Faculty of Science and Technology

Second Semester, 2021 – 22
Course Handouts

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The ICFAI University, Raipur

Faculty of Science and Technology
Second Semester, 2021 – 2022
Course Handout

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

Instructor-in-charge: Ms. Yogita Chandrakar

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

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

Lecture-wise plan:

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

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

	vector space		
33-35	To understand the concept of row equivalence and row space	Row Equivalence and Computations concerning Subspaces	2.5,2.6(T2) and from R1 3.5-All,3.6-All
36-40	Concept of linear transformations and Matrix representation	Linear Transformations, The Algebra of linear Transformations, Isomorphism, Representation bymatrices	3.1,3.2,3.3,3.4 (TB2)and from R1 4.1-All,4.2 All, 4.3-All4.4 -All, 4.5-All, 4.6-All,4.7-All,5.1-All, 5.2-All,5.3-All,5.5-All
41-42	To find the Eigen values and Eigenvectors of a given linear operator over a field	Matrices, Eigen values, Eigenvectors and from R1 6.8-All	3.4,6.1,6.2 (T2)

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

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	23.03.2022	01-10	CB
Test 2	60 Minutes	17	27.04.2022	11-20	CB
Test 3	60 Minutes	17	21.05.2022	31- 42	CB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	10.06.2022	01-42	CB

** To be announced in the class

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

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

Ms. YOGITACHANDRAKAR
Instructor-In-charge

Date: 05/01/2022

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

Course No	Course Title	L	P	U
PH102	**Physics II**	**3**	**2**	**4**

Instructor-in-charge: Dr.RAVI SHRIVASTAVA

Learning Outcomes:

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

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

Lecture wise plan

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

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

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

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

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	21.03.2022	01-10	CB
Test 2	60 Minutes	17	25.04.2022	11-20	CB
Test 3	60 Minutes	17	17.05.2022	31- 41	CB
Lab	Throughout the Semester	10	**	**	CB
Comprehensive Exam	3 Hours	40	07.06.2022	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.

Dr. RAVI SHRIVASTAVA
INSTRUCTOR-IN-CHARGE

Date: 05/01/2022

The ICFAI University, Raipur

Faculty of Science & Technology

Second Semester, 2021 – 2022

Course Handout

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

Instructor In-charge: Dr. PIYUSH THAKUR

Learning Outcomes:

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

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

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

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	22.03.2022	1-12	CB
Test 2	60 Minutes	17	26.04.2022	13- 28	CB
Test 3	60 Minutes	17	19.05.2022	29- 40	CB
Quizzes (2)	20 Minutes each	10		**	CB
Comprehensive Exam	3 Hours	40	08.06.2022	1- 40	CB

** To be announced in the class

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

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

Dr. PIYUSH THAKUR
INSTRUCTOR-IN-CHARGE

Date: 05/01/2022

The ICFAI University, Raipur

Faculty of Science & Technology

Second Semester, 2021 – 2022

Course Handout

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

Instructor-in-charge: Mr. HEMANT KUMAR DEWANGAN

Learning Outcomes:

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

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

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

Lecture-wise Plan:

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

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

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	23.03.2022	1-16	CB
Test 2	60 Minutes	17	27.04.2022	17- 27	CB
Test 3	60 Minutes	17	21.05.2022	28- 40	CB
Quiz 1	10 Minutes	5	**	1-20	CB
Quiz 1	10 Minutes	5	**	21-40	CB
Comprehensive Exam	3 Hours	40	13.06.2022	1- 40	CB

** To be announced in the class

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

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

Date: 10/01/2022

Mr. HEMANT KUMAR DEWANGAN
Instructor In-charge

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

Course No	Course Title	L	P	U
EGL101	English Language Skills-I	3	0	3

Instructor-in-charge: Mr. ZAFIR KHAN

Learning Outcomes:

After successful completion of the course student will be able to

1. Learn the aspects of pronunciation to attain intelligibility and grammatical accuracy in spoken and written English.
2. Do intensive practice and will get extensive exposure to the four basic skills; listening, speaking, reading and writing

Textbook(s) T1	English Language Skills - I, Dr. K Aruna, ICFAI Press, 2007.
Workbook	Words are Your Friends-I, Dr. K.Aruna, ICFAI Press, 2007.
Reference book(s) R1	Dictionary - Latest Publication, A.S. Hornby.
R2	Cambridge English Pronouncing Dictionary, Daniel Jones,Cambridge University Press

Lecture-wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference(Ch./Sec./Page Nos. of Text Book)
1	To know the distinction between letters and sounds, to know consonant and vowel sounds and to learn some principles for pronunciation.	English Sound System Classification of English Sounds	Ch.1 pp.1-27 Ref. book: Dictionary
2-3	To acquire correct pronunciation of English Sounds. To practice pronunciation of words. To make one's speech nationally and internationally intelligible to the listener. To develop confidence in articulation of sounds.	Description of sounds. Different spellings for the same sound. Syllable structure. Suggestions of pronunciation.	Chap.1 Ref. book , Dictionary
4	To be aware of silent letters in English Language	Silent Letters	Ch.2 pp.28 - 34 Ref. book:, Dictionary
5-6	To acquire effective pronunciation To avoid semantic confusions. To give practice inVocabularyExpansion	Lessons 1 to 3 and Review - 1	Work- Book; "Words are Your Friends"
7	To understand the various uses of Dictionary.	Dictionary: Its use	Ch.3 pp.35-47 Ref. book ,

	To learn various methods for clarifying the meaning of a word.		Dictionary
8-9	To know various English words. To identify specific uses.	Vocabulary Extension synonyms, antonyms, one word substitutes	Ch .4pp.48-64 Annexure - B
10	To be aware of various shades of meaning with accuracy and precision. To acquire competence in analyzing the word and guess the meaning. To do practice in vocabulary expansion.	Vocabulary Extension, Word Formation methods, word analysis Lessons: 4,5 and 6, Review:2	Ch.4 pp.48 - 64 Words are your Friends
11-12	To do practice in using wordsin various contexts. To reduce possible errors in usage. To be aware of commonly confused words. To enrich Vocabulary.	Annexure - G Annexure - E Annexure - C , D	Work -Book: "Words are your Friends" pp.251 - 258 pp.241-247 pp.226-240
13	To be aware of relationship expressed by prepositions	Prepositional Phrases	Ch.5pp.65-75
14-15	To develop competence in using idiomatic combinations To know specific uses of Prepositions.	Prepositional Phrases	Ch . 5 pp.65 - 75
16	To learn the use of Phrasal Verbs To know several verb combinations with distinct meanings.	PhrasalVerbs,separable and inseparable phrasal verbs Phrasal Verbs : Meanings	Ch.6 pp.76 - 95
17-18	To know the difference in meaning between phrasal Verbs with suitable examples. To do practice in vocabulary Expansion.	Phrasal verbs in oral Communication Lessons 7,8 and 9 Review - 3	Ch . 6 pp. 76-95 Work - Book "Words are your Friends"
19	To know the skill of reading fast.	Reading Skill	Ch.7 pp. 96 - 121
20-21	To read with specific purpose. To develop the ability to infer and interpret the text.	Reading Skill	Ch.7 pp. 96 - 121
22	To improve listening skill with the help of phonetic features of listening. To identify the purpose of Listening	Listening Skill	CH.8 pp.122-131
23-24	To learn how to overcome the listening barriers. To learn techniques to select relevant information while listening To acquire guidelines for improving listening skill.	Listening Skill	Ch. 8 pp.122-131
25	To express ideas clearly by effective use of words with focus on using simple and plain words.	Effective use of Words, Use of simple and plain words. Avoid clichés	Ch. 9 pp.132-145
26-27	To identify vague words and replace them with specific words. To eliminate redundancy to make the expression clear. To identify the device of trimming and padding to write clearly. To use words effectively.	Use of concrete and specific words. Lessons 10,11 and 12 Review 4	Ch. 9 pp.132-145 Words are your Friends
28	To Learn unity and coherence	Effective sentences	Ch.10

	of sentences.		
29-30	To learn how to reorganize and rewrite effective sentences by discarding unnecessary details. To eliminate the dangling modifiers and dangling infinitives and make sentences effectively. To do practice in vocabulary expansion.	Effective sentences	pp.146-162 Work -Book: "Words are Your Friends"
31	To know various elements of business letters with focus on various styles of presentation.	Structure of Business Letters	Ch.11 pp.163-178
32-33	To identify compulsory elements of business letter. To know the structure compulsory elements of business letter.	Structure of Business Letters Lessons13,14and15Review-5	Ch.11 pp.163-178 Words are your Friends
34	To write concisely, correctly using clear expression.	Effective style of Business Correspondence.	Ch .12 pp.179 -194
35-36	To practice how to write naturally, courteously, concisely, precisely and positively. To write business correspondence effectively. To do practice in vocabulary expansion.	Effective style of Business Correspondence. Lessons 13- 15 and Review - 5	Ch .12 pp.179 -194 Work -Book: "Words are Your Friends"
37	To understand various types of business letters.	Business Correspondence	Ch.13 pp. 195-203
38-39	To identify the essential features in each type of letter. To learn some useful expressions for writing business letters.	Business Correspondence	Ch.13 PP. 195-203
40	To be aware of principles of good conversation.	The art of Conversation.	CH.14 PP. 204-212
41	To aware of fundamentals of how to start the conversation and how to continue it. To do practice in vocabulary expansion. To know different types ofwords. To get competence in usingwords.	Lessons 16-18 and Review -6	Work - Book: "Words are Your Friends"

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	21.03.2022	1-10	CB
Test 2	60 Minutes	17	25.04.2022	11- 20	CB
Test 3	60 Minutes	17	17.05.2022	21- 30	CB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	06.06.2022	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.

