3, 4.4
39-41	Triangulation	Triangulation- introduction, applications,classifications	8.1, 8.2, 8.3, 8.5

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	13-09-2023	1-11	CB
Test 2	60 Minutes	17	18-10-2023	12- 25	OB
Test 3	60 Minutes	17	27-11-2023	26- 40	CB
Lab	Throughout semester	10	**	**	CB
Comprehensive Exam	3 Hours	40	20-12-2023	1- 41	CB

** To be announced in the class

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

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

Date: 02/08/2023   **Ms.JYOTI PATEL(VF)**
                                                              Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2023-2024
Course Handouts

Course Code	Course Title	L	P	U
MA301	**Mathematics-IV**	**3**	**0**	**3**

Instructor-in-charge: Dr.SHANTI SWARUP DUBEY

Learning Outcomes **:**
Enables one to devise algorithms for the numerical solutions of mathematical problems. Also discusses the error analysis of different algorithms.

Textbook(s) T1	Applied Numerical Analysis, C.F. Gerald, P.O. Wheatley, Addison-Wesley, 6th Edition, 2001.
Reference Book(s) **R1**	Introduction to Numerical Analysis, K.E.Atkinson, John Wiley and Sons, 2nd Edition, 2001.
R2	Numerical Analysis, Burden and Faires, Thomson Learning, 7th Edition, 2001.

Lecture-wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text Book)
1-4	To understand the potential pitfalls of numerical computing	Computer Arithmetic and Errors	0.5, pg.15 - 24
5-10	To find roots of nonlinear equations and understand the relative strengths and weaknesses of each computation methods of system of non-linear equations.	Interval halving, Linear interpolation methods, Newton's method, Muller's method, Fixed point iteration: x =g(x) method, Multiple roots, Theoretical matters.	1.2 - 1.6, 1.10, 1.11. Pg. 42 - 59 Pg. 76 - 87
11-16	To solve a linear system, using Gaussian elimination and iterative methods and compute matrix inverse and understand the relative strengths and weakness of each computational method	The Elimination method, The Gaussian Elimination and Gauss - Jordan methods, Other direct methods, Pathology in linear systems - singular matrices, determinants and matrix inversion, Norms, Condition numbers and errors in solutions, Iterative methods, The relaxation method, Systems of nonlinear equations, Theoretical	2.3 - 2.13 Pg. 123 - 184

17-23	What is an interpolating polynomial and how to efficiently evaluate it	An interpolation problem, Lagrangian polynomials, divided differences.	3.1 - 3.3 Pg. 221 - 238
24-30	To compute numerical derivatives and integrals using discrete data points and know how to integrate functions containing singularities	Derivatives from difference tables, Higher order derivatives, Newton - Cotes integration formulas, The trapezoidal rule - a composite formula, Simpson's rules, Other ways to derive integration formulas, Gaussian quadrature.	5.2, 5.3, 5.5 - 5.9. pg. 357 - 368 pg. 374 - 393
31-37	To compute numerical solutions of initial value problems	The Taylor Series method, Euler and Modified Euler's method, Runge- Kutta methods, Multistep methods, Milne's method, The Adams-Moulton method, System of equations and higher oder equations	6.2- 6.7, 6.9 pg. 452 - 474 pg. 477 - 482
38-42	To compute eigen values and eigen vectors of matrices, to solve boundary value problems	The shooting method, Solution through set of equations, Derivative boundary conditions, Characteristic- value problems	7.2 - 7.5 pg. 530 - 550

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	17	11-09-2023	1-10	CB
Test 2	60 Minutes	17	18-10-2023	11- 20	OB
Test 3	60 Minutes	16	27-11-2023	21- 30	CB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	20-12-2023	1- 40	CB

** To be announced in the class

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

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

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

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

Course Code	Course Title	L	P	U
CE311	**Analysis of Structures II**	**3**	**0**	**3**

Instructor-in-charge: Ms.JYOTI PATEL

Scope & Objective of the course:
Make student to understand three moment equation.
To understand the method of strain energy.
To understand the method of moment distribution

Textbook(s)T1	Basic structural analysis (vol. I &II) – S.S. Bhavikatti
T2	Theory of structures – B. C. Punmia
Reference book(s)R1	Theory of structures – S. Ramamurtham

Lecture wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Book
1	Method of three moment	Indeterminate beams	T1, T2,
2-3	Method of three moment	Principle of super position	T1, T2, R1
4-5	Method of three moment	Analysis by consistent deformation method	T1, T2, R1
6	Method of three moment	Theorem of three moment, sinking of supports	T1, T2,
7-8	Method of three moment	Shear force and bending moment diagram	T1, R1
9-11	Method of strain energy	Strain energy of linear elastic system due to axial loads	T1, T2
12-13	Method of strain energy	Bending moment and torsion , castigliano's second theorem	T1, T2
14-16	Method of strain energy	Application to indeterminate beams and rigid frame, stresses due to lack of fit	T1, T2
17-18	Method of moment distribution	Moment distribution method	T1, T2

19-20	Method of moment distribution	Application to indeterminate beams and rigid frames.	T1
21-23	Method of moment distribution	Application to indeterminate beams and rigid frames without sway problems.	T1, T2
24	Method of moment distribution	Application to indeterminate beams and rigid frames with sway problems.	T1
25-27	Method of slope deflection and column analogy	Slope deflection method	T1, T2
28-29	Method of slope deflection and column analogy	Application to indeterminate beams and rigid frames without or with sway problem	T1, T2
30-32	Method of slope deflection and column analogy	Basics of column analogy method and application for fixed beams.	T1, T2
33-35	Influence lines by muller Breslau principle	Qualitative and quantitative influence lines of indeterminate beams by muller Breslau Principle	T1, T2
36-38	Influence lines by muller Breslau principle	Application to propped cantilevers	T1, T2
39-40	Influence lines by muller Breslau principle	Application to continuous beams.	T1, T2

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	11-09-2023		CB
Test 2	60 Minutes	17	16-10-2023		OB
Test 3	60 Minutes	17	21-11-2023		CB
Lab	Throughout semester	10	**		CB
Comprehensive Exam	3 Hours	40	11-12-2023		CB

** To be announced in the class

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

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

Date: 02/08/2023   **Ms.JYOTI PATEL**
                                                                   Instructor-in-charge

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

Course Code	Course Title	L	P	U
CE314	**Construction Planning and Management**	**3**	**0**	**3**

Instructor-in-charge: Ms.JYOTI PATEL

Scope & Objective of the course:
1. To develop fundamental knowledge of project management and cost control
2. To learn about various techniques for project planning, scheduling and monitoring
3. To develop awareness of safety and quality control

Textbook(s)T1	Construction engineering and management – S. Seetharaman
T2	Project planning and control with PERT and CPM – B. C. Punmia

Lecture wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	book
1	Introduction	Objectives and functions of construction management	T1, T2,
2-3	Introduction	Stages in construction stages in planning	T1, T2,
4-6	Introduction	Bar chart and milestone charts, project feasibility reports	T1, T2,
7-8	Introduction	Scheduling job layout and line of balance technique	T1, T2,
9-10	Construction Scheduling	PERT- necessity for good scheduling,	T1, T2,
11-12	Construction Scheduling	Elements of network, development of network	T1, T2
13-14	Construction Scheduling	PERT – time estimates, time computation, network analysis	T1, T2
15-16	Construction Scheduling	Slack, critical path	T1, T2
17-18	Construction Scheduling	CPM – steps in CPM project planning	T1
19-20	Construction Scheduling	Network analysis,	T1

21-23	Construction Scheduling	Activity times and floats	T1
24	Construction Scheduling	Critical activities and critical path determination	T1
25-27	Cost control and Resource Allocation	Cost control in construction – importance , objectives of cost control	T1, T2
28-29	Cost control and Resource Allocation	Economic analysis of engineering projects, economic studies	T1, T2
30-32	Cost control and Resource Allocation	Resource allocation, resource leveling, project updating, construction cost monitoring	T1, T2
33-35	Construction safety and Quality control	Importance, cases of accidents , safety measures, responsibility for safety	T1, T2
36-38	Construction safety and Quality control	Safety benefits to various parties, safety clauses in contract.	T1, T2
39-40	Construction safety and Quality control	Quality control in construction- element of quality.	T1, T2

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	13-09-2023		CB
Test 2	60 Minutes	17	17-10-2023		OB
Test 3	60 Minutes	17	23-11-2023		CB
Lab	Throughout semester	10	**		CB
Comprehensive Exam	3 Hours	40	13-12-2023		CB

** To be announced in the class

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

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

Date: 02/08/2023   **Ms.JYOTI PATEL**
                                                          Instructor-in-charge

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

Course Code	Course Title	L	P	U
CE315	**Advance Geodesy**	**3**	**0**	**3**

Instructor-in-charge: Ms.JYOTI PATEL(VF)

Learning Outcomes:
After successful completion of the course student will be able to
1. To be familiar with various aspects of triangulations.
2. To deal with the relevant computations, errors and observations.
3. To gain the knowledge of tachometry various system and instruments.
4. To learn the concepts of photographic and aerial surveying.
5. To learn and apply the concept of hydrographic surveying.

Textbook(s) T1	Surveying (vol I & II) – B.C. Punmia
T2	Surveying (vol II & III) R. Agor
Reference book (s) R1	Surveying (vol I & II) – T.P. Kanetkar
R2	Surveying (vol I & II) – C venkataramaih

Lecture-wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./Pg No)
1	Trilateration and triangulation	Principle of Trilateration, Reduction of observation	T1
2-3	Trilateration and Triangulation	Principle and classification of triangulation system.	T1
4	Trilateration and Triangulation	Triangulation chains, strength of figures,	T1
5-6	Trilateration and Triangulation	Station marks and signals, satellite station, intersected and resected point.	T1
7-8	Trilateration and Triangulation	Field works	T1
9-10	Adjustment computations	Weighting of observations, treatment of random errors	T2
11	Adjustment computations	Probability eq, normal law of error, most probable value,	T2

12-13	Adjustment computations	Propagations of errors and variances, principle of least square	T2
14-16	Adjustment computations	Observations and correlative normal equation.	T2
17-18	Adjustment computations	Adjustment triangulation fig and level nets	T2

19	Tacheometery	Definitions , principle of stadia system	T1
20-21	Tacheometery	Instrument constant, substance and tangential systems,	T1
22-23	Tacheometery	Construction and use of reduction tachometers , range finders	T1
24	Tacheometery	EDM instruments , total station	T1
25	Photographic and aerial surveying	Photo Theodolite	T1
26-27	Photographic and aerial surveying	Principle of photogrammetry,	T1
28-30	Photographic and aerial surveying	Stereo photogrammetry, aerial surveying, scale and distortion of the vertical and tilted photograph	T1
31-32	Photographic and aerial surveying	GPS GIS study	T2
33-36	Hydrographic surveying	Introduction, shore line survey , soundings method, gauges ,	T1
37-40	Hydrographic surveying	Problem related to hydro graphic surveying, sounding party, method of locating soundings, reduction of soundings.	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.

