Programme Structure of
Vertically Integrated Engineering programmes

Level of Programme : Diploma
Discipline : Electronics and Communication Engineering
PROGRAMME CODE : DECVI

First Semester

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Course Description</th>
<th>Credit</th>
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<tr>
<td>1.</td>
<td>BET-011</td>
<td>Mathematics-I</td>
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<td>2.</td>
<td>BET-012</td>
<td>Physics</td>
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<td>BET-013</td>
<td>Chemistry</td>
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<td>OIEL-001</td>
<td>Technical English</td>
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<td>5.</td>
<td>BET-014</td>
<td>Applied Mechanics</td>
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<td>BETL-011</td>
<td>Lab-I (Applied Science)</td>
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<td>BETL-012</td>
<td>Lab-II (Applied Mechanics)</td>
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<tr>
<td>1.</td>
<td>OIEE-001</td>
<td>Basics of Electrical Engineering</td>
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<td>2.</td>
<td>BET-016</td>
<td>Engineering Drawing</td>
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<td>BET-026</td>
<td>Workshop Technology</td>
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<td>BET-024</td>
<td>E/M Engineering</td>
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<td>OIEL-002</td>
<td>Data Structures</td>
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<td>BETL-022</td>
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<td>BET-021</td>
<td>Mathematics-II</td>
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<td>BET-017</td>
<td>Computer Basics</td>
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<td>BET-022</td>
<td>Strength of Materials</td>
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<td>BIEL-026</td>
<td>PCB Testing &amp; Design</td>
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<td>BIEL-027</td>
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<td>BMEL-008</td>
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<td>BIEL-028</td>
<td>Circuits and Network</td>
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<td>2.</td>
<td>BIEL-029</td>
<td>Electronics Measurement and Instruments</td>
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<td>BIEL-030</td>
<td>Digital Electronics</td>
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<td>BIEL-031</td>
<td>Microcontroller</td>
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<td>5.</td>
<td>BIEE-032</td>
<td>Principles of Computer Architecture</td>
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<td>BIELL-014</td>
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<td>BIEL-032</td>
<td>Principles of Commutation Engineering</td>
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<td>BIEL-033</td>
<td>Basic Telematics</td>
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<td>3.</td>
<td>BIEL-034</td>
<td>Audio And Video Engineering</td>
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<td>BIEL-035</td>
<td>Digital Communication</td>
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<td>BIELL-016</td>
<td>Lab IX (Communication Engineering Lab)</td>
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<td>BIELL-017</td>
<td>Lab X(Telematics Lab)</td>
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<td>BIEL-036</td>
<td>Microprocessor</td>
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<td>BIEL-037</td>
<td>Maintenance of Electronic Equipments</td>
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<td>BIEL-038</td>
<td>Linear Integrated Circuits</td>
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Any two subject are to be chosen from the following Electives.

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<tr>
<td>1.</td>
<td>BIELE-006</td>
<td>Electronics Product Design</td>
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<td>BIELE-005</td>
<td>Industrial Electronics</td>
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<td>BIMEE-030</td>
<td>Industrial Organisation and Management</td>
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<td>BICSE-006</td>
<td>Computer Networks</td>
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**PLEASE NOTE**

There may be some compulsory subjects / elective subjects / project where the subject codes may be missing. The codes will be uploaded shortly.
BET-O11- MATHEMATICS – I

<table>
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<tr>
<th>Lectures</th>
<th>Tutorials</th>
<th>Practical</th>
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<td>External:70+Internal:30</td>
</tr>
</tbody>
</table>

Students are required to score 35% marks individually in both external and internal and 40% marks in total.

Unit 1

**Surds, Logarithms and Quadratic Equations**: Surds, Logarithms, Quadratic Equations.

Unit 2

**Sequences and Series**: Sequences, Arithmetic Progression, Geometric Progression.

Unit 3

**Binomial Theorem and Computer Mathematics**: Binomial Theorem, Computer Mathematics.

Unit 4

**Trigonometric Functions**: Angles, Circular Functions of Trigonometric Ratios, Inverse Trigonometric Functions.

Unit 5

**Applications of Trigonometry**: Properties of Triangles, Solutions of Triangles, Heights and Distances.

Unit 6

**Coordinate Geometry and Straight Line**: Cartesian Coordinate System.

Unit 7

**Circles and Conic Sections**: Circle, Conic Section.

Unit 8

**Vector Algebra**: Basic Concepts, Components of a Vector, Operations on Vectors, Product of Two Vectors.

Reference:

1. Advanced Engineering Mathematics by Wartikar
BET-012-PHYSICS

<table>
<thead>
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<th>Marks</th>
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</thead>
</table>
| 3        | 1         | --        | 4       | External: 70+Internal: 30

Students are required to score 35% marks individually in both external and internal and 40% marks in total.

Unit 1

Properties of Matter: Surface Tension, Fluid Statics, Fluids in Motion, Elasticity.

Unit 2


Unit 3

Sound: Waves, Sound and its Characteristics, Speed of Sound: Newton’s Formula.

Unit 4


Unit 5


Unit 6


Reference:

Unit 1

**Periodic Table and Periodic Properties:** Development of Periodic Table, Periodic Table and Electronic Configuration of Elements, Periodic Properties.

Unit 2

**Non-Metal:** Atmosphere, Hydrogen, Oxygen, Nitrogen and Ammonia, Chlorine, Acids.

Unit 3

**Metals:** Occurrence and Properties of Metals, Iron and Steel, Copper, Aluminum, Alloys.

Unit 4

**Water Technology:** Sources of Water, Structure of Water, Solvent Action Of Water, Hardness of Water, Sludge and Scale Formation of Boilers, Boiler Corrosion and its prevention, pH Value and Water Treatment.

Unit 5

**Fuels:** Classification of Fuels, Calorific Value of Fuels, Characteristics of a Good Fuel, Comparison between Solid, Liquid, and Gaseous Fuels, Determination of Calorific Value, Solid Fuels, Liquid Fuels, Gaseous Fuels.

Unit 6

**Lubricants:** Lubricants, Lubrication, Selection of Lubricants, Classification of Lubricants, Lubricating Emulsion, Gases as Lubricants, Gases as Lubricants, Properties of Lubricants

Unit 7

**Polymers:** Importance of Polymers, Type of Polymers, Properties of Polymers, Moulding of Plastic, Rubber

Unit 8

**Glass and Ceramics :**
Manufacture of Glass, Glass Transition, Varieties of Glasses, Ceramics, Refractories, Bleaching Powder, Commercial Bleaching Powder

**Reference:**

### OIEL-001 Technical English

<table>
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<tr>
<th>Lectures</th>
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External:70+Internal:30

Students are required to score 35% marks individually in both external and internal and 40% marks in total.

#### UNIT I

**Essentials of Grammar:** Parts of Speech, Punctuation, Vocabulary Building, Phonetics. Office Management: Types of Correspondence, Receipt and Dispatch of Mail, Filing Systems, Classification of Mail, Role & Function of Correspondence, MIS, Managing Computer.

#### UNIT II

**Letter & Resume Writing:** Types of Letters-Formal / Informal, Importance and Function, Drafting the Applications, Elements of Structure, Preparing the Resume, Do’s & Don’ts of Resume, Helpful Hints

#### UNIT III

**Presentation Skills:** Importance of Presentation Skills, Capturing Data, Voice & Picture Integration, Guidelines to make Presentation Interesting, Body Language, Voice Modulation, Audience Awareness, Presentation Plan, Visual Aids, Forms of Layout, Styles of Presentation.

#### UNIT IV

**Interview Preparation:** Types of Interview, Preparing for the Interviews, Attending the Interview, Interview Process, Employers Expectations, General Etiquette, Dressing Sense, Postures & Gestures

#### UNIT V

**Group Discussion & Presentation:** Definition, Process, Guidelines, Helpful Expressions, Evaluation

The student will be evaluated on the basis of:

1. His / Her presentation style
2. Feedback of Faculty & Students
3. General Etiquette
4. Proficiency in Letter Drafting / Interview Preparation
5. The paper is internal and at least 3 tests will be taken. Best 2 of 3 shall account for final grades (70% Test & 30% Presentation)

#### References:

2. Stephen Covey, “7 Habits of highly effective people”
3. John Collin, “Perfect Presentation”, Video Arts MARSHAL.
4. Jenny Rogers, “Effective Interviews”, Video Arts MARSHAL.
5. Raman, Sharma, “Technical Communications”, OXFORD.
BET-014-Applied Mechanics

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<tr>
<th>Lecture</th>
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</table>

External:70+Internal:30

Students are required to score 35% marks individually in both external and internal and 40% marks in total.

Unit 1

**Coplanar and Non-coplanar Forces**: System of Forces, Coplanar Force, Resultant of Concurrent Forces, Moment of a Force, Resultant of Non-concurrent Forces.

Unit 2


Unit 3

**Friction**: Laws of Friction, Problem Involving Dry Friction, Inclined Plane, Wedge Friction and Screw Friction, Simple Machines.

