BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ORISSA
ROURKELA

Course Structure & Syllabus for 1st year(2010-admission batch) B.Tech Programme

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<th>2nd Semester</th>
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Practical/Sessional

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TOTAL SEMESTER CREDITS | 28
TOTAL CUMULATIVE CREDITS | 28

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Module – I
(To develop basic concepts of quantum mechanics and its applications in bonding)

Structure & Bonding: Dual nature of matter, Schrodinger equation (need not be derived), interpretation of wave functions, molecular orbital theory of diatomic molecules, metallic bonding. (No. of Lectures = 7)

Phase rule: Phase diagram of one & two component systems, H₂O, S, Cd-Bi and Fe-C systems. (No. of Lectures = 5)

Solid State: Crystal systems, Bravais lattices, closed packed structures, ionic solids, and crystal defects including Schottky and Frenkel defects. (No. of Lectures=4)

Module – II
(To develop basic concepts about the rates of reactions and catalysis)

1. Reaction Kinetics & Catalysis:
   Rate law, Order & Molecularity, Determination of order of reaction, Kinetics of Zero, 1st and 2nd order reactions, Collision theory, theory of absolute reaction rates, Energy of activation, Homogeneous & Heterogeneous catalysis (a general idea) (No. of Lectures= 7 )

2. Electrochemistry: Electrochemical cells, EMF, Measurement of EMF, Relation between EMF & free energy change of cell reactions, Electrode potentials and measurements with reference to standard hydrogen electrode, calomel electrodes, determination of pH, dry cells, storage cells and fuel cells. (No. of Lectures= 7)

Module – III
(Applications of thermodynamic principles to chemical systems)

1. Chemical thermodynamics: Thermo chemistry, Thermo-chemical calculations based on Hess’s law and Born-Haber cycle, second law of thermodynamics, Entropy.

2. The free energy concepts, applications to gases, Gibbs Helmholtz equation, free energy change and criterion of spontaneity and equilibrium of chemical reactions, chemical equilibrium, Maxwell’s relations. (No of Lectures= 9)

Text Books:

Reference Books:
1. Determination of amount of sodium hydroxide and sodium carbonate in a mixture.
2. Determination of total hardness of water by EDTA method.
3. Estimation of calcium in limestone.
4. Determination of percentage of available chlorine in a sample of bleaching powder.
5. Preparation of Phenolphthalein.
6. Preparation of Aspirin.
7. Preparation of buffer solution and determination of pH of a buffer solution.
8. Standardization of KMnO₄ using sodium oxalate.
9. Determination of Ferrous iron in Mohr’s salt by potassium permanganate.
10. Determination of partition coefficients of iodine between benzene and water.
11. Determination of rate constant of acid catalysed hydrolysis reaction.
12. Determination of concentration of a coloured substance by spectrophotometer.
15. Determination of Flash point of a given oil by Pensky_Marten’s flash point approach.
Module – I (15 hrs)

Unit- I Oscillation and Waves
The aim of this unit is to familiarize the students with basic features of different oscillatory systems waves in general. The topics included in this unit should be treated qualitatively.

(a) Oscillatory systems: Simple harmonic oscillation, damped harmonic oscillation, forced vibration, resonance, coupled oscillation.

(b) Waves as periodic variation quantity in space and time, wave equation, Reflection and transmission of waves at boundary of two media.

Unit - 2 Interference
The principle of superposition of waves is extended to the interference of light of waves. Some systems for production of observable interference patterns are covered.

(a) Superposition of waves: Two beam superposition, Multiple-beam superposition, coherent and incoherent superposition.

(b) Two source interference pattern, Intensity distribution, Biprism, Determination of wavelength of light. Newton's rings: Determination of wavelength of light, refractive index of liquid.

Unit - 3 Diffraction
Diffraction of light waves at some simple obstacles are to be covered in this unit. Both Fresnel and Fraunhofer pattern are included.

(a) Huygen's principle, Fresnel and Fraunhofer diffraction, zone plate.

(b) Fraunhofer diffraction due to a single slit, Plane transmission grating- diffraction spectra, determination of wave length of light.

Module : II ( 11 hour)

Unit- 4 Polarization
The unit covers elementary features of polarization of light waves.