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	13-09-2023	1-12	CB
Test 2	60 Minutes	17	16-10-2023	13- 27	OB
Test 3	60 Minutes	17	21-11-2023	28- 40	CB
Quizzes (2)	20 Minutes	10	**	**	CB
Comprehensive Exam	3 Hours	40	8-12-2023	1- 40	CB

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

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

Date: 01/08/2023   **Ms.JYOTI PATEL**
                                                        Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2023-2024
Course Handouts

Course Code	Course Title	L	P	U
CS311	**Computer Network**	**3**	**0**	**3**

Instructor-in-charge: Dr.RAMESH KUMAR YADAV

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

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

Lecture-wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./PgNo)
1	Introduction to Computer Networking	Introduction to Networks, ComputerNetworking	T1: Ch-1
2-3	Use of Hardware andSoftware	Uses of computer networks, network hardware, network software	T2: Ch-1
4-5	Introduction to OSI, TCP/IP	Introduction to Reference Models OSI,TCP/IP Layers	T1: Ch-2, T2: Ch-1
6	Analog and digital Transmissions	Types of Signals: Analog and digital,Analog signals, Digital signals, Transmission impairment	T1: Ch-3

7-8	Coding and Sampling in Transmission	Line coding, block coding, 0sampling,transmission mode	T1: Ch-4
9-10	Transmission in PhysicalLayer	Types of Transmission media: Guidedmedia and Unguided media	T1: Ch-7,T2:
11	Data Link Layer	Data Link Layer Design Issues	T2: Ch-3
12-13	Errors and their significance	Error Detection And Correction	T1: Ch-10, T2: Ch-3
14-16	Data Link Layer Protocols	Data link Control and Protocols: Elementary Data Link Protocols, Sliding Window Protocols	T1: Ch-11,T2: Ch-3
17-18	MAC	Multiple Access Protocols	T1: Ch-13, T2: Ch-4
19	Design of Network Layer	Network Layer Design Issues	T2: Ch-5
20-21	Types of Routing	Routing Algorithms	T1: Ch-19, T2: Ch-5
22-23	Removing Congestion on Network	Congestion Control Algorithms	T1: Ch-23, T2: Ch-5
24	Internetworking	Quality Of Service, Internetworking	T1: Ch-23
25	Protocols of Transport Layer	The Transport Service	T1: Ch-22, T2: Ch-6
26-27		Elements of Transport Protocols, A Simple Transport Protocol	T1: Ch-22, T2: Ch-6
28-29	Internet Transport Protocols	The Internet Transport Protocols: UDP, The Internet Transport Protocols: TCP	T1: Ch-22
30-34	Services of Application Layer	DNS--Domain Name System, Electronic Mail, The World Wide Web	T1:Ch-25,26, 27,T2:Ch-7
35-38	Security on Networks	Cryptography, Symmetric-Key Algorithms	T1: Ch-29,31, T2: Ch-8
39-40	Algorithms	Public-Key Algorithms	T2: Ch-8

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	11-09-23	01-10	CB
Test 2	60 Minutes	17	16-10-23	11-20	OB
Test 3	60 Minutes	17	20-11-23	31- 40	CB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	11-12-23	01-40	CB

** To be announced in the class

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

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

Date: 03/08/2023   **Dr.RAMESH KUMAR YADAV**
                                                          Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2023-2024
Course Handouts

Course Code	Course Title	L	P	U
CS312	**Computer Organization and Architecture**	**3**	**0**	**3**

Instructor-in-charge: Dr.MANJU LATA SAHU

Learning Outcomes
Upon successful completion of the course, student will be: 1. Able to describe the basic hardware components of a computer system. 2. Familiar with the functional units of the processor such as the register file and arithmetic-logical unit. 3. Familiar with the representation of data, addressing modes and instruction sets. 4. Familiar with the RISC/CISC architectures and memory organization

Textbook(s)T1	Computer Organization & Architecture, Morris Mano,3rd Ed.,Pearson Education/Prentice Hall-New Delhi, 2004.
T2	Computer Organization, V.C.Hamacher, Z.G. Vranesic and S.G. Zaky, Mc Graw Hill, 5th Edition,2002.
Reference book(s)R1	Structured Computer Organization, A.S.Tanenbaum:,4th Ed., Pearson Education.,/Prentice Hall New Delhi.,2004
R2	Advanced Computer Architecture: Parallelism Scalability, Programmability, Kai Hwang, TMH, New Delhi,2002
NPTEL	https://archive.nptel.ac.in/courses/106/105/106105163/

Lecture-wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference(Ch./Sec./Page Nos. of Text Book)
1-4	To understand the basic structure of a computer	Functional units, Basic operational concepts, Bus structures, Memory, register, data, instruction, program counter, Accumulator, bus architecture	T1: Ch8 , 241
5-7	To understand the concept of addressing modes	Different types of Addressing modes	T1: Ch 8,260

8-10	To understand how a complete instruction executes	Instruction field, Instruction formats, Micro operations, Execution of a Complete Instruction	T1:Ch8,255,222
11-12			
13-15	To understand the control unit organization	Hardwired control, Micro programmed Control Organization	T1: Ch 7,213,214
16-17		Control memory, Address sequencing,	T1: Ch 7,213-214
18-20		Micro-Program Sequence, Microprogramming.	T1: Ch 7,232-235
21-22	To understand how arithmetic are performed inside a computer	Addition and subtractions algorithm	T1:Ch 10,334-338
23-24		Multiplication algorithm	T1:Ch 10,340-346
25-26		Division Algorithm	T1: Ch 10,348-353
27-28		Design of control unit	T1:Ch 7, 231
29-30		Floating point arithmetic.	T1: Ch 10,354-362
31	To understand Input Output Organization	Programmed I/O.,I/O addressing, I/O instruction	T1:Ch 11,381
32-34		Synchronization, RISC,CISC, pipelining	T1:Ch8, 241
35-36	To understand Memory Organization	Basic concepts and terminology, Memory hierarchy	T1:Ch 12,445
37		Semiconductor memories RAM, ROM	T1: Ch 12,448
38-39		Memories and interleaving, Virtual memory	T1: Ch 9, 324 Ch 12,469
40		Cache memory, Associative memory	T1: Ch 12,462,456

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec. No.)	Remarks
Test 1	60 Minutes	16	12-09-2023	1-10	CB
Test 2	60 Minutes	17	17-10-2023	11-20	OB
Test 3	60 Minutes	17	21-11-2023	21-30	CB
Quiz	20 minutes	10	**	**	CB
Comprehensive Exam	3 Hours	40	13-12-2023	1-40	CB

** To be announced in the class

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

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

Date: 01/08/2023   **Dr.MANJU LATA SAHU**
                                                            Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology

First Semester, 2023-2024

Course Handouts

Course Code	Course Title	L	P	U
CS313	**Data Structure Algorithm**	**3**	**0**	**3**

Instructor-in-charge: Mr.ASHISH KUMBHARE

Learning Outcomes:

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

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

Textbook(s) T1	Fundamentals of Data Structures by Ellis Horowitz & Sartaj Sahni, Computer Science press.
Referencebook(s) R1	Data Structures using C by A. K. Sharma, Pearson Education
Reference Books R2	Data structures and Algorithm Analysis in C, 2nd edition, M.A.Weiss, Pearson.
R3	Data structures and Program Design in C, 2nd edition, R.Kruse, C.L.Tondo and B.Leung,Pearson
NPTEL Link	https://nptel.ac.in/courses/106/102/106102064/
SWAYAM Link	https://onlinecourses.swayam2.ac.in/cec19_cs04/preview

Lectue wise plan:

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

6-7	To learn various sorting techniques	Sorting Algorithms: Bubble Sort, Insertion Sort, Selection Sort	T1 CH-7 7.1, 7.2
8-10	To learn various sorting techniques using Divide and Conquer strategy.	Quick Sort, Merge Sort & Radix sort	T1 CH-7 7.3, 7.4, 7.5
11	To learn introduction to linear data structure stack.	Stack concept	T1 CH-3 3.1
12-13	To learn various stack operations.	Operations PUSH, POP, TRAVERSE, Isfull, Isempty.	T1 CH-3 3.1, 3.2
14-17	To learn Applications of stack	Infix, Prefix, Postfix representation, Conversion using stack	T1 CH-3 3.3
18-19	To learn introduction to linear data structure Queue and its types.	Introduction, and Types of Queues, Priority Queue, Circular queue, Double Ended Queue,	T1 CH-3 3.1
20	To learn various Queue operations.	Operations (INSERT, DELETE, TRAVERSE)	T1 CH-3 3.1, 3.2
21-22	To learn introduction to linear data structure Linked list and its types.	Linked List, Singly and Doubly Linear link lists, Singly and doubly circular linked list	T1 CH-4 4.1
23-24	To learn various linked List operations	Operations on linked lists insert, delete, Applications of linked lists.	T1 CH-4 4.8,4.9
25-26	To learn introduction to Nonlinear data structure Tree and its types.	Definition of trees and their types, Binary trees, Properties of Binary trees,.	T1 CH-5 5.1, 5.2
27-30	To learn various operations and traversal technique.	Insertion, deletion, Searching and traversal algorithm, Preorder, post order, in-order traversal) , BFS, DFS	T1 CH-5 5.3, 5.4, 5.5
31-32	To learn various applications of tree	Binary Search Trees, Implementations, AVL Trees, B tree,	T1 CH-5 5.6, 5.7
33	To learn introduction to Nonlinear data structure Graph and its types.	Definition of Graph and their types	T1 CH-6 6.1
34-35	To learn various applications of Graph	Adjacency and incident (matrix & linked list) representation of graphs, Weighted Graphs,	T1 CH-6 6.2
36-38	To learn various operations and traversal technique.	Shortest path Algorithm, Spanning tree, Minimum Spanning tree,	T1 CH-6 6.3, 6.4
39-42	To learn various operations and traversal technique.	Kruskal and prims algorithms.	T1 CH-6 6.3, 6.4

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec. No.)	Remarks
Test 1	60 Minutes	16	12/09/2023	1-12	CB
Test 2	60 Minutes	17	17/10/2023	13- 26	OB
Test 3	60 Minutes	17	21/11/2023	27- 42	CB
Quizzes (2)	20 Minutes each	10	**	**	**
Comprehensive Exam	3 Hours	40	15/12/2022	1- 42	CB

** To be announced in the class

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

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

Date: 02/08/2023   **Mr.ASHISH KUMBHARE**
                                                        Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First 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 Outcome –
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.

Textbook(s) T1	Operating System Concepts, Silberschatz, A and Galvin, P.B, 7th edition, Addison, Wesley, 1998.
T2	Operating Systems- A concept bases approach, Dhamdhere D.M., 2nd edition, TMH 2006.
Reference Book(s) R1	Operating Systems, Stallings W, 4th edition, PHI, 2001.
R2	The design of the Unix operating System, Bach, M.J, PHI, 1986.
R3	Modern Operating Systems, Tanenbaum, A.S, PHI, 1996.
NPTEL	https://nptel.ac.in/courses/106/105/106105214/

Lecture wise plan:

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

		Batch, interactive time sharing and real time systems	T1 CH-1
4			T1 CH-1
5		Operating System Structure, operating system service,	T1 CH-3
6		Process overview (State, PCB)	T1 CH-4
7-8	To understand the concept of process and its various states	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 Scheduling Overview	T1 CH-6
12-13		Scheduling Algorithms	T1 CH-6
14		Critical Section Problem	T1 CH-7
15	To understand the problem of Critical Section and its solution	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		Memory Management Overview	T1 CH-9
22-23	To understand various memory management schemes and their relative advantages and disadvantages	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 files and brief introduction to distributive O.S	File Operations	T1 CH-11
32-33		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

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec. No.)	Remarks
Test 1	60 Minutes	16	11.09.2022	1-10	CB
Test 2	60 Minutes	17	16.10.2022	11- 20	OB
Test 3	60 Minutes	17	20.11.2022	21- 30	CB
Quiz	20 Minutes	10	**	**	CB
Comprehensive Exam	3 Hours	40	08.12.2022	1- 40	CB

** To be announced in the class

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

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

Date: 01/08/2023   **Dr.PALAK KESHWANI**
                                                              Instructor-in-charge

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

Course Code	Course Title	L	P	U
CS315	**Database Management Systems**	**3**	**2**	**4**

Instructor-in-charge: Mr.NAVEEN KUMAR VAISHANV

Scope & Objective of the Course:

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

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

Lecture wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page No.s of Text/Ref. Books)
1-3	Introduction to Database Systems	Course overview, Overview of modern DBMS, Database Architecture	T1: 1.1-1.13
4-8	About Database	Data Independence, Data Dictionary, Types of Keys	T1: 2.1-2.13
8-11	Data modeling	Basic elements of ER model, Attributes, Types of Relationship	T1: 7.1-7.10
12-16	Introduction to SQL constructs	DDL & DML Commands	T1: 3.1-3.9
17-19	Types of Operators and Functions	In, Between, Like, Aggregate Functions	T1: 5.1
20-25	Understanding additional SQL structures	Insert, Delete, Update, View Definition And Use, Temporary Tables, Nested Queries	T1: 4.1-4.5

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

Evaluation Scheme:

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

Component	Duration	Weightage (%)	Date	Syllabus (Lecture No)	Remarks
Test 1	60 Minutes	16	13-09-2023	1-16	CB
Test 2	60 Minutes	17	18-10-2023	17- 29	OB
Test 3	60 Minutes	17	22-11-2023	30-40	CB
Lab	2 Hours	10	**	**	CB
Comprehensive Exam	3 Hours	40	20-12-2023	1- 40	CB

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

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

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

Date: 02/08/2023   **Mr.NAVEEN KUMAR VAISHNAV**
                                                                          Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2023-2024
Course Handouts

Course Code	Course Title	L	P	U
EC311	**Electronic Circuit Analysis**	**3**	**2**	**4**

Instructor-in-charge: Dr.K KISHORE KUMAR

Learning Outcomes:
After successful completion of the course student will be able to
1. Develop the ability to analyse and design digital systems
2. Understand combinational and sequential digital circuits design with timing constraints

Text books T1	Digital Design Principles & Practices, John F Wakerly, Pearson education, Fourth edition, 2006
Reference Books R1	Modern Digital Electronics, RP Jain, TMH, Fourth edition, 2010.
R2	FPGA Based System Design, Wayne Wolf, First Edition 2009,Pearson
R3	Computer Logic Design, M.Morris Mano, Prentice-hall 1972

