**SCHEME OF INSTRUCTION**
**BE (Biomedical Engineering)**
**Proposed from the Academic year 2015-2016**

**SEMMESTER – II**

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SCHEME OF INSTRUCTION
BE (Civil Engineering)
Proposed from the Academic year 2015-2016

SEMESTER – II

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Service Courses (Offered to BME)

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#### BE (Mechanical Engineering)
Proposed from the Academic year 2015-2016

#### SEMESTER – II

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#### Service Courses Offered to Other Departments
(Common to ECE & EEE)

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SCHEME OF INSTRUCTION
BE (Electronics & Communication Engineering)
Proposed from the Academic year 2015-2016

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Practicals

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**BE (Electrical Engineering)**  
**Proposed from the Academic year 2015-2016**

**SEMESTER – II**

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**Interdisciplinary Courses Offered to Other Departments**  
**B.E. II Semester**

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**BE (Computer Science & Engineering)**  
**Proposed from the Academic year 2015-2016**

**SEMESTER – II**

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<td>Computer Skills Lab</td>
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**Total** | **315** | **670** | **18** | **2** | **10** | **30** | **24** |
BS 201 MT

MATHEMATICS –II
(Common to all branches)

Instructions 3 Hours/week
Duration of University Examination 3 Hours
SEE 70 Marks
CIE 30 Marks
Credits 3

Objectives:

➢ To study matrix algebra and its use in solving system of linear equations and in solving eigen value problems
➢ To provide an overview of ordinary differential equations
➢ To introduce series solutions of differential equations
➢ To study special functions like Legendre and Bessel functions

UNIT – I
Matrices :
Elementary row and column operations, Rank of a matrix, Echelon form, System of linear equations, Linearly dependence and independence of vectors, Linear transformation, Orthogonal transformation, Eigenvalues, Eigenvectors, Properties of eigenvalues, Cayley-Hamilton theorem, Quadratic forms, Reduction of quadratic form to canonical form by orthogonal transformation, Nature of quadratic forms.

UNIT – II
Ordinary Differential Equations of First Order:
Exact first order differential equations, Integrating factors, Linear first order equations, Bernoulli’s, Riccati’s and Clairaut’s differential equations, Orthogonal trajectories of a given family of curves.

UNIT – III
Linear Differential Equations of Higher Order :
Linear independence and dependence, Solutions of second and higher order linear homogeneous equations with constants coefficients, Method of reduction of order for the linear homogenous second order differential equations with variable coefficients, Solutions of non-homogeneous linear differential equations, Method of variation of parameters, Solution of Euler-Cauchy equation, Simultaneous linear differential equations.

UNIT – IV
Series Solutions of differential equations:
Ordinary and Singular points of an equation, Power series solution, Series solution about a regular singular point, Frobenius method, Beta, Gamma and error functions.

UNIT – V
Special Functions:
Legendre’s differential equation and Legendre’s polynomials, Rodrigue’s formula, Generating function for Legendre’s polynomials $P_n(x)$, Recurrence relations for Legendre’s polynomials $P_n(x)$, Orthogonal and Orthonormal functions, Orthogonal property of Legendre’s polynomials $P_n(x)$, Bessel’s differential equation and Bessel’s functions, Derivatives and integrals of Bessel’s functions, Recurrence relations for $J_n(x)$, Generating function for $J_n(x)$.
**Suggested Reading:**


BS 202 PH

ENGINEERING PHYSICS-II
(Common to All Branches)

Instructions 3 Hours/week
Duration of University Examination 3 Hours
SEE 70 Marks
CIE 30 Marks
Credits 3

OBJECTIVES: The aim of this course is to acquire the basic knowledge on elements of solid state physics. To understand the properties of semiconducting, superconducting, dielectric and magnetic materials in their bulk form. To acquire the knowledge on latest material characterization techniques such as X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM), Atomic Force microscopy (AFM) and Raman Spectroscopy. Also get introduction to basics of thin films and nano materials.

OUTCOMES: At the end of the course the student will acquire the knowledge on the properties of the materials in their bulk and thin forms. Student will apply his knowledge of the materials in selecting the materials for various engineering applications.