(a) Polarization of transverse waves, plane, circular and elliptically polarized light. Polarization by reflection, refraction and scattering.

(b) Double refraction; Nicol prism, Quarter – wave plate, half – wave plate- construction and use.

(c) Production and analysis of circular and elliptically polarized light, Optical rotation (Only concepts)
Unit – 5 Electromagnetism - Student will be familiarized with some basic used in vector calculus prior to development of Maxwell’s electromagnetic wave equations. No proof of theorems and laws included in this unit expected- statement and interpretation should sufficient.

(a) Vector calculus: gradient of scalar field, divergence, curl of vector field (Only Physical significance) Gauss divergence theorem, Stoke’s theorem, Green’s theorem (Only Statements)

(b) Gauss’s law of electrostatics in free space and in a medium(Only statements) electric displacement( D) magnetic Induction (B),Amperes circuital law (Only statements), displacement current, Faraday’s law of electromagnetic induction(Only statements).

(c) Maxwell’s electromagnetic equation in differential form and in integral form(Only statements). Electromagnetic energy density, poynting vector, poynting theorem, vector potential and scalar potential, electromagnetic wave equation for E and B, transverse nature of EM waves.

Module III (10 hours)

Unit - 6 Quantum Physics : This unit deals with elementary concepts of quantum physics formulation to deal with physical systems.

(a) Need for Quantum physics-Historical overviews, Particle aspects of radiation-Black body radiation, photoelectric effect, Compton scattering, pair production.(No derivations), Wave aspect of particles- matter wave, de Broglie Hypothesis, Heisenberg Uncertainty principles- Statement, Interpretation and example.

(b) Basic features of Quantum mechanics- Transition from deterministic to probabilistic, States of system- Wave function, probability density, superposition principle, observables and operators, expectation values. Schrodinger equation- Time dependent and time independent, wave packets.

Unit – 7 Application of Quantum Mechanics- This unit deals with applications of quantum Mechanics to specific one-dimensional problems (Sketch, Schrodinger equation for different regions, Boundary conditions, final expressions and physical interpretations only, no derivations).

Free particles- continuous states, Potential steps- Reflections, transmissions, Potential Barrier-Tunneling, Infinite deep potential well-energy eigen values, eigen functions.

Text Books :
1. Engineering Physics by D.R. Joshi, Mc Graw Hill

Reference Book:
1. Quantum Mechanics by Powel & Craseman.
2. Optics- A. K. Ghatak
3. Electricity & Magnetism : E.M. Purecell
4. Introduction to Electrodynamics- David J. Griffiths, PHI Publication
9. An Introduction to Machanics by D.Klippner & R. Kolenkow, TMH
A Student is expected to perform ten experiments from the list given below.

1. Determination of Young’s modulus by Searle’s methods.
2. Determination of Rigidity modulus by static methods.
3. Determination of surface tension by capillary rise method.
4. Determination of acceleration due to gravity by Bar / Kater’s pendulum.
5. Determination of thermal conductivity by Lee’s method.
7. Determination of grating element of a diffraction grating.
8. Determination of wave length of light of light by Biprism.
10. Plotting of characteristic curves of BJT.
11. Verification of laws of verification of strings using sonometer.
13. Study of Hall effect.
15. Study of a power source- output imedence.

**Book:** Engineering Practical Physics by S.Panigrahi & B.Mallick –S.Pub. 5
Module I (13 Hours)

Concurrent forces on a plane – Composition and resolution of forces and equilibrium of concurrent coplanar forces, Method of projections, Methods of moment, Friction.

Parallel forces in a plane- Two parallel forces, General case of parallel forces, Center of parallel forces in a plane and center of gravity- centroids of composite plane figure and curves, Distributed parallel forces in a plane. General case of forces in a plane- composition of forces in a plane and equilibrium of forces in a plane.

Module II (13 Hours)

Moments of Inertia- Plane figure with respect to an axis in its plane and perpendicular to the plane-parallel axis theorem, Moment of Inertia of material bodies.
Rectilinear Translation- Kinematics- Principles of Dynamics- D'Alemberts Principles.

