Faculty of Science and Technology

First Semester, 2022 – 23
Course Handouts

Table of Contents

The ICFAI University, Raipur

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

Course No	Course Title	L	P	U
ES101	**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 in equality, 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, polytrophic 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 (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	19.09.2022	1-10	CB
Test 2	60 Minutes	17	17.10.2022	11- 20	CB
Test 3	60 Minutes	17	17.11.2022	21- 30	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	12.12.2022	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: 02/08/2022

Mr. DILIP MISHRA
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2022 – 2023
Course Handout

Course No	Course Title	L	P	U
MA101	**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	Higher Engineering Mathematics, Jain & Iyanger, Narosa Pub.

Lecture wise plan

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page No of Text/Ref. Books)
1-4	Definition of Matrix	Types of Matrix, Systems of linear equations, Row reduction and echelon forms, Linear independence, The rank of a matrix and applications.	T l Ch-12 441-560
5-7	Introduction to linear transformations,	Introduction to linear transformations, The matrix of a linear transformation, Matrix operations, Determinants.	T l Ch-12 441-560
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, Minimal polynomial.	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, 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
32-41	Multivariable Calculus	Partial differentiation, Homogeneous function, Euler's Theorem, Total derivative of composite function. Minima and Maxima, Jacobians.	T l Ch-11 351-440

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	20.09.2022	1-10	CB
Test 2	60 Minutes	17	18.10.2022	11- 20	CB
Test 3	60 Minutes	16	18.11.2022	21- 30	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	19.12.2022	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: 02/08/2022

Dr. ANIMESH KUMAR SHARMA
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2022 – 2023
Course Handout

Course No	Course Title	L	P	U
TA101	Engineering Graphics	2	4	4

Instructor-in-charge: Mr. ABHISHEK MISHRA

Scope & Objective of the course:
Engineering Graphics is the primary medium for development and communicating design concepts. Through this course the students are trained in Engineering Graphics concepts with the use of AutoCAD. Computerized drafting is an upcoming technology and provides accurate and easily modifiable graphics entities, easy data storage and retrieval facility and enhances creativity.

Textbook(s)T1	Fundamentals of Engineering Drawing, Warren J. Luzzader & Duff J. M., 11th Edition, Prentice Hall of India, New Delhi.
T2	Engineering Drawing, K. Venugopal, New Age International (P) limited, 2003.
Reference Book(s) R1	Engineering Graphics with AutoCAD 2002, James D. Bethune, Prentice Hall of India, New Delhi, 2002.
R2	Engineering Drawing,
R3	Text Book On Engineering Drawing, K L Narayana, P Kannaiah, Scitech publications (India) Pvt Ltd., 2006.

Lecture-wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
1-2	Basics of Engineering Graphics	Introduction, Drawing conventions & practices, etc.	Notes, Sample Drawing
3-4	AutoCAD- Getting Started	Introduction, limits, toolbars, starting new drawing, saving new drawing, etc.	R1-Ch.1
5-6	AutoCAD - Fundamentals of 2D construction	Simple commands like line, circle, polygon, etc. and formatting commands	R1-Ch.2,Ch.3
7-10	AutoCAD- Fundamentals of 3D Drawing	WCS, UCS, Sample Problems 14.1-14.6	R1-Ch.14
11-13	Geometrical constructions	Geometrical terms, bisecting a line, angle, arc. Regular pentagon, hexagon, octagon	T2 - Ch. 4
14-16	Orthographic Projections- Understanding and practicing orthographic projections	Theory, techniques, first and third angle projections.	T1-Ch. 4.1-4.6 [85-90] Ch5.1-5.7 [101-104]

17-19	Orthographic Projections	Multiview drawing from pictorial views.	T1-Ch. 5.9-5.40 [105-126]
20-22	Missing Views - Identifying missing views.	Identification and drawing of missing line(s) and view in orthographic projections	T1-Ch. 5.9-5.40 [105-126]
23-25	Pictorial Drawings- Understanding pictorial views	Construction of isometric and oblique from orthographic projections.	T1-Ch.11.1-11.16 (Except 11.7) [271-285]
26-28	Auxiliary Projections - Understanding usage of primary auxiliary views	Primary and Secondary auxiliary views, true shapes.	T1-Ch. 8.1-8.17 [177-187]
29-31	Auxiliary Projections - Understanding usage of secondary auxiliary views	Primary and Secondary auxiliary views, true shapes.	T1-Ch. 8.1-8.17 [177-187]
32-34	Spatial Geometry	Projection of points, lines, true lengths.	T2 -Ch.9.1-9.22 [199-211]
35-37	Spatial Geometry	Inclinations, shortest distance, planes.	T1-Ch.9.1 9.22 [199-211]
38-40	Geometrical Solids and Sections - Solids in different positions	Construction of right regular, oblique solids.	T1-Ch.7.1-7.17 (Except 7.9) [157-169]
41-42	Geometrical Solids and Sections - Sections of solids.	Construction of Sectional views.	T1-Ch.7.1-7.17 (Except 7.9) [157-169]
43-44	Development of surfaces- Drawing layouts of object surfaces	Parallel line method	T2 - Ch.16.0-16.7
45-46	Development of surfaces- Drawing layouts of object surfaces	Radial Line method	T2 -Ch.16.10 - 16.20
47-48	Intersection of surfaces	Intersection between line-plane, plane-plane	T1-Ch.10.25-10.45 (Except 10.26) [248 265]
49-50	Intersection of surfaces	Intersection between line-solid, plane-solid, solid-solid	T2 -Ch.15.12-15.18

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	21.09.2022	1-13	CB
Test 2	60 Minutes	17	19.10.2022	14- 27	CB
Test 3	60 Minutes	17	19.11.2022	28- 42	OB
Lab		10	**	**	CB
Comprehensive Exam	3 Hours	40	21.12.2022	1- 50	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: 02/08/2022

Mr. ABHISHEK MISHRA
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology

First Semester, 2022 – 2023

Course Handout

Course Code	Course Title	L	P	U
TA102	**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.

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
R2	Principles of Manufacturing Materials and Processes by J.S.Campbell, TMH, 1999.
R3	Materials and Processes in Manufacturing, E.Paul DeGarmo, J.T.Black, PHI, 8th Edition, 2003.
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. Of Text Book)
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 To 4.16
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	20.09.2022	1-12	CB
Test 2	50 Minutes	8	18.10.2022	13- 23	CB
Test 3	50 Minutes	8	18.11.2022	24- 30	OB
Lab	Throughout the Semester	50	**	1-10 (Sr. No.)	CB
Comprehensive Exam	3 Hours	26	16.12.2022	1- 30	CB

** To be announced in the class

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

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

Date: 02/08/2022

Mr. HEMANT KUMAR DEWANGAN
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology

First Semester, 2022 - 2023

Course Handout

Course No	Course Title	L	P	U
TA103	**Computer Programming- I**	**3**	**0**	**3**

Instructor-in-charge: Dr. RAVI KIRAN

Learning Outcomes:

1. The course covers the basics of programming and demonstrates fundamental programming techniques, customs and terms including the most common library functions and the usage of the preprocessor.
2. This course helps the students in gaining the knowledge to write simple C language applications, mathematical and engineering problems.
3. This course helps to undertake future courses that assume this programming language as a background in computer programming. Topics include variables, data types, functions, control structures, pointers, strings, arrays, pointer and structure.

Textbook(s) **T1**	Programming in ANSI C by E Balagurusamy, Tata McGraw Hill.
T2	The C Programming Language by Brian Kernighan and Dennis Ritchie 2nd edition
Reference book(s) **R1**	Let Us C Yashavant Kanetkar BPB.
R2	Object Oriented Programming With C++ By Bala Gurusamy, Tata McGraw Hill.
NPTEL Link	**https://nptel.ac.in/courses/106/104/106104128/**

Lecture-wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference(Ch. /Sec./Page Nos. of Text Book)
1	To learn Introduction to Programming	Introduction to Programming	T1 CH-1 1.1,1.2
2	To learn background of programming	Programming Languages: Machine Level Languages, Assembly Level Languages, High Level Languages, and Programming Design Methodologies: Top Down and Bottom UP Program	T1 CH-1 1.3,1.4,1.5
3-4	To learn Elements of programming	Program Execution and Translation Process, Problem solving using Algorithms and Flowcharts.	T1 CH-1 1.6,1.7
6	To learn Introduction to C Programming	Features of C and its Basic Structure, Simple C programs	T1 CH-1 1.8,1.9
7-8	To learn Constant, variable in C Programming	Constants, Concept of an Integer and Variable, Rules for naming Variables and assigning values to variables	T1 CH-2 2.3,2.4, 2.5,2.6

9-10	To learn operators in C Programming	Arithmetic Operators, Unary Operators, Relational and Logical Operators, The Conditional Operator, Library Functions, Bitwise Operators, The Increment and Decrement Operators, The Size of Operator, Precedence of operators.	T1 CH-3 3.1,3.2,3.3,3.4,3.5, 3.6,3.7
11-12	To learn Data types in C Programming	Data Types and Input /Output Operators	T1 CH-2 2.7,2.8
13-16	To learn Control Statements and Decision Making Statement	The if statement, The if-else statement, Nesting of if statements, The conditional expression, The switch statement,	T1 CH-5 5.1,5.2,5.3,5.4,5.5, 5.6,5.7
17-20	To learn looping statement	The while loop, The do…while loop, The for loop, The nesting of for loops, The break statement and continue statement.	T1 CH-6 6.1,6.2,6.3,6.4,6.5
21	To learn concept of function	Function Philosophy, Function Basics, Function Prototypes	T1 CH-9 9.1,9.2
22-23	To learn function parameters concept	Passing Parameters: Passing Parameter by value and Passing Parameter by reference	T1 CH-9 9.3,9.4,9.5,9.6
24-25	To learn parameter passing	Passing string to function, Passing array to function, Structures and Functions Recursion	T1 CH-9 9.9,9.10,9.11,9.12, 9.13,9.16
26-28	To learn Concept of array	One Dimensional Arrays, Multidimensional Arrays, Strings	T1 CH-7 7.1,7.2.7.3,7.7,7.8, 7.9
29-30	To learn basics of pointers	Basics of Pointers, Pointers and One-dimensional Arrays	T1 CH-11 11.1,11.2,11.3
31	To learn Pointer Arithmetic	Pointer Arithmetic, Pointer Subtraction and Comparison	T1 CH-11 11.4,11.5,11.6
32-33	To compare pointer and array	Similarities between Pointers and One-dimensional Arrays.	T1 CH-11 11.7,11.8,11.9
34-35	To learn Basics of Structures	Basics of Structures, Arrays of Structures,	T1 CH-10 10.1,10.2
36	To learn structure operations	Pointers to Structures, Self-referential Structures,	T1 CH-10 10.8,10.9
37	To learn Introduction to Object oriented Programming	Introduction to Object oriented Programming, Difference between POP and OOP	R2 CH-1 1.2,1.3,1.4
38-40	To learn Features of Object oriented Programming	Features of OOP, Class, object, Encapsulation, Inheritance, Polymorphism	R2 CH-1 1.5,1.6

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	21.09.2022	1-16	CB
Test 2	60 Minutes	17	19.10.2022	17- 28	CB
Test 3	60 Minutes	17	19.11.2022	29- 40	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	23.12.2022	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: 02/08/2022

Dr. RAVI KIRAN
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2022 – 2023
Course Handout

Course No	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 l Ch-6 300-353

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	17	06.09.2022	1-12	CB
Test 2	60 Minutes	17	19.10.2022	13- 28	CB
Test 3	60 Minutes	16	19.11.2022	29- 42	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	21.12.2022	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: 02/08/2022

Dr. ANIMESH KUMAR SHARMA
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology

First Semester, 2022 – 2023

Course Handout

Course No	Course Title	L	P	U
ES201	**Electrical Sciences 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.
T2	Principles of Electronics By V.K. Mehta, Rohit Mehta
Reference book(s) **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 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- 20	CB
Test 3	60 Minutes	17	18.11.2022	21- 30	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	19.12.2022	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: 02/08/2022

Dr. ANIL KUMAR VERMA
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2022–2023
Course Handout

Course No	Course Title	L	P	U
ES204	**Structure and Properties of Material**	**3**	**0**	**3**

Instructor-in-charge: Mr. DILIP MISHRA

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

1. Structure and Properties of Materials course is interdisciplinary in nature, predominantly covers the fields of physics, chemistry, mechanical and metallurgical engineering.
2. This is one of the compulsory and introductory course that is offered to students of all branches of engineering, provides an excellent understanding of structure of materials at the atomic and microscopic level.
3. To apply theory and practice of Structure and properties of material to real life design applications.
4. The relation between the structure and properties of metallic, ceramic, electronic and polymeric materials is highlighted. The main objective is to show how the type of bonding and crystal structure affects the aforesaid properties of materials.

Textbook(s) T1	Materials Science & Engineering: An Introduction ,Willam D. Callister, Jr. John Wiley & Sons, 6th Edition, 2003.
Reference book(s) R1	Engineering Materials: Properties and Selection, K.G. Budinski and M. K. Budinski, Prentice Hall of India, 7th Edition, 2004.
R2	The Science and Engineering of Materials, Donald R. Askeland and Pradeep P. Phule, 4th Edition, Thomson book Company, 2003.
R3	Principles of Materials Science and Engineering, William F. Smith, , Mc-GrawHill 3rd Edition 1996.