Unit 4

**Centre of Gravity and Moment of Inertia**: Concept of Centre of Gravity, Moment of Inertia of Area.

Unit 5

**Rectilinear Motion, Projectiles and Relative Motion**: Rectilinear Motion, Projectiles, Relative Motion.

Unit 6

**Laws of Motion**: Newton’s Laws of Motion, Motion on a Circular Path, Simple Harmonic Motion, Work, Power and Energy.

Reference:

**List of Experiments in Physics (Any Eight)**

1. To determine the density of a thin rod using balance and Vernier calipers.
2. To determine young’s modules of the material by Searle’s apparatus.
3. To determine the thickness of a glass setup using speedometer.
4. To determine frequency of Tuning fork using a Sonometer.
5. To determine the velocity of sound in air by resonance tube.
6. To determine the local length of a convex lenses by displacement method.
7. To determine the refractive Index of material of the given prism.
8. To determine Verify Ohm’s Law using voltmeter & ammeter.
9. To determine to convert a galvanometer of given resistance into an ammeter.
10. To determine to convert a galvanometer of given resistance into an a voltmeter
11. To determine the value of unknown resistance by wheat stone bridge
12. To determine the verification of laws of series & parallel resistances.
List of Experiments in Applied Mechanics (Any Eight)

(1) To determine the verification of law of polygon of force.
(2) To determine the funicular polygon

(3) To determine the Finding coefficient of friction by inclined plane apparatus
(4) To determine the Mechanical, Advantage, Velocity ratio & efficiency of a
    (a) Simple purchase crab winch
    (b) Double purchase crab winch
    (c) Gear train etc.
    (d) Wheel and axle
    (e) Screw Jack
(5) To determine the finding forces in members of a cantilever truss
(6) To determine the finding forces in members of a general truss
(7) To determine the moment of inertia of a flywheel
(8) To determine the Example modulus by Searle’s apparatus,
(9) To determine the MA, VR & n of a differential pulley block, warm & warmed
(10) To determine the finding expertly Reactions in a Beam
(11) To determine graphically evaluation of forces in a trees
(12) To determine the graphically evaluation of CG of a plane figure
(13) To determine the graphically evaluation MI of a plane figure.
UNIT 1

DC CIRCUITS: Concept of electricity, Basic terms- Voltage current, Potential Difference, Power, energy and their units. Ohm’s Law Effect of temperature on resistance, temperature coefficient of resistance. Resistances in series and parallel Kirchoff’s current law and Kirchoff’s voltage law and their applications to simple circuits. Conversion of circuits from star to Delta and Delta to Star. Thevenin’s Theorem, Superposition theorem, Norton’s theorem and their use to solve simple problems.

UNIT 2

BATTERY Basic idea about primary and secondary cells. Construction, working and applications of Lead and Battery and Nickel Cadmium cells, Silver Oxide cells Charging methods used for lead acid accumulator Care and maintenance of lead acid battery. Series and parallel connections of batteries.

UNIT 3

Magnetism and Electromagnetism: Introduction to electromagnetism, Magnetic field around a straight current carrying conductor and a solenoid and methods to find its direction, force between two parallel current carrying conductors. Force on a conductor placed in the magnetic field. Series and parallel magnetic circuits, simple problems Importance of air gap Concept of hysteresis and hysteresis loop.

UNIT 4


UNIT 5

AC Theory: Concept of alternating voltage and current Difference between AC and DC, Concept of cycle, frequency period, amplitude, value, average value, r.m.s value, maximum value, form factor and peak factor. Representation of sinusoidal quantities by phasors. Derivation of equation of sinusoidal waveform. Physical concept of alternating voltage applied to a pure resistance, pure inductance and pure capacitance. Inductive reactance, capacitive
reactance Alternating voltage applied to resistance and inductance in series Alternating voltage applied to resistance and capacitance in series. Impedance triangle and phase angle Complex Numbers-Various forms; addition, subtraction, multiplication and division, addition of sinusoidal terms Solutions and phasor diagrams for simple practical RLC circuits (series and parallel). Introduction series and parallel resonance and its conditions Power in pure resistance, inductance, inductance and capacitance, power in combined RLC circuits, Power factor, active and reactive currents and their significance, practical importance of power factor, solution of simple circuits using j-notation. Use of conductance, susceptance and admittance.

UNIT 6
Polyphase System: Concept of polyphase in power system Advantages of 3-phase system over single phase system. Generation of 3-phase voltages, relation between phase voltage and line voltage, phase current, line current and power in a star and delta connected system. Simple problems on 3-phase balanced loads and concept of unbalanced loads.

RECOMMENDED BOOKS
3) Electrical Engineering- G.K.Mittal
5) Electrical Technology- Edward Hughes, Seventh Edition, Pearson Education
7) Basic circuits analysis by John Omalley Shawn Mc Graw Hill.
8) Principles of Electrical Engineering by Del. Toro, PH
Unit 1 INTRODUCTION TO DRAWING

Drawing Equipment and Instruments, Drawing Sheets and Layout, Sizes of Drawing Sheets,

Unit 2 GEOMETRICAL CONSTRUCTION

Triangle, Square, Polygon, Pentagon, Hexagon, Circle and Curves, Conic Sections, Ellipse, Parabola, Hyperbola, Cycloid, Epicycloids, Hypocycloid, Tangent and Normal to Curve

Unit 3 ORTHOGRAPHIC PROJECTIONS-I

Orthographic Projection, Projection Methods, Designation of Views, Relative Position of View
First Angle Projection Method, Third Angle Projection Method, Indication of Method
General Principles of Orthographic Drawing, Projection of Points, Projections of Point Situated in the First Quadrant, Second Quadrant, Third Quadrant, Fourth Quadrant, Projections of a Point Situated in a Plane, Projection of Straight Lines, Position of the Line with Respect to Planes of Projection, i.e. VP and HP May be Traces of a Line, True Length of a Line, Projection of Planes

Unit 4 ORTHOGRAPHIC PROJECTIONS-II

Types of Solid, Polyhedra, Solids of Revolution, Orthographic Projections of Solid
Orthographic Projections of Solid when the Axis is Perpendicular to One of the Principal Planes and Parallel to the Other Axis Perpendicular to the HP, Axis Perpendicular to the VP
Orthographic Projections of Solid when the Axis is Parallel to Both the HP and VP
Orthographic Projections of Solid when the Axis is Inclined to One of the Principal Planes and Parallel to the Other Principal Plane Axis Inclined to HP and Parallel to VP, Axis Inclined to VP and Parallel to HP, Orthographic Projections of Solid when the Axis is Inclined to Both the Principal Planes

Sections of Solid
UNIT 5 ISOMETRIC AND OBLIQUE PROJECTIONS

Classification of Pictorial Drawings, Isometric Projection, Isometric Projection of a Cube,
Isometric Scale, Construction of an Isometric Scale, Isometric Drawings of Plane Geometrical Figures,
Isometric Drawing of a Square, Isometric Drawing of a Rectangle, Isometric Drawing of a Circle,
Isometric Drawing of a Triangle, Isometric Projection of Solids, Procedure of Drawing a Cube,
Isometric Drawing of Simple Machine Brackets, Oblique Projection

Rules for Placing an Object, Procedure for Constructing an Oblique Drawing

UNIT 6 SURFACE DEVELOPMENT

Geometric Objects, Development of a Surface, Development of a Cube, Development of a Tetrahedron,
Development of a Octahedron, Development of a Prism, Development of the Surface of a Pentagonal Prism,
Development of the Surface of a Truncated Pentagonal Prism

Development of a Pyramid, Development of the Surface of a Square Pyramid

Development of the Surface of a Truncated Pyramid, Development of the Surface of a Right Cylinder,
Development of a Right Cone, Development of a Sphere

Reference:


### BET-026 WORKSHOP TECHNOLOGY

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External:70+Internal:30

Students are required to score 35% marks individually in both external and internal and 40% marks in total.

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**Unit 1**

**Carpentry:** Classification of Carpentry Tools, Types of Work & Working Procedure, Joints in Carpentry Work

**Unit 2**

**Pattern Making and Foundry:** Pattern making, Foundry

**Unit 3**

**Fitting and Plumbing:** Tools and Devices in Fitting – work, Operation in Fitting Work, Tools in Plumbing Work, Operations in Plumbing Work, Pipe Fittings and Joints

**Unit 4**

**Sheet Metal Work:** Types of Tin-Smithy Joints, Soldering, Brazing, Fluxes, Metal Used in Tin Smithy Works, Hand Tools and Machines, Sheet Metal Operation, Layout of Patterns

**Unit 5**

**Welding:** Gas Welding, Equipment for Oxy-Acetylene Gas Welding, Fluxes, Gas Flame, Arc Welding, Polarity in Arc Welding, Electrodes for Arc Welding, Arc Welding Equipment, Arc Welding Processes

**Unit 6**

**Smithy and Forging:** Forging Materials, Tools and Equipments used in forging, Forging Operations, Power Hammers and Presses, Rivet, Heat treatment

**Unit 7**

**Machine Tools:** Function of Lathe, Types of Lathe, Lathe Accessories and Attachments, Lathe Operations, Cutting Tools, Terms Used in Cutting Operation

**Unit 8**

**Painting:** Paints, Varnishes

**Reference:**


K.C. Arora, Workshops Practice, S.K. Kataria and Sons, Publishers and Distributors.