Mr. ZAFIR KHAN
Instructor-In-charge

Date: 01/02/2022

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

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

Instructor-in-charge: Dr. RAVI KIRAN

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

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

Lecture-wise plan:

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

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

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

Evaluation Component	Duration	Weightage (%)	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	22.03.2022	1-10	CB
Test 2	60 Minutes	17	26.04.2022	11- 20	CB
Test 3	60 Minutes	17	19.05.2022	21- 30	CB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	09.06.2022	1- 42	CB

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

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

Dr. RAVI KIRAN
Instructor-In-charge

Date: 01/02/2022

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

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

Instructor-in-charge: Dr. K.NAGAIAH

Learning Outcomes:
After successful completion of the course student will be able to
1.give an insight to the analysis of single phase and three phase AC circuits
2.introduce the theory and operational aspects of electrical machines

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

Lecture wise plan

Lecture No.	Learning Objective	Topics to be covered	(Ch./Sec./Text Book)
1-2	Basics of AC circuit analysis	Analysis of AC circuits using phase or method	4.1-4.3
3-4	Concept of complex power and power factor	Complex power and power factor improvement	4.4
5-6	Concepts of three phase circuit analysis	Three phase circuits; Star and delta configuration	6.1 - 6.5
7-8	- do-	Analysis of three phase circuits; Three phase power; Two watt meter method of power measurement	6.6 - 6.8
9-10	Magnetic circuits and their analysis	Concept of Magnetic circuit, Analysis of magnetic circuits; Magnetization characteristic	8.1 - 8.4
11	Concept of magnetic induction and force	Electromagnetic induction and force. Self & mutual inductances	8.5-8.6
12-13	Energy in magnetic circuits and various Losses	Energy stored in magnetic systems and losses	8.7 - 8.9
14-15	Transformer basics	Transformer, principles, types: Ideal transformer	9.1 - 9.3
16-17	Transformer modeling	Transformer circuit model and determination of its parameters using tests	9.4- 9.5
18-19	Transformer Performance	Per unit system, voltage regulation, efficiency	9.6 - 9.8
20	Various Types of transformers	Auto Transformers, 3 phase	9.9 - 9.11

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

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	23.02.2022	1-13	CB
Test 2	60 Minutes	17	21.03.2022	14- 28	CB
Test 3	60 Minutes	17	25.04.2022	29- 40	CB
Quizzes (2)	20 Minutes each	10		**	CB
Comprehensive Exam	3 Hours	40	16.05.2022	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, Tests and Comprehensive Examinations, etc.

Dr. K.NAGAIAH
INSTRUCTOR-IN-CHARGE

Date: 05/01/2022

The ICFAI University, Raipur

Faculty of Science and Technology
Second Semester, 2021 – 2022
Course Handout

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

Instructor-in-charge: Dr.K.NAGAIAH/ Mr. Dharmendra/ Mr. Hemant Dewangan

Learning Outcomes:

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

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

Lecture-wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text Book)
1-2	Basic concepts of measurement	Definition of Terms	2.1 - 2.5
		Generalized Measurement System	2.6
		Impedence Matching	2.10
		Experiment Planning	2.11
3-4	Analysis of Experimental data	Causes and Types of errors	3.1 - 3.2
		Error Analysis	3.3
		Uncertainty Analysis	3.4
		Evaluation of uncertainties	3.5
5-6	Method of Least Squares	--	3.11
	Regression Analysis	--	3.12
7-8	Graphical analysis	Graphical analysis & Curve fitting.	3.16

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

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

Evaluation Scheme:
Student evaluation is based on the series of 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	1-9	CB
Test 2	60 Minutes	17	21.03.2022	10- 18	CB
Test 3	60 Minutes	17	25.04.2022	19- 28	CB
Lab	Throughout the Semester	10		**	CB
Comprehensive Exam	3 Hours	40	18.05.2022	1- 28	CB

** To be announced in the class

Make-up Policy: Make up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.
General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc.

Dr. K.NAGAIAH
Instructor-In-charge

Date: 05/01/2022

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

Course No	Course Title	L	P	U
EN201	**Principles of Economics**	**3**	**0**	**3**

Team of Instructors: Mr. JITENDRA KUMAR SINGH

Learning Outcomes:

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

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

Lecture-wise Plan

Lecture Nos	Learning Objective	Topics to be covered	Reference
1,2	Exposure to Economics	Introduction to Economics	1, 2
3-5	Basic Framework	Application of Supply & Demand & Elasticity	3, 4
6,7	Consumer Behavior	Demand and Consumer Behaviour	5 with appendix
8,9	Producer Behavior	Production & Business Organization	6
10,11	Cost Calculation	Analysis of Costs	7, 8
12,13	Factor Pricing	Input Pricing by marginal productivity	9, 10
14,15	Market Behavior	Perfectly Competitive Markets	11
16,17	Market Behavior	Imperfect Competition and its polar case of monopoly	12
18,19	Market Behavior	Oligopoly and Monopolistic Competition	13
20,21	Public Goods Pricing	Externalities, Public Goods & Imperfect Information	14
22-25	Introduction to Macroeconomics	Macroeconomic concerns and its components	16

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

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	25.02.2022	1-13	CB
Test 2	60 Minutes	17	23.03.2022	14- 28	CB
Test 3	60 Minutes	17	27.04.2022	29- 41	CB
Quizzes	20 Minutes each	10		**	CB
Comprehensive Exam	3 Hours	40	27.05.2022	1- 41	CB

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

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

Mr. JITENDRA KUMAR SINGH
Instructor-In-charge

Date: 05/01/2022

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

Course No	Course Title	L	P	U
CS212	**Digital Logic Design**	**3**	**2**	**4**

Instructor-in-charge: Mrs. BHAVNA CHUADHARY

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 Nos	Learning Objective	Topics to be covered	Reference
1	Introduction to digital systems	Digital systems, Analog systems Vs Digital systems	T1:1.1
2-5	Concepts of Number systems, their conversions and usages	Binary, Octal, Hexadecimal numbers, 1's and 2's Complements	T1:1.2-1.5
6-8	Binary Systems	Signed Binary Numbers, Binary codes	T1:1.6-1.7
9-10	To understand the basics of Boolean Algebra	Binary Logic, Theorems & Properties of Boolean Algebra	T1:1.9; 2.3-2.4
11-13	To learn the concepts of SOP,POS Forms	Boolean functions, Canonical forms Digital Logic Gates and ICs	T1:2.1,2.5-2.9
13-15	To learn the simplification of Boolean functions	K-Maps (3 &4 Variables), Don't care conditions, AND & NOR	T1:3.1-3.3, 3.5-3.8
16-20	To learn the concepts of combinational circuits & their design	Combinational circuits, Analysis and design procedure, Adders, Sub tractors	T1:4.1-4.6
21-25	To learn the concepts of combinational circuits & their	Multipliers,Comparators,Decoders and Encoders,MUXs and DEMUXs	T1:4.7 -4.11

	design		
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	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 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	24.02.2022	01-10	CB
Test 2	60 Minutes	17	22.03.2022	11-20	CB
Test 3	60 Minutes	17	26.04.2022	31- 40	CB
Lab	Throughout the Semester	10		**	CB
Comprehensive Exam	3 Hours	40	23.05.2022	01-40	CB

** To be announced in the class

Make-up Policy: Make up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.
General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc.

Mrs. BHAVNA CHUADHARY
Date: 05/01/2022 **Instructor-In-charge**

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

Course No	Course Title	L	P	U
CS314	**Operating Systems**	**3**	**0**	**3**

Instructor-in-charge: Mr. ASHISH KUMBHARE

Learning Outcomes:

To understand the basic concepts and functions of operating systems.
To understand Processes and Threads
To analyze Scheduling algorithms.
To understand the concept of Deadlocks.
To analyze various memory management schemes.
To understand I/O management and File systems

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

Lecture-wise plan

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./ Page Nos.of Text Book)
1	To understand what is operating system and its functions	Overview	T1 CH-1
2		Types of OS	T1 CH-1
3		Design Approaches	T1 CH-1
4		I/O Structures	T1 CH-2
5		System design and implementation	T1 CH-3
6	To understand the concept of process and its various states	Process overview(State,PCB)	T1 CH-4
7-8		Process Scheduling	T1 CH-4
9		Threads	T1 CH-5
10		Inter Process Communication(IPC)	T1 CH-5
11	To know what is scheduling	CPU Scheduling Overview	T1 CH-6

12-13	and its importance	Scheduling Algorithms	T1 CH-6
14	To understand the problem of Critical Section and its solution	Critical Section Problem	T1 CH-7
15		Multi Process Solution	T1 CH-7
16		Semaphores	T1 CH-7
17		Classical Problems of Synchronization	T1 CH-7
18-20	To know what is dead lock and its handling	Dead Lock Handling	T1 CH-8
21	To understand various memory management schemes and their relative advantages and disadvantages	Memory Management Overview	T1 CH-9
22-23		Paging	T1 CH-9
24		Segmentation	T1 CH-9
25		Segmentation with Paging	T1 CH-9
26		Virtual Memory	T1 CH-10
27		Demand Paging	T1 CH-10
28		Page Replacement	T1 CH-10
29		Page Replacement Algorithms	T1 CH-10
30		Thrashing	T1 CH-10
31	To understand the concept of files, its types, attributes and operations	File Operations	T1 CH-11
32		Directory Structure	T1 CH-11
33		File-System Structure	T1 CH-12
34		Allocation Methods	T1 CH-12
35-39		I/O Systems	T1 CH-12
40		Disk Scheduling	T1 CH-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	24.02.2022	1-15	CB
Test 2	60 Minutes	17	22.03.2022	16- 25	CB
Test 3	60 Minutes	17	26.04.2022	26-40	CB
Quizzes (2)	20 Minutes each	10		**	CB
Comprehensive Exam	3 Hours	40	20.05.2022	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, Tests and Comprehensive Examinations, etc.