UNIT- I  (9 periods)
Crystallography: Crystal systems - Bravais lattices – Lattice planes and Miller Indices – Inter planar spacing - Bragg’s law - Experimental determination of lattice constant by powder diffraction method.
Crystal defects: Classification of defects - Concentration of Schottky defects in metals and ionic crystals - Concentration of Frankel defects.

UNIT- II  (8 Periods)
Superconductivity: Introduction - General properties of super conductors - Meissner effect - Type I and Type II superconductors - BCS theory (qualitative) – High Tc superconductors (in brief) - Applications of superconductors: Josephson’s Junction and SQUIDS.

UNIT- III  (8 Periods)
Semiconductors: Intrinsic and Extrinsic semiconductors - Concept of a hole - Concept of Fermi level in semiconductor - Carrier concentration and conductivity in intrinsic semiconductors – P-N junction diode and its I-V characteristics – Thermistor - Hall effect.
UNIT-IV (8 Periods)

UNIT-V (7 Periods)
Nanomaterials: Zero dimensional materials - Properties of materials at reduced size - Surface to volume ratio at nano scale - Quantum confinement - Preparation of nanomaterials: bottom-up methods (sol gel and CVD), Top-down methods (ball milling) - Elementary ideas of carbon nanotubes – Applications.

Suggested Reading:
BS 209 CH

APPLIED CHEMISTRY

(FOR BME II SEMESTER)

Instructions
3 Hours/week
Duration of University Examination
3 Hours
SEE
70 Marks
CIE
30 Marks
Credits
3

Objective:

- To study the various types of conductances, electrodes & cells
- To study the classification, journal properties and importance of Carbohydrates, Amino acids & Proteins
- To know the concept of Membrane Chemistry, Bio-energetics, Chemical Potential, Biochemist & Physical chemist standard states.


Unit- II: BATTERY TECHNOLOGY: Primary batteries: Zin–Carbon battery. Secondary batteries: Lead-acid battery, Nickel-Cadmium battery-charging and discharging reactions and its applications. Modern Lithium batteries, advantages and applications.

Solar Cells: Concept of Solar energy conversion, Photo-Voltaic cells.

Fuel Cells: Concept of fuel cells and their advantages. $H_2$-$O_2$ alkaline fuel cell and methanol-Oxygen fuel cell.


Peptide, peptide linkage, proteins, importance, classification, general properties and colour tests of proteins.


Alloys: Solid solution, interstitial alloys, intermetallic compounds.

Hume-Rothery rules. Composition, properties and uses of copper alloys, stainless steel, titanium and tantalum alloys.

Unit–V: Membrane Chemistry: Structure of cell, open system, concept of bioenergetics chemical potentials, biochemist’s and physical chemist’s standard state. Gibbs-Donnan membrane equilibrium, Gibbs-Donnan effect and its relation to the salt concentration, pH, osmotic pressure and trans-membrane potentials and applications. Structure of biological membranes, bi-layer theory of fluid mosaic model.


Suggested Reading:

ES 208 CE

APPLIED MECHANICS
(Bio-Medical Engineering)

Instructions
Duration of University Examination
SEE
CIE
Credits

3 Hours/week
3 Hours
70 Marks
30 Marks
3

Course Objectives:
- To know concepts of mass moment of inertia.
- To understand the basic concepts, theory, and evaluation of stresses and strains
- To determine the basic parameters, shear force, bending moments, and bending stress
- To understand the concept of fluid flow in statics, Kinematic, dynamics conditions
- To evaluate the flow properties in static and dynamic compressible and incompressible flow.

PART A: SOLID MECHANICS

UNIT-I

UNIT-II

UNIT-III
Beams and bending: Concepts of shear force and bending moments, and Shear force and bending moment diagram for cantilever, simply supported, and overhanging beams subjected to concentrated and uniformly distributed loads. Simple bending theory - Bending stresses.

Suggested Reading:
With effect from the Academic Year 2015-2016

ES 206 EC

ELECTRONIC ENGINEERING – 1

Instructions 3 Hours/week
Duration of University Examination 3 Hours
SEE 70 Marks
CIE 30 Marks
Credits 3

UNIT – 1
Semiconductors & diodes:
Diode circuits:
Diode as a rectifier-Half-wave, Full-wave and Bridge Rectifiers, types of Filters, Capacitor and inductor filter, zener diode as a voltage regulator, Ripple Factor and Regulation Characteristics.