R.K. Singhal, Workshop Practice, S.K. Kataria and Sons, Publishers and Distributors, Delhi
Unit 1
**Introduction to Electricity:** Electricity, Current, Resistance of a Conductor, Kirchhoff’s Laws, Batteries

Unit 2
**Electromagnetism, Electrostatics and Electrical Instruments:**
Magnetism, Biot-Savart Law and its Applications, Electromagnetic Induction, Static Electricity, Electrical Instruments

Unit 3
**AC Circuits:** Sinusoidal Signals, Impedance Concept, Concepts Relating to Power, Three-phase Circuits

Unit 4
**Electrical Machines:** DC Machines, Transformers, Distribution of Electricity

Unit 5
**Units of Measurement, Gas Laws and Fuels:** Basic Units of Measurement, Thermodynamic Systems, Gas Laws, Laws of Thermodynamics, Energy Conversion Cycles, Fuels

Unit 6
**Internal Combustion Engines:** Classification, Cycles, Four Stroke and Two Stroke Engines, Engine Performance, Octane and Cetane Numbers, Pollution

Unit 7
**Refrigeration and Airconditioning:** Refrigeration Cycle, Vapour Compression Refrigeration, Refrigeration Capacity, Refrigerants, Absorption System, Ammonia Hydrogen Refrigeration System, Steam Jet Refrigeration, Thermoelectric Cooling, Indirect Refrigeration, Air Conditioning, Psychrometry, Comfort Air Conditioning, Summer Air Conditioning (Humid Air), Winter Air Conditioning, Summer Air Conditioning (Dry Air), Package Air Conditioner, Evaporative Cooler, Ducting

Unit 8
**Lifts and Cranes:** Basic Principles, Lifts (Elevators), Escalator, Lifting of Load, Some Basic Crane Mechanisms, Types of Crane, Rotary Cranes or Derricks

Reference:
OIEL-002: Data Structures and Files

UNIT I

Review of 'C'

Arrays and pointers: arrays and pointers.


Structure and Union: Passing and returning structure and union as parameter for function structure / union and pointer.

Input / Output Files: Concept, file operations, Types: sequential & random access files.

UNIT II

Introduction to data structures

Overview: Algorithm, data structure, how to create a program, how to analyze the program. Abstract Data Types, Concept of sequential organization, concept of linear and non linear data structure, arrays as ADT, storage representations (row major and column major). Concept of ordered list & polynomial representation using arrays.

Searching and sorting techniques:

Searching: Basic search techniques, sequential searching, binary search, indexed sequential search. Analysis of these algorithms.

Sorting: General background, bubble sort, quick sort, selection sort, insertion sort & merge sort. Analysis of these algorithms.

Hash Tables: Introduction, hashing functions, overflow/collision Handling.

UNIT III

Linear Data structure using linked organization
Concept of link organization: Singly linked list, doubly linked list, Circular linked list. Insertion, deletion & traversal on above data structures. Representation & manipulation of polynomials using linked list.

Generalized lists: Representation of polynomial using generalized list.

UNIT IV

Stacks and Queues

Stack: Definition & examples, representing stack in C, implementing stack using linked list. Example: infix, postfix and prefix (basic definition and examples, evaluating postfix expressions, program to evaluate postfix expression, converting infix to postfix expression, program to convert infix to postfix).

Queues: The queue and its sequential representation, linked implementation of queues, circular queue, and concept of priority queue.

UNIT V

Trees: Basic terminology, binary trees, binary tree representation, binary tree traversal, primitive operations on binary trees


References:
1. C And Data structures – P.Padmanabham, BS Publications
2. C & Data Structures, Ashok N.Kamthane, Pearson Education
5. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/Pearson Education
BETL-022: LAB-III (WORKSHOP TECHNOLOGY)

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List of Experiments in Workshop Technology (Any Sixteen)

1. Making of lab joint, mortise and tenon-joint, Briddle joint and dovetail joint.
2. Preparation of a wooden surface for painting, apply primer on one side to paint the same side.
3. Preparation of metallic surface for painting, apply primer and paint the given surface
4. Preparation of a metallic surface for Spray-Painting. First spray primer and paint the same by spray-painting gun and Air-compressor system
5. Preparation of a soap-case by the metal-sheet.
6. Preparation of a funnel with thin sheet and solder the seam of funnel
7. Preparation of cylinder and solder the same.
8. Preparation of different types of joints such as Lap-joint, Butt joint, Single seam and double seam joints etc.
9. Brazing practice on small tube/ conduit joints
11. Filling and souring practice of chipped M.S. job
12. Threading practice by taps and Die set.
13. Drilling practice
14. Cutting and threading practice on G.I. Pipes for using socket, elbow and tee etc and fit it on wooden practice board.
15. Sketches and study of the foundry tools, cupola and pit-furnace.
16. Preparation of green moulding sand and practice to prepare moulds.
17. Preparation of square or rectangular piece by M.S. round-rod.
18. Preparation of a hexagonal or square headed bolt.
19. Preparation of a ring with hook for wooden doors.
20. Welding practice for lap and butt joints.
22. Study and sketch of Lathe Machine
23. Plain turning, step-turning and knurling practice on Lathe machine
24. Study and sketch of planning / shaping machines.
OIEEL-001: LAB-IV(ELECTRICAL ENGINEERING LAB)

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LABORATORY EXPERIMENTS

1) Study of Safety precautions
2) Study of Thevenin’s theorem
3) Study of Kirchoff’s law
4) Study of super position theorem
5) Study of RLC series circuit
6) Effect of temperature rise on conducting material
7) Direct loading test on single phase transformer
8) Study of star delta relationship
9) Study of various batteries
BET-021 MATHEMATICS -II

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Unit 1

**Differential Calculus**: Real Number System, Functions, Limits, Continuity, Derivative.

Unit 2

**Applications of Derivatives**: Application to Geometric, Derivative as a Rate Measure, Increasing and Decreasing Function, Maxima and Minima, Roller Theorems, Mean Value Theorem, Curve Sketching.

Unit 3

**Indefinite Integrals**: Antiderivatives, Basic Definitions, Methods of Integration, Integration of Rational Functions, Integration of Irrational Functions.

Unit 4


Unit 5

**Complex Numbers**: Complex Numbers, Geometrical Representation of Complex Numbers, Exponential and Circular Functions of Complex Numbers

Unit 6

**Matrices and Determinants**: Matrices, Matrix Multiplication, Determinants, Adjoint and Inverse of a Matrix, Solution of Linear Equations with the help of Inverse of a Matrix.

Unit 7

**Statistics**: Statistical Data and Variables and Units of Observations, Construction of Frequency Tables (or Frequency Distributions) from Raw Data, Graphical Presentation of Frequency Distributions, Measures of Location and Dispersion.

Reference:

Shanti Narayan, Integral Calculus, by chand & Co.


BICEL-015: LAB-IV (Survey Lab)

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List of Experiments in Survey (Any Eight)

1. Study and use of 20 m and 30 m chain components, unfolding of chain. Measurement of distance with chain and tape of plane and sloping ground. (By Direct ranging)
2. Study and use of optical square and open cross staff for setting out perpendicular. Use chain and cross staff survey for finding out area of a given field.
3. Study and use of prismatic compass for observing fore bearing and back bearing calculation of included angles from the observed bearing. Measuring fore bearing and back bearing of 5-6 sided polygons identifying the station affected by local attractions and calculations of corrected bearings.
4. Chain and compass transverse survey-A simple close traverse of 5-6 sides enclosing a building, calculation of included angle, locating details and plotting them on A1 size imperial drawing sheet.
5. Study and use of dumpy level, carrying out temporary adjustments and practice of simple leveling, recording the readings in leveling book and arithmetic checks.
6. Differential leveling precise recording in level book, reduction of levels by height of collimation method and rise and fall method, arithmetic checks.
7. Carrying benchmarks from one point to another about 500 meters away by fix leveling with double check.
8. Study and use of tilting level, temporary adjustments, study of auto set level by demonstration.
9. Profile leveling running a longitudinal section for a length of about 500 m with cross sections at 30 m center to center. The length of cross section may be 20 m on either side with staff readings at 10 m interval spot levels should be taken at every 10 m along the base line plotting the L section and cross section at A1 size imperial sheet.
10. Plane table methods orientation of plane table by back sighting and locating details by methods of intersection
12. Understanding the components of theodolite and their function reading the vernier, temporary adjustments of theodolite.
13. Theodolite traverse survey. A closed traverse of 5-6 sided for a small area. Computation by Gale’s traverse table plotting the traverse on A2 size imperial drawing sheet
Unit 1

**Differential Calculus:** Real Number System, Functions, Limits, Continuity, Derivative.

Unit 2

**Applications of Derivatives:** Application to Geometric, Derivative as a Rate Measure, Increasing and Decreasing Function, Maxima and Minima, Roller Theorems, Mean Value Theorem, Curve Sketching.

Unit 3

**Indefinite Integrals:** Antiderivatives, Basic Definitions, Methods of Integration, Integration of Rational Functions, Integration of Irrational Functions

Unit 4

**Definite Integrals:** Definite Integrals, Fundamental Theorem of Calculus, Properties of Definite Integrals, Applications.

Unit 5

**Complex Numbers:** Complex Numbers, Geometrical Representation of Complex Numbers, Exponential and Circular Functions of Complex Numbers

Unit 6

**Matrices and Determinants:** Matrices, Matrix Multiplication, Determinants, Adjoint and Inverse of a Matrix, Solution of Linear Equations with the help of Inverse of a Matrix.