Mr. ASHISH KUMBHARE
Instructor-In-charge

Date: 05/02/2022

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

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

Instructor-in-charge: Mr. RAMESH KUMAR YADAV

Learning Outcomes:

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

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

Lecture wise plan

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

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

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

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	25.02.2022	1-10	CB
Test 2	60 Minutes	17	23.03.2022	11- 20	CB
Test 3	60 Minutes	17	27.04.2022	21- 30	CB
Lab	Throughout the Semester	10		**	CB
Comprehensive Exam	3 Hours	40	25.05.2022	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.

Mr. RAMESH KUMAR YADAV
Instructor-In-charge

Date: 01/02/2022

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

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

Instructor in charge: Ms. BHAVNA CHAUDHARY

Learning Outcomes:

After successful completion of the course student will be able to

1. Having the knowledge of the 8086 instruction set and ability to utilize it in programming.

2. Able to analyze, specify, design, write and test assembly language programs

3. Able to interface various devices to the microprocessor.

4. Capable to design and develop both the hardware and software for **microprocessor based systems**

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

Lecture-wise plan:

Lecture Nos.	Learning Objective	Topics to be covered	Reference (Chapter/Sec./Page Nos. of Text/Ref. Books)
1	Description of Microcomputer / Microprocessor	Overview of Microcomputer structure and operation	R1 / R2
2	Overview of basic computer mathematics	Computer Number systems, Codes, Arithmetic operations on Binary, Hex and BCD Numbers	R1 Page(1-10)
3-4	Review of Digital Logic devices for Microprocessor system design	Basic digital devices: Tri-sate Devices, Buffers, Decoders, Encoders, MUX, DEMUX, Latches.	R1, R4
5-7	Description of 8086 Microprocessor Internal architecture	Registers&otherpartsinthe8086EU &BIU	T 1.1-1.9
8-11	Learning Assembly Language programming	Addressing Modes & instruction set, Data Transfer, Arithmetic instructions	T 2.2, 2.3.1-2.3.2
12-13	Learning Assembly Language Programming	Logical Instructions	T 2.3.3
14-16	Learning Assembly Language Programming	String Manipulation / Branch Instructions	T 2.3.4-2.3.8
17	Learning Assembly Language Programming	Assembler Directives and Operators	T 2.4
18-19	Learning to write & execute ALP	8086 Assembly Language programming	T3.1, 3.3-3.4
20-21	Learning to write subroutines	Stack Structure of 8086, Procedures	T 4.1-4.2, R1 Page (99-102)
22	Concepts of 8086 interrupt structure	Interrupts and interrupt service routines	T 4.3-4.8
23-24	Description of MACROS & 8086 timing concepts	MACROS , Timings and Delays	T4.10-4.11
25-26	Learning to interface memory with 8086	Memory interfacing: semiconductor memory interfacing, Dynamic RAM interfacing	T 5.1.1, 5.2
27	Learning to interface I/O with 8086	Interfacing I/O ports	T:5.3
28-30	Description of programmable Input-output interface	8255 Programmable port, Modes of operations: Mode0, Mode1 & Mode2	T:5.4-5.5
31-32	Description of Programmable Timer	Programmable Interval Timer 8253: Architecture, Operating Modes	T 6.1.1-6.1.3
33-34	Learning to Program and interface 8253	Programming and interfacing 8253	T 6.1.4
35-36	Description of Serial Communication Interface	Programmable communication interface 8251; USART	T 6.4
37	Description of DMA Interface	DMA controller 8257 : Architecture, Operations	T 7.1
38-39	Learning DMA transfer techniques	DMA Transfers and operations	T 7.2
40	Concepts of Multi processing	Introduction to Multiprocessor systems	T 8.1-8.2

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lecture No)	Remarks
Test 1	60 Minutes	16	24.02.2022	01-10	CB
Test 2	60 Minutes	17	22.03.2022	11-20	CB
Test 3	60 Minutes	17	26.04.2022	31- 40	CB
Lab	Throughout the Semester	10	-	**	CB
Comprehensive Exam	3 Hours	40	23.05.2022	01-40	CB

** To be announced in the class

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

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

Date: 05/01/22

Ms. BHAVNA CHAUDHARY
Instructor-In-charge

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

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

Course Instructor: Dr. K.NAGAIAH

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

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

Lecture-wise plan:

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

13-15		Fourier Transform, existence, properties.	T1:4.1-4.3 T2:2.6-2.9
16-17	The Laplace transform method to represent signals and systems	Laplace Transform, its properties, ROC etc	T1: 6.1-6.2 T2: 2.13-2.18
18-20	Analysis of systems in the Fourier and Laplace domains	Analysis of Continuous LTI using transforms, stability of systems in Fourier and Laplace domains	T1: 6.3-6.4 T2: 2.20-2.21
21-22	Sampling of Continuous signals	The Sampling Theorem	T1:5.1
23-24	Introduction to the representation of Discrete time signals and systems and basic operations	Discrete time signals and systems Difference equation representation of system and their solution Response of a system to an input Discrete time convolution	T1: 8.1-8.2, 8.4-8.5 T2: 3.1-3.2
25-26			T1:9.1-9.3
27-28			T1: 9.4- 9.6 T2: 3.3
29-30	Introduction to the Z-transform to Represent the discrete signals/systems and the influence of the ROC	Z-transforms and its properties. Inverse Z-transforms Analysis of discrete systems using Z-transform	T1: 11.1-11.2 T2: 3.5-3.6
31-32			T1: 11.1.1 T2: 3.7
33-34			T1: 11.3 T2:3.8-3.10
35-37	Discrete Fourier Series and Transforms and application to convolutions	Discrete Fourier Series and Discrete Fourier Transform and properties Linear and circular convolution using the DFT	T1: 10.1-10.3, T2: 4,1-4,3
38-39			T1: 10.6, 5.2
40	Algorithms for computing the Discrete Fourier Transform	Fast Fourier Transform Decimation in Time and in Frequency.	T1: 5.3 T2: 4.5

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

Evaluation Component	Duration	Weightage (%)	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	17	24.02.2022	1-13	CB
Test 2	60 Minutes	17	22.03.2022	14- 28	CB
Test 3	60 Minutes	16	26.04.2022	29- 40	CB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	20.05.2022	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: 05/01/22

Dr. K.NAGAIAH
Instructor-In-charge

The ICFAI University, Raipur

Faculty of Science and Technology
Second Semester, 2021 – 2022
Course Handout

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

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

Learning Outcomes:

After successful completion of the course student will be able to

1. To apply the principles of Boolean algebra to manipulate and minimize logic expressions.
2. To use K-maps to minimize and optimize two-level logic functions up to 5 variables.
3. Two-level logic functions with AND, OR, NAND, NOR and XOR gates with minimum number of gate delays or literals.
4. To design combinational circuits using Encoders, Decoders, Multiplexers and 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 Nos.	Learning Objective	Topics to be covered	Reference (Ch./Sec./Page Nos.ofText Book)
1-2	To understand the basics of Boolean Algebra	Digital systems, Binary Logic, Theorems & Properties of Boolean Algebra	T1:1.1,1.9;2.3
3-4	To learn the concepts of SOP, POS Forms	Boolean functions, Canonical forms, Digital Logic Gates, ICs	T1:2.4-2.8
4-5	Concepts of Number systems, their conversions and usages	Binary, Octal, Hexa decimal numbers, Complement, Signed Binary Numbers and codes	T1:1.2-1.7
6-7	To learn the simplification of Boolean functions	K-Maps (4,5 Variables) don't care conditions, NAND & NOR, X-OR Functions	T1:3.1-3.3,3.5-3.8
7-8	To understand the basics of	Hardware Description Language	T1:3.9

	HDL		
9-10	To learn the concepts of combinational circuits & their design	Combinational circuits, Analysis and design procedure	T1:4.1-4.3
11-12	To learn the concepts of combinational circuits & their design	Adders, Subtractors	T1:4.4-4.6
13-15	To learn the concepts of combinational circuits & their design	Comparators, Decoders, Encoders, MUXs, DEMUXs	T1:4.7-4.10
16-18	To learn the concepts of sequential circuits	Sequential Circuits, Latches, Flip-Flops	T1:5.1-5.3
19-21	To understand the concepts of sequential circuits, their analysis.	Analysis of clocked sequential circuits, HDL for sequential Circuits, State Reduction and Assignment	T1:5.4-5.6
22-24	To Understand the design of sequential circuits	Shift Registers, synchronous Asynchronous counters, Ripple Counters	T1:6.1-6.5
25-27	Implementation of Boolean functions using these programmable devices	RAM, ROM, PLA, PAL	T1:7.2,7.5-7.7
28-32	To learn the concepts of Logic Families	Logic Families,TTL, MOS, CMOS Logic families	T1:10.1-10.3, 10.5,10.7-10.10
33-34	To understand the arithmetic operations of Binary numbers	Multiplication and Division Algorithms	T2:10.3,10.4
35-38	To Understand the concepts of Memories.	Memory hierarchy & different types of memories, Auxiliary and Cache Memory	T2:Ch12.1, 12.2,12.3,12.5
39-42	To Understand the concepts of Data Transfer Techniques	Data transfer techniques, Bus interface	T2:Ch11.2-11.4