UNIT – 2
Bipolar Junction Transistor:
NPN and PNP junction Transistors, Transistor current components, CB, CE and CC Configurations and their Characteristics, Saturation, Cutoff and Active Regions, Comparison of CE, CB and CC Configurations, Maximum voltage rating, The operating point, fixed-bias, emitter stabilized bias circuits, Voltage-divider bias, DC bias with voltage feedback, Stabilization, Bias compensation, Thermal Runaway, Thermal Stability, High frequency model of a Transistor.

UNIT – 3
Small Signal – Low Frequency Transistor amplifier Circuits:
Transistor as an Amplifier, Simplified CE and CC hybrid models, The h parameters of the three transistor configurations, Analysis of Transistor Amplifier Circuits using h–parameters. Linear analysis of a Transistor circuit, BJT transistor modeling parameters: Zi, Z0, Av, Ai. Miller’s theorem and it’s duality, The CE amplifier with emitter resistance, Darlington pair, Analysis of Single Stage Amplifiers.

UNIT – 4
Field Effect Transistors:
The Junction field effect transistor, Pinch off Voltage, Volt-ampere characteristics, Drain Saturation Current, Small Signal model of FET, MOSFET – Enhancement and Depletion Modes. The low Frequency common source and common drain amplifiers, FET biasing.

UNIT – 5
Feedback Amplifiers:
**Suggested Reading:**

HS 204 EG

BUSINESS COMMUNICATION SKILLS AND PRESENTATION SKILLS

(common to all branches)

Instructions  3 Hours/week
Duration of University Examination  3 Hours
SEE  70 Marks
CIE  30 Marks
Credits  3

The following are the objectives of the courses

To enable the students to

- communicate clearly, accurately and appropriately
- learn different models of interpersonal communication
- work in teams effectively and learn how to be effective in using time
- comprehend the difference between technical and general writing
- write reports, scientific papers, letters, Statement of Purpose, Resume
- learn how to plan and prepare to face interviews effectively

UNIT – I

Business Communication: Importance of business communication; ABC of technical communication – Accuracy, Brevity, Clarity; Channels of communication: Downward communication, Upward communication, Diagonal communication, Horizontal communication; Organisational GDs

UNIT – II

Interpersonal Communication and Personality Development: Models of interpersonal development, Johari window, Knapp's model, styles of communication; Team work; Persuasion techniques; Mobile Etiquette, e-mail Etiquette; Time Management

UNIT – III

Technical Written Communication: Differences between Technical Writing and General Writing; Report Writing: Types of Reports, Structure/Format, Language Style, Writing Technical Reports; Writing Scientific Papers

UNIT – IV

Career Oriented Written Communication: Writing SOPs; Job Application: Language style and Format; Résumé writing: design and style; Cover Letter; Business Letters: Letters of enquiry and responses, Letters of complaint, Letters of adjustment, Sales letters; Agenda and minutes of the meeting

UNIT – V
Interview Skills and Group Discussions: Interviews: Purpose, Planning, Preparation, Language and style, Sample interview questions and answers; Group discussions: Types of GDs, Features of good GDs, Preparing for a group discussion

Textbook prescribed:

Books Recommended:
BS 251 PH

ENGINEERING PHYSICS LAB -II
(Common to All Branches)

Instructions 2 Hours/week
Duration of University Examination 3 Hours
SEE 50 Marks
CIE 25 Marks
Credits 1

1. **Dielectric Constant:** To determine the dielectric constant and phase transition temperature of given material (PZT).

2. **B-H Curve:** (a) To draw graph between the magnetising field and the intensity of magnetisation of a ferromagnetic specimen and (b) To determine i) Coercivity ii) Retentivity and iii) Hysteresis loss of given specimen (soft iron) from the graph.

3. **P-N Junction Diode:** To draw the volt-ampere characteristics of the given P-N junction diode.

4. **Photo Cell:** To determine the planck's constant and the work function of the photometal.

5. **Thermister:** To draw the temperature characteristics of a thermistor and to evaluate the constants

6. **Solar Cell:** To draw I-V characteristics of a solar cell and to calculate the (a) Fill factor (b) Efficiency and (c) Series resistance

7. **Hall Effect:** To determine the (a) Hall coefficient (b) Carrier concentration and (c) Mobility of charge carriers of given semi conducting material.