Module III (14 Hours)

Momentum and impulse, Work and Energy- impact
Kinetics of Rotation of rigid body

Text Books:


Reference Books:

Module – I (9Hours)

1. Basic concepts and definition: Scope of Thermodynamics, Macroscopic and Microscopic approaches; Definition of Fixed mass (closed systems) and Control volume(open system), Properties (extensive and Intensive), State and its representation on a property diagram, Process and its representation, Cyclic process (or cycle) and its representation, Characteristics of properties (point and path function); Reversible and Irreversible processes; Thermal, mechanical and Chemical equilibrium, Thermodynamic equilibrium, Zeroth Law of Thermodynamics and temperature, Measurement of temperature and calibration of thermometers, the ideal gas temperature scale, Measurement of pressure, Bourdon pressure gage and manometers, gage and absolute pressure.

2. Ideal gages and their P-V-T relations, Gas mixtures

3. Energy Transfer: Work Transfer (definition and calculation), Different modes of work, Displacement Work for various process, Heat Transfer; Modes of heat transfer, Basic laws in conduction, convection and radiation, combined modes of heat transfer with examples.

Module-II(13 hours)

4. First Law of Thermodynamics:
   i. Formal statement (using cyclic processes), First law for processes of fixed masses(closed systems) and introduction of internal energy as a thermodynamics property, Introduction of enthalpy as a thermodynamic property; Definition of specific heats and their use in calculation of internal energy and enthalpy with emphasis on ideal gages.
   ii. Application of First Law to control volumes; Nozzle, Diffuser, Compressor, Turbine, Throttling device, Heat Exchanger.(only steady flow need be considered)


6. Module-III(13 hours)

7. Properties of pure substances:
   - p-v, p-T, T-S, h-S diagram for steam, different types of steam, Introduction to steam tables with respect to specific volume, pressure, temperature, enthalpy and entropy

8. Application of thermodynamics:
   - Air compressors, steam power plant, Refrigerators and Heat pump, I.C. Engines (Brief Description of different components of above mentioned systems and working principles with Schematic diagram only)

Text Books:

1. Engineering Thermodynamics by P.K.Nag, Publisher: TMH
2. Basic Engineering Thermodynamics by Rayner Joel, Pearson Education
Reference Books:

1. Engineering Thermodynamics by Van Wylen and Sontang, John Wiley
2. Engineering Thermodynamics by M.Achuthan, Publisher: PHI
3. Applied Thermodynamics by Eastop and McConkey, Publisher: Pearson
4. Fundamental of Engineering Thermodynamics by E. Rathakrishnan, publisher. PHI
5. Engineering Thermodynamics by Russel and Adebiyi, publisher, Oxford
6. Steam Tables in SI Units by Ramalingam, Scitech.

**BE7101 Engineering Drawing (0-0-3)**


Text Books:

1. Engineering Drawing by N.D.Bhatt & V.M.Panchal, Charotar publishing House, Anand
2. Engineering Drawing with an Introduction to AutoCAD by Dhanjay A. Johle, Tata McGraw Hill

Reference Books:

5. Engineering Drawing by Shah and Rana, Pearson Education

**BE7102 Workshop Practice (0-0-3)**

Fitting Practice: Use of hand tools in fitting, preparing a male and female joint of M.S. or making a paper weight of M.S.

Welding Practice : Gas welding & Electric Arc welding Practice.
A joint such as a Lap joint, a T-joint or a Butt joint is to be prepared or to make furniture.

**Machining:**

(i) Stepped cylindrical Turning of a job and Thread-cutting in lathe.
(ii) Shaping
(iii) Milling
Reference:

2. Workshop Technology by WAJ Chapman, Viva Books
3. Workshop Manual by Kannaiah/ Narayana, Scitech

BE2101 - Basic Electronics
(3 – 0 – 0; Credits: 3; Contact Hours: 3)

Theory

MODULE – I (11 hours)

1. Introduction to Electronics: Signals, Frequency spectrum of signals, Analog and digital signals, Amplifiers, Digital logic inverters. (1.1 to 1.4 and 1.7 of Sedra and Smith) (1 Lectures)

2. The Operational Amplifier (Op-Amp): The ideal Op-Amp, Inverting and non-inverting configurations, Difference amplifier, CMRR, Application of Op-Amp (Instrumentation amplifier, Summing amplifier, Integrator and Differentiator). (2.1 to 2.4 and 2.8 of Sedra and Smith) (3 Lectures)