List of Experiments:

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

S.No.	**NameoftheExperiment(on softwareVHDL,Suggested book for VHDLis *"A VHDL Primer"*,byJ.Bhaskar,Pearson Education India)**
1	Logic Gates (NOT, AND, NAND, OR, NOR, XOR)
2	Half Adder, Full Adder, Half Subtrator and Full Subtrator
3	Encoders & Decoders (Basic)

4	Multiplexers and Demultiplexers (Basic)
5	Flip-Flops (RS,D) and D-Latch
6	Divide by 16 Counter

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	25.02.2022	1-12	CB
Test 2	60 Minutes	17	23.03.2022	13- 28	CB
Test 3	60 Minutes	17	27.04.2022	29- 42	CB
Lab	Throughout the Semester	10		**	CB
Comprehensive Exam	3 Hours	40	25.05.2022	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: 02/02/22

Dr. K.KISHORE KUMAR
Instructor-In-charge

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

Course No	Course Title	L	P	U
MA303/MATH303	**Operations Research**	**3**	**0**	**3**

Instructor-in-charge: Mr.HEMANT KUMAR DEWANGAN

Learning Outcomes:

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

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

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

Lecture-wise Plan:

Lecture No.	Learning objectives	Topics to be covered	Refer to Chapter,See (Book)
1	Linear Programming Problem	Mathematical Formulation of LPP	T1, Unit-2, ch-3, pg.3-26
2		Graphical Method for Solving LPP	T1, Unit-2, ch-3, pg.26-53

3		Simplex Method for Solving LPP and Big-M Method	T1, Unit-2, ch-5, pg.67-95
4		Some Special Cases in LPP	T1, Unit-2, ch-5, pg.95-125
5		Duality, and Solving LPP using Duality in Simplex Method	T1, Unit-2, ch-7, pg.158-203
6	Transportation	Mathematical Formulation of LPP	T1, Unit-2, ch-11, pg.262-267
7		Initial BFS of Transportation Problem	T1, Unit-2, ch-11, pg.269-278
8		Optimality Test by Stepping Stone Method and, and	T1, Unit-2, ch-11, pg.278-351
9		MODI Method	T1, Unit-2, ch-11, pg.278-351
10		Some Special Cases of Transportation Problem	T1, Unit-2, ch-11, pg.278-351
11	Assignment	Initial BFS of Assignment Problem	T1, Unit-2, ch-12, pg.352-353
12		Johnson's job of sequencing rules	T1, Unit-2, ch-12, pg.353-403
13		Solution by Hungarian Method, and Travelling Salesman Problem	T1, Unit-2, ch-12, pg.353-403
14	Game Theory	Basic Concept and Terminologies	T1, Unit-4, ch-19, pg.3-5
15		Two-person Zero-sum Game, and Game with Pure and Mixed Strategies	T1, Unit-4, ch-19, pg.20-61
16		Dominance Principle, Arithmetic Method, and Graphical Method for Solving (2× n) Game	T1, Unit-4, ch-19, pg.20-61
17		Graphical Method for Solving (m×2) Game and Solution of Game by Simplex Method	T1, Unit-4, ch-19, pg.20-61
18	Job Sequencing	Basic Terminologies and Assumptions of Job Sequencing	T1, Unit-4, ch-24, pg.299-300
19		Processing of n Jobs through 2 and 3 Machines	T1, Unit-4, ch-24, pg.300-315
20		Processing n Jobs through m Machines, and Processing 2 Jobs through m Machines - Graphical	T1, Unit-4, ch-24, pg.300-315
21	Inventory Theory	Economic Order Quantity and EOQ Models without Shortage	T1, Unit-4, ch-20, pg.62-71
22		EOQ models with Shortage and EPQ Models with/without Shortages	T1, Unit-4, ch-20, pg.72-100
23		Newsboy Problem and Probabilistic Inventory Model with Instantaneous Demand and No Set up Cost	T1, Unit-4, ch-21, pg.143-172
24		Probabilistic Inventory Model with Uniform Demand and No Set up Cost, and Buffer Stock in Probabilistic Inventory Model	T1, Unit-4, ch-21, pg.143-172
25		Problems regarding different models	T1, Unit-4, ch-21, pg.173-175
26	Queuing Theory	Basic Characteristics of Queuing System and Probability Distribution of Arrivals	T1, Unit-4, ch-23, pg.215-229
27		Probability Distribution of Departures and Model I	T1, Unit-4, ch-23,

		(M|M|1):(∞|FCFS)	pg.230-231
28		Model I. (General): (M|M|1): (∞|FCFS), and Model II. (M|M|1): (N|FCFS)	T1, Unit-4, ch-23, pg.232-257
29		Model III - (M|M|s): (∞|FCFS), and Model IV - (M|Ek|1): (∞|FCFS)	T1, Unit-4, ch-23, pg.258-268
30	Network Analysis	Networking Modeling	T1, Unit-4, ch-25, pg.316-322
31		Critical Path Method (CPM)	T1, Unit-4, ch-25, pg.323-349
32		Program Evaluation & Retention Technique (PERT)	T1, Unit-4, ch-25, pg.349-382
33		Project Crashing	T1, Unit-4, ch-25, pg.349-382
34		LP and Dual LP Solutions to Network Problem	T1, Unit-4, ch-25, pg.349-382
35	Dynamic Programming	Basic Concept and Terminology, and Dynamic Programming Models I and II	T1, Unit-5, ch-33, pg.72-77
36		DP Model III, Solution of Discrete DP Problem and Solution of LPP by DP	T1, Unit-5, ch-33, pg.82
37-38	Supply Chain Management	Introduction, Business Drivers in Supply Chain performance	R3, ch-16, pg.217-232
39-40	Just-In-Time (JIT) Manufacturing System	Introduction, The Concept of the JIT System	R3, ch-18, pg.253-261

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	50 Minutes	17	23.02.2022	1-13	CB
Test 2	50 Minutes	17	24.03.2022	14- 25	CB
Test 3	50 Minutes	16	28.04.2022	26- 40	CB
Quiz 1	10 Minutes	5		1-20	CB
Quiz 2	10 Minutes	5		21-40	CB
Comprehensive Exam	3 Hours	40	16.05.2022	1- 40	CB

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: 10/01/2022

Mr.HEMANT KUMAR DEWANGAN
Instructor-In-charge

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

Course No	Course Title	L	P	U
ME313	**Internal Combustion Engine**	**3**	**2**	**4**

Instructor-in-charge: Mr.DILIP MISHRA

Learning Objectives:

This course has been designed to make the students familiar

1. With engine which generates motive power by the burning of petrol, oil, or other fuel with air inside the engine, the hot gases produced being used to drive a piston or do other work as they expand.

2.It deals with the principle of operation and performance of internal combustion engines, along with working, analysis and design of various components of an engine.

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

Lecture-wise Plan

Lecture Nos.	Learning Objectives	Topics to be covered	Reference (Chapter/sec/pg. no.)
1-3	Introduction to I.C. Engine and nomenclature, SI & CI engine working	Introduction, Internal and external combustion engine and their comparison, classification of I.C. Engine, Nomenclature, Engine performance parameters, Comparison of four stroke and two stroke engines, comparison of S.I. and C.I. engine	Ch 1.1, 1.2, 1.3, 1.5, 1.8(T 1)
4	Engine Cycles	The first law analysis of engine cycles	Ch 1.7(T 1)
5-6	Air standard cycles & their analysis	Introduction, Carnot cycle, Stirling cycle, Ericsson cycle, Otto Cycle, Diesel Cycle, Dual Cycle, Comparison of the Otto, Diesel and Dual Cycles	Ch 2.1, 2.2, 2.3, 2.4, 2.5, 2.6(T 1)
		Worked and non-worked examples	Ch 2(T 1)
7-8	Combustion in S.I. engine	Stages of combustion, Factor influencing the flame speed	Ch 11.4, 11.5, 11.7 (T 1)