8. **Thermo Electric Power:** To calculate (a) Thermoelectric power (b) Fermi Energy and (c) Carrier concentration of given ferrite sample.

9. **Four Probe Method:** To determine the conductivity of semiconductors.

**Demonstration Experiments:**

1. X – Ray Diffractometer
2. D.C. Conductivity
3. Preparation of Nano materials- Sol-gel method
BS 252 CH

APPLIED CHEMISTRY LAB

(for BME II semester)

Instructions: 2 Hours/week

Duration of University Examination: 3 Hours

SEE: 50 Marks

CIE: 25 Marks

Credits: 1

1. Identification of the functional group in the given organic compound by qualitative test:
   - i) Carboxylic acids
   - ii) Phenols
   - iii) Amines
   - iv) Aldehydes and ketones
   - v) Carbohydrates

2. Preparation of the following Organic Compounds:
   - i) Acetanilide
   - ii) Aspirin
   - iii) Azo-dye
   - iv) Benzyalidene aniline

3. Acid-base titrations using the following instruments
   - i) Conductivity meter
   - ii) pH meter
   - iii) Potentionmeter

4. Estimation of Glucose by colorimetry

Suggested Readings:


ES 253 CS

COMPUTER SKILLS LAB

(Common to all branches)

Instruction: 2 Hours /Week
Duration of University Examination: 2 Hours
CIE: 25 Marks
SEE: 50 Marks
Credits: 1

Course Objectives:
- To learn assembling and disassembling of PC Hardware
- To understand the installation of Operating systems
- To be able to acquire skills in Productivity tools

I: PC Hardware
1. Identify the peripherals of a computer. (Processor, Memory chips, Mother board, Disk drives, and Controller card such as AGP board, Network cards, Sound card, as well as Parallel and Serial ports etc.,)

II: Productivity Tools:
2. Presentation using MS-PowerPoint: Creating presentation slides and Enhancing Slides with features like Organizational charts, Excel Charts, Word Art, Objects, Animations and Sounds, Inserting Animated Pictures or Accessing through Object.
3. MS Excel: Introduction to MS-Excel, Creating & Editing Worksheet, Formatting and Essential Operations, Formulas and Functions- like sum, average, standard deviation, and charts.
4. Internet and HTML:
   a) Telnet/Secure Shell (Remote login to university computers)
   b) Electronic Mail (Communicating with email software)
   c) File Transfer Protocols (transferring files between networked computers)
   e) Publishing Web Pages (Using HTML editors to create personal web sites)
   f) Create the web-page (With title, text, frames, hyperlinks to some sites, pictures, lists, tables, fonts and colors) without using any web authoring tools.

Suggestion Reading:

ES 256 EC

ELECTRONICS ENGINEERING LAB-I

Instructions 2 Hours/week
Duration of University Examination 3 Hours
SEE 50 Marks
CIE 25 Marks
Credits 1

1. Usage of multimeter, CRO, function generator, LCR meter, power supplies and bread board.
2. Characteristics of Semi-conductor Diodes (Si, Ge and Zener)
3. Static characteristics of Bipolar-junction Transistors CB configuration
4. Static characteristics of Bipolar-junction Transistors CE configuration
5. Characteristics of Field effect Transistors
6. Half-wave Rectifier with and without filters
7. Full-wave Rectifier with and without filters
8. Regulators:
   a) Series and Shunt Regulators
   b) Regulators ICs
9. Clipping and clamping circuits using diodes
10. Frequency response of single stage amplifier
11. Characteristics of Voltage series and Voltage shunt feedback amplifiers
12. Characteristics of Current series and Current shunt feedback amplifiers
ES 257 BM

CIRCUIT DESIGN AND SIMULATION LAB

Instructions: 2 Hours/week
Duration of University Examination: 3 Hours
SEE: 50 Marks
CIE: 25 Marks
Credits: 1

1. Identification and testing of different types of diodes, resistors, capacitors and transistors.
2. Usage of multimeter, CRO, function generator, LCR meter, power supplies and bread board.
3. Familiarization with multisim software.
4. Simulation of following circuits using Multisim:
   1. Characteristics of Semi-conductor Diodes (Si, Ge and Zener)
   2. Characteristics of CB and CE amplifier configuration
   3. Characteristics of Field effect Transistors
   4. Half-wave and full-wave Rectifiers with and without Filters
   5. Series and shunt regulators
   6. Regulator ICs
   7. Clipping and clamping circuits using diodes
   8. Frequency response of single stage amplifier
COMMUNICATION SKILLS LABORATORY
(common to all branches)