Lecture-wise plan:

The chapter-wise course plan and the number of lecture-hours allocation are detailed below: The learning objective is given at the beginning of each chapter in great detail. The students are expected to go through before they start studying the chapter.

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./Pg No)
1 - 2	General understanding of materials science, Bonding forces and their types	Introduction, Atomic bonding in solids	Ch1, 2.5 to 2.8 (T 1)
3 - 6	Crystal structures and systems, crystallographic directions and planes, Crystalline and non-crystalline materials	Metallic structures	Ch 3.1 to 3.15, Ch 3.17 (T 1)

7 - 9	Defects and dislocations	Imperfections in solids	Ch4.1 to 4.8 (T 1)
10 - 12	Diffusion mechanisms	Diffusion	Ch5.1 to 5.6 (T 1)
13 - 15	Deformation mechanisms	Dislocation	Ch7.1 to 7.6 (T 1)
16 - 18	Stress - Strain relations	Mechanical properties of solids,	Ch6.1 to 6.7 and 6.10 (T1)
19 - 21	Mechanical test behavior of ceramics	Structure and properties of ceramics	Ch 12.1 and 12.2, 12.8 to 12.11 (T 1)
22	Types and application of ceramics	Applications and processing of ceramics	Ch13.1 to 13.6 (T 1)
23	Glasses - Glass forming - properties	Fabrication and processing of glasses	Ch13.8 (T 1)
24 - 25	Molecular size, shape & structure of polymers	Polymer structures	Ch14.1 to 14.11 (T 1)
26-27	Important Characteristics of polymeric materials	Mechanical behavior, Crystallization and processing of polymers	Ch15.1 to 15.2 and15.10 to 15.14 (T 1)
28-29	Phases, microstructures, phase equilibrium	Phase diagrams	Ch9.1 to 9.7, and 9.10 (T 1)
30-31	Fe-Fe3C phase diagram, development of micro-structure in Fe-C alloys	Iron carbon systems	Ch9.17 to 9.18 (T 1)
32	Avarami rate equation	Kinetics of phase transformations	Ch10.1 to 10.4 (T 1)
33 - 34	Isothermal transformation diagrams - continuous cooling diagrams	Correlation of properties to microstructures	Ch10.5 to 10.6 (T 1)
35 - 36	Mechanical behavior of Fe-C alloys, tempered martensite	Mechanical behavior of Fe-C alloys	Ch10.7 to 10.8
37	Thermal properties of materials	Thermal properties	Ch19.1-19.6, 19.3 - 19.5
38 - 40	Energy band in semiconductors etc.,	Electronic properties	Ch18.1 to 18.3, 18.4 to 18.8, 18.16, 18.17, 18.24 to 18.25 (T1)
41	Super conductivity	Magnetic properties	Ch20.11 (T1)
42	Nanotechnology	Carbon Nano Tubes	P7, P401-403 (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	06/09/2022	1-10	CB
Test 2	60 Minutes	17	17/10/2022	11- 20	CB
Test 3	60 Minutes	17	17/11/2022	21- 30	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	12/12/2022	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: 02/08/2022

Mr. DILIP MISHRA
Instructor-in-charge

The ICFAI University, Raipur

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

Course No	Course Title	L	P	U
TA204	**Technical Report Writing**	**3**	**0**	**3**

Instructors-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 booksT1	
Reference Books R1	Technical Report Writing by Kieran Morgan
R2	Managing Your Documentation Projects by John, 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 No.	Learning Objective	Topics to be covered	Reference
1	Understanding technical communication	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 communication	Characteristics of Technical report writing	https://alg.manifoldapp.org/read/open-technical Communication /section/0debb16b-f623-4033-a47b-973d65ab0961
4	Focused technical communication	Qualities of good technical report	Microsoft Word - The qualities of a good technical report..doc (tamu.edu)
5	Rhetorical awareness	Rhetorical Awareness in Tech Communication	1.3 Understanding the Rhetorical Situation – Technical Writing Essentials (bccampus.ca)
6,7	Correctness of technical communication	Legal & Ethical Communication	"Chapter 3 - Ethics in Technical Communication" in "Open Technical Communication" on Open ALG

8,9	Understand oral technical communcation	Oral & Presentation	“2.12 - Oral Presentations” in “Open Technical Communication” on Open ALG (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 communication important?	Description & Importance of Tech Communication	What is the importance of technical report writing? – MV Organizing
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 Open ALG (manifoldapp.org)
16	Know the types of tech documents	Types of Tech Documents	“2.2 - Types of Technical Documents” in “Open Technical Communication” on Open ALG (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 communication	Technical re-writing & Editing	Ten Best Practices for Technical Writing and Editing | Perfect It™ | Proofreading Software for Professionals. (intelligentediting.com)
24	Technical writing - user orientation	Usability Testing & Tech Writing	Usability Testing | Usability.gov
25	Usage of reusable 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 Open ALG (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 Open ALG (manifoldapp.org)
32	Tech writing-customer orientation	Technical Correspondence	“2.1 - Business Correspondence and Resumes” in “Open Technical Communication” on Open ALG (manifoldapp.org)
33,34	Tech writing-resumes/ cover letters	Writing Resumes & Cover Letters	“2.1 - Business Correspondence and Resumes” in “Open Technical Communication” on Open ALG (manifoldapp.org)
35,36,37, 38	Types of tech documents	Technical Instructions, Manual Writing, Proposal Writing	“2.6 - Instructions” in “Open Technical Communication” on Open ALG (manifoldapp.org)
39,40	Practical presentation	Project Work & Presentation	Practical session

Classroom Practical

S.N.	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 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	07.09.2022	1-15	CB
Test 2	60 Minutes	17	18.10.2022	16- 29	OB
Test 3	60 Minutes	17	18.11.2022	30- 40	CB
Practical	Throughout the Semester	10	**	---	CB
Comprehensive Exam	3 Hours	40	16.12.2022	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: 02/08/2022

Dr. SHUBHRA TIWARI
Instructor-in-charge

The ICFAI University, Raipur

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

Course No	Course Title	L	P	U
EC211/CS212	**Digital Logic Design**	**2**	**2**	**3**

Instructor-in-charge: Ms. BHAVNA 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

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

Lecture-wise Plan

Lecture No.	Learning Objective	Topics to be covered	Reference
1	Introduction to digital systems	Digital systems, Analog systems V S 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	08.09.2022	1-12	CB
Test 2	60 Minutes	17	20.10.2022	13- 28	CB
Test 3	60 Minutes	17	20.11.2022	29- 42	OB
Lab	Throughout the Semester	10	**	**	CB
Comprehensive Exam	3 Hours	40	26.12.2022	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: 02/08/2022

Ms. BHAVNA CHAUDHARY
Instructor-in-charge

The ICFAI University, Raipur

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

Course No	Course Title	L	P	U
EC212	**Electronic Device & Circuits**	**3**	**0**	**3**

Instructor-in-charge: Ms. BHAVNA CHAUDHARY

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 BJTs to 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 No.	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	09.09.2022	1-12	CB
Test 2	60 Minutes	17	19.10.2022	13- 28	CB
Test 3	60 Minutes	17	19.11.2022	29- 42	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	23.12.2022	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: 02/08/2022

Ms. BHAVNA CHAUDHARY
Instructor-in-charge

The ICFAI University, Raipur

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

Course No	Course Title	L	P	U
CS211	**Object Orient 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

Text BookT1	E. Balagurusamy – Object Oriented Programming with C++, Fifth edition, Tata McGraw Education Hill, 2011.
T2	Ashok N. Kamthane, Object oriented Programming with ANSI & Turbo C++, First Edition, Pearson India
Reference book(s) R1	Herbert Schildt, The complete reference C++Fourth Edition Tata McGraw- Hill

Lecture wise plan

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page Nos of Text/Ref. Books) R1
1	To learn the OOPs fundamentals	What is OOPs? Procedure Oriented Programming vs. Object Oriented Programming.	255
2-4	To learn the OOP's principles	Abstraction Encapsulation, Polymorphism and Inheritance	257-260
5-7	To learn about Classes and Objects	Objects and Instances Class Members	289
8-9	To know about Language Constructs	Programming basics, data type, loops and decisions, Control statements	70-88
10-13	To Learn about Class Member functions and Objects	Classes and Member functions Constructors and destructors	289-324
14-16	To learn about Strings Objects	Creation and Manipulation of Strings String I/O	683-693

17-19	To define and use operators for user defined types	Operator Overloading and multiple overloading with type conversion	384-414
20-23	To learn about Inheritance	Class Single and Multiple Inheritance,	417-425
24-25	To learn about Inheritance	Member Specifiers Derived classes	426-430
26-28	To learn about Polymorphism and need and importance of Virtual Functions	Virtual Function, function call binding, late binding	444-447
29-30	To learn about Polymorphism and need and importance of Virtual Functions	Friend and static function, this operator	332, 310-315, 297-302
31-33	To learn about handling the file Object	Creating and Manipulating File and Streams	488
34-35	To learn about handling the file Object	Mechanism, try, throw and catch	494
36-37	To learn about handling the file Object	Catching all Exceptions, Multiple catches	495
38-40	To learn about handling the file Object	Programs related to exception handling	506

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	08.09.2022	1-11	CB
Test 2	60 Minutes	17	19.10.2022	12- 25	CB
Test 3	60 Minutes	17	19.11.2022	26- 40	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	23.12.2022	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: 02/08/2022

Mr. ASHISH KUMBHARE
Instructor-in-charge

The ICFAI University, Raipur

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

Course No	Course Title	L	P	U
CE211	**Fluid Mechanics**	**3**	**2**	**4**

Instructor-in-charge: Ms. NAZYA PARVEEN

Learning Outcomes:
After successful completion of the course student will be able to
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)	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, NewDelhi, 2008.

Lecture Wise Plan:

Lecture No	Learning Objectives	Topics to be covered	Reference
1st	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
2nd		Numerical	
3rd	Fluid pressure and its measurement	Fluid pressure and its measurement	**T**.1,2.2,2.3,2.4,2.5,2. 6
4th		Fluid pressure at a point, variation of pressure in a fluid, Pascal's law	
5th		Absolute, gage and vacuum pressure, manometers, mechanical gages	
6th	Hydrostatic forces on surfaces	Hydrostatic forces on surfaces, Total pressure and center of pressure	**T**.3.1,3.2,3.3,3.4,3.5
7th		Total pressure on plane surface, pressure diagram, total pressure on curved surface with Numerical	
8th		Applications of total pressure and centre of pressure with numerical	

9th	Buoyancy and floatation	Buoyancy and floatation Concepts, Buoyant force, centre of buoyancy, metacenter and metacentric height	**T.**4.1,4.2,4.3,4.4,4.5 , 4.6
10th		Numerical	
11th		Stability of submerged and floating bodies, time period of transverse oscillation of a floating body	
12th		Numerical	
13th	Liquids in relative equilibrium	Liquids in relative equilibrium-Concepts, Fluid subjected to linear acceleration	**T.**5.2,5.3,5.4,5.5
14th		liquid container subjected to constant horizontal and vertical acceleration andconstant rotation	
15th		Numerical	
16th	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
17th		description of the flow pattern, basic principles of fluid flow, continuity equation	
18th		acceleration of a fluid particle, rotational andirrotational motion, circulation and vorticity, velocity potential	
19th		stream lines, equipotential lines and flow net, use of the flow net and its limitations	
20th		Numerical	
21st	Equations of motion and energy	Equations of motion and energy, Forces actingon the moving fluid,	**T**.7.2,7.3,7.4,7.5,7.6 , 7.7,7.8
22nd		Euler's equation of motion, Bernoulli's equation with numerical	
23rd		kinetic energy correction factor, pressure velocity relationship with numerical	
24th	Flow measurement devices	Flow measurement devices-introduction, Venturimeter, orificemeter, nozzlemeter,	**T**.7.10,7.11,7.12,7.13,7.14,7.16,7.17
25th		Rotameter, elbow meter, pitot tube, vortex motion, radial flow with numerical	
26th	Impulse momentum equation and its application	Impulse momentum equation and its Application	**T**.8.2,8.4
27th		Numerical	
28th	Flow through orifices and mouth pieces	Classification of orifices and mouth pieces, head losses of flowing liquid due to suddenchange in velocity	**T.**9.2,9.4,9.8
29th		Numerical	

