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

PART A (BASIC SCIENCES)

MATHEMATICS: (15 Marks)

UNIT- 1 Quadratic Equations

Standard form of Quadratic equation ax2+bx+c=0,(a=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',45' and 60'. 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^o , 45^o ,60^o .

UNIT-3Mensuration/ 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 (MECHANICAL ENGINEERING)

Drawing: (10 Marks)

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

IC Engines (Marks 15)

Unit 1 Introduction

Working principle of two stroke and four stroke cycle, SI engines and CI engines, Otto cycle, diesel cycle and dual cycle

Location and functions of various parts of IC engines and materials used for them

Unit 2 Fuel Supply and Ignition System in Petrol Engine

Concept of carburetion
Air fuel ratio
Simple carburetor and its application, MPFI, Common rail system, super charging and turbo charger
Description of battery coil and magneto ignition system, fault finding and remedial action in ignition system

Unit 3 Fuel System of Diesel Engine

Components of fuel system
Description and working of fuel feed pump
Fuel injection pump
Injectors

Unit 4 Testing of IC Engines

Engine power - indicated and brake power
Efficiency - mechanical, thermal. relative and volumetric
Methods of finding indicated and brake power
Morse test for petro1 engine

Refrigeration (Marks 15)

Unit 1 Fundamentals of Refrigeration

Introduction to refrigeration, and air conditioning, meaning of refrigerating effect, units of refrigeration, COP, difference between COP and efficiency, methods of refrigeration, Natural system and artificial system. Rating of refrigeration

Unit 2 Vapour Compression System

Introduction, principle, function, parts and necessity of vapour compression system, T- ϕ and p– H charts, dry, wet and superheated compression. Effect of sub cooling, super heating, mass flow rate, entropy, enthalpy, work done, Refrigerating effect and COP. actual vapour compression system

Unit 3 Air Refrigeration System

Introduction, advantages and disadvantages of air-refrigeration system over vapour compression system

Workshop Technology (Marks 15)

Unit 1Welding

Welding Process

Principle of welding, Classification of welding processes, Advantages and limitations of welding, Industrial applications of welding, Welding positions and techniques, symbols.

Unit 2 Gas Welding

Principle of operation, Types of gas welding flames and their applications, Gas welding equipment - Gas welding torch, Oxy acetylene cutting torch, Blow pipe, Pressure regulators, Filler rods and fluxes

Unit 3 Arc Welding

Principle of operation, Arc welding machines and equipment, A.C. and D.C. arc welding, Effect of polarity, current regulation and voltage regulation, Electrodes: Classification, B.I.S. specification and selection, Flux for arc welding

Unit 4 Pattern Making

Types of pattern, Pattern material, Pattern allowances, Pattern codes as per B.I.S., Introduction to cores, core boxes and core materials, Core making procedure, Core prints, positioning of cores

Unit5 Moulding and Casting

Moulding Sand

Properties of moulding sand, their impact and control of properties viz. permeability, refractoriness, adhesiveness, cohesiveness, strength, flow ability, collapsibility, Various types of moulding sand,Testing of moulding sand.