Instructions 2 Hours/week
Duration of University Examination 3 Hours
SEE 50 Marks
CIE 25 Marks
Credits 1

The following are the objectives of the course:
To enable the students to
• learn the appropriate use of language
• learn to use the appropriate body language
• participate in group discussions and debates
• improve their public speaking skills
• improve their presentation and participation skills
• learn how interviews are conducted and faced

Note: While teaching the following items, emphasis may be laid on intensive practice in
the language lab. Lecturing may be avoided as far as possible.

1. **Role play**: Use of dialogues in a variety of situations and settings
2. **Presentation Skills**: Making effective presentations, Expressions which can be used in
   presentations, Use of non-verbal communication, Coping with stage fright, Handling questions
   and answer session
3. **Public Speaking**: Planning, Preparation, Techniques of delivery, Handling stage fear/fright
4. **Group Discussion**: Initiating, continuing and concluding a GD, Giving feedback; Practising
   case studies and Topic based GDs
5. **Debate**: Differences between a debate and a group discussion, Essentials of a debate,
   Participating in a debate
6. **Interview Skills**: Facing interviews confidently, Use of suitable expressions during interviews;
   Mock interviews
With effect from the Academic Year 2015-2016

Lab Manual Recommended:


Suggestion Reading:

BS 203 CH

ENGINEERING CHEMISTRY - II
(FOR ALL BRANCHES EXCEPT BME)

Instructions
3 Hours/week
Duration of University Examination
3 Hours
SEE
70 Marks
CIE
30 Marks
Credits
3

Objective:
- To study the various types of electrodes, cells and batteries & their applications.
- To study the various types of corrosion, the factors that influencing the corrosion & various corrosion controlling methods.
- To study the various types of chemical fuels, composites & liquid crystals.


Unit-II: CHEMISTRY OF BATTERIES: Chemical Cells: Primary batteries: Zin–Carbon battery. Secondary batteries: Lead-acid battery, Nickel-Cadmium battery-charging and discharging reactions and its applications. Modern Lithium batteries, advantages and applications.
Solar Cells: Concept of Solar energy conversion. Photovoltaic cells.
Fuel Cells: Concept of fuel cells and their advantages. $\text{H}_2$-$\text{O}_2$ alkaline fuel cell and methanol-Oxygen fuel cell.


Surface Coatings: Types of metallic coatings-anodic and cathodic coatings methods of application of metallic coatings: Hot-dipping, galvanizing, tinning and electroplating. Paints-constituents and their functions.

Unit–IV: CHEMICAL FUELS: Definition and Classification. Requirement of a good fuel, advantages, disadvantages of solid, liquid and gaseous fuels.


Solid Fuels: Coal-Proximate and Ultimate analysis and its significance.


Gaseous fuels: LPG, CNG composition and uses.


Insulators: Thermal and Electrical- their Characteristics and applications.

Suggested Readings:

6. Engineering Chemistry by C. Parameshwara Murthy, CV Agarwal and Andra Naidu BS Public
ES 252CE

ENGINEERING GRAPHICS-II
(Civil Engineering)

Instructions: 3 Hours/week
Duration of University Examination: 3 Hours
SEE: 70 Marks
CIE: 30 Marks
Credits: 3

Course Objectives:

- To understand the Engineering drawing concepts of section of solids and development of their surfaces.
- To know basic concepts of isometric projections.
- To determine the orthographic projections for solid sections.
- To analyze and obtain the perspective views for different solid bodies.

UNIT-I
Sections of Solids: True shape of solids, sections of prisms, pyramids, cylinders and cones.
3D modeling: Poly, Orbit, Mesh, Array, Clip.

UNIT-II
Development of Surfaces: Basics concepts of developments of surfaces. Methods of development-parallel line development and redial line development. Development of prisms, pyramids, cylinders and cones

UNIT-III
Intersection of surfaces: Intersection of cylinder and cylinder and cone.