Lecture wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference Chap/Sec
1,2	Learning basic definitions.	Introduction to S/W & H.W aspects of digital design.	T1: 1.1,1.2, 1.3, 1.4, 1.5
3,4	To introduce advanced integrated circuits.	Introduction to PLD, ASIC and digital design levels.	T1: 1.7, 1.8, 1.10
5	Introduction to parameters of logic families	Logic signals and gates, Logic Families,	T1: 3.1,3.2
6-7	Digital Logic Families	Logic families introduction, Characteristics of Digital ICs	R1: 4.1 to 4.2

8-10	Learning Bipolar logic families	RTL,DCTL, I²L, DTL,	R1: 4.3 to 4.8
11-12	Learning Bipolar logic families	TTL, ECL	R1: 4.9 & 4.11
13-16	Learning Unipolar logic families.	CMOS logic levels, MOS transistors. CMOS inverter, NAND, NOR and Non-inverting gates, AND-OR-INVERT & OR-AND-INVERT gates and Fan-in	T1: 3.3
17-19	To study steady state behavior of CMOS.	CMOS steady state electrical behavior.	T1:3.4, 3.5
20-22	To dynamic behaviour of CMOS.	CMOS dynamic electrical behaviour	T1: 3.6, 3.7
23-25	Combinational logic Circuits design.	Timing hazards. Timing diagrams, propagation delay. Timing specifications and analysis	T1: 4.4
26-28	To understand the basics of HDL	Hardware Description Language,	T1: 5.1,5.2
29-30	Combinational logic Circuits design.	Combinational logic circuits design using VHDL for Decoders, Encoders, Three state devices	T1: 6.4, 6.5, 6.6
31-33	Combinational logic Circuits design.	Multiplexers, EX-OR and parity circuits, comparators, adders, Subtractors, ALUs using VHDL	T1: 6.7-6.11
34-36	Sequential logic circuits design.	Bi-stable elements, Latches and flip-flops	T1: 7.1,7.2
37-39	Sequential logic circuits design.	Clocked synchronous state machine analysis (state machine structure and output logic).	T1: 7.3
40- 42	Sequential logic circuits design.	Clocked synchronous state machine design.(characteristic equations and analysis of state machines with D Flip-flops)	T1: 7.4

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	11-09-2023	1-10	CB
Test 2	60 Minutes	17	16-10-2023	11- 24	OB
Test 3	60 Minutes	17	21-11-2023	25- 38	CB
Quiz-1 and Quiz-2	Continuous	10	**	**	CB
Comprehensive Exam	3 Hours	40	11-12-2023	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 concerned instructor is must.

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

Date: 02/08/2023   **Dr.K KISHORE KUMAR**
                                                                              Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2023-2024
Course Handouts

Course Code	Course Title	L	P	U
EC312	**Analog Communication**	**3**	**2**	**4**

Instructor-in-charge: Mr.ROHIT KUMAR(VF)

Learning Outcomes:
After successful completion of the course student will be able to: The objective of the course is to Understand basic elements of a communication system. Analyze baseband signals in time domain and in frequency domain. Understand various analog modulation and demodulation techniques and analyze the performance of modulation and demodulation techniques in various transmission environment

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

Lecture wise plan:

Lecture No.	Learning Objective	Topics to be covered	(Ch./Sec./Text Book)
1	To understand the concept of communication.	**FOURIER TRANSFORM** Introduction to communication system, Need for modulation	T 1:1,1.2,1.3
2	To know the importance of FM	Frequency Division Multiplexing, Amplitude Modulation	T1: 3.1,T1:5.1
3	To understand the importance of TD & FD	Definition, Time domain and frequency domain description	T1: 3.2
4-6	To understand the concept of Fourier Transform	Introduction to Fourier Transform and Inverse Fourier Transform.Properties of Fourier Transform	T1: 1-4.1,1-4.2

7-9	To know the concept of PSD	Spectrum Analysis using Fourier Transform Power spectral density (PSD).	T1: 1-4.3
10-12	To understand the AM concepts	**AMPLITUDE MODULATION** Single tone modulation, power relations in AM waves	T1: 3.1, 3.2
13-14	Know the concept of Generation of AM	Generation of AM waves, square law Modulator, Switching modulator	T1: 3.2
15-16	Know the concept of Detection of AM	Detection of AM Waves, Square law detector, Envelope detector,	T1:4.1- 4.5
17	Know the concept of suppressed carrier	Double side band suppressed carrier modulators	T1:4.1- 4.5
18	Know the concept of DSBSC	Generation of DSBSC Waves, Balanced Modulators	T1:4.1- 4.5
19-20	To understand the Types of DSBSC	Ring Modulator, Coherent detection of DSB-SC Modulated wave COSTAS Loop.	T1:4.1- 4.5
21-22	To understand the concept of Angle modulation	**ANGLE MODULATION** Basic concepts, Frequency Modulation:	T1: 5.1,5.2,5.3
23-25	To understand the spectrum analysis methods	Single tone frequency modulation Spectrum Analysis of Sinusoidal FM Wave Narrow band FM, Wide band FM	T1: 5.1,5.2,5.3
26-28	To know the concept of FM detection methods	Constant Average Power, Transmission bandwidth of FM Wave Detection of FM Waves: Balanced Frequency discriminator	T1: 5.1,5.2,5.3
29-30	To understand the comparison of AM & FM	Zero crossing detector, Phase locked loop, Comparison of FM and AM.	T1: 5.1,5.2,5.3
31-33	To understand the concept of Noise in communication	**NOISE** Resistive Noise Source (Thermal),Arbitrary Noise Sources, Effective Noise Temperature,	T1: 2.1,2.2,2.3, 2.4,2.5 R1:7.2,R_2:2.10

34-35	Impact of noise in cascaded circuits	Average Noise Figures, Average Noise Figure of cascaded networks	T1: 2.1,2.2,2.3, 2.4,2.5
36-37	Properties and representation of Noise	Narrow Band noise, Quadrature representation of narrow band noise & its properties	T1: 2.1,2.2,2.3, 2.4,2.5R1:8.2-8.4,9.2 R$_2$:2.11-2.13
38-39	To understand the Noise in impact on AM DSB & SSB	Noise in Analog communication System Noise in DSB and SSB System Noise in AM System,	T1: 2.1,2.2,2.3, 2.4,2.5
40-41	To understand the Concept of pre & de emphasis	Threshold effect in Angle Modulation System, Pre-emphasis and de-emphasis.	T1: 2.1,2.2,2.3, 2.4,2.5

List of Experiments:

Expt. No	Name of the Experiment
1	Study of 1KHz and 10KHz time domain and Frequency Domain Signal using MATLAB Simulink
2	Study of Amplitude modulated signal and its spectrum using MATLAB Simulink
3	Amplitude Modulation and Demodulation
4	Study of Voice Transmission
5	DSB-SC Modulation and Demodulation
6	Frequency Division Multiplexing(FDM)
7	Frequency Modulation and Demodulation
8	Pre-Emphasis and De-Emphasis
9	Pulse Amplitude Modulation &Demodulation
10	Pulse Width Modulation and Demodulation
11	Pulse Position Modulation and Demodulation
12	Verification of Sampling Theorem

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	06-09-2023	1-13	CB
Test 2	60 Minutes	17	17-10-2023	14- 28	OB
Test 3	60 Minutes	17	17-10-2023	29- 41	CB
AC Lab		5	**		CB
Quizzes (2)	20 Minutes each	5	**	**	CB
Comprehensive Exam	3 Hours	40	13-12-2023	1- 41	CB

** To be announced in the class

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

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

Date: 02/08/2023   **Mr.ROHIT KUMAR(VF)**
                                                                            Instructor-in-charge

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

Course Code	Course Title	L	P	U
EC313	**EM Fields and Waves**	**3**	**0**	**3**

Instructor-in-charge: Mrs.BHAVNA CHAUDHARY(VF)

Scope & Objective of the course:
The objective of this course is to provide the students with the basic understanding of electromagnetic fields and waves. The material covered is fundamental to the training of Electrical engineers.

Textbook(s) T1	Electromagnetic with Applications, John D.Kraus, 5thEdition, TMHl, 1999.
T2	Antennas For All Applications, John DKraus,3rd Edition,TMH,2006.
Reference book(s) R1	Elements of Electromagnetic, Matthew N.O.Sadiku, 3rd Edition, Oxford University Press, 2005.
R2	Fundamentals of Applied Electromagnetic, Fawwaz TUlaby, 2nd Edition PHI, 2001.
R3	Engineering Electromagnetic, WH Hayt, JABuck,7th Edition, TMH,2006.

Lecture wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference(Ch./Sec./Page Nos.of Text Book)
1-4	Introduce the fundamental concepts culminating in Maxwell's equations	Maxwell's equations, Constitutive relations and Boundary conditions	T1:2.6-2.8, 2.12 (pg81-87), 2.13,2.15,2.16.
5-7	Understand the propagation of waves through space and various media	Plane Wave propagation in dielectric and conducting media	T1:4.1-4.6,4.7(pg189-193)
8	To understand how the velocity of wave changes with time	Relative Phase velocity and Index of Refraction and Group Velocity	T1:4.8,4.9

9-10	How energy is stored and transmitted in EM wave	Energy Relations and Pointing Vector	T1:4.10 T1:4.10
11-13	Understand various types of polarization in EM waves and their characteristics	Wave Polarization	T1:4.11-4.13
14-16	Behavior of plane waves at the interface between two media	Oblique Incidence: Reflection and Refraction	T1:4.14
17-18	To understand how the two approaches of field and circuit theory are related to each other	Relation between of field and circuit theory	T1:3.1-3.2.
19-21	Analysis of various cases of transmission lines from both circuit theory and field theory point of view	Transmission Lines	T1:3.3,3.4
22-24	How to solve transmission line problems using Smith Chart	Impedance matching Smith Chart	T1:3.4,3.5 More details in Ref.Book1.
25-27	Discussion of transmission systems with emphasis on waves of higher order ie having components of E or Hin the direction of propagation, their field configuration, cut-off wavelengths and attenuation	Waveguides with rectangular and cylindrical cross-section	T1:8.2-8.5
28-29	Antenna Basics	Time varying potentials (Retard ed vector and scalar potential) and antenna parameters	R1:9.6 T2:2.2-2.10
30-32	Knowledge of basic types of antennas.	Short Dipole, ?/2dipole and it's Radiation Resistance	T2:5.2-5.6
33-36	Arrays and various radiation pattern	Arrays: Point source, Two isotropic sources, Pattern multiplication point sources (Broad Side and End Fire array), Binomial array	T2:4.2-4.15

	37-40	Types of Antennas	Reflector Antenna, different type Of parabolic antenna, Horn Antennas	T2:8.1,8.5-8.7, 6.19-6.20

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	17	13-09-2023	1-12	CB
Test 2	60 Minutes	17	16-10-2023	13- 28	OB
Test 3	60 Minutes	16	21-11-2023	29- 42	CB
Quizzes (2)	20 Minutes each	10		**	CB
Comprehensive Exam	3 Hours	40	08-12-2023	1- 42	CB

** To be announced in the class

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

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

Date: 04/08/2023   **Mrs.BHAVNA CHAUDHARY(VF)**
                                                                    Instructor-in-charge

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

Course Code	Course Title	L	P	U
EC314	**Digital Signal Processing**	**3**	**2**	**4**

Instructor-in-charge: Dr.K NAGAIAH

Learning Outcomes:
After successful completion of the course student will be able to
The course aims at providing a framework to understand the filter design aspects of digital signal processing. It shall deal with the design methodology of digital FIR & IIR filters. Different filter structures for the realization of digital filters will be discussed. It will further provide a treatment of sampling rate conversions and its application to multirate digital signal processing. Adaptive filtering will also be discussed. DSP Processor architectures, instructions and implementation of DSP algorithms will also be part of the course

Textbook(s) T1	"Digital Signal Processing: A Practical Approach", Emmanuel C Ifeachor & Barrie W. Jervis, Pearson Education, Second Ed., 2003.
Reference Book(s) R1	"Algorithms for Statistical Signal Processing", John G Proakis et.al, PearsonEducation., 2002.
Reference Book(s) R2	Mitra S K "Digital Signal Processing: A Computer Based Approach", , TMH, 3rd. ed. 2005.
Reference Book(s) R3	Oppenhiem & Schafer, "Digital Signal Processing", Pearson Education , 2002
Reference Book(s) R4	B.Venkataramani & M Bhaskar, "Digital Signal Processors: Architecture, Programming and Applications", TMH, 2002.