3. Semiconductor Diodes: Introduction, Physical operation of p-n junction diodes, Characteristics of p-n junction diodes, Zener diode, Rectifier circuits (half-wave, full-wave, bridge and peak rectifiers), Diode clipper and clamper circuits, Light emitting diodes. (3.7, 3.2, 3.4 to 3.6 and 3.8 of Sedra and Smith) (4 Lectures)

4. Bipolar Junction Transistors (BJTs): Simplified structure and physical operation of n-p-n and p-n-p transistors in the active region, Current-voltage characteristics of BJT, BJT as an amplifier and as a switch. (5.1 to 5.3 of Sedra and Smith) (3 Lectures)

MODULE – II (11 hours)

5. Bipolar Junction Transistors (BJTs): BJT Circuits at DC, Biasing in BJT amplifier circuits, Small Signal Operation of BJT: Simplified hybrid-π model and its application to single stage BJT amplifiers (Common-Emitter, Common-Base and Common-Collector configurations). (5.4 to 5.7 of Sedra and Smith) (4 Lectures)


7. Electronic Instruments: Basic principle of Oscilloscope, Function of the sweep generator, Block diagrams of oscilloscope, Simple CRO, Measurement of frequency and phase by Lissajous method, Application of oscilloscope for measurement of voltage, period and frequency, Block diagram of standard signal generator, AF sine and square wave generator, and Function generator. (7.2 to 7.5, 7.20, 7.26, 7.30, 8.5, 8.7 and 8.8 of Kalsi) (3 Lectures)
**MODULE – III (10 hours)**

Digital Electronic Principles: Introduction, Binary digits, Logic levels and Digital waveforms, Introduction to basic logic operation, Number system, Decimal numbers, Binary numbers, Decimal-to-Binary conversion, Simple binary arithmetic. (1.2, 1.3 and 2.2 to 2.4 of Floyd and Jain)  

8. Logic Gates and Boolean Algebra: The inverter, The AND, OR, NAND NOR, Exclusive-OR and Exclusive-NOR gate, Boolean operations and expressions, Laws and Rules of Boolean algebra, DeMorgan’s theorem, Boolean analysis of logic circuits, Standard forms of Boolean expressions, Boolean expression and truth table. (3.1 to 3.6, 4.1 to 4.7 of Floyd and Jain)  

9. Combinational Logic and Their Functions: Basic combinational logic circuits, Implementation of combinational logic, The universal properties of NAND and NOR gates, Basic adders, Multiplexers and Demultiplexers., Elementary treatment of Latches, Basic concepts of Memory (RAMs) (5.1 to 5.4, 6.2, 6.4, 6.8, 6.9, 7.1 and 10.2 of Floyd and Jain)  

**Text Books:**


**Reference Books:**


**BE7105 - Basic Electronics Laboratory**

(0 – 0 – 3; Credits: 2; Contact Hours: 3)

(At least 8 experiments including experiments 1 to 7 and any one from experiments 8 to 10)

1. Familiarization of electronic components and devices (Testing of semiconductor diodes and transistors using digital multimeter)
2. Study and use of Oscilloscope, signal generator to view waveforms and measure amplitude and frequency of a given waveform.
3. V-I characteristics of semiconductor diode and determining its DC and AC resistance.
4. Studies on half-wave and full-wave rectifier circuits without and with capacitor filter; recording of the waveforms and measurement of average and rms values of the rectifier output.
5. V-I characteristic of an n-p-n or p-n-p transistor, DC biasing the transistor in common-emitter configuration and determination of its operating point (i.e., various voltages and currents).
6. Studies on Op-Amp applications (Inverting, non-inverting integrating and differentiating configurations); recording of the input-output waveforms.
7. Studies on Logic gates (Truth table verification of various gates).
9. Studies and experiments using MUX-DEMUX ICs.
10. Study on CMOS logic inverter.