30th	Flow over notches and weirs	Classification of notches and weirs, calibrationof rectangular weir or notch, empirical formula for discharge over rectangular weirs, flow overtrapezoidal weir or notch	**T**.10.2,10.3,10.4,10.5,10.8
31st		Numerical	
32nd	Flow through pipes	Flow through pipes, Reynolds's experiment ,laws of fluid friction, Froude's experiment, Darcy-Weisbach equation,	**T.**11.2,11.3,11.4,11.5,11.6,11.7,11.8,11.9,11.10,11.14,11.21,
33rd		The formulae for head loss due to friction in pipes, other energy losses in pipes,	11.22
34th		Hydraulic grade line and energy grade line, flow through long pipes with numerical	
35th		pipes in series, branched pipes, water hammer in pipes, pipe networks	
36th		Numerical	
37th	Boundary layer theory	Boundary layer equation, laminar boundary layer, turbulent boundary layer	**T**.12.4,12.6,12.7
38th		Numerical	
39th	Laminar flow	Laminar flow, Hagen-Poiseulle law,	**T**.13.3,13.8,13.10
40th		laminar flow of fluid in open channel, Stoke's law with numerical	
41st	Turbulent flow in pipes	Turbulent flow in pipes, Shear stress in turbulent flow, formation of boundary layer in pipes,	**T**.14.2,14.3,14.4
42nd		Hydrodynamically smooth and rough boundaries with numerical	
43rd	Open channel flow	Classification of open channel flows, Froudenumber and wave speed, uniform flow in channel,	**R1.**13.1,13.2,13.5, 13.6,13.8
44th		Best hydraulic cross-section, hydraulic jump with numerical	

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	08.09.2022	1-11	CB
Test 2	60 Minutes	17	19.10.2022	12- 25	CB
Test 3	60 Minutes	17	19.11.2022	26- 40	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	23.12.2022	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: 02/08/2022

Ms. NAZYA PARVEEN
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology

First Semester, 2022 - 2023

Course Handout

Course No	Course Title	L	P	U
CE212	**Geodesy**	**3**	**2**	**4**

Instructor-in-charge: Ms. NAZYA PARVEEN

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 ofGeodesy	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
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 andmeasurements, 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, tiltinglevel, 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 TableSurveying	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 of Volume by various methods	12.1, 12.2, 12.3, 12.9, 13.1, 13.2, 13.3, 13.4, 13.8
29-31	Trigonometricleveling	Trigonometric leveling- Elevation & Height measurement	15.1, 15.2
32-35	ElectromagneticDistance 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	09.09.2022	1-11	CB
Test 2	60 Minutes	17	20.10.2022	12- 25	CB
Test 3	60 Minutes	17	21.11.2022	26- 40	OB
Lab	Throughout semester	10	**	**	CB
Comprehensive Exam	3 Hours	40	26.12.2022	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: 02/08/2022

Ms. NAZYA PARVEEN
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2022 – 2023
Course Handout

Course No	Course Title	L	P	U
ME211	**Prime Movers and Fluid Machines**	**3**	**2**	**4**

Instructor-in-charge – Mr. DILIP MISHRA

Scope & Objective of the Course:
The Course is intended to familiarize the students with theoretical analysis of energy and momentum transfer between the fluid and rotor. The working principles, design considerations, performance and application aspects of turbo machines will be dealt with. Classification, descriptive details and performance of rotary machines and reciprocating machines will be discussed.

Text Book(s) **T1**	Jagdish Lal; Hydraulic Machines, Metropolitan Book Company Private Ltd.
Reference Books **R1**	Turbines Compressors and Fans, S M Yaha, Tata McGraw Hill, 3rd Edition
R2	Fluid Mechanics and Machinery; Agarwall S K; Tata Mc Grawhill.
R3	Hydraulics and Fluid Mechanics Including Hydraulic Machines, Modi and Seth, Standard Book House

Lecture Wise Plan:

Lecture Nos.	Learning Objectives	Topics to be covered	Reference(Ch./Sec./Page Nos. of Text Book)
1 – 4	To review the basic concepts of turbo machines, hydraulic machines, principles of Hydraulic machinery	Introduction, turbo machines, hydraulic machines. Dynamic Action of Fluid	Introduction – 1,2 1.1 – 1.18 TB-I
5	To understand Whirling Fluids	Fluid Motions, principle of Centrifugal pump	2.1 – 2. 10 TB - I
6	To understand Dimensional analysis as applied to fluid machines	units and specific quantities, specific speed	3.1 – 3.6 TB - I
7-8	To understand the classification of hydraulic turbines; principles of analysis.	Introduction; Elements of hydroelectric power plant; classification of turbines; Fundamental equation of hydraulic machines;	4.1 – 4.20 TB - I

9 – 11	To understand the analytical principles of various hydraulic turbines - Impulse turbines	Pelton turbine, design of components, force, power and efficiency.	5.1 – 5.5, 5.9 – 5.16, 5.19- 5.23 TB – I
12 - 17	To understand the analytical principles of various hydraulic turbines – Reaction turbines	Francis, Kaplan Turbines Design of components, force, power and efficiency.	6.1 – 6.20 7.1 – 7.9 TB - I
18 - 21	To understand the classification of pumps, working principles of various pumps, Analysis of reciprocating pumps.	Introduction; reciprocating pumps	11.1 – 11.5 11.9 – 11.25 TB – I
22- 24	To understand the analytical principles of centrifugal pumps	Centrifugal pumps; classification; basic equations of analysis; Curvature of blades; velocity triangles; problems on the above topics.	12.1, 12.3 – 12.14 12.17 – 12.21 TB – I
25 - 27	To understand the analytical principles of centrifugal pumps	Theory of centrifugal pumps	12.22 -12.50 TB – I
28 - 30	To understand the classification of steam turbines and basic principles of analysis.	Introduction; Compounding of steam turbines; velocity diagrams of moving blades.	Class notes 4.1 – 4.4 RB -I
31 - 33	To understand the analysis of various steam turbines.	Impulse turbines; reaction turbines; degree of reaction; stage efficiency; turbine efficiency & reheat factor; losses in steam turbines; governing	Class notes 4.5 – 4.7 RB- I
34 - 36	To understand classification; working & analytical principles of gas turbines.	Introduction; elementary design of turbines; gas turbine blading; numerical problems.	Class notes 3.1 – 3.9 RB –I
37 - 40	To understand classification; working & analytical principles of various compressors.	Introduction; classification; reciprocating compressors; Multi stage compression with inter cooling	15.1 – 15.6 RB -II

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	08.09.2022	01-10	CB
Test 2	60 Minutes	17	19.10.2022	11-20	CB
Test 3	60 Minutes	17	19.11.2022	31- 41	OB
Lab	Throughout the Semester	10	**	**	CB
Comprehensive Exam	3 Hours	40	23.12.2022	01-41	CB

** To be announced in the class

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

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

Date: 02/08/2022

Mr. DILIP MISHRA
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2022 – 2023
Course Handout

Course No	Course Title	L	P	U
ME212	**Applied Thermodynamics**	**3**	**0**	**3**

Instructor-in-charge: Mr. HEMANT KUMAR DEWANGAN

Scope & Objective of the course:
By end of the course, the students will be in a position to know how to apply first and second laws of thermodynamics for heat engine, refrigerator, Otto cycle, Diesel cycle, Brayton cycle, Rankin cycle, combined gas and vapor power cycles. At the same time, they have complete understanding of vapor compression refrigeration, vapor absorption refrigeration systems, air conditioning and gas mixtures, thermodynamic relations of various properties, compressible flow, chemical reactions and equilibrium of various thermodynamics systems.

Textbook(s) **T1**	Thermodynamics, An Engineering Approach Yunus A. Cengel and Michael A Boles. Tata Mc Graw Hill Publishing Company limited, New Delhi, 5th Edition, 2006.
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	Fundamentals of Thermodynamics, Van Wylen, G.J&R E Sonntag, John Wiley, 6th Edition, 2003.

Lecture-wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference
1	To apply first law of thermodynamics for steady flow engineering devices.	Conservation of mass, Flow work and energy of a flowing fluid, Energy analysis of steady flow systems, Some steady flow engineering devices	5.1 -5.4
2	To solve problems on first law of thermodynamics	Numerical Problems	Chapter-5
3-4	To apply second law of thermodynamics and entropy for heat engine and refrigerator.	Introduction to the second law, Thermal energy reservoirs, Heat engines, Refrigerators and heat pumps, Perpetual motion machines, Reversible and Irreversible processes, Carnot cycle, The Carnot principles, The thermodynamic temperature scale, The Carnot heat engine.	6.1-6.9 & 7.1-7.4
5	To solve problems on second law of thermodynamics and entropy.	Numerical problems Chapters	6 & 7

6	Energy analysis of reversible and irreversible processes	Work potential of energy, Exergy associated with kinetic and potential energy, reversible work and irreversible and second law of efficiency.	8.1-8.3
7	To solve problems on Exergy.	Numerical problems	Chapter-8
8-10	To determine the efficiency of Otto, Diesel and Brayton Gas power cycles.	Basic considerations in the analysis ofpower cycles, The Carnot cycle and itsValue in engineering, Air standard assumptions, An overview of Reciprocating engines, Otto cycle Diesel cycle, Brayton cycle: the ideal cycle.	9.1-9.6 &9.8
11-12	To solve problems on Gaspower cycles.	Numerical problems	Chapter-9
13-14	To determine the efficiency of Rankine and regenerative Rankinecycles and second law analysis for combined cycles.	The Carnot vapor cycle, Rankine cycle, The ideal cycle for vapor powercycles, Deviation of actual power cycles from idealized ones, How can we increase the efficiency of Rankine cycle, The ideal reheat Rankine cycle, The ideal regenerative Rankine cycle, second law analysis of vapor power cycles, combined gas -vapor Power cycles.	10.1-10.7 &10.9
15-16	To solve problems on Vapor andCombined power cycles	Numerical problems	Chapter-10
17-19	To determine the COP of vapor compression and vapor absorptionrefrigeration systems.	Refrigerators and heat pumps, The reversed Carnot cycle, The ideal vaporcompression refrigeration cycle, Actual vapor compression refrigeration cycle, selecting the rightrefrigerant, heat pump systems. Gas refrigeration cycles, Absorption refrigeration systems.	11.1-11.6 & 11.8-11.9
20-21	To solve problems on Refrigeration cycles	Numerical problems	Chapter-11
22-23	To know thermodynamic propertyrelations for ideal and real gases	A little math- partial derivatives andassociated relations, The Maxwell relations, The clapeyron equation, The joule-Thomson coefficient, The h, u and s of real gases.	12.1-12.3 &12.5-12.6
24-25	To know the properties ofGas Mixtures	Composition of a gas mixture, P-V-T behavior of gas mixtures, properties ofgas mixtures.	13.1-13.3
26-27	To solve problems on Gas Mixtures	Numerical problems	Chapter-13
28-29	To know the properties of Gas-Vapormixtures and Air-Conditioning processes.	Dry and atmospheric air, specific andrelative humidity of air, dew point temperature, adiabatic saturation andwet bulb temperature, the Psychometric chart, human comfortand air conditioning, and air conditioning processes.	14.1-14.7

30-31	To solve problems on Gas-Vapormixtures and Air-Conditioning systems.	Numerical problems	Chapter-14
32-33	To apply laws of thermodynamics forcombustion and its formation.	Chemical reactions, Fuels and combustion, theoretical and actual combustion processes, Enthalpy of formation and enthalpy of combustion,First law analysis of reacting systems, Adiabatic flame temperature, Entropychange of reacting systems	15.1-15.6
34-35	To solve problems on ChemicalReactions	Numerical problems	Chapter-15
36-37	To apply chemical and phase equilibrium for ideal gas mixtures.	Criteria for chemical equilibrium, Equilibrium constant for idealgas mixtures.	16.1-16.2
38-39	To know the properties of one dimensional compressible flow.	Stagnation properties, speed of soundand match number, one dimensional isentropic flow.	17.1-17.3
40	To solve problems oncompressible flow.	Numerical problems.	Chapter-17

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	09.09.2022	01-10	CB
Test 2	60 Minutes	17	20.10.2022	11-20	CB
Test 3	60 Minutes	17	21.11.2022	31- 41	OB
Lab	Throughout the Semester	10	**	**	CB
Comprehensive Exam	3 Hours	40	26.12.2022	01-41	CB

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

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

Date: 02/08/2022

Mr. HEMANT DEWANGAN
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2022 – 2023
Course Handout

Course No	Course Title	L	P	U
MA301	**Numerical Analysis**	**3**	**0**	**3**

Instructor-in-charge - Dr. ANIMESH KUMAR SHARMA

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 matters.	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 odder 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	06.09.2022	1-10	CB
Test 2	60 Minutes	17	17.10.2022	11- 20	CB
Test 3	60 Minutes	16	17.11.2022	21- 30	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	12.12.2022	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: 02/08/2022

Dr. ANIMESH KUMAR SHARMA
Instructor-in-charge

The ICFAI University, Raipur

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

Course No	Course Title	L	P	U
EC312	**Analog Communication**	**3**	**2**	**4**

Instructor-in-charge: Dr. K.NAGAIAH

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 environments.

Textbook(s) T1	Modern Digital and Analog Communication Systems by B P Lathi, Z Ding International 4th edition, Oxford University Press
Reference book(s) R1	Principles of Communication Systems by Herbert Taub , Donald L Schilling & Goutam Saha,3rd Edition , Tata McGraw-Hill **.**
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	06.09.2022	1-13	CB
Test 2	60 Minutes	17	18.10.2022	14- 28	CB
Test 3	60 Minutes	17	18.10.2022	29- 41	OB
AC Lab		5	**		CB
Quizzes (2)	20 Minutes each	5	**	**	CB
Comprehensive Exam	3 Hours	40	19.12.2022	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.