Lecture wise plan:

Lecture No.	Learning Objective	Topics to be covered	(Ch./Sec./Text Book)
1	General Introduction to DSP & filter designand filter specifications	Framework for Digital filter design	TB:6.1-6.4 R2:7.1.1-7.1.3
2-3	Standard design procedure for analog lowpass, high pass, Bandpass, and Bandstop filters filters from given specifications	Design of analog low pass filter: Butterworth & Chebyshev approximations	TB: 8.9.1.1-8.9.1.2
4-5		Frequency transformation in analog domain	TB: 8.9.2

6	Design of IIR filters with given specifications using the analog filter design	Digital IIR filter design concepts. Pole-zero placement method	TB: 8.1-8.5
7		Impulse Invariant method & Matched Z-transform method	TB:8.6-8.7
8-10		Bilinear Z-Transform method	TB:8.8-8.9 R2:7.2-7.4
11-12	Filter structures for IIR filters	Realization structures for IIR filters	TB: 8.13R2:6.4
13-14	Design of FIR filters using various design methodologies	FIR Filter Design Concepts. Concepts of linear phase	TB: 7.1-7.4 R2:4.4.1-4.4.54
15-16		FIR Filter Design using Window method	TB: 7.5 R2:7.7
17		FIR Filter Design using optimal method	TB: 7.6 R2:7.7
18		FIR Filter Design using frequency sampling method	TB: 7.7
19	Filter structures for FIR filters.	Realization structures for FIR filters	TB:7.10.1, 7.10.2 R2:6.3
20-22	Introduction to multirate signal processing.	Multi-rate DSP: Decimation& Interpolation, Multistage approach	TB: 9.1-9.2 R2:10.1-10.2.3
23	Filter design for multirate filters	Design of practical sampling rate converters	TB:9.3R2:10.3
24	Efficient filter structures for implementing multirate filters.	Sampling rate conversion using polyphase filter structures	TB9.6 R2:10.4
25-26	Introduction to the adaptive filter theory.	Adaptive filters: Concepts/ Basic Wiener Theory	TB: 10.1-10.3 R1:5.1-5.2.1
27-28	To design and study the performance of LMS filters	Basic LMS adaptive algorithm	TB: 10.4 R1: 5.2.2-5.2.3
29-30	Some practical applications of DSP filters	Applications of DSP	TB:8.19,9.7, 10.6 R2:
31-32	To know the difference between the Von Neumann architecture and Harvard	Introduction to programmable DSP's and DSP architectures	TB: 12.1-12.2 R4: 2.1-2.8

33	Comparison of various DSPs processors.	General purpose DSPs and selectioncriteria for DSPs	TB: 12.3-12.4
34-35	To study in detail the architecture and programming of the TMS320C5X DSP processor.	DSP TMS320C5X: Architecture	R4: 3.1-3.14
36-37		Addressing Modes	R4: 4.2
38		Instruction Set	R4: 4.3-4.9
39-40		Application Programs in C5X	R4: 6.1-6.3

List of Experiments:

Digital Signal Processing Laboratory: (List of Experiments)

1	Waveform Generation
2	Basic Operations On D.T Signals
3	Properties of Discrete Time System
4	Sampling Rate Conversion
5	Discrete Convolution
6	Discrete Fourier Transform
7	Fast Fourier Transform Algorithms
8	Design of FIR Filters
9	Design of Butterworth Filters
10	Design of Chebyshev Filters
11	Design of IIR Filters using MATLAB Code

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	17	13-09-2023	1-13	CB
Test 2	60 Minutes	17	19-10-2023	14- 26	OB
Test 3	60 Minutes	16	22-10-2023	27- 35	CB
DSP Lab		10			CB
Quizzes (2)	20 Minutes each	10		**	CB
Comprehensive Exam	3 Hours	40	16-12-2023	1- 40	CB

** To be announced in the class

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

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

Date: 02/08/2023   **Dr.K NAGAIAH**
                                                            Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2023-2024
Course Handouts

Course Code	Course Title	L	P	U
EC315	**Control Systems**	**3**	**0**	**3**

Instructor-in-charge: Mrs.BHAVNA CHAUDHARY(VF)

Learning Outcomes:

After successful completion of the course student will be able to
  1. Know about various parts of process industries, power plants and manufacturing industries.
  2. The techniques used in control system analysis are used even in non- engineering applications.
  3. The various concepts and principles involved in the analysis of control systems

Textbook(s) T1	Control systems Engineering, Nagrath I. J. and M. Gopal, New Age International., 4thedition, 2005
Reference Book(s) R1	Control Systems, A. Nagoor Kani,RBAPublications,1998
R2	Automatic Control Systems, B.C. Kuo, Prentice Hall of India, 7thEdition, 2003
R3	Control Systems: Principles and design, M. Gopal, Tata-McGraw Hill, 2003.

Lecture wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference(Ch./Sec./ Page Nos. of Text Book)
1,2	Concept of automatic control	Introduction to the control system and servo mechanisms; examples	1.1-1.4,1.6
3,4	Introduction to the modeling of physical systems	Differential equations of physical systems; mechanical systems and electric a analogies	2.1,2.2
5,6	Modelling using transfer functions	Concept of Transfer Function, and derivation for D.C servo motor	2.4
7,8	Control system block-diagrams	Block diagrams and reduction methods	2.5
9,10	Representation using signal flowgraph	Construction of Signal flow graphs; Mason's Gain formula and its applications	2.6

11,12	Concept of feedback	Feedback systems and effect of feedback on sensitivity and system dynamics	3.1-3.3
13	Do	Effect of feedback on control systems with disturbance signals regenerative feedback	3.4-3.6
14.	Feedback control system example	Temperature feedback control system	3.7
15,16	Control system components	D.C and A.C servo motors, potentiometers and synchros	4.3
17	Time domain analysis of control system	Test signals and time domain response of first order system	5.1to5.3
18,19	Do	Response of second order system; time domain specifications	5.4
20,21	Do	Steady state errors and error constants for various types of systems	5.5
22	Analysis of control systems for stability	Stability of control systems and effect of root locations	6.1, 6.2
23-25	Do	Routh Hurwitz stability criterion	6.3,6.4, 6.6
26	Root locus method of analysis	Concept of root locus and magnitude and angle criteria	7.1, 7.2
27,28	Do	Root locus construction rules; examples	7.3
29,30	Frequency response methods	Introduction to Frequency Response and correlation with time response, Polar plots	8.1- 8.3
31,32	Do	Bode plots	8.4, 8.5
33	Do	Experimental determination of transfer function using Bode plot	8.6
34	Nyquist analysis of control systems	Principle of argument and introduction to Nyquist stability criterion	9.1- 9.3
35,36	Do	Nyquist stability analysis: examples	9.3
37,38	Design concepts	Introduction to control systems design	10.1, 10.2
39,40	Introduction to state variables	Concept of state variable model	12.1, 12.2
41, 42	State variable model	Representation of continuous system using state variable method	12.3

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	17	13-9-2023	1-12	CB
Test 2	60 Minutes	17	18-10-2023	13- 28	OB
Test 3	60 Minutes	16	24-11-2023	29- 42	CB
Quizzes (2)	20 Minutes each	10		**	CB
Comprehensive Exam	3 Hours	40	18-12-2023	1- 42	CB

** To be announced in the class.

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

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

Date: 03/08/2023   **Mrs.BHAVNA CHAUDHARY**
                                                           Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2023-2024
Course Handouts

Course Code	Course Title	L	P	U
ME311	**Production Techniques**	**3**	**2**	**4**

Instructor-in-charge: Mr.HEMANT KUMAR DEWANGAN

Learning Outcomes:
After successful completion of the course student will be able to:
Get the introduction to analysis, economics and quality control of different types of metal working, metal cutting, plastic working (forming) of metals, joining and casting processes, along with laboratory exercises in metal cutting, plastic working (forming) of metals, testing and inspection of weldments and castings.

Textbook T1	"Manufacturing Technology" Volume 1, Foundry, Forming and Welding, P.N. Rao, Tata McGraw-Hill 3rd Edition.
Textbook T2	"Manufacturing Technology" Volume 2, Metal Cutting and Machine Tools, P.N. Rao, Tata McGraw-Hill 2nd Edition.
Textbook T3	Little R.L., Welding and welding Technology, Tata McGraw Hill Publishing Co., Ltd., New Delhi, 34th reprint, 2008.
Textbook T4	Manufacturing Engineering Technology – S. Kalpakjian & S.C. Schemid – Pearson Education – New Delhi
Textbook T5	A Course in Workshop Technology Vol: 1, Manufacturing Process, B.S Raghuwanshi, Published by Dhanpat Rai & Co (P) Ltd.-2014.
Reference R1	Amitabha Ghosh and Asok Kumar Mallik, "Manufacturing Science", Affiliated East-West Press, New Delhi, 1985.
Reference R2	G. E. Dieter, "Mechanical Metallurgy," McGraw-Hill, Singapore, 1985.
Reference R3	G. Boothroyd and K. Knight, "Metal Cutting Machine Tools," Chapman and Hall, 1990.
Reference R4	Fundamentals of Metal casting, Flinn, Addison Wesley.
Reference R5	Principles of Metal casting, Heine, Loper & Rosenthal, McGraw Hill.

Lecture wise plan:

Lecture Nos.	Learning Objectives	Topics to be covered	Reference (chapter/sec /pg. no.)
1-4	Introduction to manufacturing and to understand the different types of manufacturing processes	Manufacturing processes, Engineering properties and their measurement	Ch-1(T1): Sec- 1,2
		Ferrous and non-Ferrous materials	Ch-1(T1): Sec- 3
		Heat treatment of metals, Material removal	Ch-

		processes and variety of machine tools.	1(T1): Sec- 4 – 9, Ch- 2(T1): Sec- 1, 2, 3
5		Introduction: Definition of Casting; advantages and disadvantages ad applications of Casting Process.	Ch- 7(T1): Sec-1-5
6		Patterns: Definition, Pattern design; recent developments in pattern design; materials and construction. Different Pattern Allowances	Ch- 7(T1): Sec- 6, 11
7		Shrinkage allowance and numerical problems, Draft allowances, Machining allowances and problems, Rapping allowances	
8	Metal Casting	Types of pattern Materials, Types of pattern and details of each pattern	
9		Moulding Sand and their properties and problems, Grain fineness number	
10		Core and Core Prints and problems to be solved, Types of Moulding Methods	
11		Gating Design: Elements, objectives, air aspiration effect, top gating and bottom gating design, problems to be solved.	
12		Pressurised and non-pressurized gating system, gating ratio and problems to be solved, solidification time and problems to be solved	
13		Cleaning of casting and different casting defects	
14		Introduction to welding, definition, advantages, disadvantages, classification of welding	
15		Welding Terminology, flat welding, horizontal welding, vertical welding, overhead welding, arc welding, AC welding and DC welding operations	
16-18	Welding/Joining Process and Understanding the different types of Fabrication Methods and applications.	Types of welding machines: droop and flat characteristics, stable arc, maximum power and optimum arc length, problems to be solved.	
19		Arc Blow: disadvantages and remedies, functions of flux coatings, flux coating materials, Electrode Designation	
20		Melting efficiency and problems to be solved	

21		Shielded Gas Welding: TIG welding, MIG Welding, Plasma Arc welding, Submerged Arc welding	
22-24		Gas Welding: Types of Flames, applications, Gas cutting, Thermit Welding, Resistance Welding and problems to be solved, Seam Welding, Solid State Welding, Explosive welding, Ultrasonic Welding, Friction Welding, Forge Welding, Electron Beam Welding, Laser Beam Welding, Electroslag welding, Soldering, Brazing, adhesive bonding, Welding defects	
25-26		Rolling - Classification, products, processing sequence, mill types, mill line equipments, accessories for flat and shape rolling, variables, load, torque, power calculations, rolling mill controls, defects – causes and remedies	
27-28		Forging - Types, tools and dies, equipment, recent trend in forging, design considerations, defects, causes and remedies.	
29-31	Metal Working Process	Press working - Material properties – Formabilities, yield point phenomenon, Anisotropy, metals, shearing process – types, forces, finish blanking, equipments, bending-stresses and spring back, methods, flanging and necking, special processes – spinning, bulging, peen forming, stretch forming, deep drawing dies, design considerations in metal working.	
32-34		Extrusion - Process, tooling, analysis and variables. Wire and tube drawing - Operations and Analysis.	
35-40	Principles and applications of different Unconventional Machining Processes	Abrasive Jet Machining, Water Jet Machining, Abrasive Water Jet Machining, Ultrasonic Machining, principles and process parameters. Electrical Discharge Machining, principle and processes parameters, MRR, surface finish, tool wear, dielectric, power and control circuits, wire EDM, Electrochemical machining (ECM), etc., process parameters, MRR and surface finish. Laser Beam Machining (LBM), Plasma Arc Machining (PAM) and	

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec. No.)	Remarks
Test 1	1 Hour	17	11-09-2023	1-12	CB
Test 2	1 Hour	17	16-10-2023	13- 28	OB
Test 3	1 Hour	16	21-11-2023	29- 40	CB
Lab	-------	10		------	CB
Comprehensive Exam	3 Hours	40	11-12-2023	1- 40	CB

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

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

Date: 03/08/2023   **Mr.HEMANT KUMAR DEWANGAN**
                                                          Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2023-2024
Course Handouts

Course Code	Course Title	L	P	U
ME312	**Power Plant Engineering**	**3**	**0**	**3**

Instructor-in-charge: Mr.HEMANT KUMAR DEWANGAN

Learning Objectives:
After successful completion of the course student will be able to:
1. Learn the concept of production of electrical energy using various mechanical related equipment.
2. Learn the various thermodynamic substances like water, steam, gas, nuclear being used extensively as the energy carrying source inside these machines.
3. Learn the other non-conventional energies like wind, solar, geothermal energy conversion processes also discussed.
4. Get that the main focus of the course still lies in the area of thermal power plants but new renewable energy concept also being introduced.