**BS1101 - MATHEMATICS-I (3-1-0)**

(1st Sem)

**Module-1**  (15 Hours)

Differential Equation: First order differential equations, Separable equation, exact differential equation, Linear differential equation, Bernoulli’s equation and application to Electrical circuits. Linear differential equation of second and higher order, Homogeneous equation with constant co-efficient, Euler-Cauchy equations, Solution by undetermined co-efficient, Solutions by variation of parameters, Modeling of electric circuits

**Module-II**  (15 Hours)

Calculus: Asymptote, Curvature
Series solution of differential equations, Power series method, Legendres equation and Lagenders polynomials, Bessels equation, Bessels function and its application

**Module-III**  (15 Hours)

Linear algebra, Matrices, Vectors, Determinants, System of linear equations, eigen values and eigen vectors, Symmetric and skew-symmetric matrices, Orthogonal matrices, Complex matrices, Hermitian and skew-hermitian matrices, Unitary matrices and similarity of matrices.

**Text Books :**

1. Differential Calculus by Santi Narayan and Mittal, Chapters 14, 15
   Publisher: S. Chand
2. Advanced Engineering Mathematics by E. Kreyszig
Module – I  (15 Hours )
Laplace transformation and its use in getting solution to differential equations, Convolution, Integral equations
Fourier series, Fourier expansion of functions of any period, Even and odd functions, Half range expansion

Module – II  (15 Hours )
Fourier transform and Fourier Integral, Gamma, Beta functions, error function
Vector differential calculus: vector and scalar functions and fields, Derivatives, Curves, tangents and arc length, gradient, divergence, curl

Module – III  (15 Hours )
Vector integral calculus: Line Integrals, Green Theorem, Surface integrals, Gauss theorem and Stokes theorem

Text Book
1. Advanced Engineering Mathematics by E. Kreyszig
   Publisher: John Willey & Sons Inc- 8th Edition
   Chapter 5( 5.1 to 5.7),
   Chapter 8(8.4, 8.5, 8.9 to 8.11)
   Chapter 9( 9.1 to 9.9)
   Chapter 10( 10.1 to 10.4, 10.8 to 10.10)

Reference Books:
3. Higher Engineering Mathematics by B. V. Ramana
   Publisher: TMH
4. Mathematical Methods by Potter and Goldberg
   Publisher: PHI
Module-I  The elements of communication (6 hours)

1.1 the importance of communication through English at the present time
1.2 the process of communication and factors that influence communication: sender, receiver, channel, code, topic, message, context, feedback, 'noise', filters and barriers
1.3 the importance of audience and purpose
1.4 the information gap principle: given and new information; information overload
1.5 verbal and non-verbal communication: body language
1.6 comparing general communication and business communication

Module-II  The sounds of English (14 hours)

2.1 vowels, diphthongs, consonants, consonant clusters
2.2 the International Phonetic Alphabet (IPA); phonemic transcription
2.3 problem sounds
2.4 syllable division and word stress
2.5 sentence rhythm and weak forms
2.6 contrastive stress in sentences to highlight different words
2.7 intonation: falling, rising and falling-rising tunes
2.8 varieties of Spoken English: Standard Indian, American and British

(Note: This unit should be taught in a simple, non-technical manner, avoiding technical terms as far as possible.)

Module-III  Review of English grammar (10 hours)

3.1 stative and dynamic verbs
3.2 the auxiliary system; finite and non-finite verbs
3.3 time, tense and aspect
3.4 voice: active and passive
3.5 modality
3.7 negation
3.8 Interrogation; reported and tag questions
3.9 conditionals
3.10 concord
3.11 Phrasal verbs

(Note The teaching of grammar should be treated as a diagnostic and remedial activity and integrated with communication practice. The areas of grammar in which errors are common should receive special attention when selecting items for review. Teaching need not be confined to the topics listed above.)