UNIT-IV
Isometric Projections: Isometric Scale, Isometric projections of prisms, pyramids, cylinders, cones and spheres, and combinations of two or three solids

UNIT-V
Perspective Views: Perspective views of straight lines, plane figure (triangle, square, pentagon, hexagon, circle), and simple solids (cylinder cone, regular prism, regular pyramid) using Visual Ray Method and Vanishing Point method.

Suggested Reading:
ES 205 CE

ENGINEERING MECHANICS-II
[Common to Civil Engineering and Mechanical Engineering]

Instructions 3 Hours/week
Duration of University Examination 3 Hours
SEE 70 Marks
CIE 30 Marks
Credits 3

Course Objectives:
• To understand the mass moment of inertia analysis for the different bodies.
• To know basic concepts of dynamic loads, their behavior, analysis and motion bodies
• To determine the work energy principles and impulse momentum theory

UNIT-I
Centre of Gravity and Mass Moment of Inertia: Centre of gravity and mass moment of inertia for solid and composite bodies. Radius of gyration

Virtual Work: Principle of virtual work and its application to simple systems.

UNIT-II
Kinematics: Rectilinear motion, curvilinear motion, Velocity and acceleration, Types of rigid body motion, and its analysis in a plane.

UNIT-III
Kinetics: Analysis as a particle and as a rigid body in Translation, Fixed axis rotation, Rolling bodies and Plane motion.

UNIT -IV

UNIT-V
Impulse momentum: Linear impulse momentum, Conservation of momentum, Elastic impact and Plane motion.

Suggested Reading:

BS 252 CH

ENGINEERING CHEMISTRY LAB - II
(FOR ALL BRANCHES EXCEPT BME)

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INSTRUMENTAL ANALYSIS

CONDUCTOMETRY
1. Conductometric and acid-base strong acid vs strong base titration
2. Conductometric weak acid vs strong base titration
3. Conductometric mixture of acids vs strong base titration
4. Conductometric precipitation titration-barium chloride against sodium sulphate

POTENTIOMETRY
1. Potentiometric acid-base titration –strong acid vs strong base, using quinhydrone electrode.
2. Potentiometric redox titration-KMnO₄ vs Fe²⁺

pH Metry
1. pH metry strong acid vs strong base titration
2. pH metry weak acid vs strong base titration

COLORIMETRY
1. Verification of Beer’s Law –using Potassium permanganate
2. Estimation of KMnO₄(Mn) in the given solution
3. Estimation of iron in cement

KINETICS
1. First order reaction-hydrolysis of methyl acetate
2. Second order reaction-potassium iodide and persulphate

Suggested Readings:

With effect from the Academic Year 2015-2016

ES 258 ME

ENGINEERING WORKSHOP -II
(Common to Civil & Mechanical)

Instructions 2 Hours/week
Duration of University Examination 3 Hours
SEE 50 Marks
CIE 25 Marks
Credits 1

Objectives
1. To know the usage of smithy tools and its operations.
2. To acquire the skills in welding and machining of metals.
3. To familiarize with usage of plumbing tools for making pipe joints and PC parts assembly

LIST OF EXERCISES

SMITHY
1. Flattening Operation
2. Bending Operation
3. Upsetting Operation
4. Fullering Operation

WELDING
1. Demonstration of Arc and Gas Welding
2. Bead formation on a plate
3. Lap and Butt Joints
4. Brazing and Soldering

MACHINING
1. Plain and Step Turning Operations
2. Knurling Operation
3. Taper turning Operation
4. Thread Cutting Operation

PLUMBING
1. Making Single Joint with Coupling and Union.
2. Making 90° Pipe Joint using Elbow/Bend
3. Making Tee and 4-way joint
4. Making pipe joint with two different diameters (3/4” x 1/2” Reducer)

PC ASSEMBLY
1. Demo of Assembling PC components

Suggested Reading

**ES 210 ME**

**ELEMENTS OF MECHANICAL ENGINEERING**

(Common to ECE & EEE)

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<td>SEE</td>
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<td>CIE</td>
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**Objectives**

- To understand basic concepts of thermodynamics.
- To understand applications of thermodynamics concepts.
- To understand the working principles of I.C. engines, Reciprocating compressors and Refrigeration
- To familiarize the design and working principles of drives transmission systems.
- To understand various manufacturing processes.