Unit 7

**Statistics:** Statistical Data and Variables and Units of Observations, Construction of Frequency Tables (or Frequency Distributions) from Raw Data, Graphical Presentation of Frequency Distributions, Measures of Location and Dispersion.

**Reference:**

Shanti Narayan, Integral Calculus, by chand & Co.


BET-017: COMPUTER BASICS

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Students are required to score 35% marks individually in both external and internal and 40% marks in total.

Unit 1


Unit 2


Unit 3

Ms Word Part I: About MS Word, MS Word Screen Layout, Creating Documents, S Word Menus, Standard Toolbar, Formatting Toolbar

Unit 4

Ms Word II: Creating a Simple Document, Bullets, Numbering the Text, Aligning the Text, Spelling and Grammar Check, Print Preview, Print, Saving the document, Closing the document, Opening the document, Exiting MS Word, Selecting a Template, Starting the Template and selecting the Template Style, Header and Header Items, Recipients name and the closing items, Header and Footer, Typing the Text, Creating and modifying tables, Creating rows and columns, Inserting rows and columns, Merging rows and columns,

Unit 5

Introduction to Spreadsheets Part-I: Starting MS Excel, Excel Screen Layout, Excel Menu

Unit 6

Ms Excel Toolbars: Standard Toolbar, Formatting Toolbar, Creating a Simple Worksheet, Functions

Unit 7

Ms PowerPoint: About PowerPoint, Toolbars, Creating a simple presentation, Making your presentation attractive, Viewing a presentation, Printing a presentation, Getting Help

Unit 8

Internet and E-Mailing: Internet Basics, Starting the Internet, Searching, E-mailing, Internet Chat.

Reference:
Joe Hubraken, Microsoft office 2000: 8 in 1, Prentice Hall of India, New Delhi.
BET-022: STRENGTH OF MATERIAL

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Unit 1

**Stresses and Strains:** Basic Concepts, Mechanical Behavior of Materials, Deformation of Bars, Composite Bars, Thermal Stresses and Strains, Relationship between Elastic Constants.

Unit 2

**Principal Stresses:** State of Stresses, Normal and Shear Stresses, Stress on Oblique Sections, Principal Stresses and Principal Planes.

Unit 3

**Shear Forces and Bending Moments:** Beams, Shear Force and Bending Moment, Shear Force and Bending Moment Diagram.

Unit 4

**Stresses in Beams:** Simple Bending or Pure Bending, Moment of Resistance, Bending Stress Distribution, Practical Applications, Section Modulus, Shear Stress Distribution in Beams.

Unit 5

**Deflection of Beams:** Curvature of Bending Beam, Differential Equation of Deflection Curve, Double Integration Method for Slope and Deflection.

Unit 6

**Torsion:** Torsion of Circular Shafts, Power Transmission by Shafts.

Unit 7

**Columns and Struts:** Failure of a Column or Strut, Sigh Conventions, Types of End Condition of Columns, Equivalent Length of a Column, Slenderness Ratio, Factor of Safety, Indian Standard Specifications for Columns.

Reference:

UNIT I

Introduction and objective of this subject:

1. Study of passive components: - Specifications, application and simple testing procedure and study of IEEE symbols for components/devices.
2. Study of active components like Diodes, Transistors, SCR etc study using data sheets and Simple testing procedures. Use of analog multimeter & DMM.
3. To learn specifications front panel controls of Dual trace oscilloscope for measurement of waveform parameters.
4. To learn & use signal generator, power supply and Digital multimeter. To understand Specifications, precautions, and limitations for measurement.

UNIT II

Explain and demonstrate various types of PCB materials and all types of PCBs like single sided, double sided, multilayer & flexible etc.

(a) Overview of PCB design & fabrication.

(b) Make a single sided PCB for a simple circuit such as two stage transistor amplifier/discrete voltage regulator.

UNIT III

Artwork and Layout for PCB, Manual artwork, Computer aided artwork.

UNIT IV

PCB fabrication, Etching Methods, Etching solutions

UNIT V

Soldering of components on PCB

UNIT VI

Simulation Software’s of typical circuits using Circuit Simulation tools such as pSpice, multiSim, Simulink, Proteus, MATLAB/OCTAVE 20 SIM

Reference Book:

1. J. A. Sam Wilson, Joseph A. Risse - Electronic Troubleshooting and Servicing Techniques
   - Thomson Learning.
BIEL-027: Applied Electronics

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UNIT I


UNIT II


UNIT III


UNIT IV

Multivibrators: Transistor as switch. Definition & graphical representation of different time periods. Multivibrator classification, circuit working & frequency with specific application. MMV, AMV, BMV & Schmitt trigger

UNIT V
**Time base generator:** Voltage time base generator, exponential sweep generator UJT Relaxation Oscillator, negative resistance generator. Working principle & operation. Current time base generator, bootstrap & miller sweep generator, applications in TV & CRO.

**UNIT VI**

**Trouble shooting & Testing:** Need for trouble shooting. Important steps for testing Visible testing - Observing circuits for visible faults like broken component, open contacts etc. Active testing - Voltage analysis, Resistance analysis, signal analysis. Trouble shootings of multivibrators, phase shift oscillators, transistorised sweep generator, clipping & clamping circuits.

**References:**

**BICEL-016: Lab – V (Computer Application)**

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**List of Practical:** (Any Ten)

1. Installation of PC, connecting and disconnecting key board, monitor and printer, correct method of handling floppies, disks and mouse
2. Exploring the control panel – changing date & time, Desktop Background, Screen Saver, Add or Remove Programs.
3. Creating & Deleting folders, opening files/folders, copying files, renaming files/folders, changing folder view
4. To prepare captions in different sizes and fonts and generate tables in MS Word and using windows.
5. Creating & modifying tables in MS word.
6. Creating documents in MS Word and working with MS Word menus.
7. To prepare tables and charts in MS Excel using windows.
8. Creating a worksheet and working with functions in MS Excel
9. Creating a presentation/slide-show in MS PowerPoint
10. Creating an E-mail Account, checking & sending E-mail, E-mail attachments & Internet Chatting.
BMEL-008: Lab-VI (Strength of Materials Lab)

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Marks

External:30+Internal:70

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List of Experiments in Strength of Materials (Any Eight)

1. To determine shear force (SF) and Bending moment (BM) diagram at various sections of a simply supported beam loaded with several point load on plain paper.
2. To determine yield stress, ultimate stress, young’s modulus, percentage elongation of a mild steel rod by Universal testing machine.
3. Determination of bending test on timber.
4. Determination of bending test on floor tiles.
5. Determination of modulus of rigidity of a curve by torsion apparatus.
6. Determination of deflection and stiffness of a helical spring.
7. To determine hardness of a plate by Rock wells Brinell’s hardness testing machine.
8. To determine impact resistance of a material by Izode impact testing machine.
9. To determine compression test on timber, bricks, mild steel and copper.
10. Determination of water absorption test on bricks.
11. Determination of water absorption test on floor tiles.
12. To determine the moisture content and specific gravity of timber.
UNIT I

UNIT II
Resonance & applications: Definition of figure of merit, Q. Series resonance: Current Bandwidth, Impedance & selectivity in series resonance. Parallel (anti) resonance: Application of resonance ckt including impedance transformation.

UNIT III

UNIT IV

UNIT V

UNIT VI

Reference Books:
2. John D. Ryder - Network lines & Fields by - PHI.
BIEL-029: Electronics Measurements & Instruments

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UNIT I

UNIT II

UNIT III
Digital Meters: Concepts of ADC & DAC only. Resolution, Sensitivity and Accuracy of digital display. Digital frequency meter-Block Diagram and operation only. Digital Voltmeter-Ramp type DVM, Integrating type DVM, Successive approximation type DVM, Dual slope type DVM. (Block diagram, Operation and waveform if required). Digital Multimeter- Block Diagram and operation only. LCR, Q meter- Block diagram and operation only. Digital phase meter- Block diagram and operation only.

UNIT IV

UNIT V
Signal Generator and Analyzer: Concept of oscillator. Signal generator-AF and RF type- Block diagram and operation only. Function generator and pulse generator- Block diagram, Simple controls and operation only. Specification. Concept of time domain and frequency domain instruments. Spectrum & Logic analyzer- Block diagram and operation only.

Reference Books:
2. Kalsi, “Electronic Instruments” Tata Mc Grow Hill
BIEL-030: Digital Electronics

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UNIT I
Number System: Introduction to digital system. Number System - Introduction to Binary, Octal, Decimal, Hexadecimal number system, Conversion of number systems, 1’s complement and 2’s complement, Binary arithmetic (addition, subtraction, division, multiplication). Codes - BCD codes, 9’s and 10’s complement, 8421 BCD codes, Excess – 3 code, gray code, BCD arithmetic (addition, subtraction).