9-11	Effects of engine variables on combustion	Phenomenon of knocking S.I. engine, Effect of engine variable on knock, effects of detonation, Pre-ignition, effect of pre-ignition	Ch 11.10, 11.11 (T 1)
12-14	Combustion in C.I. engine	Stages of combustion, Factor influencing the delay period	Ch 11.13, 11.14, 11.15(T 1)
15-16	Knocking in SI and CI engines	Phenomenon of knock in C.I. engine, Effect of engine variable on knock, Comparison between knock in S.I. and C.I. engine	Ch 11.16, 11.17 (T 1)
17-18	I.C. Engine fuels, their characteristics	Requirement of an ideal gasoline, Properties	Ch 8.5 (T 2)
19-21	Effect of fuel properties on engine performance, fuels rating	Structure of petroleum, effect of fuel structure on combustion, Volatility of liquid fuels, ASTM distillation curve, Effect of volatility on engine performance - cold starting, hot starting, Antiknock rating of fuels, CCR, HUCR, Octane number, performance number, Cetane number, Dopes.	Ch 8.2, 8.5.3, 8.5.4, 8.6(T 2), Ch 5.6 (T 1)
22	Alternate fuels	Possible alternatives, Solid fuels, liquid Fuels, Bio-diesel, Gaseous fuels-Hydrogen	Ch 6.2, 6.3, 6.4, 6.8, 6.9(T 1)
23-24	Introduction to carburetor, Requirement of Carburetion	Simple carburetor, Principle of carburetion, Properties of air-petrol mixtures, Factors affecting carburetion	Ch 7.1, 7.2, 7.3, 7.4, 7.7,Ch 8.5.4 (T 2)
25-26	Elements of carburetor, Design of carburetor	Element of complete carburetor, main metering system-compensating jet device, Idling system, power enrichment system, acceleration pump, Nozzle lip, Venturi depression, calculation of fuel jet and Venturi throat diameter for given air fuel ratio,	Ch 7.10, 7.11, 7.12, 7.13, 7.14 (T1),
27-28	Limitations of carburetors & Various Shut-off condition of an IC Engine	Cold starting system, carburetor icing, Vapour lock, acceleration, crank case dilution and Disadvantages of carburetor, limitation of simple carburetor	Ch 7.3 (T1)
29-30	Different fuel injection systems	Gasoline injection system: Type of injection system, components of injection system	Ch 8.2, 8.3, 9.2, 9.3, 9.4, 9.7 (T1)
31-32	Ignition System, Firing order, Ignition Timing and Engine parameters	Battery and magneto ignition system and their comparative study, Firing order, Ignition Timing and Engine parameters	Ch 10.4, 10.5, 10.6, 10.7, 10.8, 10.13, 10.14 (T1)
33-35	Lubrication System	Lubrication, Lubrication of engine components, Lubrication system, Crankcase ventilation, Properties of lubricants.	Ch 12.7, 12.8, 12.9, 12.10, 12.11 (T1)
36-37	Testing and Performance of an IC	Performance parameters, measurements of brake power, indicated power, measurement	Ch 15.2, 15.3, 15.5,

	engine	friction power, Morse test, motoring test, measurement fuel consumption, and measurements of air consumption	15.6 (T1)
38-39		Calculation of various performance parameter, heat balance sheet and heat balance diagram	Ch 16.7 (T 1)
40-41		Performance curves of S.I. and C.I. Engine at full throttle variable speed operation and at constant speed variable load operation.	Ch 16.8 (T 1)
42		Numerical based on testing and performance	Ch 16 (T 1) Worked out examples

Evaluation Scheme:
Student evaluation is based on the series of Tests 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	01-10	CB
Test 2	60 Minutes	17	21.03.2022	11-20	CB
Test 3	60 Minutes	17	25.04.2022	31- 41	CB
Lab	Throughout the Semester	10		**	CB
Comprehensive Exam	3 Hours	40	18.05.2022	01-41	CB

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

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

Date: 05/01/2022

Mr.DILIP MISHRA
Instructor-In-charge

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

Course No	Course Title	L	P	U
ME322	**Dynamics of Machines and Vibrations**	**3**	**0**	**3**

Instructor-in-charge: Mr.DILIP MISHRA

Learning Outcomes:
The content of this course is basically selected in such a way so as to give the knowledge of forces involved in various machine elements. It also deals with the concept of friction and its effect on the functioning of Brakes and clutches. In addition to these, a brief introduction to vibration theory and its engineering applications will be given. By the end of the course the student will be able to perform force analysis of simple mechanisms and vibration related problems.

Textbook(s)	**T1**	Theory of Mechanisms & Machines- Amitabha Ghosh & Asok Kumar Mallik (Third edition), East-West Press Private Limited.
	T2	Mechanical vibrations, Singiresu.S.Rao (Fourth edition, Pearson Education)
Reference Book(s) R1		Theory of Machines, S.S. Ratan (Third edition), TMH
R2		Theory of Machines & Mechanisms-John J. Unicker, Jr. Gordon R. Pennock, Joseph E. Shigley (Third edition, international version); Oxford University Press
R3		Theory of Machines, Thomas Bevan (ELBS/CBS pub. New Delhi)
R4		Theory of Machines: P.L.Ballaney (Khanna publications)

Lecture-wise plan:

Lecture Nos.	Learning Objectives	Topics to be covered	Reference (Ch./Sec./ Page Nos. of Text Book)
1-4	Dynamic Force and Motion Analysis	Principle of Virtual Work, D'Alembert's principle and Dynamic Equilibrium, Dynamic Force and Motion Analysis	4.1-4.8 T1
5-8	Turning Moment & Flywheel	Turning moment diagrams, Fluctuation of energy, Flywheel	4.10-4.13 T1
9-11	Governors	Centrifugal Governors and its characteristics, Hunting of Centrifugal Governor,	6.1-6.5T1
12-13	Inertia Governors	Introduction to Inertia Governors, Numericals	6.6-6.8T1
14-16	Balancing of masses	Balancing of Rotating Masses, Two-plane Balancing	7.1-7.4 T1

17-19	Friction	Introduction to friction, Pivot and collar friction, Friction circle, Single plate, Multiplate and Cone clutches	8.1-8.4, 8.8-8.16 R1
20-23	Belts, Ropes and Chain	Belts and pulleys, Flat and V-belts, Design and selection.	9 R1
24-27	Brakes	External and internal shoe brakes, Band and Block brakes, Dynamometers (Introduction)	15.1-15.6 R1
28-30	Gyroscopic Motion	Introduction, Angular velocity, Angular acceleration, Gyroscopic torque, Gyroscopic effects in machines	17.1-17.5R1
31-34	Fundamentals of vibration	Basic concepts, Classification of vibration, Vibration analysis procedure, Spring, Mass and Damping elements,Harmonic motion	1.1-1.10 T2
35-37	Free Vibration of Single degree of Freedom systems	Free vibration of Undamped Translational and Torsional systems, Free vibration with viscous damping	2.1-2.6 T2
38-40	Harmonically excited vibration	Response of Damped and Undamped system under Harmonic force, Response of a Damped system under the Harmonic motion of the Base	3.1-3.6 T2
41-43	Continuous systems	Transverse vibration of a string or cable, Longitudinal vibration of a Bar or Rod, Torsional vibration of a Shaft or Rod	8.1-8.4 T2

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	24.02.2022	1-12	CB
Test 2	60 Minutes	17	22.03.2022	13- 27	CB
Test 3	60 Minutes	17	26.04.2022	28- 43	CB
Quizzes (2)	20 Minutes each	10		**	CB
Comprehensive Exam	3 Hours	40	20.05.2022	1- 43	CB

** To be announced in the class

Make-up Policy: Make up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.
General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc.

Date: 05/01/2022

Mr.DILIP MISHRA
Instructor-In-charge

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

Course No	Course Title	L	P	U
ME323	**Machine Tools and Metrology**	**3**	**2**	**4**

Course Instructor: Mr. HEMANT KUMAR DEWANGAN

Learning Outcomes:

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

1. Understand the basic parameters of metal cutting operation.
2. Understand different components of Machine Tools and their functions.
3. Understand the basic structure of Lathe machines.
4. Understand the features of Milling process, milling machines, Milling operations and different types of indexing.
5. Understand the basics of Metrology like Surface roughness, surface finish,limits and tolerances etc.

Text book(s):	
T1	Production Technology by R.K. Jain and S.C. Gupta.
T2	Production Technology /H.M.T./Tata McGraw Hill.
T3	Engineering Metrology / R. K. Jain / Khanna Publishers.
T4	Engineering Metrology / I C Gupta / DhanpathRai.
Reference book(s):	
R1	Principles of machine tools/ Bhattacharyya A and Sen G.C. /New central book agency
R2	A text book on Production Engineering by Dr. Swadesh Kumar Singh
R3	Elements of Manufacturing Processes by B.S. Nagendra Parashar, R.K.Mittal
R4	Machine Tool Engineering by G.R. Nagpal
R5	Workshop technology vol. I and II by HazaraChaudhary
R6	Manufacturing processes by Rousnoff
NPTEL Web Course	http://nptel.ac.in/courses/112106179/1 http://nptel.ac.in/downloads/112105127/
NPTEL Video Course	https://youtu.be/S60_tjveEKw https://youtu.be/HpIEeBtJupY

Lecture-wise Plan:

Lecture No.	Learning objectives	Topics to be covered	Refer to Chapter,See (Book)
1	Introduction to Metal Cutting	Introduction to Metal Cutting	T1, T2
2		Need of machine tool technology and it's use, Material removal processes,	T1, T2
2		Types of machine tools	T1, T2
3		Stages in cutting, factors affecting cutting	T1, T2
4-5		Types of chips, Continuous, discontinuous & built up edge(BUE), BUE formation condition and its effect upon surface finish	T1, T2