**UNIT- I**

Statements of 0th, 1st, 2nd and 3rd Laws of thermodynamics with their applications. Representation of thermodynamics processes on P-V and T-s plots. Ideal gas equation. Relations for internal energy and entropy changes, heat and work transfers for closed systems. Steady flow energy equation for an open systems-derivation and applications in turbines, compressors, nozzles and diffusers. Relations for enthalpy changes, heat and work transfers for open systems.

**UNIT-II**

**Power Cycles:** Concept of air standard cycles- Otto, Diesel, Joule cycles with applications. Representation of Cycles on P-V and T-s plots. Calculation of Cycle efficiencies.

**IC Engines:** Classification of IC Engines. Mechanical components of IC Engines. Working Principles of four stroke and two stroke cycle engines. Differences between petrol and diesel engines. Calculation of engine parameters -IP, BP, Specific fuel consumption, mechanical and thermal efficiencies.

**UNIT-III**


Refrigeration: Carnot and Reversed Carnot Cycles-representation on T-s, P-V and P-h Plots.
With effect from the Academic Year 2015-2016

principle of vapour compression refrigeration system. COP calculation. Common refrigerants in use.

UNIT-IV

**Belt drives:** Velocity ratio, effect of slip, belt thickness and creep. Length of open and cross belts. Ratio of tensions, centrifugal tension and its effect on power transmission. **Gear drives:** Nomenclature and types of gears. Problems on simple, compound and epicyclic gear trains. **Governors:** Working of Watt, Porter and Hartnell governors. Effect and power of governor, Effect of friction. Stability of governor and isochronism. Balancing of several masses in one plane and in several planes.

UNIT- V


**Suggested Reading**

PC 211 EC

ELECTRONIC DEVICES

Instructions 3 Hours/week
Duration of University Examination 3 Hours
SEE 70 Marks
CIE 30 Marks
Credits 3

Objectives:
- To understand the characteristics and applications of Diode.
- To understand the characteristics, configurations and biasing of transistors.
- To understand the characteristics and biasing of FET.
- To study the working of CRO.
- To study the working of Thyristors and their characteristics.

Unit 1 Formation of PN diode: Types of materials, electrons and holes in an Intrinsic Semiconductor, Conductivity of a semiconductor, Carrier concentrations in an Intrinsic Semiconductor, Fermi level in an Intrinsic semiconductor, Donor and Acceptor impurities, Fermi level in a semiconductor having impurities, Diffusion.
PN junction as a diode: band structure of an open circuited PN junction, Current components in a pn diode, Volt-ampere characteristics, Temperature dependence of pn characteristics, diode resistance, Transition capacitance, Diffusion capacitance, PN diode forward bias and reverse bias condition.

Unit 2 Rectifiers: Half-wave, Full-wave and bridge rectifiers and their performance characteristics. Design of rectifiers with filters (L, C, LC and π). Comparison of different rectifiers with and without filters.


Unit 4 Field Effect Transistors: JFET formation, FET operation, Pinch-off Voltage, V-I characteristics. Comparison of BJT and FET. MOSFET, Enhancement MOSFET and Depletion MOSFET and characteristics.

Unit 5 Special Devices: Zener diode, Tunnel diode, Varactor diode, Schottky diode, Photo diode and their Input-Output characteristics. SCR, Diac, Triac, UJT, CRO - Block diagram and its applications in Electronic measurements.

Suggested Reading:


ES 212 EE

**BASIC ELECTRICAL ENGINEERING**
*(Common to ECE&CSE)*

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<tr>
<td>CIE</td>
<td>30 Marks</td>
</tr>
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<td>Credits</td>
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**Objectives:**
1. To acquire knowledge in circuits and principle operation of electrical machines.
2. To be able to understand the tariff and safety measures.

**Unit-I**

**DC & AC Circuits**:
- Ohm’s law, Kirchhoff’s laws, Series & parallel circuits, Star & Delta conversions, Thevenin’s, Norton’s and Superposition theorems (analysis with DC excitation only).
- **A.C. Circuits**: Production of sinusoidal voltage, Phasor representation of sinusoidal quantities, Average & rms values, Form factor, RLC circuits excited by sinusoidal input. Active & reactive power, power factor.