UNIT II

UNIT III
Combinational Logic Circuits: Introduction to combinational logic circuit. Standard representation of Canonical forms (SOP & POS, Minterm, Maxterm) - Conversion between SOP & POS, Numericals based on above topic, Don’t care conditions. K – map reduction techniques and realization (only for SOP – 2, 3, 4 variables), Realization using K – map techniques of Half adder, full adder, Half subtractor, full subtractor, gray to binary, binary to gray converter, BCD to 7 – segment decoder using K-map. Multiplexer - Necessity of multiplexer, Types of multiplexers 2:1, 4:1, 8:1, 16:1 with realization, Multiplexer Tree, Study of MUX ICs 74150, 74151, 74152, 74153, 74157, Applications of multiplexer. Demultiplexer - Necessity and Principle of Demultiplexer. Types and realization of De Mux 1:2, 1:4, 1:8, 1:16, Demux Tree, Application of Demux as decoder, Study of ICs 74138, 74139, 74154, 74155.

UNIT IV

UNIT V
Logic Families: Characteristics of logic gates: propagation delay, power dissipation, Fan in, Fan out, current sinking, current sourcing. TTL logic family - Introduction to TTL logic, Realization of basic gates using TTL logic, TTL NAND gate – Totem pole output, open collector. ECL logic family - Introduction to ECL logic, ECL OR, NOR gate. MOS families - Introduction to PMOS, NMOS & CMOS logic, Realization of PMOS inverter, NAND, NOR, Realization of NMOS inverter, NAND, NOR, Realization of CMOS inverter, NAND, NOR. Comparison of different logic families. Study of 7400 TTL series / CD 4000 series gate ICs.

UNIT VI
A) Synchronous sequential m/c’s: Design of Synchronous counter using 1C 74191, 4 bit up/down mod-n counters. Moore/Mealy M/c’s, representation techniques, state diagrams, state tables, state reduction, state assignment, implementation using flip-flops. Applications like sequence generator and detection.

B) A/D and D/A converters: Digital to Analog converters, example of D/A converter 1C, Analog to Digital converters, example of A/D converter.

C) Semiconductor Memories: Memory organization and operation, expanding memory size, classification and characteristics of memory, RAM, ROM, EPROM, EEPROM, NVRAM, SRAM, DRAM.

Reference Books:

6. M. Morris Mano ‘Digital logic Design’ Prentice Hall India (PHI)
BIEE-032: Principles of Computer Architecture

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UNIT I

Motherboard And Its Components: Different types of PC configurations and their comparison, Chipset basic, chipset Architecture: North/South Bridge, architecture and Hub architecture, Architecture of Intel chipset 915 G& 945 G, Overview and features of ISA, PCI-X, PCI-Xpress, AGP, Processor Bus (no pin description) Comparison between PCI and PCI Express, Logical memory organization: Conventional memory, Extended memory, Expanded memory (No memory map), Concept of cache memory: Internal cache, External cache, (L1, L2, L3 cache), Overview and features of SDRAM, DDR, SDRAM, DDR2, SDRAM, DDR3, BIOS Basics

UNIT II

Storage Devices And Its Interfacing: Recording Technique: RM, MFM, RLL Perpendicular, magnetic recording, Hard disk construction and working, Terms related to Hard Disk: Track, Sector cylinder, cluster, Head parking, MBR, Zone recording, Formatting, Low level formatting, High level formatting, partitioning, Hard disk drive interface: features of parallel AT attachment, (PATA), Serial AT Attachment (SATA), External SATA (no pin discription), CDROM drive: Construction, recording, DVD: Construction, Recording

UNIT III

Display Devices & Interfacing: CRT colour monitor: Block diagram and function of each block, Characteristics of CRT monitor: Dot pitch, Resolution, Video bandwidth, Horizontal scanning frequency, Interlaced versus non interlaced monitor, Advantages of CRT display over LCD display, LCD monitor: functional block diagram of LCD monitor, working principal, advantages and disadvantages Types: Passive matrix and Active matrix, Important characteristics: Resolution, Refresh rate, Response time. Basic block diagram of a video accelerator card

UNIT IV


UNIT V

Power Supplies: Block diagram and working of SMPS, Signal description and pin diagram of AT and ATX connectors, Power supply characteristics: Rated wattage, Efficiency, Regulation, Ripple, Load regulation, line regulation, Power problems: Blackout, Brownout, surges and spikes, Symptoms of power problems, Protection devices: Surge suppressor: working UPS: Block diagram, working, Types, Rating
UNIT VI

Interfaces: SCSI cables and connectors, SCSI drive configuration. USB features, RS232 : (Voltages & 9 pin Signal description), Centronics (interface diagram, signals and timing waveform), Firewire features

Pc Diagnostic, Testing And Maintenance And Tools: Preventive Maintenance : Active Preventive maintenance, passive preventiv maintenance, periodic maintenance procedure Preventive maintenance of peripherals of PCs. Fault finding and troubleshooting of the above peripherals, ESD (Electrostatic discharge), RFI protection, Working of logic probe, logic purser, current

Reference Books:

1. Mike Meyers, Scott Jernigan, ‘Managing & Troubleshooting PCs’ TMH
2. Bigelow, ‘Bigelow's Troubleshooting, Maintaining & Repairing PCs’ TMH
5. Scott Mueller, ‘Upgrading & Repairing PCs’ Pearson Education
BIEL-031: Microcontroller

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External:70+Internal:30

Students are required to score 35% marks individually in both external and internal and 40% marks in total.

UNIT I
Peripheral Devices: Need of peripheral, Data Transfer Techniques, Synchronous and Asynchronous Serial and Parallel Hand shaking, Polling, Interrupt driven Microprocessor controlled with DMA (Only concept of DMA; no chip details)

UNIT II
Programmable I/O Devices: IC 8155, Block Diagram, pin out, operating modes, Simple I/O programs and Interfacing with 8085 Microprocessor. Comparison of features of 8155, 8355 and 8755 Minimum system configuration of 8085 Microprocessor. IC 8255 Block Diagram, pin out, operating modes, Simple I/O programs and Interfacing with 8085 Microprocessor. Interfacing of A to D Converter with 8085 Microprocessor. Interfacing of D to A Converter with 8085 Microprocessor. Practical Applications using 8085 Microprocessor. Stepper Motor Control, Temperature Control

UNIT III

UNIT IV
8051 Microcontroller: MCS-51 Architecture and details, Pin configuration, 8051 Hardware details- Clock, Oscillator, Registers, SFRs, DPTR, Flags, Stack, PC, Ports. Internal RAM and ROM as Data Memory and Program, Memory Connections of External Memory, 8051 Boolean Processor, Power saving options

UNIT V
MCS-51 Addressing Modes and Instructions: 8051 Addressing modes, MCS-51 Instruction Set, Simple Programming

UNIT VI
Assembly language programming: Development systems tools, Editor, Assembler, Linker Creating various files to run the 8051 program (asm, obj, lst and hex files) 8051 Data Types and Directives (DB, ORG, EQU, END etc.) Software Simulators of 8051, SPJ Systems, Keil

Reference Books:


**BIELL-014: Lab-VII (Circuits and Networks)**

<table>
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Students are required to score 35% marks individually in both external and internal and 40% marks in total.

**List of practical:**

1. To Verify Thevenins’s Theorem.
2. To verify Maximum power transfer Theorem (ac and dc).
3. To plot frequency response of frequency selective network (Twin T or Wein bridge).
4. To build & test series and parallel Resonance circuits (fr, BW, Q calculations).
5. To design constant k LPF and HPF circuits, to plot frequency response & to find cut off frequency.
6. To design constant k BPF and BSF circuits, to plot frequency response & to find cut off frequencies.
7. Select any two port network & find Z-Y parameters.
8. To plot Poles & zeroes for one port driving point function.
10. Design, build & test symmetrical T and pi attenuators (plot of attenuation versus load resistance)

**Design Problems:**

1. Design Series RLC Circuits to get fr = 50 kHz.
2. Design any two port network with variable load and measure the output power for each load.

**List of Equipments:**

1. Bread board
2. Connectors
3. Inductors
4. Capacitors
5. CRO (30 MHz)
Connecting Probes

Digital Multimeters.

**BIELL-015: Lab VIII (Digital Electronics)**

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*(Students are required to score 35% marks individually in both external and internal and 40% marks in total.)*

**List of Practical:**

1. Realize basic logic gate using diodes & resistors.
2. Verify De Morgan’s Theorem.
3. Prove NAND and NOR gate as universal gate.
4. Design and realize binary to gray and gray to binary converter using gates.
5. Design Half adder & Full adder / half subtractor & Full subtractor using Logic gates.
6. Verify operation of ICs 74138, 74154, 74155.
7. Realize and verify RS flip flop using NAND and NOR gate.
8. Realize and verify master slave JK Flip flop using NAND gate.
10. Design asynchronous decade counter.

**Design Problems:**

1. Design 1 digit BCD to 7 segment decoder using IC7447.
2. Design 4 bit binary adder/subtractor using IC7483.
3. Design 4 bit synchronous counter using IC7476.
4. Design decade counter using IC7492/93.

**List of Equipments:**

1. Digital Trainer kit
2. IC Tester
3. Bread Board
4. Connecting wires
5. CRO
6. Basic Logic Gate IC’s
7. ICs 74138, 74154, 74155
**BIEL-032: Principles of Communication Engineering**

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Students are required to score 35% marks individually in both external and internal and 40% marks in total.