6-7		Definition of cutting force, feed force, radial force power requirement for each type of force	T1, T2
8		Tool geometry and influence of tool angles, Desirable properties of cutting tool.	T1, T2
9		Primary and secondary function of cutting fluids and properties of cutting fluids commonly used, Types of cutting fluids.	T1, T2
10-11		Cutting variables, tool wear and tool life, Tools life specifications, Taylor's tool life equation	T1, T2
12		Cutting speed calculation, Economics of metal cutting.	T1, T2
13	Lathe Machine	Introduction and parts of lathe machine	T1, T2
14		Working principle and operation performed in lathe machine	T1, T2
15		Basic difference between central lathe, turret and capstan lathes, Constructional Details and specifications	T1, T2
16-17		Solved Numerical on Lathe machine	T1, T2
18	Drilling	Introduction to twist drill and geometry	T1, T2, R1
19		Drill parts and different angles	T1, T2, R1
20		Drill Specification and other hole making operations	T1, T2, R1
21		Solved Numerical on Drill Time	T1, T2, R1
22	Shaper and Planner	Introduction and difference between shaper and planner	T1, T2, R1
23		Solved numerical on machining time	T1, T2, R1
24	Milling Machines & Milling Processes	Definition of milling, Classification of milling machine part and their functions	T1, T2
25		Types of table movement in universal milling machine	T1, T2
26		Specification of milling M/C, Conventional and climb milling and different milling operations and applications	T1, T2
27		Milling cutters and tools angles, Classification of cutting tool materials, Use of arbor, collect and adopters machine attachment	T1, T2
28		Solved Numerical on Milling time	T1, T2
29	Grinding And Finishing Processes	Definition of grinding and action in grinding, Types of abrasive materials and their properties	T1, T2
30		Bonding materials, Grinding wheel classification, Condition for selection of grinding wheels	T1, T2
31		Balancing of grinding wheels, Glazing, loading dressing and Trueing	T1, T2
32		Principles of working of grinding machines and functions of main parts, Types of grinding processes	T1, T2
33		Definition of micro finishing, honing, lapping, super finishing methods, Equipments involved, materials used	T1, T2

34	Jigs And Fixtures	Definition and functions of jigs and fixtures	T3, T4
35		Design criteria for simple jigs and fixtures	T3, T4
36	Metrology	Introduction to metrology, accuracy and precision, Definition, types, need of inspection, terminologies, methods of measurement	T3, T4
37-38		Limits fits and tolerances Interchangeability, selective assembly, limits, fit and tolerances	T3, T4
39-40		Measurement of surface finish: Introduction, terminology, specifying roughness on drawings, surface roughness parameters, factors affecting surface roughness, roughness measurement methods	T3, T4

Machine Tools and Metrology Lab:

S.No	Name of the Experiment
1	To find the tool life by taylor's tool life equation through experiment.
2	To Perform Various Lathe Operations Such As Plain Turning, Step Turning, Taper Turning Knurling And Chamfering On A Given Material Made Of Mild Steel.
3	Measurement of lengths, heights, diameters by Vernier calipers micrometers etc.
4	Tool maker's microscope and its application
5	Angle and taper measurements by Bevel protractor, Sine bars, etc.
6	Use of spirit level in finding the flatness of surface plate.
7	Machine tool "Alignment of test on the lathe.
8	Measurement of bores by internal micrometers and dial bore indicators.
9	Thread measurement by Two wire/ Three wire method or Tool makers microscope.

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	50 Minutes	17	24.02.2022	1-12	CB
Test 2	50 Minutes	17	22.03.2022	13- 23	CB
Test 3	50 Minutes	16	26.04.2022	24- 40	CB
Lab	Throughout the Semester	10		1-10 (Sr. No.)	CB
Comprehensive Exam	3 Hours	40	23.05.2022	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: 10/01/2022

Mr.HEMANT KUMAR DEWANGAN
Instructor-In-charge

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

Course No	Course Title	L	P	U
ME315	**Advance Mechanics of Solid and Kinematics**	**3**	**0**	**3**

Instructor-in-charge: Mr.HEMANT KUMAR DEWANGAN

Learning Outcomes:

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

1. Analyze an in-depth analysis of some advanced topics in Mechanics of Solids, beyond what is covered in the common course ES 202.
2. Learn the second part which deals with kinematics of simple mechanisms and motion generation, which lays foundation for further study in Dynamics and Vibration ME C442.
3. Understand the concept of tensor.
4. Analyze advanced concept of stress and strain in structural problems.
5. Apply the concept of different elastic functions to solve complex problems.
6. Evaluate the influence of various geometric and loading parameters in plane stress and plane strain problems.
7. Implement advanced concept of solid mechanics in torsion, plates and shells.

Textbook(s)	
T1	Advanced Mechanics of Materials- Arthur P., Boresi and R.J. Schinid, John Wiley,6th Edition 2003.
Reference book(s)	
R1	Theory of Machines - S.S.Rattan, Tata McGrw-Hill, second Edition 2008
R2	Advanced Mechanics & Solids L.S. Srinath, Tata Mc.Graw Hill Publishing Co.
R3	Advanced Mechanics of Solids - Otto T. Bruhns, Springer Verlag, 2003
R4	Advanced Mechanics of Materials - R. Davis Cook and Warren C. Young, Prentice Hall 2nd Edition, 1998.
R5	Design of Machinary- An introduction to synthesis and analysis of Mechanisms andmachines"RobertL.Norton - Mcgraw Hill company.

Lecture-wise Plan:

Lecture No.	Learning objectives	Topics to be covered	Refer to Chapter, See (Book)
1-2	Review of elementary Mechanics of Materials and methods of analysis, failure analysis & properties of material (T1)	Introduction & review of elementary mechanics of solids	CH1 (T1)
3-4	Three dimensional stress strain relations and tensor representation. Generalized Hooke's Law. Hook's law for Anostropicelasticity, Isotropic elasticity and Orthotropic materials	Theories of stress strain & Generalized Hooke's law.	CH2 (T1) & CH3 (T1)
5-9	Principle of potential energy, Castigliano's	Energy methods and	CH5 (T1)

	theorem, Deflections in statically determinate structures and statically indeterminate structures, applications to curved beam treated as straight beams.	applications	
10-12	Non-symmetrical loading bending and defection of straight beams. Shear flow in thin-walled beam cross sections and deflections in standard channel sections	Asymmetrical bending	CH7 (T1)
13-17	Location of neutral axis, radial stress, correction of circumferential stress and deflections of curved beams. Curved beams of standard sections: I & T. Analysis of statically indeterminate curved beams (closed ring).	Curved beams	CH9 (T1)
18-22	Stress - Stain - Temperature relation for thick walled cylinders and composite cylinders. Analysis of open and closed cylinders	Thick walled cylinders	CH11 (T1)
23-25	Geometry of contact surface, methods of computing contact stress, deflection of bodies in point contact and line contact with normal load.	Contact stresses	CH17 (T1)
26-27	Degree of freedom, types o kinematic joints. Inversions, Grassoff's law	Introduction to kinematics	CH1 (R1) CH1 (R5)
28-31	Velocity and acceleration analysis of Kinematics chains	Vector method, Instantaneous centre method, graphical method	CH2 (R1) CH3 (R1)
32-33	Velocity and Acceleration analysis	Analytical solutions of velocity and acceleration	13.5 to 13.9 (R1)
34-37	Direction of rotation, speed and torque determination for simple, compound and planetary gear systems.	Gears terminology and gear trains	CH10 (R1)
38-41	Different types of cams, motion analysis and motion synthesis of cam. Cam profile drawing	Cam and follower systems	CH8 (R1) CH5 (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	50 Minutes	17	25.02.2022	1-12	CB
Test 2	50 Minutes	17	23.03.2022	13- 25	CB
Test 3	50 Minutes	16	27.04.2022	26- 40	CB
Quiz 1	10 Minutes	5		1-20	CB
Quiz 2	10 Minutes	5		21-41	CB
Comprehensive Exam	3 Hours	40	25.05.2022	1- 41	CB

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

Date: 10/01/2022

Mr.HEMANT KUMAR DEWANGAN
Instructor-In-charge

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

Course No	Course Title	L	P	U
ME315	**Advances in Materials Science**	**3**	**0**	**3**

Instructor-in-charge – Mr. DILIP MISHRA

Scope and Objective of the Course:

The course Advances in Materials Science deals with in-depth exposure to mechanical behavior of materials, understanding the phenomena of creep, fatigue and fracture, explanation about corrosion, behavior and properties of polymers, ceramics and composites. Mechanical testing techniques and non-destructive testing techniques are explained through laboratory schedules. The course ends with using the knowledge gained for material selection, for a given product/situation.

Textbook(s) T1	Materials Science and Engineering–An Introduction;William D.CallisterJr.,Sixth Edition, JohnWiley & Sons,Inc.2003.
Reference book R1	Foundations of Materials Science and Engineering; William F.Smith,Third Edition, McGraw-Hill, 2004.