Dr. K.NAGAIAH
Instructor-in-charge

Date: 02/08/2022

The ICFAI University, Raipur

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

Course No	Course Title	L	P	U
ME314	**Control Systems**	**3**	**0**	**3**

Instructor-in-charge: Ms. BHAVNA CHAUDHARY

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 principals 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 NY Quist stability criterion	9.1- 9.3
35,36	Do	NY Quist 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	09.09.2022	1-12	CB
Test 2	60 Minutes	17	19.10.2022	13- 28	CB
Test 3	60 Minutes	16	19.11.2022	29- 42	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	23.12.2022	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: 02/08/2022

Ms. BHAVNA CHAUDHARY
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2022 – 2023
Course Handout

Course No	Course Title	L	P	U
EC323	**Microelectronic Circuits**	**3**	**0**	**3**

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

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

1. To develop the student with the principles, operation and applications of the analog building blocks like diodes, BJT, FET for performing various functions.

2. To learn the qualitative analysis using models, equations to illustrate the concepts and to gain the knowledge of existing analog circuits.

3. To understand the working and analysis of amplifiers, feedback amplifiers and oscillators

Text Book T1	A.S.Sedra & K.Smith, Microelectronic Circuits, 5th edition, Oxford higher education, 2009.
Reference book(s) R1	Robert L.Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 10th edition, Pearson, New Jersy, Coloumbus, ohio, 2011
Reference book(s) R2	Jacob Millman, CCHalkias, Satyabrata Jit, Electronic Devices and Circuits, 3rd edition, TMH, New Delhi, 2011.
R3	S. Shalivananan, N.Suresh Kumar, A.VallavaRaj, Electronic Devices & Circuits, Tata McGraw Hill, New Delhi,2003

Lecture wise plan

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page No s of Text/Ref. Books)
1-2	Characteristics and type of amplifiers.	Amplifiers, Circuit Models, Frequency response of amplifiers	T l Ch-l 1.4,1.5,1.6
3-4	BJT Structure, I-V Characteristics, working as a switch and amplifier	Device structure & Physical operation, I-V Characteristics, BJT as an Amplifier & switch	T1 Ch-5 5.1,5.2,5.3
5-6	Analysis of BJT circuits under DC conditions	BJT circuits at DC	T1 Ch-5 5.4
7-8	Biasing and small signal models of BJT	Biasing in BJT amplifier circuits, Small signal operation & Models	T1 Ch-5 5.5, 5.6

11-12	Structure and I-V Characteristics of MOSFET.	Device structure & Physical operation, I-V Characteristics	T1 Ch-4 4.1,4.2
13-14	Working of MOSFET as amplifier, switch and its circuits at DC.	MOSFETS Circuits at DC,MOSFET as an amplifier and as a switch	T1 Ch-4 4.3, 4.4
15-17	Biasing and small signal models of MOSFET.	Biasing in MOS amplifier circuits, Small signal operation & Models	T1 Ch-4 4.5, 4.6
18-19	MOSFET as a single stage amplifier and its high frequency models.	Single stage MOS Amplifiers, MOSFET Internal capacitances & High frequency model	T1 Ch-4 4.7, 4.8
20-22	To Understand the concept of Differential Amplifiers.	The MOS Differential pair.	TI Ch-7 7.1
23-24	Operation of MOS Differential amplifier.	Small signal operation of MOS Differential pair	T1 Ch-7 7.2
25-26	Practical characteristics of MOS Differential pair.	Non-ideal characteristics of MOS Differential pair.	T1 Ch-7 7.4
27-28	Effect of active load on MOS differential amplifier.	MOS Differential amplifier with active load.	T1 Ch-7 7.5
29-30	To understand the concept of Feedback concept	General Feedback structure, Properties of Negative feedback, Four basic feedback topologies	T1 Ch-8 8.1,8.2,8.3
31-32	Analysis of Series-Shunt & Series-Series feedback amplifier	Series-Shunt and Series-Series feedback amplifier	T1 Ch-8 8.4,8.5,
33-34	Analysis of Shunt-Shunt & Shunt-Series feedback amplifier.	Shunt-Shunt and Shunt-Series feedback amplifier.	T1 Ch-8 8.6
35-37	To Understand the concept of power amplifiers and output stages	Classification of output stages, Class A and Class B output stage.	TI Ch-14 14.1, 14.2, 14.3
38-40	Overview of class AB Output stage	Class AB output stage and its biasing.	TI Ch-14 14.4,14.5
41-42	To learn the concepts power transistors	Power BJT's and MOS power transistors.	TI Ch-14 14.6,14.9

Evaluation Scheme:

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	12.09.2022	1-10	CB
Test 2	60 Minutes	17	18.10.2022	11- 24	CB
Test 3	60 Minutes	17	18.11.2022	25- 42	OB
Assignments	Continuous	10		**	CB
Comprehensive Exam	3 Hours	40	16.12.2022	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-02/08/2022

Dr. K. KISHORE KUMAR
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2022 – 2023
Course Handout

Course No	Course Title	L	P	U
EC314	**Digital Signal Processing**	**3**	**2**	**4**

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

Learning Outcomes:
After successful completion of the course student will be able to
1. Analyze and implement digital systems using the DFT and the Fast Fourier Transform (FFT).
2. Analyze digital signal processing systems using Laplace- Transform and Z-transform.
3. Design frequency-selective digital filters.
4. Design digital filters using windows.
5. Use MATLAB for DSP system analysis and design

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

Lecture-wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference(Ch./Sec./ Page Nos.of Text Book)
1	General Introduction to DSP & filter design and filter specifications	Framework for Digital filter design	T1:6.1-6.4 R2:7.1.1-7.1.3
2-3	Standard design procedure for analog low pass, high pass, Band pass, and Band stop filters from given specifications	Design of analog low pass filter: Butterworth & Chebyshev approximations	T1:8.9.1.1 - 8.9.1.2
4-5	Standard design procedure for analog low pass, high pass, Band pass, and Band stop filters from given specifications	Frequency transformation in analog domain	T1: 8.9.2
6	Design of IIR filters with given specifications using th	Digital IIR filter design concepts. Pole-zero placement method	T1:8.1-8.5

7	Design of IIR filters with given specifications using the analog filter design	Impulse Invariant method & Matched Z-transform method	T1:8.6-8.7
8-10	Design of IIR filters with given specifications using the analog filter design	Bilinear Z-Transform method	T1:8.8-8.9
11-12	Filter structures for IIR filters	Realization structures for IIR filters	R1:7.2-7.4
13-14	Design of FIR filters using various design methodologies	FIR Filter Design Concepts. Concepts of linear phase	T1:8.13R2:6.4
15-16	Design of FIR filters using various design methodologies	FIR Filter Design using Window method	T1: 7.1-7.4R2:4.4.1-4.4.54
17	Design of FIR filters using various design methodologies	FIR Filter Design using optimal method	T1:7.5
18	Design of FIR filters using various design methodologies	FIR Filter Design using frequency sampling method	R2:7.7
19	Filter structures for FIR filters.	Realization structures for FIR filters	T1:7.6
20-22	Introduction to multi rate signal processing.	Multi-rate DSP: Decimation & Interpolation, Multistage approach	R2:7.7
23	Filter design for multirate filters	Design of practical sampling rate converters	T1:7.7
24	Efficient filter structures for implementing multirate filters.	Sampling rate conversion using polyphase filter structures	T1:7.10.1,7.10.2
25-26	Introduction to the adaptive filter theory.	Adaptive filters: Concepts/Basic Wiener Theory	R2:6.3
27-28	To design and study the performance of LMS filters	Basic LMS adaptive algorithm	T1:9.1-9.2
29-30	Some practical applications of DSP filters	Applications of DSP	R2:10.1-10.2.3
31-32	To know the difference between the Von Neumann architecture and Harvard architecture.	Introduction to programmable DSP's and DSP architectures	T1:9.3
33	Comparison of various DSP processors.	General purpose DSPs and selection criteria for DSPs	R2:10.3
34-35	To study in detail the architecture and programming of the TMS 320C5X DSP processor.	DSP TMS 320C5X:Architecture	T1:9.6
36-37	To study in detail the architecture and programming of the TMS 320C5X DSP processor	Addressing Modes	R2:10.4

38	To study in detail the architecture and programming of the TMS 320C5X DSP processor	Instruction Set	R4:4.3-4.9
39-40	To study in detail the architecture and programming of the TMS 320C5X DSP processor	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	16	23.02.2022	1-13	CB
Test 2	60 Minutes	17	21.03.2022	14- 26	CB
Test 3	60 Minutes	17	25.04.2022	27- 35	OB
DSP Lab	Throughout the Semester	10	-----	**	CB
Comprehensive Exam	3 Hours	40	18.05.2022	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 and Comprehensive Examinations, etc.

Date: 02/08/2022

Ms. BHAVNA CHAUDHARY
Instructor-in-charge

The ICFAI University, Raipur

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

Course No	Course Title	L	P	U
CS311	**Data Communication Systems**	**3**	**0**	**3**

Instructor-in-charge: Mr. NAVEEN VAISHNAV

Learning Outcomes:
After successful completion of the course student will be able to:
Data communication and networking are changing the way we live and do the things today. They rely on computer networks and internetworks. This course focuses on networking fundamentals, standards and various underlying protocols to make the network connected for text, audio, video and a conglomerate of them. 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
R1	Computer Networks, A. S. Tanenbaum, Pearson Education / Prentice Hall of India, 4th Edition, 2004.
R2	Data Communications, Computer Networks and Open Systems, Halsall Fred, Addition-Wesley, 4th Edition, 2004.
R3	An Engineering Approach to Computer Networks, S. Kesha, Pearson Education, (2004)

Lecture-wise plan:

Lecture No.	Learning Objective	Topics to be covered	(Ch./Sec./Text Book)
1-3	To Understand network concept	OSI MODEL, TCP/IP and other networks models, Arpanet,	T1: 1.1,T1: 3.1,3.2,3.3: T:2.3
4-6	To understand the network topologies	Network Topologies Internet WAN, LAN, MAN Physical Layer: Transmission media copper,	T1:1.2.1.3 T1: 7.1,7.2,7.3
7-10	To understand the concept of ISDN and physical layer	Twisted pair wireless Switching and encoding asynchronous communications; Broad band ISDN	T1:1.2.1.3,1.4 T1: 7.1,7.2,7.3
11-13	To know the concept of ATM & detection methods	ATM Framing, error detection and correction CRC,	T1: 10.1,10.2,10.3
14-15	To understand the different flow control techniques	Elementary Protocol-stop and wait, sliding window	T1: 10.4,10.5
16-17	To know the concept protocols	DHCP, – Ethernet Data link layer in HDLC	T1:11.1.11.2
18-19	To understand MAPs	Multiple Access Protocols Link Layer Addressing – ARP	T1:12.1,12.2,12.3
20-21	To know the concept network components	Hubs, Bridges, Switches., Topology	T1:12.1,12.2,12.3

22-24	Different types of multiple access control protocols	Medium Access sub layer: ALOHAMAC addresses, Carrier sense multiple accesses.	T1:12.1,12.2,12.3
25-28	To understand IEEE 802.x concepts	IEEE 802.X Standard Ethernet wireless LANS Bridges	T1:15.1,15.2
29	To know the network service models	Forwarding and Routing, Network Service Models	T1: 18.5
30	To know IP concepts	Virtual Circuit, Mobile IP – IP	T1:18.1,18.2,18.3,18.4
31-33	To understand the different IPv4, IPv6	Protocol (IP Datagram Networks, Router – Internet IPv4 and IPv6 Link State Routing, Distance Vector Routing	T1:18.1,18.2,18.3,18.4
34-35	To understand the network layers	Transport Layer Services – Multiplexing and Demultiplexing – UDP	T1:18.1,18.2,18.3,18.4
36-37	To understand data transfer techniques	Reliable Data Transfer – Go Back-N Selective Repeat. Connection-Oriented Transport:	T1: 17.1,17.2,17.3
38	To understand TCP structure & operation	TCP – Segment Structure – RTT estimation –	T1: 24.1,24.2,24.3
39	To understand TCP structure & operation	Flow Control – Connection Management	T1: 24.1,24.2,24.3
40	To understand TCP structure & operation	Congestion Control – TCP Delay Modeling	T1: 24.1,24.2,24.3

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	16	06.09.2022	1-13	CB
Test 2	60 Minutes	17	19.10.2022	14- 28	CB
Test 3	60 Minutes	17	19.11.2022	29- 40	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	23.12.2022	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: 02/08/2022

Mr. NAVEEN VAISHNAV
Instructor-in-charge

The ICFAI University, Raipur

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

Course No	Course Title	L	P	U
CS312	Computer Organization and Architecture	3	0	3

Instructor-in-charge: Ms. PALAK KESHWANI

Learning Outcomes

1. The course aims at introducing the concept of computer architecture and organization.
2. It involves design aspects and deals with the current trends in computer architecture.
3. System resources such as memory technology and I/O subsystem needed to achieve proportional increase in performance will also be discussed portion increase in performance will also be discussed.