**UNIT I**

Introduction to electronic communication: Importance, Block diagram of communication system, Modulation, Need for modulation, Types of Electronics communications, Simplex & Duplex – Full & Half, Digital Analog Applications of communication. The electromagnetic spectrum (different bands & their frequencies) Concept of Transmission bandwidth.

**UNIT II**


**UNIT III**


**UNIT IV**


**UNIT V**

i) Loop antenna, ii) Ferrite loop antenna, iii) Telescopic antenna, iv) Yagi-uda antenna, v) Microwave antennas- Dish antenna & Horn antenna.

UNIT VI


Reference Books:

2. Roddy Collen “Electronic Communication” Prentice Hall India
UNIT I
Telephone Instrument and signals: Introduction, Telephone receiver, Block diagram & operation of electronic telephone, Tones used in telephone exchange dial tones, busy tone, ring tone, number unobtainable tone , Touch tone (DTMF), Block diagram of cordless telephone system, Frequency allocation.

UNIT II
Digital Switching System: Introduction, Classification of switching system, Telecommunication network -trunks, subscriber lines, Basic of switching system.- Inlets, outlets symmetric network, folded network, blocking network, non blocking network , Elements of Switching system , SPC (Stored program control) Centralize SPC , Distributed SPC, Enhanced services, Telephone Network, Subscribers loop system – MDF,MF, FP, BF,DP,DC,DW, Switching Hierarchy routing, Numbering plan- Telephone number.

UNIT III
Analog, Digital Services and Applications of Telecommunication:(only informative treatment ) Analog services – Switched, leased, local call service, Toll call services, 800 services, WATs, 900 services. Digital services- switched / 56, Digital data service (DDS), Digital signal services (DS). Digital subscriber line (DSL) – ADSL. Business applications of telecommunication Automated teller machines(ATM), Videoconferencing , Banking, Shopping Telecommuting, Distance Learning, Telemedicine

UNIT IV
ISDN: Motivation for ISDN, Services provide by ISDN, X. 400 family of standards, Architecture of ISDN, ISDN rate access interface, Primary rate access (PRI) interface, basic rate access (BRI) interface , Message format for ISDN , ISDN address structure, Broad band ISDN, Introduction to FAX, Working principle of FAX, Image processing, Data compression, Block diagram & operation of FAX machine, Introduction to Modem, Working principle of Modem, Types of Modem- Synchronous, A Synchronous, half duplex & full duplex. Block schematic of Modem. ADSL & cable Modem

UNIT V
Telephone Instrument ( DTMF): Tone Type, MF, Wireless Telephone, FAX, ISDN Installation, ISDN Procedure, PRZ, BRZ Line .ISDN telephone, FAX, Conferencing, Internet

UNIT VI
EPABX (Electronic private automatic business exchange): Block diagram, Signal Processing (working), Analog CMOS cross point switch, Digital TDM / PCM switch, Installation procedure for EPABX, Installing Procedure, Programming on Console, on terminal, on computer, Maintenance technique, Voice Over IP Phone, Wiring Diagram.

4. N.N Biswas ‘ Principle of Telephony’
UNIT I

Hi-Fi Audio Amplifier: Introduction to Amplifiers: Mono, Stereo, Public Address. Difference between stereo amplifier & Mono amplifier. Block diagram of Hi-Fi amplifier & explanation Controls available on it & its function & other facility available on it like (Mic in, Aux.in, headphone in) Graphic equalizer concept, circuit diagram and operation. (5 Point Circuit diagram) Dolby NR recording system Types of speaker – its comparison only I) woofer, II) Midrange, III) Tweeter Cross over network circuit & its function

UNIT II

CD player: CD – material used, size Block diagram of CD player & explanation. Principle & working of detection used in CD player. Component used for CD mechanism. I) CD pick-up assembly, II) gear system, III) drive motors, IV) CD lens. Function of controls. Parts, function of remote control (transmitter unit) & function of receiver used in CD player. Advantages of fluorescent display system used in CD player.

UNIT III


UNIT IV

TV Transmitters & Receiver: Audio and Video signal transmission Positive and Negative modulation Merits and Demerits of Negative modulation Introduction to television camera tube (working & principle only) a) Vidicon b) Plumbicon c) Solid State camera based on CCD. Color Picture tube (working & principle only). a) PIL b) Delta gun picture tube. Block diagram of monochrome TV transmitter (Function of each black) Block diagram of Colour TV transmitter. Block diagram of monochrome TV Receiver.

UNIT V


UNIT VI

Reference Books:

4. R.R Gulati “Modern TV Practice” New age International
6. R.R Gulati “Colour Television Principles and Practice” New age International
8. R.R Gulati “Mono Chrome and Colour Television” New age International
UNIT I
Introduction of Digital Communication: Basic digital communication system, block diagram, Channel capacity-definition, Hartley’s law, Shannon-Hartley theorem, Channel capacity equation, channel noise and its effect, entropy, Advantages and disadvantages of digital communication

UNIT II

UNIT III
Digital Modulation Techniques: ASK, FSK, PSK definition & waveforms, their transmitter and receiver block diagram and working. M-ary encoding. QPSK, QAM, DPSK block diagram of transmitter and receiver and working. Bandwidth for each modulation technique and their comparison.

UNIT IV

UNIT V
Multiplexing and Multiple Access: Need of Multiplexing, TDM, FDM definition block diagram and their comparison. Introduction to WDM. Access technique TDMA, FDMA, CDMA (only concepts), advantages of TDMA over FDMA.

UNIT VI

Reference Books:
1. Fronuzen ‘Data Communication Networking’ Tata Mc-graw Hill
2. Wayne Tomasi ‘Electronic communication system’ Pearson Education
4. Roddy Collen ‘Communication System’ Prentice Hall of India
7. B. Sklar ‘Digital Communication Fundamentals & Applications’ PE
## BIELL-016: Lab-IX (Communication Engineering)

<table>
<thead>
<tr>
<th>Lecture</th>
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External:30+Internal:70
Students are required to score 35% marks individually in both external and internal and 40% marks in total.

### List of Practical: (Any Ten)

1. Observe AM Signal on Spectrum Analyzer
2. Observe FM wave & calculate modulation index.
3. Visit to transmitter station & prepare a report.
4. Draw the circuit diagram & layout of AM radio receiver.
5. Voltage waveform analysis at various points in AM radio receiver.
6. Observe input & output waveforms of AM detector.
7. Plot graph of sensitivity of receiver.
8. Plot graph of selectivity of receiver.
9. Plot graph of fidelity of receiver.
10. Fault finding of AM radio receiver.
11. Create two faults in each section OR fault finding in FM radio receiver, Create two faults in each section
12. Prepare a report on different types of radio receivers available in market. find out their specifications, IC used etc
13. FM detector characteristics.
14. Measure the length of directors, reflectors, dipoles and spacing between them of Yagi uda antenna and compare with the theoretical value.
15. Plot the directional pattern of given antenna.

### Design Problems:

1. AM/FM Radio Receiver/Transmitter using transistor
2. AM modulator/detector/mixer using diode.
3. FM detector

### List of Equipments:

1. AM signal Trainer kit
2. FM signal Trainer kit
3. Spectrum analyser
4. CRO (30 MHz)
5. Digital Multimeter  
6. Antenna Set Up  
7. Antennas (Yagi-Uda, Dipole)  
8. Milli Ammeter (0-10 mA) 

**BIELL-017: Lab-X (Basic Telematics)**

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External:30+Internal:70

Students are required to score 35% marks individually in both external and internal and 40% marks in total.

**List of Practical:**

1. Testing and installation of fixed telephone  
2. Testing and installation of cordless telephone  
3. Visit to Telephone exchange and prepare report.  
4. Draw the layout of given EPABX system.  
5. Installation and testing of EPABX system.  
6. Preparation and installation of wiring layout using MDF, CT boxed box.  
7. Installation of FAX machine.  
8. Installation of MODEM.

**List of Equipments:**

1. EPABX System  
2. Fix Telephone sets  
3. FAX Machine  
4. MODEM  
5. Connectors
BIELP-001 : PROJECT WORK IN SEMESTER V & VI

In project work group of maximum five students will work in a team for a common defined objective.

Project work must be done in consultation with the industries and industrial needs. Students are expected to visit any industry of their liking for selection of industrial projects/problems. They will prepare document defining the problem clearly. The final draft and scope of project will be decided by students in consultation with the internal and external (industry expert) guide.

They will train themselves to solve above defined problem if necessary. Once the final draft and scope of project is defined they can work on project with that industry.

Student will complete project work in two phases (two semesters) and they will prepare presentation of project work carried out in these semesters and present it as Project Seminar –I and II in respective semesters. It is expected that students should complete following work as follows

<table>
<thead>
<tr>
<th>Semester- V</th>
<th>Semester- VI</th>
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<tr>
<td>Visit to industry/ study of a specific problem.</td>
<td>Prepare a rough report containing following</td>
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<td>Define a problem.</td>
<td>4. Experimental work/ testing/design/fabrication.</td>
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<td>Finalize the scope and nature of work.</td>
<td>5. Results</td>
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<td>Submit the synopsis.</td>
<td>6. Discussion</td>
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<td>Train themselves (if necessary)</td>
<td>7. Conclusions</td>
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<td>Prepare a rough report containing following</td>
<td>8. Scope of future work.</td>
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<td>1. Introduction</td>
<td>9. References</td>
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<td>2. Literature survey</td>
<td>Finalize the report.</td>
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<td>3. Need and justification of work.</td>
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<td>Finalize the report.</td>
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<td>Prepare presentation based on above and present it as Project Seminar –I</td>
<td>Prepare presentation based on total work and present it as Project Seminar –II</td>
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Credit Guidelines

There will be 8 credits assigned to the project work.