Text Book T1	Power Plant engineering, P K Nag, Tata McGraw Hill, 3rd Edition,2008
Reference Book R1	Power Plant Technology, M.M.EI-Wahil, McGraw-hill, International Edition 1984
Reference Book R2	Power Plant Engineering, Arora, Domkundwar, Dhanpat Rai & Co, 5th Edition, New Delhi
NPTEL	https://nptel.ac.in/courses/112/107/112107291/

Lecture Wise Plan:

Lecture No.	Learning Objective	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text Book)
01	Chapter 01 – Introduction	Economics of Power Generation: Introduction to various types of power plants, load-duration curves, location, various types of costs	T1.1 to T1.4
02		Indian Energy scenario and Coal – fuelled electricity generating unit.	T1.5 to T1.6
03	Chapter 02 –	Introduction to different cycles	T2.1

04	Analysis of Steam Cycles	Steam power plant, Rankine cycle	T2.2
05		Carnot cycle, reheating of steam, regeneration, Feed water heating, deaerator	T2.3 to T2.9
06		Typical layout of steam power plant, super critical pressure cycles	T2.12 to T2.14
07		Various efficiencies in steam power plant and cogeneration of power and process heat.	T2.15 to T2.17
08	Chapter 03 – Combined cycle power generation	Introduction to Combined cycle power generation	T3.1
09		Flaws of steam as working fluid, vapour power cycles	T3.1
10		Binary vapour cycles, coupled cycles combined cycle plants and gas turbine steam turbine power plant.	T3.2 to T3.6
11	Chapter 04 – Fuels and Combustion	Introduction to fuels and combustion	T4.1 to T4.6
12		Fuels-coal, coal analysis, fuel oil. stoichiometric air, actual air-fuel ratio	T4.7 to T4.21
13	Chapter 05 – Combustion Mechanism	Combustion Equipment and Firing methods: equipment for burning coal, fuel bed combustion, mechanical stokers	T5.1 to T5.5
14		Pulverized coal firing system, fluidized bed combustion	T5.7 to T5.10
15	Chapter 06 – Steam Generators	Types, fire tube boilers	T6.1 to T6.2
16		Water tube boilers, economizers, super heaters, reheaters, air preheater	T6.3 to T6.8
17		Fluidized bed boilers electrostatic precipitators	T6.9 to T6.10
18		Ash handling system, feed water treatment, deaeration	T6.12 to 6.14
19	Chapter 07 – Steam turbines	Introduction	T7.1
20		Flow through nozzles, turbine blading	T7.2 to T7.3
21		Simple impulse and reaction turbine	T7.4
22	Chapter 08 – Condenser, feed water and circulating water systems	Introduction	T8.1
23		Types of condensers	T8.2 to T8.3
24		Feed water heaters, cooling tower	T8.4 to T8.7
25	Chapter 09 – Nuclear power plant	Types of Nuclear Reactors	T9.15
26		Pressurised water reactor(PWR)	T9.16
27		Boiling water reactor(BWR)	T9.17
28		Liquid metal fast breeder reactor, heavy water reactor	T9.18 to T9.19
29	Chapter 10 - Hydroelectric power plants	Introduction, advantages and disadvantages of water power	T10.1 to T10.2
30		Surge tanks, draft tube	T10.23

31		Classification of hydroelectric power plants	T10.9
32		Hydraulic turbines	T10.10
33	Chapter 11 – Diesel engine power plant	applications of diesel engines in power plants	T11.1
34		Schematic layout of diesel engine power plant	T11.4
35		Combustion in a CI engine and super charging	T11.5 to T11.7
36	Chapter 12 – Gas turbine power plant	Introduction	T12.1
37		Components of gas turbine plant	T12.2
38	Chapter 13- Non-conventional Power generation	Direct Energy Conversion	T13.1
39		thermoelectric power generation, geothermal energy and fuel cells	T13.2 to T13.4
40		Environmental Degradation and use of renewable energy	T14.1 to T14.9

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec. No.)	Remarks
Test 1	50 Minutes	17	12-09-2023	1-12	CB
Test 2	50 Minutes	17	17-10-2023	13- 28	OB
Test 3	50 Minutes	16	23-11-2023	29- 40	CB
Quiz 1	10 Minutes	5		1-20	CB
Quiz 2	10 Minutes	5		21-40	CB
Comprehensive Exam	3 Hours	40	13-12-2023	1- 40	CB

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

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

Date: 01/08/2023   **Mr.Hemant Kumar Dewangan**
                                                           Instructor-in-charge

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

Course Code	Course Title	L	P	U
ME313	**IC Engines**	**3**	**0**	**3**

Instructor-in-charge: Mr.DILIP MISHRA

Scope & Objective of the course:
This course has been designed to make the students familiar
1. With engine which generates motive power by the burning of petrol, oil, or other fuel with air inside the engine, the hot gases produced being used to drive a piston or do other work as they expand.
2. It deals with the principle of operation and performance of internal combustion engines, along with working, analysis and design of various components of an engine.

Text Books	**T1:** Internal Combustion Engines**,** Sharma & Mathur**,** Dhanpat Rai Publications, 4th Edition, 2010
	T2: Internal Combustion Engines, V. Ganeshan, Tata Mc-Graw-Hill, 2nd edition, 2003.
Reference Books	**R1:** Internal Combustion Engines, R.K. Rajput, Laxmi publications(P) Ltd, 2nd edition, 2007
	R2: Automotive Mechanics, K. Giri, Khanna Publishers, 8thEdition, 2008

Lecture Wise Plan:

Lecture Nos.	Learning Objectives	Topics to be covered	Reference (Chapter/sec/pg. no.)
1-3	Introduction to I.C. Engine and nomenclature, SI & CI engine working	Introduction, Internal and external combustion engine and their comparison, classification of I.C. Engine, Nomenclature, Engine performance parameters, Comparison of four stroke and two stroke engines, comparison of S.I. and C.I. engine	Ch 1.1, 1.2, 1.3, 1.5, 1.8(T 1)
4	Engine Cycles	The first law analysis of engine cycles	Ch 1.7(T 1)
5-6	Air standard cycles & their analysis	Introduction, Carnot cycle, Stirling cycle, Ericsson cycle, Otto Cycle, Diesel Cycle, Dual Cycle, Comparison of the Otto, Diesel and Dual Cycles	Ch 2.1, 2.2, 2.3, 2.4, 2.5, 2.6(T 1)
		Worked and non-worked examples	Ch 2(T 1)

7-8	Combustion in S.I. engine	Stages of combustion, Factor influencing the flame speed	Ch 11.4, 11.5, 11.7 (T 1)
9-11	Effects of engine variables on combustion	Phenomenon of knocking S.I. engine, Effect of engine variable on knock, effects of detonation, Pre-ignition, effect of pre-ignition	Ch 11.10, 11.11 (T 1)
12-14	Combustion in C.I. engine	Stages of combustion, Factor influencing the delay period	Ch 11.13, 11.14, 11.15(T 1)
15-16	Knocking in SI and CI engines	Phenomenon of knock in C.I. engine, Effect of engine variable on knock, Comparison between knock in S.I. and C.I. engine	Ch 11.16, 11.17 (T 1)
17-18	I.C. Engine fuels, their characteristics	Requirement of an ideal gasoline, Properties	Ch 8.5 (T 2)
19-21	Effect of fuel properties on engine performance, fuels rating	Structure of petroleum, effect of fuel structure on combustion, Volatility of liquid fuels, ASTM distillation curve, Effect of volatility on engine performance - cold starting, hot starting, Antiknock rating of fuels, CCR, HUCR, Octane number, performance number, Cetane number, Dopes.	Ch 8.2, 8.5.3, 8.5.4, 8.6(T 2), Ch 5.6 (T 1)
22	Alternate fuels	Possible alternatives, Solid fuels, liquid Fuels, Bio-diesel, Gaseous fuels-Hydrogen	Ch 6.2, 6.3, 6.4, 6.8, 6.9 (T 1)
23-24	Introduction to carburetor, Requirement of Carburetion	Simple carburetor, Principle of carburetion, Properties of air-petrol mixtures, Factors affecting carburetion	Ch 7.1, 7.2, 7.3, 7.4, 7.7,Ch 8.5.4 (T 2)
25-26	Elements of carburetor, Design of carburetor	Element of complete carburetor, main metering system-compensating jet device, Idling system, power enrichment system, acceleration pump, Nozzle lip, Venturi depression, calculation of fuel jet and Venturi throat diameter for given air fuel ratio,	Ch 7.10, 7.11, 7.12, 7.13, 7.14 (T1),
27-28	Limitations of carburetors & Various Shut-off condition of an IC Engine	Cold starting system, carburetor icing, Vapour lock, acceleration, crank case dilution and Disadvantages of carburetor, limitation of simple carburetor	Ch 7.3 (T1)

29-30	Different fuel injection systems	Gasoline injection system: Type of injection system, components of injection system	Ch 8.2, 8.3, 9.2, 9.3, 9.4, 9.7 (T1)
31-32	Ignition System, Firing order, Ignition Timing and Engine parameters	Battery and magneto ignition system and their comparative study, Firing order, Ignition Timing and Engine parameters	Ch 10.4, 10.5, 10.6, 10.7, 10.8, 10.13, 10.14 (T1)
33-35	Lubrication System	Lubrication, Lubrication of engine components, Lubrication system, Crankcase ventilation, Properties of lubricants.	Ch 12.7, 12.8, 12.9, 12.10, 12.11 (T1)
36-37	Testing and Performance of an IC engine	Performance parameters, measurements of brake power, indicated power, measurement friction power, Morse test, motoring test, measurement fuel consumption, and measurements of air consumption	Ch 15.2, 15.3, 15.5, 15.6 (T1)
38-39		Calculation of various performance parameter, heat balance sheet and heat balance diagram	Ch 16.7 (T 1)
40-41		Performance curves of S.I. and C.I. Engine at full throttle variable speed operation and at constant speed variable load operation.	Ch 16.8 (T 1)
42		Numerical based on testing and performance	Ch 16 (T 1) Worked out examples

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec. No.)	Remarks
Test 1	60 Minutes	16	12.09.2023	01-10	CB
Test 2	60 Minutes	17	17.10.2023	11-20	OB
Test 3	60 Minutes	17	21.11.2023	21- 30	CB
Lab	Throughout the Semester	10	**	**	**
Comprehensive Exam	3 Hours	40	15.12.2023	01-42	CB

** To be announced in the class

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

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

Date: 01/08/2023   **Mr.DILIP MISHRA**
                                                              Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2023-2024
Course Handouts

Course Code	Course Title	L	P	U
ME315	**Advance mechanics of Solid and Kinematics**	**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 the principles and properties of advanced materials used in mechanical engineering. 2. Comprehend the development and characterization techniques of advanced materials. 3. Analyze the applications of advanced materials in mechanical engineering. 4. Apply nanofabrication techniques for the synthesis of nanomaterials. 5. Explore the mechanical behavior of nanomaterials through nano-mechanics. 6. Develop a practical understanding of composite materials and their engineering applications.

Text Book T1	"Materials Science and Engineering: An Introduction" by William D. Callister Jr. and David G. Rethwisch, Wiley, 10th edition, 2018.
Reference Book R1	"Nanomaterials: Synthesis, Properties, and Applications" by A.S. Edelstein and R.C. Cammarata, CRC Press, 1996.
R2	"Composite Materials: Fabrication Handbook" by John Wanberg, Apress, 2014.
R3	"Nanoindentation" by Anthony C. Fischer-Cripps, Springer, 2011.

