Time: 3 Hours

Max. Marks: 60

Note:
1. It is compulsory to answer the questions of Part -A. Limit your answers within 20-40 word in this part.
2. Answer any four questions from Part -B in detail.
3. Different parts of the same question are to be attempted adjacent to each other.
4. Assume suitable standard data wherever required, if not given.

PART -A

Q1 (a) List any four physical properties of materials. (2)
(b) Define toughness of materials. (2)
(c) What do you mean by tensile stress and strain? (2)
(d) Write down the formulae for factor of safety for ductile material and brittle material. (2)
(e) List any four types of rivet heads by showing their sketch. (2)
(f) Name any four type of springs. (2)
(g) Define spring index. (2)
(h) Classify cotter joints. (2)
(i) Differentiate between thick and thin cylinders. (2)
(j) Name three types of friction clutches. (2)

PART -B

Q2 (a) What are the factors to be considered for the selection of materials for the design of machine elements? Discuss. (5)

(b) Write short notes on free cutting steel, and stainless steel. (5)

Q3 (a) Elaborate the Methods of Reducing Stress Concentration in engineering components (5)

(b) Enumerate the different types of riveted joints and rivets. (5)

Q4 (a) Discuss the Advantages and Disadvantages of Welded Joints over Riveted Joints. (5)

(b) A plate 100 mm wide and 10 mm thick is to be welded to another plate by means of double parallel fillets. The plates are subjected to a static load of 80 kN. Find the length of weld if the permissible shear stress in the weld does not exceed 55 MPa. (5)

Q5 A helical spring is made from a wire of 6 mm diameter and has outside diameter of 75 mm. If the permissible shear stress is 350 MPa and modulus of rigidity 84 kN/mm^2, find the axial load which the spring can carry and the deflection per active turn. (10)

Q6 A thin cylindrical pressure vessel of 500 mm diameter is subjected to an internal pressure of 2 N/mm^2. If the thickness of the vessel is 20 mm, find the hoop stress, longitudinal stress and the maximum shear stress. (10)

Q7 (a) Write short note on the splined shaft covering the points of application, different types and method of manufacture. (5)

(b) Write short note on Concentric or Composite Springs. (5)

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