Oral/ Practical Examination

In this, students are expected to prepare for external oral examination. Students will be assessed by the external examiner which is either appointed by university or by industrial expert (may be called from industry having work experience in the field in which project is completed). As far as possible, same external examiner will assess group of students for project in two semesters. This will ensure involvement
of examiner and proper evaluation of project work. The evaluation of the Project is to be carried out of 200 marks only in sixth semester and no evaluation will be carried out in fifth semester.

**BIEL-036: MICROPROCESSOR**

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Students are required to score 35% marks individually in both external and internal and 40% marks in total.

**UNIT 1**
Evolution and overview of Microprocessor, micro computer organization Microprocessor Architecture – introduction and pin diagram of 8085, ALU timing and control unit, registers,

Data and address bus, timing and control signals, fetch and execute operations, instruction and data flow, system timing diagram, minimum system configuration for 8085.

**UNIT 2**
Instruction type classification of instruction addressing modes, instruction format, assembler Directives, over view of instruction set, writing assembly language program with and without subroutines, concepts of stack, interrupts, interrupt service subroutine.

**UNIT 3**
Memory types, memory organization, static RAM interfacing memory, use of RAMs and EPROMs, RAM- 6116, 6164, EPROM-2716, 2732, 2764, programmable peripherals Interface (8255). Programmable Interval Timer 8253, Basic concepts in serial I/O and data transfer schemes and their classification.

**UNIT 4**
Types of A/D & D/A converters, Interfacing & programming of ADC- 088/0809 and DAC- 0800. Multiplexers and demultiplexers, 8085 based data acquisition system, stepper motor control, DC motor control, temperature control, traffic control.

**UNIT 5**
16-bit Microprocessor 8086 and its internal, architecture, instruction set. Introduction to programming of 8086, 8086 interrupts, multi-user, multitasking. Introduction to microcontrollers- 80286, 80386, 80486, microprocessor family, Comparison of microprocessors.

**RECOMMENDED BOOKS**

1. Fundamentals of Microprocessor and Microcomputers- B.Ram
2. Microprocessors and programmed logic- Kenneth B.Short
3. Introduction to Microcomputer- Albert Paul Malvino
BIEL-037 : Maintenance of Electronic Equipments

UNIT I

Reliability aspects of electronic equipment: Traditional bathtub reliability curve, generalized reliability curve, Mean time to fail, Failure rate Mean time between failure, Mean time to repair, Mean time to restore system, Thermal acceleration, Electrical acceleration, Damp heat acceleration, Practical reliability, Quality standards, Maintenance policy, Preventive maintenance, Corrective maintenance, Qualitative Maintenance

UNIT II


UNIT III

Fundamental Troubleshooting Procedure: Reading of block diagram, Reading of circuit diagram, Reading of working diagram, Di-assembly, Re-assembly, Trouble shooting process, Fault establishment, Fault correction, Fault finding aids, Service, Maintenance & Instruction manuals, Test and measuring Tools, Pre Trouble shooting technique, Preliminary observation, Functional area approach, Split half method, Divergent path, Convergent path, Feed back path, Systematic troubleshooting checks, Check control setting, Checks associated equipments, Visual check, Calibration, Isolates the troubling circuit, Measurement, Individual components

UNIT IV


UNIT V

Trouble shooting aids: Tools: Service manual, Circuit diagram, Circuit board location, Voltage analysis, Fault finding flow check, Diagnostic software, List of replace able parts Data manuals: Trouble shooting technique, Voltage analysis, Signal injection, Signal tracing

Reference Books:

1. R.G. Gupta ‘Electronic Instruments & System’ Tata MacGraw Hill

BIEL-038: Linear Integrated Circuits

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External: 70 + Internal: 30

Students are required to score 35% marks individually in both external and internal and 40% marks in total.

UNIT I

Salient features of OPERATIONAL AMPLIFIER (OPAMP): Importance Of Op-Amp, Equivalent Circuit, Circuit Symbols And Terminals, Block diagram (all stages) Function of all stages (with the circuit such as balanced, unbalanced differential amplifiers with simple current source, level shifter and complementary push pull amplifier, Definitions of parameters of op-amp, Input offset voltage, Input offset current, Input bias current, differential input resistance, Input capacitance, Input voltage range, offset voltage adjustment, CMMR, SVRR, large signal voltage gain, supply voltages, supply current, output voltage swing, output resistance, slew rate, gain bandwidth product, output short circuit current. Ideal op-amp: electrical characteristics. Ideal voltage transfer curve OPAMP IC’s: 741 pin diagram and pin function Open loop and closed loop configuration of op-amp, its comparison, problem based on – ve feedback. Basic concept of frequency compensation of op-amp.

UNIT II

OPAMP basic circuits: Virtual ground concept. Open loop configuration – Inverting, Non-inverting, Close loop configuration – Inverting, non-inverting, differential amplifier, unity gain amplifier (voltage follower), inverter (sign changer), Inverting & non-inverting configuration of Adders (summing amplifier, scaling Amplifier, averaging amplifier), Subtractor, Practical Integrator, Practical Differentiator, Numerical based on designing of above circuit.

UNIT III

Applications of OPAMP: Instrumentation amplifier (using one, two, three OPAMP), IC AD524, LM324, pin diagram, specifications and pin functions. features, requirements, need for signal conditioning & signal processing circuit diagram, circuit operation, derivation of output voltage equation advantages & applications Voltage to current converter (with floating load, with grounded load) Current to voltage converter Sample and hold circuit (IC LF 398, Pin diagram specification and pin functions) Logarithmic and antilogarithmic amplifiers (using Diodes) Analog divider and analog multiplier Comparators (IC LM 301, LM 310, 710 Pin diagram specification and pin functions) Concept of comparator: zero crossing detector, Schmitt trigger, window detector, phase detector, active peak detector, peak to peak detector

UNIT IV

Filters: Introduction to filters Classification of filters Merits & demerits of active filters over passive filters Concept of passive & active filters Ideal and actual characteristics, terms: - cut off frequency, pass band, stop band, center frequency, roll off rate, BW, Q-factor, first order & second order Butterworth filters Low pass filter, high pass filter, band pass filter (wide band pass, narrow band pass filter) Band reject filter (wide band reject, narrow band reject filter), all pass filter

UNIT V

Timers: Introduction to timer IC 555. Block diagram of IC 555 and its pin diagram & function of each pin. Concepts of different timer circuits used in industries: water level controller, touch plate switch, frequency divider etc. Monostable multivibrator, astable
multivibrator, bistable multivibrator, Schmitt trigger, voltage controlled oscillator, IC 556 features, pin diagram and specifications, Designing of simple circuits and trouble shooting of these circuits Numerical based on timers.

UNIT VI

Special purpose IC’s: IC 565 (phase lock loop), IC 566 (voltage controlled oscillator), its block diagram and pin diagram, application of PLL as frequency multiplier, FM demodulator. Introduction to timer IC 555 Block diagram of IC 555 and its pin diagram & function of each pin Concepts of different timer circuits used in Industries: water level controller, touch plate switch, frequency divider etc. Monostable multivibrator, astable multivibrator, bistable multivibrator, Schmitt trigger, voltage controlled oscillator IC 556 features, pin diagram and specifications. Designing of simple circuits and trouble shooting of these circuits Numericals based on timers. Special purpose IC’s: IC 565 (phase lock loop), IC 566 (voltage controlled oscillator), its block diagram and pin diagram, application of PLL as frequency multiplier, FM demodulator

Reference Books:

1. Sergio Franco “Design with OPAMP & analog integrated ects” TMH, New Delhi
2. G B Clayton “Operational Amplifiers” British library catalogu in publication data
3. William D. Stanley “Operational Amplifier with Linear Integrated Circuits” P. E.
5. Coughlin & Dirscoll “Operational amplifier & Linear Integrated circuits” P. E.
6. K.R. Botkar “Integrated circuits” Khanna Publisher, New Delhi
UNIT I

**Power electronics:** Introduction to power electronics. Power transistor: Structure of vertical power transistor, I-V characteristics of power transistors, second breakdown, SOA: Safe operating Area.

UNIT II

**Thyristor family devices:** Brief introduction to Thyristor family devices: TRIAC, SUS, SCS, SBS, LASCR, PUT, GTO. Construction, Symbol, working and static V/I characteristics of UJT, PUT, SCR, Diac, Triac, IGBT, MOS controlled thyristors, GTO. The two transistor analogy of SCR.

UNIT III

**Turn ON and Turn OFF methods of Thyristor:** Introduction to Turn ON and Turn OFF methods of Thyristor. Turn on methods – Forward Voltage triggering, Gate triggering, dv/dt triggering, thermal triggering of Thyristor. Gate trigger circuits – General block diagram of a thyristor gate trigger circuit, Resistance firing circuit, Resistance Capacitance firing circuit, Resistor Capacitor full wave trigger circuit. SCR triggering using UJT, PUT. Synchronised UJT triggering. Thyristor Turn OFF methods – Class A, B, C, D, E, F.

