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YMCA UNIVERSITY OF SCIENCE & TECHNOLOGY, FARIDABAD

B. Tech. (Mech. Engg.) V Semester (UNDER CBS)

MACHINE DESIGN –I (MU-309)

Time: 3 Hours

Max. Marks: 60

Note: It is compulsory to answer the questions of Part -1. Limit your answers within 20-40 word in this part.
Answer any four questions from Part -2 in detail.
Different parts of the same question are to be attempted adjacent to each other.
Use of unmarked Design Data Book is allowed.
Assume suitable standard data wherever required, if not given.
All the notations and symbols have their usual meanings.

PART -1

Q1 (a) What is malleable iron? (2)
(b) What is factor of safety? (2)
(c) Define welding. (2)
(d) What is the function of a coupling? (2)
(e) What is meant by surging of springs? (2)
(f) What is the function of a clutch? (2)
(g) Differentiate between thick and thin cylinders. (2)
(h) Differentiate between pipe and tube. (2)
(i) List various materials suitable for thin cylinders. (2)
(j) What is the application of screw jack? (2)

PART -2

Q2 (a) Enumerate the factors and properties of materials a designer is required to consider while designing a machine part. (5)
(b) Write short notes on: (i) powdered materials (ii) composite materials. (5)

Q3 (a) Write short notes on : (i)designing for wear resistance (ii)designing for Heat resistance (iii) stiffness design (iv)designing for vibration resistance (v) designing for contact strength (5)
(b) A flat bar 32 mm wide and 12 mm thick is loaded by a steady tensile load of 85 Kn. The material is mild steel with yield point stress of 315 N/mm^2. Find the factor of safety based on the yield point. (5)

Q4 Design a double riveted butt joint with two cover plates for the longitudinal seam of a boiler shell, 0.75 m diameter, to carry a maximum steam pressure of 1.05 N/mm2. The allowable stresses are: σ_t =35 N/mm^2, τ = 28 N/mm^2. Assume the efficiency of the joint 75% (10)

~~75%~~.

~~(10)~~

Q5 A marine type flange coupling is required to transmit 2900 kW power at a speed of 100 rev/min. flanges are connected by 8 taper bolts having an allowable shear stress of 60 N/mm^2. The material of the shaft and bolts used is same. Design the flange coupling and determine the shaft diameter. (10)

Q6 A laminated leaf spring is to carry a load of 3400 N with a deflection of about 31 mm. the spring must be supported at the ends, the distance between supports being 650 mm and is loaded at the centre. Allow a maximum stress of 420 N/mm^2. Take $e = 2 \times 10^5$ N/mm^2. Find (i) the stress which will be induced if the load comes down with a shock, deflecting the spring 75 mm. (ii) the magnitude of the impact energy which the spring will absorb in this case. (iii) the height from which the load must drop and (iv) the corresponding impact force. Number of leaves is 6 of width 51 mm each. The thickness of each leaf is 5.46 mm. (10)

Q7 Answer the following: (i) Enumerate the qualities of the friction material used in clutches. (ii) What are various means for controlling the engagement of a clutch? (10)

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