Textbook(s) T1	Computer Organization & Architecture, Morris Mano, 3rd Ed., Pearson Education / Prentice Hall - New Delhi , 2004.
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

Lecture-wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./Page Nos.of Text Book)
1	To learn the concept of Central Processor organization	Bus organized computer, Memory Address Structure,	T1: Ch 5, 147
2-3	To learn the concept of Central Processor organization	Memory data, register, program counter, Accumulator	T1: Ch 4,
4-5	To learn the concept of Central Processor organization	Addressing modes	T1: Ch 8, 278-282
6-7	To learn the concept of Central Processor organization	Instruction, register, Instruction field, Micro operations,	T1: Ch 8, 273-277
8-9	To learn the concept of Central Processor organization	Register transfer languages, Instruction field	T1: Ch 4, 111-140
10-11	To learn the concept of Central Processor organization	Decoding and execution, Instruction formats and addressing modes.	T1: Ch 5, 153-163
12-13	To learn the concept of control unit organization	Instruction sequencing, Instruction interpretation,	T1: Ch 7, 234-238

14-15	To learn the concept of control unit organization	Hardwired control, Micro programmed Control Organization	T1: Ch 7, 238-256
16	To learn the concept of control unit organization	Control memory, Address sequencing,	T1: Ch 7, 231-238
17-18	To learn the concept of control unit organization	Micro-instruction, Formats	T1: Ch 8, 273-277
19-20	To learn the concept of control unit organization	Micro-Program Sequence, Microprogramming.	T1: Ch 7, 253
21-22	To Learn the concept of Arithmetic Processor Design	Addition and subtractions algorithm	T1: Ch 10, 351-356
23-24	To Learn the concept of Arithmetic Processor Design	Multiplication algorithm	T1: Ch 10, 358-364
25-26	To Learn the concept of Arithmetic Processor Design	Division Algorithm Processor configuration	T1: Ch 10, 366-371
27-28	To Learn the concept of Arithmetic Processor Design	Design of control unit	T1: Ch 10, 366-371
29-30	To Learn the concept of Arithmetic Processor Design	Floating point arithmetic.	T1: Ch 10, 372-380
31-33	To Learn Input Output Organization	Programmed I/O., I/O addressing, I/O instruction	T1: Ch 11, 42
34-36	To Learn Input Output Organization	Synchronization, RISC, CISC	T1: Ch 8, 300-306
37-38	To Learn Concept of Memory Organization and Multiprocessor	Basic concepts and terminology, Memory hierarchy	T1: Ch 12, 463
39	To Learn Concept of Memory Organization and Multiprocessor	Semiconductor memories RAM, ROM	T1: Ch 12, 466-470
40	To Learn Concept of Memory Organization and Multiprocessor	memories and interleaving Virtual memory	T1: Ch 12, 487-490
41-42	To Learn Concept of Memory Organization and Multiprocessor	Cache memory, Associative memory	T1: Ch 12, 480-487

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	07.09.2022	1-12	CB
Test 2	60 Minutes	17	18.10.2022	13- 28	CB
Test 3	60 Minutes	17	18.11.2022	29- 42	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	16.12.2022	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: 02/08/2022

Ms. PALAK KESHWANI
Instructor-in-charge

The ICFAI University, Raipur

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

Course No	Course Title	L	P	U
CS313	Data Structures and Algorithms	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

Learning Outcomes:

Text Book (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
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

Lecture-wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./Page Nos.of Text Book)
1-3	To learn Introduction of Data structure and its types	Introduction of Data structure, Data types: primitive, non-primitive data types, Linear and nonlinear data structure.	T1 CH-1 1.1, 1.3, 1.4
4-6	To learn application of array and various searching techniques	Array concept (one dimension, two dimension), Linear and Binary Search Algorithms,	T1 CH-2 2.4
6-7	To learn various sorting techniques	Sorting Algorithms: Bubble Sort, Insertion Sort, Selection Sort	T1 CH-7 7.1, 7.2

8-10	To learn various sorting techniques using Divide and Conquer strategy.	Quick Sort, Merge Sort & Radix sort	T1 CH-7 7.3, 7.4, 7.5
11	To learn introduction to linear data structure stack.	Stack concept	T1 CH-3 3.1
12-13	To learn various stack operations.	Operations PUSH, POP, TRAVERSE, Is full, is empty.	T1 CH-3 3.1, 3.2
14-17	To learn Applications of stack	Infix, Prefix, Postfix representation, Conversion using stack	T1 CH-3 3.3
18-19	To learn introduction to linear data structure Queue and its types.	Introduction, and Types of Queues, Priority Queue, Circular queue, Double Ended Queue,	T1 CH-3 3.1
20	To learn various Queue operations.	Operations (INSERT, DELETE, TRAVERSE)	T1 CH-3 3.1, 3.2
21-22	To learn introduction to linear data structure Linked list and its types.	Linked List, Singly and Doubly Linear link lists, Singly and doubly circular linked list	T1 CH-4 4.1
23-24	To learn various linked List operations	Operations on linked lists insert, delete, Applications of linked lists.	T1 CH-4 4.8,4.9
25-26	To learn introduction to Nonlinear data structure Tree and its types.	Definition of trees and their types, Binary trees, Properties of Binary trees,.	T1 CH-5 5.1, 5.2
27-30	To learn various operations and traversal technique.	Insertion, deletion, Searching and traversal algorithm, Preorder, post order, in-order traversal) , BFS, DFS	T1 CH-5 5.3, 5.4, 5.5
31-32	To learn various applications of tree	Binary Search Trees, Implementations, AVL Trees, B tree,	T1 CH-5 5.6, 5.7
33	To learn introduction to Nonlinear data structure Graph and its types.	Definition of Graph and their types	T1 CH-6 6.1
34-35	To learn various applications of Graph	Adjacency and incident (matrix & linked list) representation of 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
39-40	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 (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	07.09.2022	1-12	CB
Test 2	60 Minutes	17	18.10.2022	13- 26	CB
Test 3	60 Minutes	17	18.11.2022	27- 40	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	19.12.2022	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: 02/08/2022

Mr. ASHISH KUMBHARE
Instructor-in-charge

The ICFAI University, Raipur

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

Course No	Course Title	L	P	U
CS221	**Microprocessor Programming & Interfacing**	**3**	**0**	**3**

Instructor-in-charge: Mr. ASHISH KENDE

Learning Outcomes:
After successful completion of the course student will be able to
This course is a basic introduction to processor ISA, Assembly programming, Computer & Embedded Architecture. Intel 80x86 is used as a platform through the course. 8086 - 80486 Programmers model of processor, processor architecture; Instruction set, modular assembly programming using subroutines, macros etc.; Timing diagrams; Concept of interrupts: hardware & software interrupts, Interrupt handling techniques, Interrupt controllers. Types of Memory & memory interfacing. Programmable Peripheral devices and I/O Interfacing, DMA controller and its interfacing. Design of processor based system.

Textbook(s) T1	Barry B Brey, The Intel Microprocessors. Pearson, Eight Ed. 2009.
Reference book(s) R1	Douglas V Hall, Microprocessor and Interfacing, TMH, Second Edition.

Lecture-wise Plan:

Lect. No.	Learning Objectives	Topics to be covered	Reference to Text
1.	Introduction to Microprocessor and Microcomputers	Compute Architecture, Memory & I/O organization,CISC/RISC processors	Chapter 1
2-4	Microprocessor & itsarchitecture	Programming Model, Real & Protected Addressing mode, memory paging, Flat mode memory	Chapter 2
5-6	Assembly Programming	Addressing Modes	Chapter 3
7-12	Assembly Programming	Instruction Set & ALP	Chapter 4-6, 8
13-15	8086/8088 Hardware Specifications	Pin Out, Modes of operation, Clocking, Buses	Chapter 9
16-19	Memory Interface	Memory Devices, Address Decoding- Memory Interface 8086- 80386	Chapter -10

20	I/O Interfacing	Basic I/O interfacing (I/O mapped I/O and Memory mapped I/O)I/O port address decoding	Chapter 11.1, 11.2
21	Interrupts	Types of interrupts, Vector tables, Priority Schemes	Chapter 12.1, 12.2,
22-29	Programmable PeripheralDevices	8255,8254,ADC,DAC, 8259	Chapter 11.3-11.6 & 12.3 -12.6
30-32	DMA controller	8 Basic Operation, 8237, Shared Bud, Disk Memory Systems, Video Displays	Chapter -13
33-35	Bus Interface	ISA, PCI, Com, USB,AGP	Chapter 15
36-38	Advanced Processors	80186-80286	Chapter 16
39-41	Advanced Processors	80386-80486	Chapter 17
	Self-Study Topics- Microcontroller Architecture -8051		

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	09.09.2022	1-12	CB
Test 2	60 Minutes	17	19.10.2022	13- 27	CB
Test 3	60 Minutes	17	19.11.2022	28- 40	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	21.12.2022	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-02/08/2022

Mr. ASHISH KENDE
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2022 – 2023
Course Handout

Course No	Course No	L	P	U
ME414	**Computer Aided Manufacturing**	**3**	**0**	**3**

Instructor-in-charge: Ms. NAZYA PARVEEN

Scope and objective of the Course:
To enhance the productivity, the industries are trying to minimize repetitive human efforts and to apply computerized automation in the manufacturing activities. This has forced industries to introduce computerized numerical control machine tools (CNC), automated storage & retrieval system (AS/RS), industrial robots etc. On the shop floor and to take computer's aid in planning and de3sign and manufacturing sections (CAPP, CAD and CAM), The objective of the course is to give students an insight to the theory and applications of automation in manufacturing and to make students familiar with the concept of flexible manufacturing systems (FMS) and architecture of the computer integrated manufacturing (CIM).

Textbook(s)	P.N. Rao, CAD/CAM Principles and Applications, Tata McGraw-Hill, 3e-2010.
T1	P.N. Rao, N.K.Tiwari, T.K.Kundra, Computer Aided Manufacturing, Tata McGraw-Hill, 2009.
T2	Groover.M.P, Zimmers E.W.Jr., CAD/CAM Computer Aided Design and Manufacturing PHI, New Delhi 2008.
Reference Book(s) R1	Ibrahim Zeid, CAD/CAM Theory and Practices, Tata McGraw-Hill, New Delhi, 2-e 2009

Lecture-wise Plan:

Lect. No.	Objective	Topics	T/R-Chapter
1-2	Introduction	Basic concepts, advantages and classifications of NC systems, Product cycle, Advantages of CAM	T2-1.1, 1.2
3-4	Introduction to Numerical Control	Numerical Control, Numerical Control Modes, Numerical Control Elements, NC Machine Tools.	T1-9.2-9.5
4-6	To introduce basics of CNC hardware	Structure of CNC m/c tools, Spindle design, Derives, Actuation systems, Feedback devices, Automatic tool changers, Work holding, Machine control unit.	T1-10.1-10.5 & T1-11.5-11.6

7-12	To equip students with NC Part programming skills	Part Programming fundamentals, Manual part programming methods, Preparatory functions, Miscellaneous functions, Program number, Tool length compensation, Canned cycles, Cutter radius compensation, examples and unsolved problems at the end of chapter.	T1-13.1-13.8
13-15	To equip students with NC Part programming skills	Turning Center programming, Comparison between machining centers and turning centers, General programming functions, Motion commands, Cut planning, Thread cutting, Canned cycles, Computer aided programming, APT programming, other programming systems.	T1-14.1 & 14.4-14.8
16-21	To equip students with Computer aided Part programming skills and to explain control loops of CNC system	Computer aided part programming (CAPP), Control of point to point systems and contouring systems, APT programming	T1-16.1-16.8
24-25	To introduce Adaptive Controls	Adaptive control with optimization (ACO), adaptive control with constraints (ACC)	R1-9.7 T1-12.4, T2-5.5.1-5.5.2
26-29	To introduce automated material handling systems	Automated material handling, types, automated storage and retrieval systems (AS/RS).	T1- 21.1-21.4&R1
30-31	To make students to grasp Industrial\ robots fundamentals	Basic concepts in Robotics, the manipulator, controls and drives, intelligent robots, economics, applications of robots	T1- 21.1-21.4&R1
32-34	To explain the use of computers in process planning	Process planning, Computer Aided Process Planning (CAPP), application programs.	T1-18.5-18.6&T2
35-37	To explain the use of computers in inspection and quality control	Quality assurance & quality control, Coordinate measuring machine (CMM), Non-contact inspection, shop floor control and automatic identification techniques.	T2-12.1-12.6 & T1-23.5-23.8
38-39	To make students understand concept of FMS	Introduction to FMS, FMS equipment's, Tool management systems, FMS control, Development of the concept.	T1-21.1-21.3 & T1-21.5-21.6
40-41	To make students familiar with CIM architecture	CIM architecture, Benefits of CIMS, The factory of future.	T1-24.2 & R1

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	08.09.2022	01-10	CB
Test 2	60 Minutes	17	19.10.2022	11-20	CB
Test 3	60 Minutes	17	19.11.2022	11- 30	OB
Quizzes	20 Minutes	10	**	**	CB
Comprehensive Exam	3 Hours	40	21.12.2022	01-41	CB

** To be announced in the class

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

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

Date-02/08/2022

Ms. NAZYA PARVEEN
Instructor-in-charge

The ICFAI University, Raipur

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

Course Code	Course Title	L	P	U
ME415	**Automotive Vehicles**	**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 principle of operation and performance of internal combustion engines, along with working, analysis and design of various components of automotive vehicles.
2. Understand base tire, wheel, suspension and base steering theory.
3. Understand how to service suspension, steering components and principals of alignment.
4. Understand mechanical and hydraulic brake system theory.
5. Practice safe work habits.