Lecture-wisePlan:

Lecture No.	Topics to be covered	Learning Objectives	ReferenceChapter
1-2	Introduction to Materials Science and Engineering	To understand 6 different properties ofmaterials, 3 primary classification of solid materials and 4 components of the discipline of Materials Science and Engineering	Ch.1
3-8	Mechanical Properties of Materials, Fatigue and Fracture of Materials	To define and explain engineering stress, engineering strain, true stress, true strain, Poisson's ratio, 0.2% offset yield strength/proof strength, elongation, ductility, hardnesset.Also, to understand the mechanism of crack propagation, fracture, fatigue, creep, fracture toughness etc.	Ch. 6 & 8

9-14	Polymeric Materials	To describe a typical polymer molecule in terms of its chain structure, concept of crystallites and % crystallinity,stress-strain behavior of polymers, fabrication techniques used for polymers, visco elasticity, stress relaxation is polymers, glass transition temperature, thermosetting and thermo plastic polymers, applications	Ch. 14 & 15
15-18	Ceramic Materials	To understand basic properties of ceramics, traditional and engineering ceramics, polymorphs of carbon, mechanical properties of ceramics, flexural strength, elastic behaviour, influence of porosity on modulus of elasticity and flexural strength of ceramics, forming methods, different types of glasses, applications of ceramics, advanced ceramics.	Ch. 12 & 13
19-24	Composite Materials	To understand the concept of composite materials, different types of fibre reinforced polymeric composites, to calculate longitudinal modulus and longitudinal strength for uni directional composites, common reinforcing fibres and polymeric matrix materials, applications.	Ch. 16
25-28	Corrosion and Degradation of Materials	To understand corrosion phenomenon, to distinguish between oxidation and reduction, to describe galvanic corrosion, pitting corrosion, uniform corrosion, crevice corrosion, integranuler corrosion, stress corrosion Cracking, corrosion penetration rate, to learn corrosion prevention methods.	Ch.17
29-31	Nondestructive Testing Techniques	To learn the techniques of magnetic methods of crack detection, liquid penetration inspection and ultrasonic flaw detection.	Laboratory
32-34	Mechanical Testing of Materials	To learn tensile testing of materials, to observe the phenomenon of ductile fracture, impact test, hardness test, fatigue test and torsion test.	Laboratory
35-40	Materials Selection and Design Considerations	To understand material selection process, describe biocompatibility, mechanical compatibility and other considerations required for selecting materials for artificial hip replacement	Ch.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	50 Minutes	17	25.02.2022	1-12	CB
Test 2	50 Minutes	17	23.03.2022	13- 25	CB
Test 3	50 Minutes	16	27.04.2022	26- 40	CB
Quiz 1	10 Minutes	5		1-20	CB
Quiz 2	10 Minutes	5		21-40	CB
Comprehensive Exam	3 Hours	40	27.05.2022	1- 40	CB

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

Date: 10/01/2022

Mr. DILIP MISHRA
Instructor-In-charge

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

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

Instructor-in-charge Dr. K.NAGAIAH

Learning Outcomes:

After successful completion of the course student will be able to

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 CIfeachor & 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	Digital IIR filter design concepts. Pole-zero placement method	T1:8.1-8.5

	the analog filter design		
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 R1:7.2-7.4
11-12	Filter structures for IIR filters	Realization structures for IIR filters	T1:8.13R2:6.4
13-14	Design of FIR filters using various design methodologies	FIR Filter Design Concepts. Concepts of linear phase	T1: 7.1-7.4R2:4.4.1-4.4.54
15-16	Design of FIR filters using various design methodologies	FIR Filter Design using Window method	T1:7.5 R2:7.7
17	Design of FIR filters using various design methodologies	FIR Filter Design using optimal method	T1:7.6 R2:7.7
18	Design of FIR filters using various design methodologies	FIR Filter Design using frequency sampling method	T1:7.7
19	Filter structures for FIR filters.	Realization structures for FIR filters	T1:7.10.1,7.10.2 R2:6.3
20-22	Introduction to multi rate signal processing.	Multi-rate DSP: Decimation & Interpolation, Multistage approach	T1:9.1-9.2 R2:10.1-10.2.3
23	Filter design for multirate filters	Design of practical sampling rate converters	T1:9.3 R2:10.3
24	Efficient filter structures for implementing multirate filters.	Sampling rate conversion using polyphase filter structures	T1:9.6 R2:10.4
25-26	Introduction to the adaptive filter theory.	Adaptive filters: Concepts/Basic Wiener Theory	T1:10.1-10.3 R1:5.1-5.2.1
27-28	To design and study the performance of LMS filters	Basic LMS adaptive algorithm	T1:10.4 R1:5.2.2-5.2.3
29-30	Some practical applications of DSP filters	Applications of DSP	T1:8.19,9.7,
31-32	To know the difference between the Von Neumann architecture and Harvard architecture.	Introduction to programmable DSP's and DSP architectures	T1:12.1-12.2 R4:2.1-2.8
33	Comparison of various DSP processors.	General purpose DSPs and selection criteria for DSPs	T1:12.3-12.4
34-35	To study in detail the architecture and programming of the TMS 320C5X DSP processor.	DSP TMS 320C5X:Architecture	R4:3.1-3.14
36-37	To study in detail the architecture and	Addressing Modes	R4:4.2

	programming of the TMS 320C5X DSP processor		
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	CB
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, Tests and Comprehensive Examinations, etc.

Dr. K.NAGAIAH

Date: 05/01/22 **Instructor-In-charge**

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

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

Instructor-in-charge: Dr. K.NAGAIAH

Learning Outcomes:

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

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

Lecture wise plan

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

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

List of Experiments:

Digital Communication Laboratory: (List of Experiments)

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

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	24.02.2022	1-13	CB
Test 2	60 Minutes	17	22.03.2022	14- 26	CB
Test 3	60 Minutes	17	26.04.2022	27- 39	CB
Lab	Throughout the Semester	10	-----	**	CB
Comprehensive Exam	3 Hours	40	20.05.2022	1- 39	CB

** To be announced in the class

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

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

Dr. K.NAGAIAH
Instructor-In-charge

Date: 05/01/2022

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

Course No	Course Title	L	P	U
EC429	**Antennas and Wave Propagation**	**3**	**0**	**3**

Instructor-in-charge: Mrs. BHAVNACHAUDHARY

Learning Outcomes:

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

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

Lecture-wise plan:

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

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

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	30/01/22	1-12	CB
Test 2	60 Minutes	17	27/02/22	13-27	CB
Test 3	60 Minutes	17	27/03/22	28-38	CB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	07/05/22	1-40	CB

** To be announced in the class

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

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

Mrs. BHAVNACHAUDHARY
Instructor-In-charge

Date: 05/01/2022

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

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

Instructor-in-charge: Mrs. BHAVNACHAUDHARY

Learning Outcomes:

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

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

Lecture-wise plan:

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

	microwave sources and circuit elements		
25-26	Overview of design and principle of semiconductor devices used as microwave sources and circuit elements	Transferred electron devices, GUNN effect, GUNN diodes	T2:7.1-7.5
27-28	Overview of design and principle of semiconductor devices used as microwave sources and circuit elements	Avalanche Transit time devices, IMPATT,TRAPATT,BARITT	T2:8.1-8.4
29-32	Overview of design and principle of high power sources of microwave like Klystron Magnetron & amplifiers using TWTs.	Klystrons, Multicavity Klystrons, Reflex Klystrons TWTs,	T2:9.2-9.5
33-34		Magnetrons	T2:10.1
35-36	An introduction to design of Microwave antennas	Antennas special problems and design at microwave frequencies	Class notes
37-38	To study the RF and Microwave Comm. Systems.	Microwave and RF systems, transmitters and receivers.	R2:T1:121
39-40	To study EMI &EMC	An introduction to Electromagnetic Interference and Compatibility	Class Notes
41-42	Other microwave applications such as Radar, Radiometry, microwave Ovens etc.	Radar equations and various types of radars such as pulse, Doppler, RCS, etc.Microwave ovens, and Radiometry.	R2:T1:12.3-12.4,T1:12.6

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	25.02.2022	01-10	CB
Test 2	60 Minutes	17	23.03.2022	11-20	CB
Test 3	60 Minutes	17	27.04.2022	31- 4	CB
Lab	Throughout the Semester	10	-----	**	CB
Comprehensive Exam	3 Hours	40	25.05.2022	01-42	CB

** To be announced in the class

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

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

Mrs. BHAVNACHAUDHARY

Date: 05/01/2022 **Instructor-In-charge**

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

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

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

Learning Outcomes

After successful completion of the course student will be able to

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

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

Lecture-wise plan:

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

17-24	Application of Opamp in realization of Non-linear functions	Logarithmic Amplifier Analog Multipliers Applications Precision Circuits Comparators Schmitt Triggers Analog Switch Sample-and-Hold Circuits, Analog Multiplexers	T1: 5.2 T1: 5.3.1-5.3.6 T1: 5.4 T1: 5.5 T1: 5.6.1-5.6.2 T1: 5.6.4 T1: 5.7.1-5.7.3 T1: 5.8 T1: 5.9.1-5.9.2
25-30	Generation of Various types of signals using Op-amps	Sinusoidal Oscillators Non-sinusoidal Oscillators Function Generator Phase Locked Loop	T1: 6.2 T1: 6.3 T1. 6.5 T1: 6.6
31-34	Use of Op-amps in Voltage Regulation	Voltage Regulator Circuits Switched capacitor voltage converters Switching Regulators	T1: 7.1-7.3 T1: 7.4.5 T1: 7.4.6(part)
35-36	IC Power Amplifiers	Fixed gain, Bridge Amplifiers	R1: 14.8
37	Tuned Amplifiers	Basic Principle, Tuned circuits	R1: 12.11
38-40	Data Converters	DAC & ADC circuits	R1: 9.7-9.9
41-42	IC sensors and Analog Systems	Evolution of sensors, classification of sensors, Introduction to MEMS Typical IC Sensors	T1: 11.1-11.6

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	25.02.2022	1-12	CB
Test 2	60 Minutes	17	23.03.2022	13- 28	CB
Test 3	60 Minutes	17	27.04.2022	29- 42	CB
Lab	Throughout the Semester	10		**	CB
Comprehensive Exam	3 Hours	40	27.05.2022	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.

