General English (Full Marks: 100)

(a)	Essay Writing (Not more than 300 words)
(b)	Idioms & Phrases (Objective Type/MCQ)
(c)	Comprehension of given passages
	(Objective Type/MCQ)
(d)	Grammar: (Objective Type/MCQ)
	Parts of Speech: Nouns, Adjective, Verb, Adverb, Preposition, etc
(e)	Composition (Objective Type/MCQ)
	(i) Analysis of complex and compound sentences.
	(ii) Transformation of sentences.
	(iii) Synthesis of sentences.

MECHANICAL ENGG. (Objective Type/MCQ) Paper-I (Full Marks: 150)

Unit I Mechanics of Materials:

(f)

22 Marks

Hooke's law, Young's modulus, Shear modulus of rigidity, Poisson's ratio, generalized Hooke's law for two dimensional stress, relation among the elastic constants for an isotropic material determination of principle stresses and strains. Stresses in welded joints: butt weld and fillet weld. Determination of principal stresses and strains, thin walled cylindrical and spherical pressure vessels. Simple bending of beams, torsion of shaft, columns and struts

Unit II Design of machined elements:

20 Marks

Material behaviour and design factors for dynamic load; design of circular shafts for bending and torsional load only; design of screwed joints; design of belts and gears for transmission of power.

Unit III Theory of Machines:

- 24 Marks

Kinematic and dynamic analysis of plane mechanisms. Cams, Gears and epicyclic gear trains, flywheels, governors, balancing of rigid rotors, balancing of single and multicylinder engines. Ropes, belts and chain drives. Functions of Brakes, clutches and dynamometers.

Unit IV Machine Tools

20 Marks

Metal cutting and cutting tools- Metal cutting by chip forming process, drives and mechanisms in machine tools- Machine tool motions, Lathe- types of lathe tools and their uses; drilling machine-Operations, classification, specifications. Shaper, Planer, Slotter and broaching - Operations, classification, specifications. Operations, classifications, specifications of Milling machine, Boring machine, Grinding machine, Gear hobbing machine, Capstan & Turret lathe. Principles of numerical control; operation of NC, CNC and DNC systems: point-to-point, continuous path / contour system.

Unit V Manufacturing Processes

30 Marks

Mechanical properties of metals and alloys, manufacturing of iron and steel, carbon and alloy steels. Metallurgy in manufacturing, Microstructure of Metals, Equilibrium diagram of alloys. Heat treatment of steel, Casting processes. Fabrication processes- mechanical joining, adhesive joining, welding, brazing and soldering. Gas welding and cutting, electric Arc welding and cutting. Metal working processes - Forging and rolling.

Non-conventional machining: Chemical Machining, Electrochemical Machining, Electro Discharge Machining (EDM), Laser Beam Machining, Electron Beam Machining, Water Jet Machining, Abrasive Jet Machining.

Unit VI Production Management:

24 Marks

Plant location and layout, material handling- Factors affecting plant location; necessity of plant layout; process and product layout; work station design; procedural steps for making a plant layout; Demand forecasting, Production planning and control measures. Product inspection and quality control; raw materials management and inventory control.

Work study - Concept and objectives of work study; method study procedure: flow process chart, flow diagram; principles of product design for mass production and simple operations research (OR) models.

Unit VII Mechanical Measurement:

10 Marks

Concept of fits and tolerances; tools and gauges; comparators; inspection of length; position, profile and surface finish. Linear measurement, angular measurement; measurement of screw threads and gears.

Machine tool metrology - Tests for level of installation of machine in horizontal and vertical planes.

MECHANICAL ENGG. (Objective Type/MCQ) Paper-II (Full Marks: 150)

Unit I Fluid Mechanics:

10 Marks

Fluid and properties of fluid. Pressure and its measurement -Intensity of pressure; pressure head; Pascal's Law. Equilibrium of floating bodies- Archimedes' principle; buoyancy and principle of floatation. Flow of fluid and flow through pipes- Chezy's equation and Dancy's equation of head loss, Reynold's number and its effect on pipe friction; open channel flow and flow measurement.

Unit II Fluid Machines:

24 Marks

Various types of pumps, reciprocating pump; centrifugal pump; axial flow pump and jet pump. Classification of water turbines- Impulse turbine (Pelton wheel); inward flow reaction turbine (Francis turbine) and axial flow reaction turbine (Kaplan turbine)

Unit III Thermal Engineering:

30 Marks

Basic concept of First law and second law of Thermodynamics; concept of entropy and reversibility; availability and unavailability and irreversibility.

Steam generation- modified Rankine cycle analysis. Modern steam boilers properties of steam, Steam engine- Classification of steam engines; Function and use of steam turbines, Function of a steam condenser, elements of a condensing plant. Type and size of a steam power plant; essential equipment of a steam power plant; coal handling system; pulverized coal firing system.

Function and use of gas turbines- Principle of operation, closed cycle and open cycle, constant pressure and constant volume gas turbine.

Unit IV I.C. Engines:

24 Marks

IC engines - Classification of IC engines; working principle of 2-stroke and 4-stroke cycles IC engines; SI engine and CI engine; Otto cycle; Diesel cycle; dual-combustion cycle.

Firing order of multi cylinder engine; Types of Fuels- additives; knocking, compression ratio, octave

rating; cetane rating; Governing of SI and CI engines. Super-changing and turbo-changing of IC engines.

Unit V Automobile Engineering:

16 Marks

Automobile components, automobile engines-classification and components, petrol and diesel engine. Fuel system- Working principle of difficult types of modern carburetors. Different types of engine cooling systems. Principles of different types of lubrication system- petrol, splash, semi-pressure, pressure, wet-sump, dry sump. Power train- transmission, clutch and gear boxes and function of propeller shaft. Principle of braking system; functions of Suspension system and Steering system; types of commercial vehicle wheels.

Unit VI Refrigeration and air-conditioning

· 16 Marks

Concepts of refrigeration and air-conditioning system. Thermal principles- heat transfer by conduction, convection and radiation, heat exchangers, vapour compression system and vapour absorption system.

Psychrometry - properties; processes; charts; sensible heating and cooling; humidification and dehumidification effective temperature; air-conditioning load calculation. Determination for comfort condition and simple load calculations. Concept of an air-conditioning and distribution system

Unit VII Mechanical Estimation

· 10 Marks

Elements of cost, Components of cost, Indirect expenses. Forms of materials, procedural steps for calculating material cost of a product. Estimation in machine shop, forging, welding and sheet metal shop.

Calculation for machining time, machining cost of machined items.

UNIT VIII APTITUDE TEST

20 Marks

(a) Numerical And Figurework Tests: (4 Marks)

These tests are reflections of fluency with numbers and calculations. It shows how easily a person can think with numbers. The subject will be given a series of numbers. His/Her task is to see how the numbers go together to form a relationship with each other. He/She has to choose a number which would go next in the series.

(b) Verbal Analysis And Vocabulary Tests: (6 Marks)

These tests measure the degree of comfort and fluency with the English language. These tests will measure how a person will reason with words. The subject will be given questions with alternative answers, that will reflect his/her command of the rule and use of English language.

(c) Visual And Spatial/3-D Ability Tests: (4 Marks)

These tests are used to measure perceptual speed and acuity. The subject will be shown pictures where he/she is asked to identify the odd one out; or which comes next in the sequence or explores how easily he/she can see and turn around objects in space.

(d) Abstract Reasoning Tests: (6 Marks)

This test measures the ability to analyse information and solve problems on a complex, thought based level. It measures a person's ability to quickly identify patterns, logical rules and trends in new data, integrate this information, and apply it to solve problems.

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