Textbook(s) T1	Kirpal Singh, Automobile Engineering, - Vol. I & II, Standard Publishers Distributors, 1995.
Reference book(s)R1	V. Ganeshan, Internal Combustion Engines, Tata McGraw-Hill, 2nd edition, 2003
R2	K. Giri, "Automotive Mechanics", Khanna Publishers, 1996.
NPTEL	https://nptel.ac.in/courses/107/106/107106088/

Lecture-wise Plan

Lecture Nos.	Learning Objectives	Topics to be covered	Reference (chapter /sec/pg. no.)
1-4	Introduction to Automobiles	Definition of Automobile, History starting from Otto cycle	Ch-1(T1): Sec- 1,2
		Components of automobile: the basic structure, the power plant, the transmission system, the auxiliaries, the controls, the superstructure	Ch-1(T1): Sec- 3
		Chassis: classification, conventional construction, Frame: construction, advantages and disadvantages	Ch-1(T1): Sec- 4 – 9, Ch-2(T1): Sec- 1, 2, 3
5-6	Suspension system & Springs	Objectives of suspension system, functions, types of springs	Ch-7(T1): Sec-1-5
		Leaf spring, tapered leaf spring, coil spring, torsion bar, rubber spring, air spring	Ch-7(T1): Sec- 6, 11

7-9	Tyre, types of tyres, construction, working and properties	Tyres and its types and specifications: tubed and tubeless, tyre performance, functions,	Ch-9(T1): Sec- 4,5,6,11,12,13
		Tyre pressures, ageing of tyres Factors affecting tyre life and other factors: material, rotation, tools etc	Ch-9(T1): Sec- 21
10-13	Steering Systems	Steering Geometry, camber, king pin inclination, castor, camber, Toe-in toe-out	Ch-8(T1): Sec- 6
		Correct Steering angle for inside wheel and outside wheel while taking turn, turning circle radius	Ch-8(T1): Sec- 7, 8
		Numerical Problems based on correct steering angle and turning circle radius	Ch-8(T1): Sec- 7, 8, 9, 20
14-16	Parts of a simple Carburetors	Strainer, float chamber, choke, throttle, metering system, idling system, acceleration system	Ch-9(RB1): Sec- 9.4
	Concept of Carburetors	Carburetion, engine mixture requirements, calculation of air fuel ratio	Ch-9(RB1): Sec- 9.9
17- 18	Study of Brakes	Theory of band brake, blocks brake, and band and block brake. Internal expansion brake.	Ch-10(T1): Sec- 7, 8, 9
19-20		Hydraulic brakes. Hand or parking brakes. Braking of vehicle moving in a curved path.	Ch-10(T1): Sec- 12
21-23	Concept of Clutch	Characteristics, functions, principles of operation of clutch	Ch-3(T1): Sec-1-4
24-26	Operation of Clutch	Driving system and Plate clutch (uniform pressure and uniform wear).Cone clutch (uniform pressure and uniform wear)	Ch-3(T1): Sec- 5
27-29	Energy transfer in Clutch	Energy lost by plate clutch during engagement. Centrifugal clutch.	Ch-3(T1): Sec- 5.8, 6
30-32	Lubrication systems	Causes of engine friction. Function of lubrication. Mechanism of lubrication. Journal bearing lubrication.	Ch-6(T1 vol-2): Sec- 1,2,3
33-35	Types of lubrication system	Types of lubrication systems. Lubrication of engine components	Ch-6(T1 vol-2): Sec- 4
36	Emission Control	Emission sources, emission control norms	Ch-18(T1 vol-2): Sec- 1,2
37-40	I.C. Engine	Introduction to all transmission systems, diesel engine, petrol engine, 2-stroke engine, 4-stroke engine, cut section of different type of engine	Lecture Notes

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	16	06.09.2022	1-13	CB
Test 2	50 Minutes	17	17.10.2022	14- 26	CB
Test 3	50 Minutes	17	17.11.2022	27- 40	OB
Quiz 1	10 Minutes	5	**	1-20	CB
Quiz 2	10 Minutes	5	**	21-40	CB
Comprehensive Exam	3 Hours	40	12.12.2022	1- 40	CB

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

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

Date: 02/08/2022

Mr. HEMANT KUMAR DEWANGAN
Instructor-in-charge

The ICFAI University, Raipur

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

Course No.	Course Title	L	P	U
ME418	**Refrigeration Air-conditioning**	**3**	**2**	**4**

Instructor-in-charge: Mr. DILIP MISHRA

Learning Outcomes:

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

1. An in-depth study of theory of refrigeration and air-conditioning and their applications.
2. The techniques of analysis and design of refrigeration and air- conditioning systems.

Textbook(s)	Arora C.P. 'Refrigeration and Air-conditioning', 2nd Ed. Tata McGraw Hill Co, 2000.
Reference book(s) **R1**	Manohar Prasad, 'Refrigeration and air-conditioning', Wiley Eastern Ltd, 1983
R2	Roy J. Dossat, 'Principles of Refrigeration', 4nd Ed., Pearson Education Asia, 2002.
R3	Edward G. Pita, 'Air Conditioning Principles and Systems', 4nd Ed., Pearson Education Asia, 2003.

Lecture-wise Plan:

Lect. No.	Learning Objectives	Topics to be covered	Reference (chapter/sec/pg. no.)
01	Introduction & Review	Introduction, the second law interpretation, the Carnot principle	Ch. 1,Ch 2
02	Gas cycle refrigeration	Limitation of Carnot cycle, reversed Brayton cycle	Ch. 1
03	Gas cycle refrigeration	Air craft refrigeration	Ch. 11
04	Gas cycle refrigeration	Joule-Thomson coefficient and inversion curve, reversed Sterling cycle	Ch. 11
05	Gas cycle refrigeration	Analysis of Gas cycle refrigeration	Ch. 11
06	Vapor compression system	Modification in reversed Carnot cycle, Vapour compression cycle	Ch. 3
07	Vapor compression system	Vapour compression system calculation	Ch. 3
08	Vapor compression system	Effect of operating conditions on Vapour compression cycle	Ch. 3
09	Vapor compression system	Actual Vapour compression cycle	Ch. 3

10 -11	Multi-pressure systems	Multi stage compression	Ch. 5
12	Multi-pressure systems	Multi evaporative systems	Ch. 5
13	Multi-pressure systems	Cascade systems, dry ice	Ch. 5
14	Compressors	Principle and performance of reciprocating compressor, rotary and centrifugal compressors	Ch. 6
15	Condensers	Types, Heat transfer in condensers, Wilson's plot	Ch. 7
16	Evaporators	Types, Heat transfer in evaporators, augmentation of boiling heat transfer	Ch. 8
17	Expansion Valves	Types of expansion devices, constant pressure and thermostatic expansion valve	Ch. 9
18	Refrigerants	Designation of refrigerants, comparative study, selection of refrigerant	Ch. 4
19	Refrigerants	Chemical and physical requirements, substitutes for refrigerants	Ch. 4
20	Vapor absorption system	Vapor absorption system	Ch. 12
21	Vapor absorption system	Single effect water - Lithium Bromide absorption Chiller	Ch. 12
22	Vapor absorption system	Double effect H_2O-$LiBr_2$ absorption system, Electrolux refrigerator	Ch. 12
23	Psychometric of air-conditioning processes	Psychrometric properties, psychometric chart, application of first law	Ch. 14
24	Psychometric of air-conditioning process	Basic processes in conditioning of air	Ch15
25	Psychometric of air-conditioning processes	Psychrometric processes in air-conditioning equipment's	Ch.15
26	Psychometric of air-conditioning processes	Summer air-conditioning	Ch15
27	Psychometric of air-conditioning processes	Winter air-conditioning	Ch. 15
28	Load Calculations – Cooling &Heating	Design conditions, solar radiations, heat transfer through building structure	Ch. 16,17,18
29 –30	Load Calculations – Cooling & Heating	Heat gains, cooling and heating load estimate	Ch. 19
31–32	Load Calculations – Cooling & Heating	Psychrometric calculations and selection of air-conditioning apparatus cooling and dehudification	Ch. 19
33	Design of air-conditioning systems	Heat and moisture transfer in air-conditioning equipment's	Ch. 20
34	Design of air-conditioning systems	Design of cooling and dehumidifying coils	Ch. 20
35	Design of air-conditioning systems	Spray equipment's	Ch. 20
36	Transmission and distribution of air	Friction loss and dynamic losses in ducts	Ch. 21

37	Transmission and distribution of air	Air flow through simple duct system, air duct design	Ch. 21
38	Transmission and distribution of air	Transmission and distribution of air in rooms, centrifugal and axial flow fans and fan arrangements	Ch. 21,22
39	Application of Refrigeration & Air Conditioning Systems	Food processing by refrigeration and storage, transportation refrigeration	Ch. 24
40	Application of Refrigeration & Air Conditioning Systems	Cooling and heating of foods, freeze drying and heat drying of foods	Ch. 24

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	06.09.2022	1-12	CB
Test 2	60 Minutes	17	17.10.2022	13-27	CB
Test 3	60 Minutes	17	17.11.2022	28-40	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	14.12.2022	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-02/08/2022

Mr. DILIP MISHRA
Instructor-in-charge

The ICFAI University, Raipur

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

Course No.	Course Title	L	P	U
ME421	**Quality Control, Assurance and Reliability**	**3**	**0**	**3**

Instructor-in-charge: Mr. HEMANT KUMAR DEWANGAN

Scope and Objective of the Course:
This course presents an exposition to the modern thoughts on quality and related practices. The principles and techniques for quality control, based on statistical methods and the procedures for quality assurance are covered. Tools for quality engineering and quality management are dealt in detail. Concepts of reliability and methods to improve product and systems reliability are also covered. The course is tailored to enable students to become successful managers in a sustained manner, thereby provide support to the business houses in their never ending quest for quality.

Textbook T1	Mitra A, Fundamentals of quality control and improvement, Pearson Education, 2nd Edition, 2001.
Reference book(s) R1	F. M., Chua, R. C. H. and Defeo, J. A., Juran's Quality Planning and Analysis for Enterprise Quality, Tata McGraw Hill, 5th Edition, 2007.
R2	Montgomery, D. C., Introduction to Statistical Quality Control, John Wiley & Sons, 4th Edition, 2003.
R3	K. and Lamberson, L., Introduction to Reliability Engineering, John Wiley & Sons, 2nd Edition, 1989.
R4	Omery, D.C., Design and Analysis of Experiments, John Wiley & Sons, 3rd Edition, 2000.
R5	Mathews, P., Design of Experiments with Minitab, Pearson Education, 1st Edition, 2005

Lecture-wise Plan:

Lecture No.	Learning Objectives	Topics to be covered	Refer to Text Book [T1]
1-2	Introduction to Quality Control	Evolution of quality control, Quality, Quality assurance, Responsibility for quality	Ch-1(T1), sec-1.2-1.5
3	Total Quality System	Total quality systems, Quality cost, Quality and productivity	Ch-1(T1), sec-1.8, 1.15
4	Quality control in service sector	Service industries and characteristics, Model for service quality	Ch-1(T1), sec-1.11
5	Some philosophies and their impact on Quality	Deming's philosophy	Ch-2(T1), sec-2.4
6		Crosby's philosophy	Ch-2(T1), sec-2.5
7		Juan's philosophy	Ch-2(T1), sec-2.6

8-11	Quality Management practices, tools and standards	Management commitment, QFD, Innovative adoption and performance evaluation, Tools for continuous Improvement, International standards	Ch-3(T1), sec-3.1, 3.2, 3.3, 3.5, 3.6
12	Fundamental ofstatistical concepts and techniques in quality control and improvement	Descriptive statistics	Ch-4(T1), sec-4.5
13		Probabilitydistributions	Ch-4(T1), sec-4.6
14		Inferential statistics	Ch-4(T1), sec-4.7
15-16		Concepts in sampling	Ch-5(T1), sec-5.7
17	Graphical methods of Data presentation and quality improvement	Frequency distributions and Histograms	Ch-5(T1), sec-5.2
18		Run charts, Stem-and-leaf plots, Pareto diagram, Cause-and-effect diagram	Ch-5(T1), sec-5.2
19		Normal probability plot, Scatter diagrams	Ch-5(T1), sec-5.2
20		Multivariable charts	Ch-5(T1), sec-5.2
21	Statistical process control using control charts	Causes of variation	Ch-6(T1), sec-6.2
22		Statistical basis for control charts	Ch-6(T1), sec-6.3
23		Selection of rational Samples, Analysis of patterns	Ch-6(T1), sec-6.4, 6.5
24	Control chart for Variables	Selection of characteristics for investigation	Ch-7(T1), sec-7.2
25		Control chart for mean and range	Ch-7(T1), sec-7.4
26		Control chart for mean and standard deviation	Ch-7(T1), sec-7.5
27		Other control charts	Ch-7(T1), sec-7.8
28	Control chart for Attributes	Charts for proportion nonconforming, Charts for number of nonconformities	Ch-8(T1), sec-8.4, 8.5
29		Chart for number of nonconformities per unit	Ch-8(T1), sec-8.6
30		Chart for demerits per unit	Ch-8(T1), sec-8.8
31	Process capability Analysis	Process capability analysis	Ch-9(T1), sec-9.3
32		Process capability indices	Ch-9(T1), sec-9.6
33		procedures for setting Tolerances on assemblies components	Ch-9(T1), sec-9.9

34	Acceptance sampling plans for attributes and variables	Types of sampling plan	Ch-1(T1)0, sec-10.5
35		OC curve, Evaluating sampling plans	Ch-10(T1), sec-10.4, 10.6
36		Lot by Lot attribute sampling plan	Ch-10(T1), sec-10.8
37		Other attribute sampling plans	Ch-10(T1), sec-10.9
38	Reliability	Introduction to reliability, System reliability	Ch-11(T1), sec-11.1-11.4
39		Reliability and life testing plans	Ch-11(T1), sec-11.6
40	Design of experiment and Taguchi method	Experimental design fundamentals	Ch-12(T1), sec-12.2, 12.4, 12.5
41-42		Factorial experiments, Taguchi method	

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	16	07.09.2022	1-13	CB
Test 2	50 Minutes	17	18.10.2022	14- 26	CB
Test 3	50 Minutes	17	18.11.2022	27- 40	OB
Quiz 1	10 Minutes	5	**	1-20	CB
Quiz 2	10 Minutes	5	**	21-40	CB
Comprehensive Exam	3 Hours	40	19.12.2022	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-02/08/2022

Mr. HEMANT KUMAR DEWANGAN
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science & Technology
First Semester, 2022-2023
Course Handout

Course No.	Course Title	L	P	U
ME424	**Non-Conventional Sources of Energy**	**3**	**0**	**3**

Instructor-in-charge: Mr. HEMANT KUMAR DEWANGAN

Learning Outcomes:

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

1. To know about important non-conventional energy resources and the technologies for harnessing these.
2. To analyze performances and the thermodynamic principle of working.