Books recommended:
1. An Introduction to Professional English and Soft Skills by B.K.Das et al., Cambridge University Press. (Facilitated by BPUT).
Lab sessions will be devoted to practice activities based on all three modules of theory.

a. phonemic transcription 5 hours

Students will be trained to find out the correct pronunciation of words with the help of a dictionary, to enable them to monitor and correct their own pronunciation.

i transcription of words and short sentences in normal English orthography (writing) into their IPA equivalents;
ii transcription of words presented orally;
iii conversion of words presented through IPA symbols into normal orthography
iv syllable division and stress marking (in words presented in IPA form)

b. Listening 10 hours

i listening with a focus on pronunciation (ear-training): segmental sounds, stress, weak forms, intonation

Students should be exposed, if possible, to the following varieties of English during listening practice: Standard Indian, British and American.

c. Speaking 15 hours

i pronunciation practice (for accent neutralization), particularly of problem sounds, in isolated words as well as sentences
ii practising word stress, rhythm in sentences, weak forms, intonation
ii reading aloud of dialogues, poems, excerpts from plays, speeches etc. for practice in pronunciation

d. Grammar and usage 12 hours

The focus will be on the elimination of common errors. Some writing activities (e.g. writing of short paragraphs on assigned topics) can be used to identify these errors.

Project Work

Students will be required to produce and submit by the end of Semester 1 a 350-500 word project report on a topic of their choice. The project should involve data collection, analysis and reporting. Ten marks (out of the 100 marks allocated for the Lab test) will be set apart for the project.
Module - I  The Elements of Business Communication  (10 hours)

1.1 patterns of communication in the business world: upward, downward, horizontal, grapevine etc
1.2 internal and external channels of communication; formal and informal channels.
1.3 Introduction to cross-cultural communication.
1.4 avoiding gender, racial and other forms of bias in communication
1.5 common forms of oral and written communication in the business world:
   Oral presentations, interviews and group discussions
   Memos, reports, summaries and abstracts, e-mails

Module-II  Reading and writing  (15 hours)

2.1 the importance of developing reading skills
2.2 the sub-skills of reading:
   a. understanding the main idea and supporting details
   b. reading between the lines: inferential reading
   c. understanding the writer's point of view
   d. making predictions
   e. guessing the meanings of unfamiliar words
   f. skimming and scanning
   g. note-making
2.3 the importance of writing skills
2.4 the differences between speech and writing
2.5 the qualities of effective writing: coherence, cohesion, logical structuring and organization,
   clarity of language, stylistic variation etc.
2.6 the writing process: pre-writing, drafting, re-writing
2.7

Module -III  Soft skill development  (5 hours)

4.1 soft skills: becoming a good leader and team-player
4.2 inter-relating soft skills and communication skills

Books recommended:
1 Business Communication Today by Bovee et al (Pearson)
2 Business Communication by Meenakshi Raman and Prakash Singh (Oxford)
3 Crash Course in Personal Development by Brian Clegg (Kogan Page)
4 Activities for Developing Emotional Intelligence by Adele B.Lynn (HRD Press)
5 Lateral Thinking by Edward De Bono (Penguin)
a. Communication Practice

i Speaking: oral communication in social and work-related situations, e.g.:

- Greeting an acquaintance/friend, introducing oneself, introducing a friend to another friend, breaking off a conversation politely, leave-taking;
- Making and responding to inquiries; expressing an opinion;
- Expressing agreement/disagreement, contradicting/refuting an argument;
- Expressing pleasure, sorrow, regret, anger, surprise, wonder, admiration, disappointment etc.
- Narrating or reporting an event;
- Describing people, objects, places, processes etc.
- Ordering/directing someone to do something
- Making requests; accepting/refusing a request
- Expressing gratitude; responding to expressions of gratitude
- Asking for or offering help; responding to a request for help
- Asking for directions (e.g. how to reach a place, how to operate a device etc.) and giving directions
- Asking for and granting/refusing permission
- Prohibiting someone from doing something
- Suggesting, advising, persuading, dissuading, making a proposal
- Praising, complimenting, felicitating
- Expressing sympathy (e.g. condolence etc.)
- Complaining, criticizing, reprimanding

ii Reading

Students will be given practice in reading and comprehending 6-8 simple passages of 100-300 words each, on topics of general as well as professional interest. The texts will be supported by suitable exercises designed to foster comprehension skills and vocabulary enrichment, together with study skills (note making) and reference skills (using a dictionary).