Lecute wise plan:

Lecture Nos.	Learning Objectives	Topics to be covered	Reference (chapter/sec/pg. no.)
1-4	Understand the basics of advanced materials and nanotechnology.	Introduction to advanced materials and nanotechnology.	T1 (Chapter 1)
		Historical developments and current trends.	T1 (Chapter 1)

		Overview of the course syllabus and assessment methods.	T1 (Chapter 1)
5-9	Explore the classification and properties of advanced materials. Understand the importance of advanced materials in mechanical engineering.	Classification of advanced materials: metals, ceramics, polymers, composites, nanomaterials.	T1 (Chapter 1)
		Properties of advanced materials: mechanical, thermal, electrical, and optical properties.	T1 (Chapter 1)
10-14	Comprehend the synthesis and processing techniques of advanced materials. Understand the role of microstructure in material properties.	Synthesis techniques: casting, powder metallurgy, solid-state reactions, etc.	T1 (Chapter 3)
		Processing techniques: heat treatment, sintering, polymerization, etc.	T1 (Chapter 3)
		Microstructure and its influence on material properties.	T1 (Chapter 3)
15-19	Learn about the characterization techniques of advanced materials. Understand the significance of characterization in material analysis.	Microscopy techniques: optical microscopy, scanning electron microscopy (SEM), transmission electron microscopy (TEM).	T1 (Chapter 4)
		Spectroscopy techniques: X-ray diffraction (XRD), energy-dispersive X-ray spectroscopy (EDS), Fourier-transform infrared spectroscopy (FTIR).	T1 (Chapter 4)
		Thermal analysis techniques: differential scanning calorimetry (DSC), thermogravimetric analysis (TGA).	T1 (Chapter 4)
20-23	Explore the properties and applications of nano materials. Understand the synthesis techniques of nano materials.	Introduction to nano materials and their unique properties.	T1 (Chapter 18), R1
		Synthesis techniques: chemical vapor deposition (CVD), sol-gel method, ball milling, etc.	T1 (Chapter 18), R1
		Applications of nano materials in mechanical engineering: nano composites, sensors,	T1 (Chapter 18), R1

24-27	Learn about nanofabrication techniques for device fabrication. Understand the principles and applications of nano-electromechanical systems (NEMS).	Nanofabrication techniques: lithography, etching, deposition methods (CVD, PVD), self-assembly.	R1, T1 (Chapter 18)
		Introduction to NEMS: principles, fabrication, and applications.	R1, T1 (Chapter 18)
28-32	Explore the mechanical behavior of nanomaterials. Understand the fundamentals of nanoindentation.	Mechanical properties of nanomaterials: size-dependent behavior, strengthening mechanisms.	R3
		Introduction to nanoindentation: principles, experimental setup, data analysis.	R3
		Applications of nanoindentation in material characterization.	R3
33-36	Explore the manufacturing techniques of composite materials. Understand the challenges and considerations in composite fabrication.	Composite manufacturing techniques: hand lay-up, filament winding, pultrusion, autoclave curing, etc.	R2
		Design considerations for composite fabrication: fiber orientation, stacking sequence, void content.	R2
37-40	Analyze the applications of composite materials in mechanical engineering. Understand the advantages and limitations of composites.	Applications of composites: aerospace, automotive, sports equipment, construction, etc.	T1 (Chapter 16), R2
		Advantages of composites: high strength-to-weight ratio, corrosion resistance, design flexibility.	T1 (Chapter 16), R2
		Limitations and challenges in composite applications.	T1 (Chapter 16), R2

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	17	13-9-2023	1-12	CB
Test 2	60 Minutes	17	18-10-2023	13- 28	OB
Test 3	60 Minutes	16	24-11-2023	29- 42	CB
Quizzes (2)	20 Minutes each	10		**	CB
Comprehensive Exam	3 Hours	40	18-12-2023	1- 42	CB

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

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

Date: 03/08/2023   **Mr.HEMANT KUMAR DEWANGAN**
                                         Instructor-in-charge

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

Course Code	Course Title	L	P	U
CS432	**Network Security**	**3**	**0**	**3**

Instructor-in-charge: Mr.ASHISH KUMBHARE

Learning Outcomes:
The objective of this course is to teach the concepts of securing computer network protocols, based on the application of cryptography techniques. This course covers the underlying principles and techniques for network and communication security. The course also gives a survey of cryptographic tools and explains how they can be utilized in protocols and applications, for example how to provide secure user authentication over a public network. Students have a good understanding of how applications can communicate securely and what tools and protocols exist in order to offer different levels of security.

Textbook(s) T1	Cryptography And Network Security – Principles and Practices, William Stallings, Prentice Hall of India, Fifth Edition, 2011
Reference Book(s) R1	Cryptography and Network Security Atul Kahate, Tata McGrawHill, 2003.
Reference Book(s) R2	Security in Computing Charles B. Pfleeger, Shari Lawrence Pfleeger, Third Edition, Pearson Education, 2003.
NPTEL Link	https://nptel.ac.in/courses/106/105/106105031/

Lecture wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference(Ch./Sec./Page Nos.ofTextBook)
1	To learn Introduction of Network Security	Introduction of Network Security,	T1 CH-1 1.1, 1.2
2-3	To learn Need for Security	Need for Security – Concept & Types of Attacks, Types of Services and Mechanisms	T1 CH-1 1.3, 1.4,1.5
4-5	To learn concept of encryption	Introduction to encryption, Classical encryption Techniques	T1 CH-2 2.1,2.2
6-8	To learn various encryption standards	Block ciphers standard, Data encryption standard, Advanced encryption standard	T1 CH-3 3.1,3.2
9-11	To learn symmetric cipher encryption DES algorithm	Symmetric ciphers- triple DES concept, DES- Modes of operation	T1 CH-3 3.4,3.5

12-13	To learn public key cryptography	Confidentiality using Symmetric Encryption, Public key cryptography	T1 CH-8 8.1,8.2
14-15	To learn public key cryptography RSA Algorithm	Concept and working of RSA	T1 CH-9 9.1,9.2
16-17	To learn Key management and distribution technique	Key management Techniques, Key Distribution Techniques	T1 CH-10 10.1,10.2
18	To learn public Key Cryptosystems	Other public Key Cryptosystems – Diffie Hellmen Inroduction	T1 CH-10 10.2
19	To learn Diffie Hellmen Algorithm	Diffie Hellmen working Concept	T1 CH-10 10.2,10.3
20-21	To learn concept of Hash Function	Cryptographic Hash functions – concept, uses, Cryptographic Hash functions –SHA	T1 CH-11 11.1,11.2
22	To learn Message authentication Codes	Introduction to Message authentication Codes (MAC),	T1 CH-11 11.3
23-26	To learn different MAC algorithm	Message authentication Codes (MAC) – HMAC, Message authentication Codes (MAC) – DAA, Hash and MAC algorithms – MD5	T1 CH-12 12.1,12.3,12.4
27	To learn concept of Digital Signature	Introduction to Digital signatures	T1 CH-13 13.1
28-29	To learn Digital Signature technique	Digital signatures – DSS, Digital signatures –DSA,	T1 CH-13 13.2,13.3
30-32	To learn Authentication principles	Application of X.509 Certificates. Authentication principles, Authentication applications-Kerberos V4 & V5	T1 CH-14 14.1,14.2
33-34	To learn Web security concept	Introduction to Web security, Working concept of Web security	T1 CH-17 17.1,17.2
35	To learn Web security	Web security - Secure Electronic Transaction	T1 CH-17 17.3
36-37	To learn E-Mail security	Introduction E-Mail security, Working concept of E-Mail security	T1 CH-15 15.2
38-39	To learn IP Security	Introduction to IP Security, Working concept of IP Security	T1 CH-16 16.1,16.2
40-42	To learn Application of IP Security	Application of IP Security, PGP (Pretty_Good_Privacy) Cocept	T1 CH-15 15.1

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	17	11-09-2023	1-12	CB
Test 2	60 Minutes	17	16-10-2023	13- 28	OB
Test 3	60 Minutes	16	20-11-2023	29- 42	CB
Quizzes (2)	20 Minutes each	10		**	CB
Comprehensive Exam	3 Hours	40	02-12-2023	1- 42	CB

** To be announced in the class.

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

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

Date: 03/08/2023   **Mr.ASHISH KUMBHARE**
                                           Instructor-in-charge

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

Course Code	Course Title	L	P	U
CS322	**Programming Language and Complier Construction**	**3**	**0**	**3**

Instructor-in-charge: Dr.PALAK KESHWANI

Learning outcomes
Upon successful completion of the course, student will be able to: 1. Understand the working of compiler. 2. Understand the intermediate code generated by compiler. 3. Develop small compiler using tools.

Textbook T1	Aho, A .V. , Lam, M ., Sethi, R . and Ullman, J D., " Compilers: Principles, Techniques and Tools", 2nd 2007 Ed., Pearson Education.
Textbook T2	Tremblay, J.P. and Sorenson, P G., "Theory and Practice of Compiler Writing", SR Publications, 1st edition, 1985.
Reference Book R1	"Principle of compiler design", V. Raghavan, Tata McGrawHill , 4th edition 2012.
Reference Book R2	"Compiler Principles and Practice", Parag H. Dave, Himanshu B. Dave, Pearson, 1st edition,2012.
Reference Book R3	Compiler Design, O.G. Kakde, 4th edition, Laxmi Publication.
NPTEL	https://nptel.ac.in/courses/106105190

Lecture wise plan:

Lecture Nos.	Learning Objectives	Topics to be covered	References (Ch./Sec./Page Nos. of Text Book)
1-3	To understand the basics of compiler.	Introduction to Compiler, single and multi-pass compilers, Phases of Compilers, compiler construction tools.	T1: Ch 1, 1-12
4-6	To understand the working of lexical analyzer.	Lexical analysis: Role of lexical analyzer, specification and recognition of tokens, Regular expression, Finite automata from regular expression	T1: Ch 3, 109-166

7-10	To understand Top Down Parsing techniques.	Context free grammars, Bottom-up parsing and top down parsing, Top down Parsing : elimination of left recursion, recursive descent parsing, Predictive Parsing	T1: Ch 4, 192-231
11-15	To understand Bottom Up Parsing techniques	Bottom Up Parsing : Operator precedence parsing, LR parsers, Construction of SLR,	T1: Ch 4, 233-257
16-20	To understand Bottom Up Parsing techniques	Canonical LR and LALR parsing Tables, YACC	T1: Ch 4, 259-297
21-22	To learn the syntax directed translation schemes.	Syntax directed definitions: Inherited and synthesized attributes, Dependency graph, bottom up and top down evaluation of attributes	T1: Ch 5, 303-309
23-24	To learn the syntax directed translation schemes.	Construction of syntax trees, Postfix notation ,bottom up and top down evaluation of attributes, S- attributed and L attributed definitions	T1: Ch 5, 310-313
25-30	To learn the concept of intermediate code generation.	Three address code, quadruples, triples and indirect triples, Translation of assignment statements, control flow, Boolean expression and Procedure Calls.	T1: Ch6, 357-421
31-34	To learn the principles of parameter passing and runtime memory management.	Run time environments, storage organization and allocation strategies, parameter passing, symbol tables.	T1: Ch 7, 427-440
35-37	To learn the code optimization techniques to improve the performance of a program.	Code Optimization- Sources of optimization, optimization of basic blocks, data flow analysis, code generation from DAG, peep hole optimization.	T1: Ch 8, 533-553
38-40	To learn the concept of code generation.	Code Generation- Issues in code generation, basic blocks and flow graphs, register allocation, the target machine, and simple Code generator.	T1: Ch 8, 505-512, 525-535, 553-557

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	17	11-09-2023	1-12	CB
Test 2	60 Minutes	17	17-10-2023	13- 28	OB
Test 3	60 Minutes	16	24-11-2023	29- 42	CB
Quizzes (2)	20 Minutes each	10		**	CB
Comprehensive Exam	3 Hours	40	15-12-2023	1- 42	CB

** To be announced in the class.

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

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

Date: 03/08/2023   **Dr.PALAK KESHWANI**
                                                         Instructor-in-charge

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

Course Code	Course Title	L	P	U
CS435	**Machine Learning**	**3**	**2**	**4**

Instructor-in-charge: Dr.RAMESH KUMAR YADAV

Learning Outcomes
1. Introduce the basic principles of ML towards problem solving, inference, perception,knowledge representation and learning.   2. Investigate applications of ML techniques in machine learning models.   3. Experiment with a machine learning model for simulation and analysis.   4. The course will cover the major approaches to learning namely, supervised, unsupervised, and reinforcement leaning. The course emphasizes various techniques, which have become feasible with increased computational power and our ability to produce and capture huge volumes of data. The topics covered in the course include regression, decision trees, support vector machines, artificial neural networks, Bayesian techniques, Hidden Markov models, genetic algorithms etc. Some advanced topics like active and deep learning will also be covered

Textbook(s) T1	Tom M. Mitchell, Machine Learning, The McGraw-Hill Companies, Inc. International Edition 1997.
Reference book(s)R1	1.Christopher M. Bhisop, Pattern Recognition and Machine Learning, Springer, 2006 2. N. J. Nilson, Introduction to Machine Learning, Stanford, Online Link http://robotics.stanford.edu/people/nilsson/mlbook.htm 3. D. Michie, D.J. Spiegelhalter, C.C. Taylor (eds), Machine Learning, Neural and Statistical Classification, Ellis Horwood publishers, Online Link http://www.amsta.leeds.ac.uk/~charles/statlog 4. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer, 2009. Online Link http://statweb.stanford.edu/~tibs/ElemStatLearn/printings/ESLII_print10.pd 5. Hal Daume III, A Course in Machine Learning, 2015. Online Link http://ciml.info/ 6. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012 Online Link https://mitpress.mit.edu/books/machine-learning-0