Text Book T1	Non-Conventional Energy Sources - G.D. Rai – Khanna Publishers
Reference Book(s) R1	Solar Energy - Fundamentals and Applications – H.P. Garg & J. Prakash,TMH ,Delhi
R2	Non-Conventional Energy Sources – Saeed, Hasan and DK Sharma, SK Kataria, Delhi
R3	Solar Energy – Principles of Thermal Collection and Storage- R Sukhatme, TMH, New Delhi
R4	Non-Conventional Energy Resources: Alternative Energy Sources And Systems- R.K. Singhal, Kataria , Delhi

Lecture wise plan:

Lect. No.	Learning Objectives	Topics to be covered	Reference (chapter/sec /pg. no.)
1-3	Introduction to various energy sources and their availability	Classical sources of energy, Availability of reserves, Demerits of classical energy source utilization, Energy crisis, Search for alternative sources of energy.	T 1, Ch.1
4-5	Introduction to various non-conventional energy sources	Introduction to Solar energy, Wind energy, Geo thermal energy, Tidal energy etc., Applications, Water heating, Space heating & cooling, Solar distillation, solar pumping, solar cooking, Greenhouses, Solar power plants	T 1, Ch1

6-10	Solar Energy Source &terminologies	Solar energy, earth sun angles, resolution, solar insolation measurement, collection of solar energy, Extra-terrestrial radiation, Spectral distribution, Solar constant, Solar radiations on earth, Measurement of solar radiations, Solar radiation geometry, Flux on a plane surface, Latitude, Declination angle, Surface azimuth angle, Hour angle, Zenith angle, Solar altitude angle expression for angle between incident beam and the normal to a plane surface (no derivation), Local apparent time, Apparent motion of sun, Day length, Solar radiation data for India.	T 1, Ch2
11-15	Solar thermal power & its conversion	Flat plate collector, Solar concentrating collectors, Types of concentrating collectors, Thermo dynamic Limits to concentration, Cylindrical collectors, Evacuated tube collector, Focusing collector, Solar trough, Solar Pond etc.,	T 1, Ch3
16	Tracking and Power storage	Tracking CPC and solar swing, Solar thermal energy storage Introduction to Photovoltaic cell energy conversion techniques, Photovoltaic effect, Efficiency of solar cells,	T 1, Ch4
17-19	Photovoltaic system	Semiconductor materials for solar cells, Solar photovoltaic system, Standards of solar photovoltaic system, Applications of PV system, PV hybrid system	T 1, Ch5
20-22	Collector's Performance analysis	Assumptions, Collector performance analysis, Some design parameters and calculation procedure, Applications with advantages & drawbacks of solar energy	T 1, Ch3, Ch4, Ch5
23-25	Wind energy	Basic principles of wind energy conversion, wind energy estimation, site selection consideration, basic components of wind energy conversion system, classification, advantages &Disadvantages of WECS.	T 1, Ch6
26-28	Geothermal energy	Geothermal energy, nature of geothermal fields, Geothermal sources, prime movers for geothermal energy, advantages, disadvantages of geothermal energy over other energy forms, Its application.	T 1, Ch8

29-33	Ocean energy	Principle of ocean thermal energy conversion, Wave energy conversion machines, Power plants based on ocean energy, Problems associated with ocean thermal energy conversion systems, Thermoelectric OTEC, Developments of OTEC	T 1, Ch9
34-36		Impact of renewable energy generation on environment, Kyoto Protocol, Cost of electricity production from different energy sources, Energy options for Indian economy.	T 1, R 1
37-38	Bio-mass	Introduction, Bio-mass conversion technologies, bio-gas generation, classification of bio-gas plant, Gasifies, Goober (animal-human waste) gas plant, applications.	T 1, Ch7
39-40	Additional Alternate Energy Sources	Hydrogen energy systems, Decentralized and dispersed generation, Principle of Magneto hydrodynamics (MHD) power system, types of MHD system, advantages, and materials for MHD system	T 1, Ch12

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	07.09.2022	1-12	CB
Test 2	60 Minutes	17	18.10.2022	13- 27	CB
Test 3	60 Minutes	17	18.10.2022	28- 40	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	1.12.2022	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: 02/08/2022

Mr. HEMANT DEWANGAN
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2022 – 2023
Course Handout

Course Code	Course Name	L	P	U
CS321	**Advanced Computer Organization and Architecture**	**3**	**0**	**3**

Instructor in charge: Ms. SNEHA THAKUR

Learning Outcome –
The course aims at introducing the concept of computer architecture and organization. It involves design aspects and deals with the current trends in computer architecture. System resources such as memory technology and I/O subsystem needed to achieve proportional increase in performance will also be discussed.

Textbook(s) **T1**	Computer Organization & Architecture, William Stallings, 6th Ed., Pearson Education / Prentice Hall - New Delhi , 2004
T2	Structured Computer Organization, A. S. Tanenbaum:, 4th Ed., Pearson Education, Prentice Hall New Delhi., 2004.
Reference book(s) **R1**	Computer Architecture-A quantitative approach, J. Hennessy & David Patterson, Morgan Kaufmann, 3rd Edition, 2006.
R2	Advanced computer Architecture : Parallelism Scalability, Programmability , Kai Hwang, TMH, New Delhi , 2002
R3	Multiuse Design Guidebook- Structures, Architecture and Applications, James B. Johnson & Steve Kassel, McGraw-Hill International Edition, 1996
NPTEL	https://nptel.ac.in/courses/106/103/106103206/

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
1 – 2	Concept of computer as a hierarchical system	Introduction : Organization and Architecture	T1(1)
3 – 5	Balancing performance of various elements	Design for Performance	T1(2)
6 – 10	Computer components, instruction cycles., etc.	Computer functions & Interconnection	T1(3), T2(2)
11 – 15	Memory hierarchy and cache memory principle & design	Computer Memory : Cache Design	T1(4), R1(5.1-5.7)

16 -20	Static and dynamic memory operation and error detection and correction mechanisms	Semiconductor Memory D RAM and SRAM, Error correction	TI(5)
21 – 24	External memory operations	External Memory, RAID levels, Optical and DVD memories	T1(ó)
25 – 26	I/O modules and interrupts	Input and Output	T1(7)
27 – 30	Memory Management schemes from OS view point	Memory Management scheme Swapping, partitioning and memory management schemes	TI(8), R3(1,2,3)
31 – 32	Floating point arithmetic, FPAU	Computer Arithmetic	T1(9)
33 – 37	Register organization, pipelining and functions	CPU structure and functions	T1(12) R1(A.1-A.7)
38 -40	Fetch, decode and hardwired implementation	Control Unit Operations	T1(16)

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lecture No)	Remarks
Test 1	60 Minutes	17	09.09.2022	1-10	CB
Test 2	60 Minutes	17	17.10.2022	11- 20	CB
Test 3	60 Minutes	16	17.11.2022	21 - 30	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	14.12.2022	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: 02/08/2022

Ms. SNEHA THAKUR
Instructor-in-charge

The ICFAI University, Raipur

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

Course No	Course Title	L	P	U
CS428	**Theory of Computation**	**3**	**0**	**3**

Instructor-in-charge: Ms. SNEHAL VAIRAGADE

Learning Outcomes:
The learning objectives of this course are to:

1. Introduce students to the mathematical foundations of computation including automata theory; the theory of formal languages and grammars; the notions of algorithm, decidability, complexity, and computability.
2. Enhance/develop students' ability to understand and conduct mathematical proofs for computation and algorithms.

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

Lecture wise plan

Lecture Nos.	Learning Objective	Topics to be covered	Reference (chapter/sec./Page No. of Text/Ref. Books)
1-5	To understand the basics of Automata	Introduction to Automata(Introduction and motivation, infinite sets, proofs, Closures, Alphabets, languages, and representations)	T l Ch-l 1.4,1.5,1.6,1.9
6-10	To learn the concept of Finite Automata	Finite Automata (Deterministic finite automata, Non-deterministic finite automata, Closure properties and equivalences, Regularity)	T2 Ch-2 2.1,2.2,2.3,2.9
16-20	To learn the concepts of Regular-Expression & DFA	Regular Expressions and Languages,	T1 Ch-3 3.2,3.4 T2 Ch3 3.6,3.8
21-23	To learn the concepts of Regular-Languages	Properties of Regular Languages	T1 Ch-4, 4.5, 4.6 T2 Ch4, 4.8,4.10

24-25	To understand concept of CFG	Context-Free Grammars and Languages	T1 Ch-5 5.7,5.8
31-40	To learn the concepts of PDA and its uses, NP concept	Pushdown Automata Languages of PDA Deterministic Pushdown Automata Properties of Context-Free Languages The complexity class P, The complexity class NP	T1 Ch-5,Ch6 5.9, 6.4,7.1 T2 Ch6 6.8,7.4,7.9

Evaluation Scheme:

Student evaluation is based on the series of Tests (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	06.09.2022	1-12	CB
Test 2	60 Minutes	17	18.10.2022	13- 28	CB
Test 3	60 Minutes	17	18.11.2022	29- 42	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	19.12.2022	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: 02/08/2022

Ms. SNEHAL VAIRAGADE
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2022 – 2023
Course Handout

Course No	Course Title	L	P	U
CS435/EC430	**Machine Learning**	**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. Eddies, Pearson Education Asia, Second Ed., 3rd . Indian reprint 2005.
ReferenceBook(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	Loss image compression, compression standards	Loss 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 I	50minutes	16	07-09-2022	1-12	CB
Test II	50minutes	17	17-10-2022	13-28	CB
Test III	50minutes	17	17-11-2022	29-40	OB
Lab		10		**	CB
Comprehensive Exam	3hours	40	12-12-2022	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: 02/08/2022

Dr. K. NAGAIAH
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2022 – 2023
Course Handout

Course No	Course Title	L	P	U
CS322	**Programming Languages and Compiler Construction**	**3**	**0**	**3**

Instructor-in-charge: Ms. PALAK KESHWANI

Learning outcomes :-

Upon successful completion of the course, student will be able to:

1. Understand the complexity in designing the compiler.
2. Working of compiler.
3. Develop small compiler using the tools.
4. Understand the intermediate code generated by compiler.

Textbook(s) T1	A .V, Lam, M, Sethi, R and U llman, J D. "Compilers: Principles, Techniques and Tools", 2nd 2007 Ed., Pearson Education.
T2	Tremblay, J.P. and Sorenson, P G., "Theory and Practice of Compiler Writing", SR Publications, 1st edition, 1985.
Reference book(s)R1	"Principle of compiler design", V. Raghavan, Tata McGraw-Hill, 4th edition 2012.
R2	"Compiler Principles and Practice", Parag H. Dave, Himanshu B. Dave, Pearson, 1st edition, 2012.
R3	Holub, A.I.,"Compiler Design in C", Prentice-Hall of India, 1st edition, 1993.
R4	Tremblay, A.S., and Sorenson, P.G.," The Theory and Practice of Compiler Writing", McGraw-Hill Int. 1st Edition, 1985.