Practice will be provided in the important sub-skills of reading which are introduced in Module 2 of the theory component.

iii Writing

Writing short paragraphs on given topics or topics of one’s choice; social and business letters; reports; applications; resumes; summaries

The principles of ‘Process Writing’ should be used to teach writing skills.

i Pre-writing: generating ideas, brain-storming, idea mapping, outlining

ii Writing: generating a first draft; reviewing, redrafting, editing

iii Post-writing: making a presentation; discussion and feedback, preparing the final draft

b. Soft skills practice

Activities designed to highlight leadership and ‘team’ skills; Group discussion
BE2102 - Basic Electrical Engineering (3-0-0)

Module I (10 Hours)
Fundamentals of Electric Circuits
Charge, current, KCL, Voltage and KVL, Electric Power and sign conventions, circuit elements and their characteristics, Resistance and Ohm’s Law
Practical voltage and current sources, Measuring devices
(Rizzoni: Ch 2.2 to 2.8)
Resistive Network Analysis
Node voltage analysis, Mesh current analysis, node and mesh current analysis with controlled sources, principle of superposition, maximum power transfer
(Rizzoni: Ch3.1 to 3.5 and 3.7)

Module II (15 Hours)
AC Network analysis
Energy Storage elements, time-dependent signal sources, solution of circuits containing energy storage elements, phasor solutions of circuits with sinusoidal excitations, AC circuit analysis methods
(Rizzoni: Ch 4.1 to 4.5)
Transient Analysis
Transient Analysis, Writing differential equations for circuits, DC steady state solutions of circuits, Transient Response of second order circuits
(Rizzoni: Ch 5.1 to 5.5)
AC Power
Power in AC circuits, Complex Power, Transformers, Three-phase power, Residential Wiring: Grounding and safety
Generation and distribution of AC Power
(Rizzoni: Ch 7.1 to 7.6)

Electronic Instrumentation and Measurements
Measurement Systems and Transducers, Wiring, Grounding and noise, signal conditioning, A/D and D/A Conversion
(Rizzoni: Ch 15.1 to 15.4)

Module III (15 Hours)
Principles of Electro mechanics
Electricity and Magnetism, Magnetic Circuits, Magnetic Materials and B-H curves, Transformers, Electromechanical Energy Conversion
(Rizzoni: Ch 18.1 to 18.5)
Introduction to Electric Machines
Rotating Electric machines, DC Machines, DC Generators, DC Motors, AC machines, Alternator
(Rizzoni: Ch 19.1 to 19.6)

Text Book
Principles and Applications of Electrical Engg., Rizzoni, McGrawHill

Reference Books
Select any 8 experiments from the list of 10 experiments:

1. Connection and measurement of power consumption of a fluorescent lamp.
3. Starting and speed control of a DC shunt motor by (a) field flux control method, and (b) armature voltage control method.
4. V-I characteristics of incandescent lamps and time-fusing current characteristics of a fuse.
5. Connection and testing of a single-phase energy meter.
7. Determination of open circuit characteristics (OCC) of DC shunt generator.
8. Calculation of current, voltage and power in series R-L-C circuit excited by single-phase AC supply and calculation of power factor.
10. Study of single-phase induction motors/fan motors.
Module – I

Algorithm, flowchart, Structured Programming Approach, structure of C program (header files, C pre-processor, standard library functions, etc.); identifiers, basic data types and sizes, Constants, variables, arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bitwise operators, assignment operators, expressions, type conversions, conditional expressions, precedence and order of evaluation. Input-output statements, statements and blocks, if and switch statements, loops:-while, do-while and for statements, break, continue, goto, programming examples.

Module – II

Designing structured programs: - Functions, parameter passing, storage classes- extern, auto, register, static, scope rules, user defined functions, recursive functions. Arrays- concepts, declaration, definition, accessing elements, and functions, two-dimensional and multi-dimensional arrays, applications of arrays. pointers- concepts, initialization of pointer variables, pointers and function arguments, address arithmetic, Character pointers and functions, pointers to pointers, pointers and multidimensional arrays, dynamic memory management functions, command line arguments,

Module – III

Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit fields, C program examples. Input and output – concept of a file, text files and binary files, streams, standard I/O, Formatted I/O, file I/O operations, error handling, C program examples.

Text Books:

3. Deitel -“C How to programme” PHI publication/ Pearson Publication

Reference Books:

1. Y. Kanitkar – “Let us C” BPB Publisher
3. Schaum Series- “C Programming” - Gotterfried
Experiment No. 1

a) Write a C program to find the sum of individual digits of a positive integer.
b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Experiment No. 2

a) Write a C program to calculate the following Sum:
   \[ \text{Sum} = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \frac{x^8}{8!} - \frac{x^{10}}{10!} \]
b) Write a C program to find the roots of a quadratic equation.