UNIT IV

**Polyphase Rectifiers:** Need and Use of Polyphase Rectifiers. Circuit diagram and waveforms of Three phase half wave Delta – Wye rectifier Six phase star half wave rectifier Three phase Delta – Wye Bridge Rectifier

UNIT V


**Reference Books:**

2. Muhammad H. Rashid “Power Electronics Circuits Devices and Applications” P HI
4. S N Biswas “Industrial Electronics” Dhanpat Rai and Sons
5. Harish C. Rai “Industrial and Power Electronics” Umesh Publications
UNIT I
Design of Linear Regulated Power supply:
1) Design the circuit with given specification.
2) Design of regulated DC power supply.
3) Indicators for over voltage, over current.
4) Input power considerations and protection circuits. (EMI filters, Fuses, MCB)
5) Thermal considerations.
6) Verification of each designed circuit using any simulation software. (Printout should be part of submission)

UNIT II
FSM, ASM based Digital Design Design to include:
a) FSM - sequence generator, sequence detector
b) Moore and Mealy machines, state diagram.
d) Implementation - combinational logic in state machine using MSI, LSI devices like multiplexers, decoders, PLDs, ROM, fuse map generation, steps in designing using PAL

UNIT III
Analog Filter Design:
a) Second order transfer functions of LP / HP / BP / BS filters
b) Unity gain sallen key, KRC filters realization techniques.
c) Sensitivity analysis
d) Frequency response simulation using softwares like p-SPICE etc.
e) Cascading of filters for higher order filter design
UNIT IV

Micro controller Based Data Acquisition System:

a) Selection of Transducer for given specification
b) Front end analog signal conditioning circuit
c) Selection of suitable A to D converter
d) Selection of Microcontroller
e) Output interfacings:
   i) Relay
   ii) Display (Single LED)
   iii) DAC with PWM for analog output

Reference Books:

1. Franklin P. Prosser, David E. Winkel, “The art of digital design”, (PHI)
2. Hill and Peterson, ”Digital design”
3. Fletcher, ”Introduction to digital design”
5. Tubay Grame & Huelsmann ”Operational amplifiers”, (student Edition-Burr Brown)
6. Gobind Daryanani, ”Principles of active networks synthesis and design”, John Wiley & Sons

Reference Manuals:

1. Motorola, ”Linear / Switch mode power supplies”
2. ”National Semiconductor regulator design manual."
3. ”Philips small signal and power transistor manual.”
4. Texas instruments, ”Linear interface and applications circuit design”
5. ”Motorola power Transistors & Thyristors data hand book.”

List of Equipments:

1. Diodes, Capacitors, resistors, Inductors, Transformer
2. IC 7476, PAL, PLD
3. Microwave Oven, Washing machine
4. Computer system with p-Spice software
5. Transducers like, Thermocouple, LDR
6. Relay, LED Display
7. Tool Kit
8. Digital Voltmeter
9. Soldering Gun
UNIT I

**Introduction:** Review of Applications of Computer Networks, Network hardware and software, Reference Models: OSI and TCP/IP, Example Networks: Internet, X.25, Frame Relay, ATM, Ethernet, Wireless LANs, Network standardization, Switching, Buffering and Multicasting

UNIT II

**Data Link Layer:** Design issues: Services, Framing, Error and flow control, Stop-and-Wait protocol, Sliding Window protocol, Go-Back-N ARQ, Selective Repeat ARQ, HDLC, Data link layer in Internet and ATM **Point-to-Point-Access** (PPP): Frame format, Transition states, PPP Stack: LCP, NCP **Network Hardware Components:** Connectors, Transceivers and Media Converters, Repeaters, NICs, Bridges and Switches

UNIT III

**Medium Access Control sub-layer:** Channel allocation: Static and Dynamic allocation, Multiple Access Protocols: ALOHA, CSMA, Collusion-free and limited-contention protocols, WDMA, Wireless LAN Protocols, Ethernet: Cabling, encoding, MAC sub-layer protocol, Switched, fast and Gigabit Ethernet, Logical link control, Wireless LANs and Digital Cellular Radio, Broadband Wireless, Virtual LANs, Bluetooth, Virtual Circuit Switching: Frame Relay and ATM

UNIT IV

**Network Layer:** Design Issues, Packet switching, Connectionless and Connection-oriented Services, Virtual Circuit and Datagram Subnets, Routing Algorithms, Internetworking, Firewalls **Congestion Control and QOS:** General Principals, Congestion prevention policies, Load shading, Jitter Control, Quality of Service, Internetworking **Network layer Protocols:** ARP, IP protocol, IP Addresses, IPv6, ICMP, Unicast Routing Algorithms: RIP, OSPF, BGP, Multicast Routing: IGMP, Mobile IP

UNIT V

**Transport Layer:** Services and service primitives, Sockets and Socket programming, Elements of Transport protocol: Addressing, Connection establishment and release, flow control and buffering, Multiplexing, Crash recovery, Simple Transport Protocol, UDP: Introduction, RPC, TCP: Introduction, Model, protocol, header, connection establishment and release, connection management, Transmission policy, congestion control, timer management, Introduction to wireless TCP and UDP, Performance issues

UNIT VI

**Application Layer:** Domain Name Systems (DNS) and DNS server, Electronic Mail Architecture and services, Message Formats,MIME, message transfer,SMTP, Mail Gateways, Relays, Configuration Mail Servers, File Transfer Protocol, General Model commands,TFTP World Wide Web: Introduction, Architecture overview, static and dynamic web pages, WWW pages and browsing UTTP, LDAP, Browser Architecture, Caching in Web Browser remote login, Wireless web

**Reference Books:**

2. Fourauzan B., "Data Communications and Networking", 3rd edition, TMH

5. Gallo M., Hancock W., "Computer Communications and networking Technologies", Thomson Brooks/Cole,
UNIT I

Globalization - Strength & weaknesses.

UNIT II


UNIT III


UNIT IV


UNIT V


UNIT VI


UNIT VII


Reference Books:

1. O.P. Khanna “Industrial Engg & Management” Dhanpal Rai & sons New Delhi
LABORATORY EXPERIMENTS

1. Addition, Subtraction, Multiplication and Division operation
2. Packing and unpacking of 8 bit data
3. Finding seven segment code using look up table
4. 8085 Interfacing : (I/O Mode, Generation of square and sine wave using Timmer mode)
5. 8085 Interfacing : (I/O Mode and BSR Mode Operation)
6. Generation of square, triangular and sine wave using DAC
7. Any one application of Ato D converter Interfacing
8. Stepper Motor Control

Following may be considered as design experiments which will enhance the knowledge and practice of the subject contents (are optional)

1. Design a Microprocessor based system for Robot
2. Design a Microprocessor based system for washing machine.
3. Design a Microprocessor based system for clock timer for ringing the bell.
BIELP- 001 : PROJECT WORK IN SEMESTER V & VI

In project work group of maximum five students will work in a team for a common defined objective.

Project work must be done in consultation with the industries and industrial needs. Students are expected to visit any industry of their liking for selection of industrial projects/problems. They will prepare document defining the problem clearly. The final draft and scope of project will be decided by students in consultation with the internal and external (industry expert) guide.

They will train themselves to solve above defined problem if necessary. Once the final draft and scope of project is defined they can work on project with that industry.

Student will complete project work in two phases (two semesters) and they will prepare presentation of project work carried out in these semesters and present it as Project Seminar –I and II in respective semesters. It is expected that students should complete following work as follows

<table>
<thead>
<tr>
<th>Semester- V</th>
<th>Semester- VI</th>
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</thead>
<tbody>
<tr>
<td>Visit to industry/ study of a specific problem.</td>
<td>Prepare a rough report containing following</td>
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<tr>
<td>Define a problem.</td>
<td>13. Experimental work/ testing/design/fabrication.</td>
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<tr>
<td>Finalize the scope and nature of work.</td>
<td>14. Results</td>
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<tr>
<td>Submit the synopsis.</td>
<td>15. Discussion</td>
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<tr>
<td>Train themselves (if necessary)</td>
<td>16. Conclusions</td>
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<tr>
<td>Prepare a rough report containing following</td>
<td>17. Scope of future work.</td>
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<td></td>
<td>18. References</td>
</tr>
<tr>
<td>10. Introduction</td>
<td>Finalize the report.</td>
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<tr>
<td>11. Literature survey</td>
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<tr>
<td>12. Need and justification of work.</td>
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<tr>
<td>Finalize the report.</td>
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</table>

Prepare presentation based on above and present it as Project Seminar –I

Prepare presentation based on total work and present it as Project Seminar –II

Credit Guidelines

There will be 8 credits assigned to the project work.

Oral/ Practical Examination

In this, students are expected to prepare for external oral examination. Students will be assessed by the external examiner which is either appointed by university or by industrial expert (may be called from industry having work experience in the field in which project is completed). As far as possible, same external examiner will assess group of students for project in two semesters. This will ensure involvement of examiner and proper evaluation of project work. The evaluation of the Project is to be carried out of 200 marks only in sixth semester and no evaluation will be carried out in fifth semester.