Lecture-wise-plan:

Lecture. Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./Page Nos.of Text Book)
1-3	To learn the concept of language processor and compiler.	Evolution of programming languages, language processors, structure of a compiler, phases of the compiler, compiler construction tools.	T1: Ch1, 1-14
4-5	To learn the roles of the lexical analyzer.	Lexical analysis: Role of lexical analyzer, specification and recognition of tokens, automatic generation of lexical analyzer. tool.	T1: Ch3, 109-146
6-7	To learn the concepts of different Parsing techniques.	CFG ambiguity, associativity, precedence, Top down parsing methods	T1: Ch4, 192-233

8-11	To learn the concepts of different Parsing techniques	Elimination of left recursion, recursive descent and predictive parsers; Bottom up parsing, shift-reduce parsing, precedence parsing, LR parsers, SLR (1) table construction, limitations of SLR parsing, non -SLR (1) grammars; Introduction to canonical and LALR parsing, YACC.	T1: Ch4, 233-297
12-13	To learn the syntax directed translation schemes.	Syntax directed definitions: Inherited and synthesized attributes	T1: Ch5, 303-309
14-15	To learn the syntax directed translation schemes.	Dependency graph, bottom up and top down evaluation of attributes	T1: Ch5, 310-312
16	To learn the syntax directed translation schemes.	L- and S- attribute definition	T1: Ch5, 312-314
17-18	To learn the syntax directed translation schemes.	Type checking, type systems, type expressions, type conversion and overloading	T1: Ch6, 370-362-399
19-20	To learn the principles of parameter passing and runtime memory management.	Run time environments, storage organization and allocation strategies, parameter passing, symbol tables.	T1: Ch7, 427-441
21-22	To learn the concept of intermediate code generation.	Intermediate code generation, interpreters, intermediate languages	T1: Ch6, 357-362
23-24	To learn various ways to generate the intermediate code.	syntax trees, postfix code, triples and indirect triples, syntax directed translation of simple statements	T1: Ch6, 363-370
25-26	To learn the concept of code generation.	Issues in code generation, basic blocks and flow graphs, next use information, register allocation and assignment	T1: Ch8, 505-512, 525-532, 553-557
27-30	To learn the code optimization techniques to improve the performance of a program.	Simple code generation. Sources of optimization, optimization of basic blocks, data flow analysis, code generation from DAG, peep hole optimization.	T1: Ch8, 533-553
31-33	To learn the concept of type system.	Type systems, data abstraction	T1: Ch1, 18
34-37	To learn the concept of object oriented features.	Compilation of object-oriented features	T1: Ch1, 13
38-40	To learn the concept of non-imperative programming languages.	Non-imperative programming languages	T1: Ch1, 13

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	12.09.2022	1-10	CB
Test 2	60 Minutes	17	18.10.2022	11- 20	CB
Test 3	60 Minutes	17	18.11.2022	21- 30	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	16.12.2022	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: 02/08/2022

Ms. PALAK KESHWANI
Instructor-in-charge

The ICFAI University, Raipur

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

Course No	Course Title	L	P	U
EC414	**Mobile and Personal Communication**	**3**	**0**	**3**

Instructor-in-charge: Mr. ROHIT KUMAR

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

The course aims at the study of mobile personal communications, one of the fastest growing fields in the engineering worldwide. Design methods and general concepts involved in understanding and implementation of wireless systems and techniques are discussed. In this course an effort will be made to impart an understanding of the basics ofthe rapidly growing field of mobile and personal communication systems, services and standards.

Textbook(s) T1	"Wireless Communications Principles and Practice" by Theodore S.Rappaport, Second Edition, Pearson Education Asia, 2002
Reference book(s) R1	"Mobile Communication Engineering" WCY lee, Mc-Graw-Hill, International (1998). Wireless Network Evolution: 2G to 3G, V K Garg , Pearson Education Asia, 2002 Wireless Communications & Networks, William Stallings, Pearson Education, Asia, 2002

Lecture-wise plan:

Lecture No.	Topic	Learning Objectives	Ref. To Text & Ref. Book.
1 & 2	Introduction & General Overview	Introduction to wireless communication and overview of mobile networks.	Ch-1 (T1 ,R1)
3 & 4	Modern wireless communication systems	Mobile and wireless, Second GenerationNetworks	Ch-2 (T1)
5 - 8	Cellular Design Concept	Frequency Reuse, channel assignment &handoff strategies; interference and system capacity. Coverage improvementand system capacity.	Ch-3 (T1)

9-12	Propagation Models	Different channel models for mobile communication. Modes of propagation.Outdoor and Indoor propagation.	Ch- (T1)(R1) 4, Ch- 1
13-18	Multipath fading	Small scale fading & Statistical models	Ch.5 (T1) Ch.3 (R1)
19-21	Modulation Techniques	AM, FM, Digital Modulation Schemes,GMSK, Spread Spectrum Modulation and Modulation Performance in Fading	Ch.6 (T1)
22-25	Equalization, Diversity andChannel Coding , Speech Coding	Equalization in communication receivers, types, Diversity techniques and coding schemes for wireless systems	Ch-7, Ch.8 (T1)
26 - 30	Multiple Access Techniques for Wireless	FDMA, TDMA, CDMA and SDMA for wireless. Packet Radio, Capacity of Cellular Systems	Ch.9 (T1) Ch.15 (R1)
31-34	Wireless Networking	Development of Wireless Networks, fixed network transmission hierarchy, circuit switching , packet switching, wireless data services, ISDN, SS7, PCS/PCNs, protocols, UMTS etc.,	Ch-10 (T1)
35-38	Wireless Systems andStandards	AMPS & ETACS, IS-54 , IS-136, GSM, CDMA (IS-95),PACS, PDC, PHS, PCS & ISM bands	Ch-11 (T1) & Class notes
39-41	Wireless LANs, PANs andNew Trends	IEEE 802.11 Wireless LANs, Bluetooth,Wi Max and emerging trends	Class discussions & notes

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	08.09.2022	1-12	CB
Test 2	60 Minutes	17	18.10.2022	13- 27	CB
Test 3	60 Minutes	17	18.11.2022	28- 40	OB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	19.12.2022	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: 02/08/2022

Mr. ROHIT KUMAR
Instructor-in-charge

The ICFAI University, Raipur

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

Course No	Course Title	L	P	U
CS415/EC420	**Artificial Intelligence**	3	0	3

Instructor In-charge: Dr. K. NAGAIAH

Learning Outcomes:

The course aims at:-

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

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

Lecture Nos.	Learning objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text Book)
1-3	Overview & Search Techniques:	Introduction to AI, Problem Solving, State space search,	15-32
4-5	Overview & Search Techniques:	Blind search: Depth first search, Breadth first search,	48-60
6	Overview & Search Techniques:	Informed search: Heuristic function, Hill climbing search.	71-77
7-9	Overview & Search Techniques:	Best first search, A* & AO* Search.	81-87
10	Overview & Search Techniques:	Constraint satisfaction, Game tree	88- 95
11-12	Overview & Search Techniques:	Evaluation function, Mini-Max search, Alpha-beta pruning, Games of chance.	135-148

13-15	How to do Knowledge Representation	Introduction to KR, Knowledge agent, Predicate logic	155-159
16-17	How to do Knowledge Representation	WFF, Inference rule & theorem proving forward chaining, backward chaining, resolution	160-190
18	How to do Knowledge Representation	Propositional knowledge, Boolean circuit agents.	200-221
19-20	How to do Knowledge Representation	Rule Based Systems, Forward reasoning	230-241
21-22	How to do Knowledge Representation	Conflict resolution, backward reasoning: Use of Back tracking, Structured KR	317-329
23-24	How to do Knowledge Representation	Semantic Net - slots, inheritance, Frames- exceptions and defaults attached predicates	330-354
25-26	How to do Knowledge Representation	Conceptual Dependency Formalism and other knowledge representations.	360-371
27	How to Handling uncertainty & Learning:	Source of uncertainty, Probabilistic inference	373-375
28-29	How to Handling uncertainty & Learning:	Bayes' theorem, Limitation of naïve Bayesian system, Bayesian Belief Network (BBN)	380-386
30	How to Handling uncertainty & Learning	Inference with BBN, Dempster-Shafer Theory	389-405
31-32	How to Handling uncertainty & Learning	Fuzzy Logic, Fuzzy function, Fuzzy measure, Non monotonic reasoning:	410-419
33-34	How to Handling uncertainty & Learning	Dependency directed backtracking, Truth maintenance systems.	420-434
35-36	How to Handling uncertainty & Learning	Learning: Concept of learning, Learning model, learning decision tree, Paradigms of machine learning,	435-447
37-40	How to Handling uncertainty & Learning	Supervised & Unsupervised learning, Example of learning, Learning by induction, Learning using Neural Networks.	448-460

Evaluation Scheme:

Student evaluation is based on the series of Tests and 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	06.09.2022	1-12	CB
Test 2	60 Minutes	17	17.10.2022	13-26	CB
Test 3	60 Minutes	17	17.11.2022	27-40	OB
Quizzes (2)	20 minutes	10	**	**	CB
Comprehensive Exam	3 Hours	40	12.12.2022	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: 02/08/2022

Dr. K. NAGAIAH
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2022 – 2023
Course Handout

Course No	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 I	60min	16	07-09-2022	1-10	CB
Test II	60min	17	19-10-2022	11-22	CB
Test III	60min	17	19-11-2022	23-35	OB
Lab		10	**		CB
Comprehensive Exam	3hrs	40	21-12-2022	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: 02/08/2022

Dr. K NAGAIAH
Instructor-in-charge

The ICFAI University, Raipur

Faculty of Science and Technology
First Semester, 2022 – 2023
Course Handout

Course No	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 analyses and design digital systems
2. Understand combinational and sequential digital circuits design with timing constraints

Text books T1	Digital Design Principles & Practices, John F Waverly, 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, I^2L, 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 behavior of CMOS.	CMOS dynamic electrical behavior	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, Subtractions, 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	06.09.2022	1-10	CB
Test 2	60 Minutes	17	18.10.2022	11- 24	CB
Test 3	60 Minutes	17	18.11.2022	25- 42	OB
Quiz-1 and Quiz-2	Continuous	10	**	**	CB
Comprehensive Exam	3 Hours	40	16.12.2022	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: 02/08/2022

Dr. K. KISHORE KUMAR
Instructor-in-charge

The ICFAI University, Raipur

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

Course No	Course Title	L	P	U
CE491/ CS491/ME491/EC491	**Special Project**	**0**	**0**	**3**

Instructor-in-charge: Mr. DILIP MISHRA

Scope & Objective of the course:
This is an unstructured open ended where under the overall supervision of a faculty-in-charge, batches of students will be attached to different faculty members. Each batch will work on a specific time bound which is of basic or peripheral concern of student's discipline Each Student must submit a project report as a culmination of his endeavor and investigation. Faculty-in-charge will determine the choice of the project and also whether or not the project report is to be submitted jointly by a group or individually by a student. This course will aim to evaluate the student actual ability to use the fundamentals of knowledge and to meet the new unknown situations as demonstrated by the student's interaction with the faculty member and faculty-in-charge. The faculty-in-charge may assign specific hours of formal brain storming sessions.

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

1. Independently acquire and handle knowledge through independent studies of relevant literature
2. Independently identify and analyze relevant problems and solve a problem by a systematic use of an appropriate choice of theory and methodologies

Text Book T	No prescribed Texts. Student must do literature survey from journals of his field of research.
Reference book(s) R1	None

Evaluation Scheme:
Student evaluation is based on Literature survey, seminar series conducted, and observations of the supervisor and Thesis report.

Evaluation Component	Weightage	Date	Remarks
Literature Survey and Project outline	20	06.09.2022 03:30PM – 04:30 PM	Supervisor to submit copy to IC
Mid-term Project Report	10	04.10.2022	Supervisor to submit to IC after evaluation
Mid-term Seminar	20	04.10.2022 03:30PM – 04:30 PM	Mid-semester grading to be submitted to IC by Supervisor
End-Semester Project Report	25	22.12.2022	Supervisor to submit to IC after evaluation
End-Semester Seminar	25	22.12.2022 02:30PM – 04:30 PM	

General Guidelines:

a) This being a three-unit course, a student is expected to work for at least 9 hours per week including the formal contact hours with the instructor.

b) Each student should meet the faculty at least once a week in addition to the formal contact hours at mutually agreed time to apprise the faculty of the progress in the project.

c) Student is supposed to maintain a diary and record the daily progress of the work done. The diary would be periodically checked by the faculty.

d) All the evaluation components are compulsory. If a student misses any component of evaluation, he is likely to get "NC".

e) The Mid-term evaluation is to be strict to avoid any laxity on the part of the student.

f) Student should make two copies of the final report in the prescribed format, one his personal copy and the other for submission to the Institute. The faculty may ask for an additional copy if so desired.

g) The final seminar is to be planned only after the submission of the project report.

h) The final seminar is open to all the student and the faculty. The faculty member should involve the local experts in the evaluation of final seminar.

i) If the progress in the project work is not satisfactory, the faculty may advise the student to withdraw from the course in time and the same may be communicated to the instructor-in-charge.

j) The student should submit the withdrawal request to the Department. The last day for withdrawal is the same as that for all other courses.

k) If more than one student is working on the same project, the distribution of work among the students is to be made clear to the students and the Instructor-in-charge. The evaluation should be based on individual performances only.

l) The details of components of evaluation should be submitted in the prescribed format only.

m) The student is expected to attend a conference on the area of project opted or present a technical paper in any of the journal.

Date: 02/08/2022

Mr. DILIP MISHRA
Instructor-in-charge