Experiment No. 3

a) Write C programs that use both recursive and non-recursive functions
   i) To find the factorial of a given integer.
   ii) To find the GCD (greatest common divisor) of two given integers.
   iii) To solve Towers of Hanoi problem.

Experiment No. 4

a) Write a C program to find both the largest and smallest number in a list of integers.
b) Write a C program that uses functions to perform the following:
   i) Addition of Two Matrices
   ii) Multiplication of Two Matrices

Experiment No. 5

a) Write a C program that uses functions to perform the following operations:
   i) To insert a sub-string into given main string from a given position.
   ii) To delete n Characters from a given position in a given string.
b) Write a C program to determine if the given string is a palindrome or not.

Experiment No. 6

a) Write a C program to construct a pyramid of numbers.
b) Write a C program to count the lines, words and characters in a given text.

Experiment No. 7

a) Write a C program that uses functions to perform the following operations:
   i) Reading a complex number
   ii) Writing a complex number
   iii) Addition of two complex numbers
   iv) Multiplication of two complex numbers
(Note: represent complex number using a structure.)
Experiment No. 8

a) Write a C program which copies one file to another.
b) Write a C program to reverse the first n characters in a file.
(Note: The file name and n are specified on the command line.)

Book:- PNV. Varalakshmi, Project Using C Scitech Publisher

BE 2106 DATA STRUCTURE (3-0-0)

Module – I

Introduction to data structures: storage structure for arrays, sparse matrices, Stacks and Queues: representation and application. Linked lists: Single linked lists, linked list representation of stacks and Queues. Operations on polynomials, Double linked list, circular list.

Module – II

Dynamic storage management-garbage collection and compaction, infix to post fix conversion, postfix expression evaluation. Trees: Tree terminology, Binary tree, Binary search tree, General tree, B+ tree, AVL Tree, Complete Binary Tree representation, Tree traversals, operation on Binary tree-expression Manipulation.

Module – III

Graphs: Graph terminology, Representation of graphs, path matrix, BFS (breadth first search), DFS (depth first search), topological sorting, Warshall’s algorithm (shortest path algorithm.) Sorting and Searching techniques – Bubble sort, selection sort, Insertion sort, Quick sort, merge sort, Heap sort, Radix sort. Linear and binary search methods, Hashing techniques and hash functions.

Text Books:

1. Gilberg and Forouzan: “Data Structure- A Pseudo code approach with C” by Thomson publication
2. “Data structure in C” by Tanenbaum, PHI publication / Pearson publication.

Reference Books:

Experiment No. 1
Write a C program to perform matrix multiplication using array.

Experiment No. 2
(a) Write a C program to create a stack using an array and perform
   (i) push operation (ii) pop operation
(b) Write a C program to create a queue and perform
   i) Push   ii) pop iii) Traversal

Experiment No. 3
Write a C program that uses Stack operations to perform the following:
   i) Converting infix expression into postfix expression
   ii) Evaluating the postfix expression

Experiment No. 4
Write a C program that uses functions to perform the following operations on Single linked list:
   i) Creation ii) Insertion iii) Deletion iv) Traversal in both ways

Experiment No. 5
Write a C program that uses functions to perform the following operations on Double linked list:
   i) Creation ii) Insertion iii) Deletion

Experiment No. 6
Write a C program that uses functions to perform the following operations on Binary Tree:
   i) Creation ii) Insertion iii) Deletion

Experiment No. 7
Write C programs that use both recursive and non recursive functions to perform the Linear search operation for a Key value in a given list of integers:
   i) Linear search

Experiment No. 8
Write C program that use both recursive and non recursive functions to perform the Binary search operation for a Key value in a given list of integers:

Experiment No. 9
Write a C program that implement Bubble Sort method to sort a given list of integers in descending order.

Experiment No. 10
Write a C program that implement Quick Sort method to sort a given list of integers in ascending order:

Book: “Data structure using C” by Sudipta Mukherjee, TMH Publication