

**GOVERNMENT POLYTECHNIC COLLEGE, PULWAMA**  
**Islamic University of Science & Technology, Awantipora**  
**Syllabi for Lateral Entry Entrance Examination (Electrical Engineering)**

**PART A (BASIC SCIENCES)**

**MATHEMATICS:**

**(15 Marks)**

**UNIT- 1 Quadratic Equations**

Standard form of Quadratic equation  $ax^2+bx+c=0,(a\neq 0)$ , solution of quadratic equation (only real roots) by factorization any by completing the square, i.e.by using quadratic formulas, relationship between discriminant and nature of roots. Problems related to day to day activities to be incorporated

**UNIT-2 Introduction to Trigonometry**

Trigonometric ratios of an acute angle of a right angled triangle. Proof of their existence (well defined)

Values with proofs of the trigonometric ratios of  $30^\circ, 45^\circ$  and  $60^\circ$ . Relationship between the ratios.

Trigonometric identities, Proofs and applications of the identity  $\sin 2A + \cos 2A = 1$ , only simple identities to be given. Trigonometric ratios of complementary angles.

**Heights and Distances :**

Simple and believable problems on heights and distances. Problems should not involve more than two right triangles. Angle of elevation/ depression should be only  $30^\circ, 45^\circ, 60^\circ$ .

**UNIT-3 Mensuration/ Surface Areas and Volumes**

Problems on finding area/surface areas / volumes of different geometrical figures & combinations of any two of the following:

Cubes, cuboids, spheres, hemispheres and right circular cylinders/ cones, frustum of a cone.

**CHEMISTRY:** (15 Marks)

**UNIT-1 Chemical Reactions and Equation**

- Chemical equation, writing of chemical equation; Balancing chemical equations.
- Types of chemical reactions; Viz. Combination reactions; Decomposition reactions;
- Displacement reactions; Double displacement reactions; Oxidation and reduction.

- Effects of oxidation and reduction reactions in everyday life, viz. corrosion and rancidity

### **UNIT-2 Carbon and its compounds**

- Bonding in Carbon, Covalent bond, Allotropes of carbon;
- Versatile nature of carbon; Saturated and unsaturated hydrocarbons; chains; Branches and rings; homologous series and its characteristics; nomenclature of Carbon compounds.
- Chemical properties of carbon compounds viz. combustion; oxidation; Addition and substitution reactions.
- Important Carbon compounds and their properties.

### **UNIT-3 Metals and non-metals**

- Physical properties of metals and non-metals.
- Chemical properties of metals like action of water, air, acids, salts; Reactivity series of metals.
- Cause of reactivity of metals and non-metals. Properties of ionic compounds.
- Occurrence of metals; their extraction, enrichment of ores, Extraction of metals in accordance with activity series; refining of metals.
- Corrosion of metals

## **PHYSICS:**

**(15Marks)**

### **Unit 1 Laws of Motion /Friction**

Concept of Distance, Displacement, speed, velocity & acceleration  
Newton's laws of motion and its applications  
Friction, Types of Friction and its applications.

### **Unit 2 Work, Power & Energy**

Concept of Work, Power & Energy and their units.  
Simple numerical on Work, power & energy.

### **Unit 3 Force**

Concept of Force and its units. Laws of Forces and determination of Resultant of forces.  
Simple numerical for calculating resultant and direction of forces.

## **PART B (Electrical Engineering)**

### **Drawing:**

**(10 Marks)**

Conventions/ Conventional brakes  
Symbols of Electrical / Mechanical /Civil equipments/appliances  
Different types of lines

### **Fundamentals of Electrical Engineering(15 Marks)**

#### **Unit 1 Basic Electrical Quantities**

Basic concept of charge, current, voltage, resistance, power, energy and their units  
Conversion of units of work, power and energy from one form to another

#### **Unit 2 DC Circuits**

Ohm's law, resistances in series and parallel  
Kirchhoff's laws and their applications in solving electrical network problems  
Network theorems such as Thevenin's theorem, superposition theorem Maximum power and transfer theorem and Norton's theorem

#### **Unit 3 Electromagnetic Induction:**

Faraday's Laws of electromagnetic induction  
Lenz's law  
Fleming's Right and Left Hand Rule  
Principle of self and mutual induction  
Principle of self and mutually induced e.m.f. and simple problems  
Inductances in series and parallel  
Energy stored in a magnetic field  
Concept of eddy currents, eddy current loss

#### **Unit 4 AC Fundamentals**

Concept of a.c. generation (single phase and three phase)  
Difference between a.c and d.c  
Concept of alternating current and voltage, equation of instantaneous values, average value, r.m.s value, form factor, power factor etc.  
Concept of phasor and phase difference.

## **ELECTRICAL ENGINEERING MATERIALS(15 Marks)**

### **Unit 1 Classification:**

Classification of materials into conducting, semi conducting and insulating materials

### **Unit 2. Conducting Materials**

#### Introduction

Resistance and factors affecting it such as alloying and temperature etc

Classification of conducting material as low resistivity and high resistivity materials,

Low resistance materials

#### Copper:

General properties as conductor: Resistivity, temperature coefficient, density, mechanical properties of hard-drawn and annealed copper, corrosion, contact resistance. Application in the field of electrical engineering.

#### Aluminium:

General properties as conductor: Resistivity, temperature coefficient, density, mechanical properties of hard and annealed aluminium, solderability, contact resistance. Applications of aluminium in the field of electrical engineering.

#### Steel:

General properties as conductor: Resistivity, corrosion, temperature coefficient, density, mechanical properties, solderability, Applications in the field of electrical engineering.

### **Unit 3. Insulating materials; General Properties:**

#### Electrical Properties:

Volume resistivity, surface resistance, dielectric loss, dielectric strength (breakdown voltage) dielectric constant

#### Physical Properties:

Hygroscopicity, tensile and compressive strength, abrasive resistance, brittleness

#### Thermal Properties:

Heat resistance, classification according to permissible temperature rise. Effect of overloading on the life of an electrical appliance, increase in rating with the use of insulating materials having higher thermal stability, Thermal conductivity, Electro-thermal breakdown in solid dielectrics

#### Chemical Properties:

Solubility, chemical resistance, weatherability

Mechanical properties, mechanical structure, tensile structure

### **Unit 4. Special Materials**

Thermocouple, bimetals, leads soldering and fuses material, mention their applications

## **Unit 5**

Introduction of various engineering materials necessary for fabrication of electrical machines such as motors, generators, transformers etc

## **Electrical Machines**

**(Marks 15)**

### **Unit 1 Introduction to Electrical Machines**

Definition of motor and generator

Torque development due to alignment of two fields and the concept of torque angle

Electro-magnetically induced emf

### **Unit 2 DC Machines**

Main constructional features

Function of the commutator for motoring and generation action

Factors determining the electromagnetic torque

Types of dc generation on the basis of excitation, voltage built up in a dc shunt generator

Significance of back e.m.f., the relation between back emf and Terminal voltage

Armature Reaction

Performance and characteristics of different types of DC motors

Speed control of dc shunt/series motors

Applications of DC motors

Losses in a DC machine

### **Unit 3 Transformers (single phase)**

Constructional features of a transformer and parts of transformer

Working principle of a transformer

Transformer on no-load

Relation between induced emf and terminal voltage, regulation of a transformer

Losses in a transformer

Open circuit and short circuit test. Calculation of efficiency, condition for maximum efficiency-maintenance of Transformer, scheduled Maintenance

### **Unit 4 Three phase Transformers**

Construction of three phase transformers and accessories of transformers

Types of three phase transformer i.e. delta-delta, delta-star, star-delta and star-star