Lecture wise Plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./Page Nos.of Text Book)
1-5	Overview of ML	Introduction to Machine Learning, Probability theory, Decision theory	TB[Ch-1, R1[Ch2], TB[Apndx-C]

6-9	Basic concept of regression	Liner Models for regression: Linear basis function models, Bayesian linear regression	R1[Ch-3]
10-14	Overview & Techniques of liner models	Liner Models for classification: Discriminant Functions, Probabilistic Generative Classifiers,	R1[Ch-4]
15-19	Overview & Techniques of Bayesian Learning	Bayesian Learning Techniques: Bayes optimal classifier, , Naive Bayes Classifier	TB[Ch-6]
20-26	Overview& Non-linear Models Techniques:	Non-linear Models: Model Selection & Decision Trees, Ensemble Classifiers, Neural Networks, Multilayer Perceptron, Network training, Error back-propagation, Instance-based Learning, K-NN, Case-based Reasoning	TB[Ch-3], TB[Ch-4], R1[Ch-5], TB[Ch-8]
27-30	Overview and SVMTechniques:	Margin/Kernel Based Approaches: Support Vector Machines	Class Notes, R1[Ch-7]
31-34	How to do Graphical Models Representation	Graphical Models: Bayesian Belief Networks, Hidden Markov Models	TB[Ch-6], class notes
35-38	Unsupervised Learning concept	Unsupervised Learning: Mixture Models, K-means Clustering,	TB[Ch-6], R1[Ch-9]
39-40	Reinforcement Learning:concept	Reinforcement Learning: Q Learning, Non-deterministic rewards & actions, Temporal difference learning, Generalizatio	TB[Ch-13]

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	18.09.2023	1-12	CB
Test 2	60 Minutes	17	22.10.2023	13-26	OB
Test 3	60 Minutes	17	20.11.2023	27-40	CB
Lab/Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	13.12.2023	1-40	CB

** To be announced in the class

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

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

Date: 03/08/2023   **Dr.PALAK KESHWANI**
                                                                                        Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2023-2024
Course Handouts

Course Code	Course Title	L	P	U
CS443	**Internets of Things(IOT)**	**3**	**2**	**4**

Instructor-in-charge: Dr.MANJU LATA SAHU

Learning Outcomes
  1. Upon successful completion of the course, student will be:
  2. To understand the definition and significance of the Internet of Things.
  3. To learn the architecture, operation, and business benefits of an IoT solution.
  4. To examine the potential Security issues in IoT and explore the relationship between IoT, cloud computing, and big data.
  5. Design and program IoT devices, use real IoT protocols for communication, Secure the elements of an IoT device.

Textbook(s)T1	Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press, 2017.
Textbook T2	Raj kamal, "Internet of Things: Architecture and design Principles", McGraw Hill Education, 2017.
Textbook T3	Simone Cirani, Gianluigi Ferrari, Marco Picone, Luca Veltri, "Internet of Things: Architectures, Protocols and Standards," Wiley, 2018.
Reference Book(s)R1	R. Buyya and A.K. Dastjerdi (eds.), "Internet of Things: Principles and Paradigms," Cambridge, MA, USA: Morgan Kaufmann (Elsevier), 2016.
Link	https://www.javatpoint.com/iot-internet-of-things

Lecture wise plan:

Lecture No.	Learning Objective	Topics to be covered	Reference(Ch./ Sec./Page Nos.)
1	To understand the introduction to The Internet of Things	Introduction to IoT and Components of IoT Ecosystem	T1: 1
2		IoT applications, Trends and Implications	T1:3
3-4		IoT issues and challenges, IoT Architectures	Notes
5		Components of internet of things, Operating System for IoT	Notes, T2:15
6	To understand basic	WoT Applications for Mobile and Wearable Devices	T2:336

7-8	components and working of IoT	Industrial IoT: case study: Agriculture, Healthcare, Process Automation & monitoring etc.	T1: 28
9-10		Working of IoT, Communication Technologies used in IoT	T2:9,48
11-12		Infrastructure Protocols: MAC protocols for sensor network, S-MAC, IEEE 802.15.4,	T2:74
13-14	To understand different communication protocol for IoT	Near Field Communication (NFC), RFID, ZigBee, Bluetooth Low Energy (BLE),IPv6 over LowPower Wireless Personal Area Networks (6LoWPAN),	T1: 71-78
15-16		Long Term Evolution-Advanced, Z-Wave, Components of ZWave Network,	T2: 53
17-18		Protocols for IoT Service Discovery: DNS service discovery, multicast domain name system.	T2:141
19-20		Constrained Application Protocol (CoAP), Message Queue Telemetry Transport (MQTT), Extensible Messaging and Presence Protocol (XMPP),	T2: 81, 97, 99
21-22	To understand different networking protocol for IoT	Advanced Message Queuing Protocol (AMQP), Data Distribution Service (DDS),	T1:111, 112
23-25		Service Discovery Protocols, Routing Protocol for Low Power and Lossy Networks (RPL),	T1:61, 64
26-28		Wireless sensor network architecture, data dissemination and gathering protocol.	T2: 32,63
29-30		Introduction to Microcontrollers, Arduino and Raspberry-Pi, IoT Systems	T2: 293, 309
31-32	To understand how to build IoT	Logical Design using Python, IoT Physical Devices & Endpoints, IoT Device	T2:327
33-34		Programming with Arduino and different sensors.	T2:327
35-36	To Understand Platforms for IoT Applications and Analytics	Role of the cloud and fog resources in the delivery of IoT services, Splunk Software for IoT Data,	T1: 237
37-38		The IoT Building Blocks, Connected Devices, IoT or Sensor Data Gateway,	T1:156

		Amazon Web Service IoT Platform, Azure IoT Hub, The IoT Data Virtualization Platforms, IoT Data Visualization Platform, Security and Privacy in IoT	T2:456, T1:20 T1:285 T1: 191
39-40			

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec. No.)	Remarks
Test1	60 Minutes	16	13/09/23	1-10	CB
Test2	60 Minutes	17	16/10/23	11-20	OB
Test3	60 Minutes	17	20/11/23	21-30	CB
Quiz	20 minutes	10	**	**	CB
Comprehensive Exam	3 Hours	40	08/12/23	1-40	CB

** To be announced in the class

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

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

Date: 01/08/2023   **Dr.MANJU LATA SAHU**
                                                              Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2023-2024
Course Handouts

Course Code	Course Title	L	P	U
CS438	**Big Data and High Performance Computing**	3	2	4

Instructor-in-charge: Dr.RAVI KIRAN PATNAIK

Learning Outcomes:
1. Provide the essential knowledge for the students to understand big data computer system, storage, management, processing, and visualization
2. Provide training in state-of-the-art big data processing frameworks
3. Provide training in big data applications
4. Provide the students with prerequisite for graduate level study in computer science
5. Prepare the students for industrial career.

Textbook(s) T1	Title: Big Data Fundamentals: Concepts, Drivers & Techniques Author: Wajid Khattak, Paul Buhler, Thomas Erl Publisher: John Wiley & Sons, Inc ISBN: 13: 9780134291079
Reference Book(s) R1	BIG DATA and ANALYTICS, Seema Acharya, Subhasinin Chellappan, Wiley publications
Reference Book(s) R2	BIG DATA, Black BookTM , DreamTech Press, 2015 Edition

Lecture wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference(Ch./Sec./Page Nos. of Text Book)
1-6	Understanding Big Data	Concepts and Terminology Datasets Data Analysis Data Analytics Descriptive Analytics Diagnostic Analytics Predictive Analytics Prescriptive Analytics Business Intelligence (BI) Key Performance Indicators (KPI) Big Data Characteristics Different Types of Data Structured Data Unstructured Data Semi-structured Data Metadata Background History	T1:- Chpt 1

		Technical Infrastructure and Automation Environment Business Goals and Obstacles	
7-13	Business Motivations and Drivers for Big Data Adoption	Marketplace Dynamics Business Architecture Business Process Management Information and Communications Technology Data Analytics and Data Science Digitization Affordable Technology and Commodity Hardware Social Media Hyper-Connected Communities and Devices Cloud Computing Internet of Everything (IoE)	T1:- Chpt 2
14-20	Big Data Adoption and Planning Considerations	Privacy Security Provenance Limited Realtime Support Distinct Performance Challenges Distinct Governance Requirements Distinct Methodology Clouds Big Data Analytics Lifecycle Business Case Evaluation Data Identification Data Acquisition and Filtering Data Extraction Data Validation and Cleansing Data Aggregation and Representation Data Analysis Data Visualization Utilization of Analysis Results	T1:- Chpt 3
21-26	Enterprise Technologies and Big Data Business Intelligence	Online Transaction Processing (OLTP) Online Analytical Processing (OLAP) Extract Transform Load (ETL) Data Warehouses Data Marts Traditional BI Ad-hoc Reports Dashboards Big Data BI	T1:- Chpt 4
27-32	Big Data Storage Concepts	Clusters File Systems and Distributed File Systems NoSQL Sharding Replication	T1:- Chpt 5
33-36	Big Data Processing Concepts	Parallel Data Processing Distributed Data Processing Hadoop Processing Workloads Batch Transactional Cluster Processing in Batch Mode Batch Processing with MapReduce Map and Reduce Tasks	T1:- Chpt 6

37-40	Big Data Storage Technology	On-Disk Storage Devices Distributed File Systems RDBMS Databases NoSQL Databases Characteristics	T1:- Chpt 7
41-42	Big Data Analysis Techniques	Quantitative Analysis Qualitative Analysis Data Mining Statistical Analysis A/B Testing Correlation Regression Machine Learning	T1:- Chpt 8

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec. No.)	Remarks
Test 1	60 Minutes	16	12-09-2023	1-13	CB
Test 2	60 Minutes	17	16-10-2023	14-26	OB
Test 3	60 Minutes	17	21-11-2023	27-36	CB
LAB	Through out	10		**	CB
Comprehensive Exam	3 Hours	40	11-12-2023	1-42	CB

** To be announced in the class

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

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

Date: 01/08/2023   **Dr.RAVI KIRAN PATNAIK**
                                                                        Instructor-in-charge

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

Course Code	Course Title	L	P	U
EC420	**Artificial Intelligence**	**3**	**0**	**3**

Instructor-in-charge: Dr.K NAGAIAH

Scope and Objective
To train the students to understand different types of AI agents, various AI search algorithms, fundamentals of knowledge representation, building of simple knowledge-based systems and to apply knowledge representation, reasoning. Study of Markov Models enable the student ready to step into applied AI.

T1	Russell, S. and Norvig, P, Artificial Intelligence: A Modern Approach, Third Edition, Prentice-Hall, 2010
R1	Artificial Intelligence, Elaine Rich, Kevin Knight, Shivasankar B. Nair, The McGraw Hill publications, Third Edition, 2009.
R2	George F. Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education, 6th ed., 2009

Lecture wise plan:

Lecture No.	Learning Objective	Topics to be covered	(Ch./Sec./Text Book)
1-2	Introduction to AI, ,	Introduction to AI, • Problem Solving, State space search,	T1 CHAPTER 1, 2, 3, 4.
3-4	Search methods	Blind search: Depth first search, Breadth first search,	T1 CHAPTER 1, 2, 3, 4.
5-6	Informed search:	Informed search: Heuristic function, Hill climbing search, Best first search, A* & AO* Search, Constraint satisfaction.	T1 CHAPTER 1, 2, 3, 4.
7-10	Game tree Evaluation function, Mini-Max search, Alpha-beta pruning, Games of chance.	Game tree Evaluation function, Mini-Max search, Alpha-beta pruning, Games of chance.	T1 CHAPTER 1, 2, 3, 4.

11-12	Knowledge Representation	Introduction Approaches to knowledge Represetation	T1 CHAPTER 5,6.
13-14		Knowledge Representation Using Semantic Network	T1 CHAPTER 5,6
15		Extended Semenytic Networks for KR Knowledge Representation Using Frames	T1 CHAPTER 5,6
16-18	Expert Systems and Applications	Intro Phases in Building Expert System, ES Architrcture ES Verses Traditional Trurh maintaonace System	T1 CHAPTER 5,6
19- 20	Expert Systems and Applications	Applications of Expert System List of Shells and Tools Uncertainity Measure.	T1 CHAPTER 5,6
21-26	Machine Learning Paradiggms	Intrduction Machine Learning System Supervised Unsupervised Learning Inductive Learning Decision Trees Deductive Learning Clustring Support Vector Machine	T1 Chater 9 & 10
27-31	Artificial Nueral Networks	Introduction Single Layer, Feed Forward Networks Multi Layes Feed Forward Networks Radial Basis Function Networks Design Issues Of Artificial Nueral Networks Recurrent Networks	T1 Chater 9 & 10
32-36	Advanced knowledge representation Techniques	Case Grammar, Semantic Web Natural Language Processing Introduction Sentence Analysis Phase,	T1 Chapter 11
37-40	Advanced knowledge representation Techniques	Grammar and Phrases Types of Parsers Semantic Anaysis Universal Networking knowledge	T1 Chapter 11

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

Component	Duration	Weight age(%)	Date	Syllabus for each Test (L.No)	Remarks
Test 1	60min	16	12-09-2023	1-10	CB
Test 2	60min	17	17-10-2023	11-23	OB
Test 3	60min	17	21-11-2023	CB	CB
Lab		10			
Compre.Exam	3hrs	40	11-12-2023	1-40	CB

Make-up Policy: Make-up will be given only under genuine circumstances. However prior and proper Intimation to the concerned instructor is a must.