**Unit-II**

**3-Phase Balanced Circuits**: Star & Delta connections, Measurement of 3-phase power by two-wattmeter method.

**Single-Phase Transformer**: Principle of operation, Constructional details, Transformer on no-load and on load, OC & SC tests, Losses, Efficiency, Regulation.

**Unit-III**

**DC Generator**: Principle of operation, Constructional details, EMF equation, Types of generators, Armature reaction, No-load & Load characteristics, Losses & efficiency, Applications.

**DC Motor**: Principle of operation, Types of motors, Torque equation, 3-point starter, Characteristics of DC motors, Speed control of DC shunt motor, Losses & efficiency, Applications.

**Unit-IV**

**Three-phase Induction Motor**: Production of rotating field, Constructional details. Types of motors, Torque-slip characteristics, Star-delta starter, Auto-transformer starter, Losses & efficiency, Applications.

**Single-phase Induction Motors**: Principle of operation, Capacitor run & Capacitor start motor, Applications.

**Unit-V**


**Electrical Safety Measures**: Earthing and its Importance, Safety practices, Basic ideas of Fuse, Circuit Breaker, and relay.
Suggested Reading
PC 259 EC

ELECTRONIC DEVICES LAB

Instructions: 2 Hours/week
Duration of University Examination: 3 Hours
SEE: 50 Marks
CIE: 25 Marks
Credits: 1

Objectives:

- To understand the characteristics of Diode.
- To understand the input and output characteristics of different Transistor configurations.
- To understand the input and output characteristics of FET.
- To study the working of CRO.
- To study the characteristics of different devices, UJT, SCR.

List of Experiments:

1. Study of CRO.
2. Static Characteristics of Diodes (Si, Ge)
4. Ripple and Regulation characteristics of Half-wave, Full-wave and Bridge rectifiers.
5. Ripple and Regulation characteristics of Half-wave, Full-wave and Bridge rectifiers with Filters (C, L, LC and π)
6. Static Characteristics of CB Configuration of Transistor
7. Static Characteristics of CE Configuration of Transistor
8. Static and Transfer Characteristics of FET.
9. Static characteristics of CS configuration of FET.
10. Characteristics of special device UJT.
11. Characteristics of special device SCR.
12. Characteristics of Light emitting Diode and Photo diode.

Suggested Reading:

PC 213 CS

OBJECT ORIENTED PROGRAMMING USING C++

Instructions : 3 Hours/Week
Duration of SEE : 3 Hours
SEE : 70 Marks
CIE : 30 Marks
Credits : 3

Course Objectives:

- To understand basic notions of object oriented programming
- To acquire object-oriented problem solving skills
- To be able to write programs in C++

UNIT - I
Introduction to C++: Programming paradigms, Object Oriented Programming Concepts, Advantages and Applications of OOPs. Variables and assignments, Data types, expressions, Simple flow control and Control structures.

UNIT - II

UNIT – III
Strings, Pointers and Dynamic Arrays, Recursion, Constructors, Destructors, Copy Constructors. Inheritance: The notation of inheritance, derived classes, overriding, Virtual Base Class

UNIT-IV
Static Polymorphism: Function and Operator overloading, Friend function, Runtime Polymorphism, Virtual functions, and Exception Handling. Function Templates, and Class Templates.

UNIT – V
Pointers and Linked Lists: Nodes and linked lists, Implementation of stacks and queues using arrays and linked lists, Operation on linked lists- inserting a node, deleting a node, searching for a node.
Suggested Reading:


With effect from the Academic Year 2015-2016

PC 260 CS                                      C++ PROGRAMMING LAB

Instruction : 2 Hours/Week
Duration of SEE : 2 Hours
SEE : 50
CEE : 25
Credits : 1

Course Objectives:

- To be able to write, compile and debug programs in C++
- To be able to formulate problems and implement in C++.
- To be able to acquire skills to solve computing problems in real-world.

1. Implementation of complex numbers using classes.
2. Implementation of matrix class.
3. Programs using constructors, destructors and copy constructors.
5. Programs on Inheritance.
6. Programs on Function overloading, operator overloading, and Exception Handling
7. Programs on Virtual Functions, Dynamic polymorphism.
8. Programs on Function templates and Class templates.
9. Implementation of Stack using arrays and linked list.
10. Implementation of Queue using Arrays and Linked list.
With effect from the Academic Year 2015-2016