Dr. K.KISHORE KUMAR
Instructor-In-charge

Date: 05/02/2022

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

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

Instructor-in-charge: Ms.NISHA THAKUR

Learning Outcomes

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

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

Lecture-wise plan:

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

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

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	23.02.2022	1-12	CB
Test 2	60 Minutes	17	21.03.2022	13-26	CB
Test 3	60 Minutes	17	25.04.2022	27-40	CB
Quizzes (2)	20 Minutes each	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, Tests and Comprehensive Examinations, etc.

Ms.NISHA THAKUR
Date: 05/01/22 **Instructor-In-charge**

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

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

Instructor-in-charge: Ms. YOGITA CHANDRAKAR

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

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

Lecture-wise plan:

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

23-25	To learn about Boolean Algebra.	Partially Ordered Sets, Lattices, Hasse diagram	6.1-6.3
26-28	To understand the logical representations.	Boolean Algebra, & Boolean Expressions	6.4, 6.5
29-31	To learn the construction of data bases of logical flows.	Trees & their representations, labeled trees	7.1,7.2
32-34	To learn the construction of language compilers.	Undirected trees, spanning trees, Minimal Spanning Trees, Prim & Kruskal algorithms for minimal spanning tree in a connected graph	7.4, 7.5
34-35	To study finite state machines.	Definition of group & semi group	9.2,9.4
36-40	To understand phrase structure grammars.	Languages & finite state machines	10.1,10.3,10.4
41-42	To learn about computer science applications.	Functions for Computer Science	5.2

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	17	24.02.2022	1-12	CB
Test 2	60 Minutes	17	22.03.2022	13-26	CB
Test 3	60 Minutes	16	26.04.2022	27-42	CB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	23.05.2022	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: 05/01/22

Ms. YOGITA CHANDRAKAR
Instructor-In-charge

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

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

Instructor-in-charge: Ms.NISHA THAKUR

Learning Outcomes:

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

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

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

Lecture wise plan

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

		Statistics for data science, machine learning	
18-19	Understanding prediction for univariate and multivariate dataset	Introduction to Machine Learning, Linear Regression Single Variable	https://www.youtube.com/watch?v=8jazNUpO3lQ&list=PLeo1K3hjS3uvCeTYTeyfe0-rN5r8zn9rw&index=2
20-21		Linear Regression Multiple Variables, Gradient Descent and Cost Function	https://www.youtube.com/watch?v=J_LnPL3Qg70&list=PLeo1K3hjS3uvCeTYTeyfe0-rN5r8zn9rw&index=3 & https://www.youtube.com/watch?v=vsWrXfO3wWw&list=PLeo1K3hjS3uvCeTYTeyfe0-rN5r8zn9rw&index=4
21-23		Training and Testing Data	https://www.youtube.com/watch?v=fwY9Qv96DJY&list=PLeo1K3hjS3uvCeTYTeyfe0-rN5r8zn9rw&index=7
24-27		Logistic Regression (Binary Classification), Decision Tree	https://www.youtube.com/watch?v=zM4VZR0px8E&list=PLeo1K3hjS3uvCeTYTeyfe0-rN5r8zn9rw&index=8 & https://www.youtube.com/watch?v=PHxYNGo8NcI&list=PLeo1K3hjS3uvCeTYTeyfe0-rN5r8zn9rw&index=10
28-33		Support Vector Machine (SVM)	https://www.youtube.com/watch?v=FB5EdxAGxQg&list=PLeo1K3hjS3uvCeTYTeyfe0-rN5r8zn9rw&index=11
34-35	Learning about the minimization of factors for effective predictions	Eigen Systems, Factor Analysis, Notation	Printed Notes Contents
36-42	Understanding the various Tests	Principal Components Analysis (PCA) Exploratory Factor Analysis	Printed Notes Contents
40-42		Hypothesis Testing, P-value, using one & two sample Z-test and one & two sample T-test	Printed Notes Contents

Data Science (Lab)

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

8	Write a program working with forms using ASP.NET.
9	Write a program to connectivity with database.
10	Write a program to access data source through ADO.NET.

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	8	24.02.2022	1-12	CB
Test 2	60 Minutes	8	22.03.2022	13-26	CB
Test 3	60 Minutes	8	26.04.2022	27-42	CB
Lab	Throughout the Semester	20		-	CB
Comprehensive Exam	3 Hours	56	20.05.2022	1-42	CB

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

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

Ms.NISHA THAKUR
Instructor-In-charge

Date: 05/02/2022

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

Course No	Course Title	L	P	U
CS327	**Block chain Technology**	**3**	**0**	**3**

Instructor in charge: Mr.RAMESH KUMAR YADAV

Learning outcome:

The learning objectives of this course are to:

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

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

Lecture-wise plan:

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

21-23	Blockchain Characteristics	Decentralized Identity management, Transactions, incentivising and mining. Distributed Consensus (PoW), Cryptocurrency as the first blockchain application. Mechanics of Bitcoin, Bitcoin Scripts, Storing and Using Bitcoins, Mining in Bitcoin.	T1 Ch-4 4.5, 4.6 T2 Ch4 4.8,4.10
24-25	Other Consensus Mechanisms	Proof of storage, proof of stake algorithms for adjusting difficulty and retargeting. Limitations of Bitcoin, alternative crypto currencies.	T1 Ch-5 5.7,5.8
26-30	Smart Contracts and Ethereum	History, Purpose and types of smart contracts, Introduction to Ethereum, bitcoin vs Ethereum stack. P2P network in Ethereum, consensus in Ethereum, scripts in Ethereum, Smart contracts (Ethereum Virtual Machine). Concept - Developing and executing smart contracts in Ethereum. State and data structure in Ethereum.	T2 Ch-5 5.4,5.8
31-40	Private and Consortium based Blockchain: Hyperledger	Need for the consortium. Hyperledger stack, Multi chain blockchain. Innovation in Hyperledger, smart contracts, and distributed applications in hyperledger.	T1 Ch-5,Ch6 5.9, 6.4,7.1 T2 Ch6 6.8,7.4,7.9

Evaluation Scheme:

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lecture No)	Remarks
Test 1	60 Minutes	16	25.02.2022	1-12	CB
Test 2	60 Minutes	17	23.03.2022	13- 28	CB
Test 3	60 Minutes	17	27.04.2022	29- 40	CB
Quizzes (2)	20 Minutes each	10	**	**	CB
Comprehensive Exam	3 Hours	40	25.05.2022	1- 40	CB

** To be announced in the class

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Mr.RAMESH KUMAR YADAV
Instructor-In-charge

Date: 05/0212022

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

Course Code	Course Title	L	P	U
CS323	**Computer Networks**	**3**	**0**	**3**

Instructor-in-charge: Mr. NAVEEN VAISHNAV

Learning Outcomes:

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

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

Lecture-wise plan:

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

14-16	Data Link Layer Protocols	Data link Control and Protocols: Elementary Data Link Protocols, Sliding Window Protocols	T1: Ch-11, T2: Ch-3
17-18	MAC	Multiple Access Protocols	T1: Ch-13, T2: Ch-4
19	Design of Network Layer	Network Layer Design Issues	T2: Ch-5
20-21	Types of Routing	Routing Algorithms	T1: Ch-19, T2: Ch-5
22-23	Removing Congestion on Network	Congestion Control Algorithms	T1: Ch-23, T2: Ch-5
24	Internetworking	Quality Of Service, Internetworking	T1: Ch-23
25	Protocols of Transport Layer	The Transport Service	T1: Ch-22, T2: Ch-6
26-27		Elements of Transport Protocols, A Simple Transport Protocol	T1: Ch-22, T2: Ch-6
28-29	Internet Transport Protocols	The Internet Transport Protocols: UDP, The Internet Transport Protocols: TCP	T1: Ch-22
30-34	Services of Application Layer	DNS--Domain Name System, Electronic Mail, The World Wide Web	T1:Ch-25,26, 27,T2:Ch-7
35-38	Security on Networks	Cryptography, Symmetric-Key Algorithms	T1: Ch-29,31, T2: Ch-8
39-40	Algorithms	Public-Key Algorithms	T2: Ch-8

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

Evaluation Component	Duration	Weightage	Date	Syllabus (Lec.No.)	Remarks
Test 1	60 Minutes	16	25.02.2022	01-10	CB
Test 2	60 Minutes	17	23.03.2022	11-20	CB
Test 3	60 Minutes	17	27.04.2022	31- 40	CB
Quizzes (2)	20 Minutes each	10		**	CB
Comprehensive Exam	3 Hours	40	27.05.2022	01-40	CB

** To be announced in the class

Make-up Policy: Make up will be given only under genuine circumstances for Tests Only. However prior and proper intimation to the concerned instructor is must.
General: It shall be the responsibility of individual students to attend all sessions, to take prescribed Assessment Tests, Tests and Comprehensive Examinations, etc.

Mr. NAVEEN VAISHNAV
Instructor-In-charge

Date: 05/02/2022

The ICFAI University, Raipur

Faculty of Science and Technology

Second Semester, 2021 – 2022

Course Handout

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

Instructor-in-charge: Mr. DILIP MISHRA

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

Mr. DILIP MISHRA
Instructor-In-charge

Date: 05/02/2022