General: All students are advised to attend classes regularly and strictly maintain a minimum attendance of 75%. Students failing to maintain the required percentage of theory/practical attendance will not be permitted to appear for the tests and examinations

Date: 01/08/2023   **Dr.K NAGAIAH**
                                                          Instructor-in-charge

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

Course Code	Course Title	L	P	U
EC422	**IMAGE PROCESSING**	**3**	**2**	**4**

Instructor-in-charge: Dr.K NAGAIAH

Scope and Objective
This is a basic course in digital image processing and aims at providing an understanding of some of the fundamental concepts involved. It shall deal with the fundamentals of images. The various discrete transforms that are used extensively in image processing and their application to data compression are dwelt with. In addition, the course covers some basic enhancement and restoration techniques and coding. The course also briefly covers image understanding, image classification and recognition along with some neural networks.

Textbook(s) T1	Digital Image Processing, Rafael C. Gonzalez & Richard E. Woods, Pearson Education Asia, Second Ed., 5th. Indian reprint 2003.
T2	Digital Image Processing Using MATLAB, Rafael C. Gonzalez & Richard E. Woods, Steven L. Eddins, Pearson Education Asia, Second Ed., 3rd . Indian reprint 2005.
Reference book(s) R1	Digital Image Processing, Anil K. Jain, PHI, 1998, Indian reprint 2003
R2	Digital Image Processing and Analysis, Bhabatosh Chanda & Dwijesh Dutta Majumdar, PHI, 2002
R3	Fundamentals of Electronic Image Processing, Arthur R. Weeks, PHI, 1999, Indian reprint 2003.

Lecture wise plan:

Lecture No.	Learning Objective	Topics to be covered	(Ch./Sec./Text Book)
1	Introduction	Introduction to digital image processing and systems	TB:2.2
2-3	Digital Image Fundamentals	Image Sampling and Quantization	TB: 2.3.4- 2.4.5
4-6	Image Enhancement in Frequency Domain	Fourier Transform, DFT and its properties	TB: 4.2.1-4.2.2
7-8	Implementation	2D convolution	TB: 4.6.3-4.6.4

9	Implementation	Fast Fourier Transform	TB: 4.6.6
10	Image enhancement in spatial domain	Introduction to Image Enhancement	TB: 3.1
11-12	Basics of gray level transformations	Image enhancement-gray level transformations	TB: 3.21-3.2.4
13-14	Histograms	Image enhancement- histogram processing	TB:3.3-3.3.3
15-16	Basics of spatial filtering	Image enhancement by spatial filtering	TB: 3.5.-3.6.1 3.7.1-3.7.3
17-18	Filtering of images	Image enhancement-filtering in frequency	TB: 4.2.3-4.4.3
19	Image degradation models, noise models	Image restoration-image degradation models	I TB: 5.1-5.2.2; 5.5
20-21	Estimation of degrading function	Image restoration-removal of linear motion blur	TB: 5.6.3
22-23	Image restoration - filters	Image restoration-Inverse filtering, constrained least squares	TB: 5.7 - 5.9
24-25	Fundamentals and models of image compression	Fundamentals of image compression	TB: 8.1-8.2
26-27	Information theory for image compression	Elements of information theory for compression	TB: 8.3.1-8.3.2
28-30	Coding theorems	Fundamentals of image coding	TB: 8.3.3-8.3.4
31-33	Error-free image compression	Error-free image compression	TB: 8.4.1-8.4.4
34-36	Lossy image compression, compression standards	Lossy image compression, compression standards	TB: 8.5.1-8.5.2 8.6.1-8.6.2
37-38	Image segmentation	Image segmentation	TB:10.1-10.1.3 10.3.1-10.3.3
39-40	Image representation	Representation	TB:11.1

Evaluation Scheme:

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

Component	Duration	Weight age(%)	Date	Syllabus for each Test (L.No)	Remarks
Test 1	60 Minute	16	11-09-2023	1-10	CB
Test 2	60 Minute	17	16-10-2023	11-22	OB
Test 3	60 Minute	17	21-11-2023	23-35	CB
Lab		10	**		CB
Comprehensive Exam	3hours	40	11-12-2023	1-40	CB

** To be announced

Make-up Policy: Make-up will be given only under genuine circumstances. However prior and proper Intimation to the concerned instructor is a must.

General: All students are advised to attend classes regularly and strictly maintain a minimum attendance of 75%. Students failing to maintain the required percentage of theory/practical attendance will not be permitted to appear for the tests and examinations

Date: 01/08/2023   **Dr.K NAGAIAH**
                                                               Instructor-in-charge

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

Course Code	Course Title	L	P	U
EC431	**Digital Systems**	**3**	**0**	**3**

Instructor-in-charge: Dr. K KISHORE KUMAR

Learning Outcomes:
After successful completion of the course student will be able to
1. Develop the ability to analyse and design digital systems
2. Understand combinational and sequential digital circuits design with timing constraints

Text books T1	Digital Design Principles & Practices, John F Wakerly, Pearson education, Fourth edition, 2006
Reference books R1	Modern Digital Electronics, RP Jain, TMH, Fourth edition, 2010.
R2	FPGA Based System Design, Wayne Wolf, First Edition 2009,Pearson
R3	Computer Logic Design, M.Morris Mano, Prentice-hall 1972

Lecture wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference Chap/Sec
1,2	Learning basic definitions.	Introduction to S/W & H.W aspects of digital design.	T1: 1.1,1.2, 1.3, 1.4, 1.5
3,4	To introduce advanced integrated circuits.	Introduction to PLD, ASIC and digital design levels.	T1: 1.7, 1.8, 1.10
5	Introduction to parameters of logic families	Logic signals and gates, Logic Families,	T1: 3.1,3.2
6-7	Digital Logic Families	Logic families introduction, Characteristics of Digital ICs	R1: 4.1 to 4.2
8-10	Learning Bipolar logic families	RTL,DCTL, I²L, DTL,	R1: 4.3 to 4.8

11-12	Learning Bipolar logic families	TTL, ECL	R1: 4.9 & 4.11
13-16	Learning Unipolar logic families.	CMOS logic levels, MOS transistors. CMOS inverter, NAND, NOR and Non-inverting gates, AND-OR-INVERT & OR-AND-INVERT gates and Fan-in	T1: 3.3
17-19	To study steady state behaviour of CMOS.	CMOS steady state electrical behaviour.	T1:3.4, 3.5
20-22	To dynamic behaviour of CMOS.	CMOS dynamic electrical behaviour	T1: 3.6, 3.7
23-25	Combinational logic Circuits design.	Timing hazards. Timing diagrams, propagation delay. Timing specifications and analysis	T1: 4.4
26-28	To understand the basics of HDL	Hardware Description Language,	T1: 5.1,5.2
29-30	Combinational logic Circuits design.	Combinational logic circuits design using VHDL for Decoders, Encoders, Three state devices	T1: 6.4, 6.5, 6.6
31-33	Combinational logic Circuits design.	Multiplexers, EX-OR and parity circuits, comparators, adders, Subtractors, ALUs using VHDL	T1: 6.7-6.11
34-36	Sequential logic circuits design.	Bi-stable elements, Latches and flip-flops	T1: 7.1,7.2
37-39	Sequential logic circuits design.	Clocked synchronous state machine analysis (state machine structure and output logic).	T1: 7.3
40- 42	Sequential logic circuits design.	Clocked synchronous state machine design.(characteristic equations and analysis of state machines with D Flip-flops)	T1: 7.4

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	07.09.2022	1-10	CB
Test 2	60 Minutes	17	18.10.2022	11- 24	OB
Test 3	60 Minutes	17	18.11.2022	25- 38	CB
Quiz-1 and Quiz-2	Continuous	10	**	**	CB
Comprehensive Exam	3 Hours	40	19.12.2022	1- 42	CB

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

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

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

Date: 03/08/2023   **Dr.K KISHORE KUMAR**
                                                         Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2023-2024
Course Handouts

Course Code	Course Title	L	P	U
EC414	**Deep Learning**	**3**	**0**	**3**

Instructor-in-charge: Dr.K NAGAIAH

Scope and Objective
This is a basic course in digital image processing and aims at providing an understanding of some of the fundamental concepts involved. It shall deal with the fundamentals of images. The various discrete transforms that are used extensively in image processing and their application to data compression are dwelt with. In addition, the course covers some basic enhancement and restoration techniques and coding. The course also briefly covers image understanding, image classification and recognition along with some neural networks.

Text Book T1	Digital Imagel Processing, Rafael C. Gonzalez & Richard E. Woods, Pearson Education Asia, Second Ed., 5th. Indian reprint 2003.
Text Book T2	Digital Imagel Processing Using MATLAB, Rafael C. Gonzalez & Richard E. Woods, Steven L. Eddins, Pearson Education Asia, Second Ed., 3rd . Indian reprint 2005.
Reference Book R1	Digital Image Processing, Anil K. Jain, PHI, 1998, Indian reprint 2003
Reference Book R2	Digital Image Processing and Analysis, Bhabatosh Chanda & Dwijesh Dutta Majumdar, PHI, 2002
R3	Fundamentals of Electronic Image Processing, Arthur R. Weeks, PHI, 1999, Indian reprint 2003.

Lecture wise plan:

Lecture No.	Learning Objective	Topics to be covered	(Ch./Sec./Text Book)
1	Introduction	Introduction to digital image processing and systems	TB:2.2
2-3	Digital Image Fundamentals	Image Sampling and Quantization	TB: 2.3.4- 2.4.5
4-6	Image Enhancement in Frequency Domain	Fourier Transform, DFT and its properties	TB: 4.2.1-4.2.2
7-8	Implementation	2D convolution	TB: 4.6.3-4.6.4
9	Implementation	Fast Fourier Transform	TB: 4.6.6

10	Image enhancement in spatial domain	Introduction to Image Enhancement	TB: 3.1
11-12	Basics of gray level transformations	Image enhancement-gray level transformations	TB: 3.21-3.2.4
13-14	Histograms	Image enhancement- histogram processing	TB:3.3-3.3.3
15-16	Basics of spatial filtering	Image enhancement by spatial filtering	TB: 3.5.-3.6.1 3.7.1-3.7.3
17-18	Filtering of images	Image enhancement-filtering in frequency	TB: 4.2.3-4.4.3
19	Image degradation models, noise models	Image restoration-image degradation models	I TB: 5.1-5.2.2; 5.5
20-21	Estimation of degrading function	Image restoration-removal of linear motion blur	TB: 5.6.3
22-23	Image restoration - filters	Image restoration-Inverse filtering, constrained least squares	TB: 5.7 - 5.9
24-25	Fundamentals and models of image compression	Fundamentals of image compression	TB: 8.1-8.2
26-27	Information theory for image compression	Elements of information theory for compression	TB: 8.3.1-8.3.2
28-30	Coding theorems	Fundamentals of image coding	TB: 8.3.3-8.3.4
31-33	Error-free image compression	Error-free image compression	TB: 8.4.1-8.4.4
34-36	Lossy image compression, compression standards	Lossy image compression, compression standards	TB: 8.5.1-8.5.2 8.6.1-8.6.2
37-38	Image segmentation	Image segmentation	TB:10.1-10.1.3 10.3.1-10.3.3
39-40	Image representation	Representation	TB:11.1

Evaluation Scheme:

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

Component	Duration	Weightage (%)	Date	Syllabus for each Test (L.No)	Remarks
Test 1	60 Minute	16	07-09-2022	1-10	CB
Test 2	60 Minute	17	14-10-2023	11-22	OB
Test 3	60 Minute	17	18-11-2023	23-35	CB
Lab		10			CB
Comprehensive. Exam	3hours	40	16-12-2023	1-40	CB

Make-up Policy: Make-up will be given only under genuine circumstances. However prior and proper Intimation to the concerned instructor is a must.

General: All students are advised to attend classes regularly and strictly maintain a minimum attendance of 75%. Students failing to maintain the required percentage of theory/practical attendance will not be permitted to appear for the tests and examinations

Date: 01/08/2023

Dr.K NAGAIAH
Instructor-in-charge