O.P.Code: 19ME0318 | R19 | H.T.No.

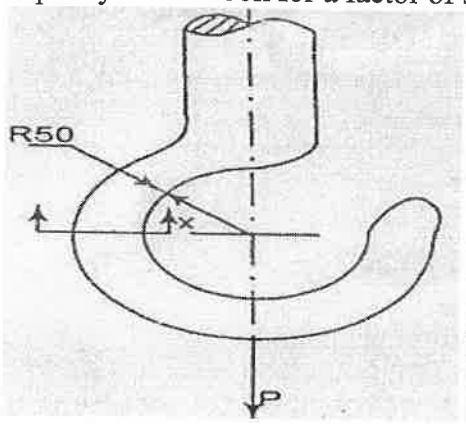
SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech III Year II Semester Supplementary Examinations May/June-2024
DESIGN OF MACHINE ELEMENTS-II
(Mechanical Engineering)

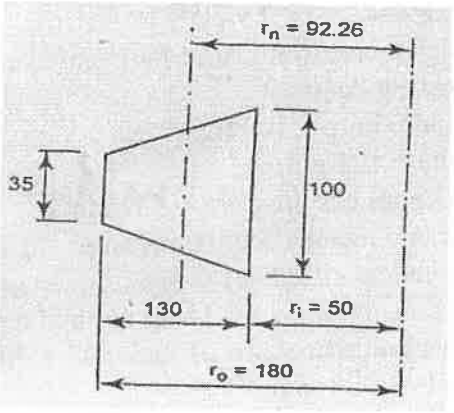
Time: 3 Hours **Max. Marks: 60**

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

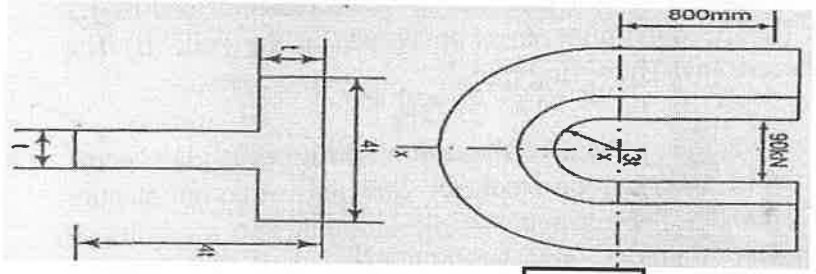
1	a	Differentiate the straight and curved beams?	CO1	L2	2M
	b	A crane hook has a section, which for the purpose of analysis is considered trapezoidal as shown in fig. it is made of plain carbon steel with an yield strength of 350Mpa in tension. Determine the load capacity of the hook for a factor of safety 3	CO1	L5	10M





OR

2		A punch press of capacity 90KN has a c-frame of T- cross section as shown in fig. The frame is made of a material with an ultimate tensile stress of 400MPa for a factor of safety of 3.5, determine the dimensions of the frame.	CO1	L5	12M



UNIT-II

3		Design a journal bearing for a centrifugal pump with the following data. Diameter of journal =150mm Load on bearing =40kN Speed of journal =900 RPM	CO2	L5	12M

OR

4		Design a journal bearing for centrifugal pump from the following data: Load on the journal = 20 kN Speed of the journal = 900 rpm Type of oil SAE 10 for which absolute viscosity at 55°C = 17 centipoises Ambient temperature of oil = 15.5°C Maximum bearing pressure for the pump = 1.5 N/mm2 Calculate also the mass of the lubricating oil required for artificial cooling to rise in temperature of the oil limited to 10°C. Heat dissipation coefficient = 12.2 kN/m2/°C	CO2	L5	12M

UNIT-III

5	The following data is given for the piston of a four stroke diesel engine: Cylinder bore = 250 mm Material of piston rings = Gray cast iron Allowable tensile stress=100N/mm2 Allowable radial pressure on cylinder wall = 0.03 MPa Thickness of piston head = 42 mm and No of piston rings = 4 Calculate: (i) Radial with of piston rings. (ii) Axial thickness of piston rings. (iii) Gap between the ends of piston rings before and after assembly. (iv) Width of the top land. (v) Width of the ring grooves. (vi) Thickness of the piston barrel and thickness of the barrel open end.	CO3	L5	12M
	OR			
6	Design a cast iron piston for a single acting four stroke engine for the following data: Cylinder bore = 100 mm Stroke = 125 mm Maximum gas pressure = 5 N/mm2 Indicated mean effective pressure = 0.75 N/mm Mechanical efficiency = 80% Fuel consumption = 0.15 kg per brake power per hour Higher calorific value of fuel = 42 × 103 kJ/kg Speed = 2000 rpm Tensile stress for cast iron (σt) = 38 MPa. Any other data required for the design may be assumed.	CO3	L6	12M

UNIT-IV

7	A compression spring made of alloy steel of coil diameter 75 mm and spring index 6.0, number of active coil 20 is subjected to a load of 1.2 kN. Calculate: (i) The maximum stress developed in the coil. (ii) The deflection produced. (iii) The spring rate.	CO4	L5	12M
	OR			
8	It is required to design a helical compression spring with plain ends, made of cold drawn plain carbon steel, for carrying a maximum pure static force of 1000 N. The ultimate tensile strength and modulus of rigidity for spring material are 1430 N/mm2 and 85 N/mm2 respectively. The spring rate is 48 N/mm. If spring index is 5, determine: (i) Wire diameter. (ii) Total number of coils. (iii) Free length and (iv) Pitch. Draw a neat sketch of spring with necessary dimensions.	CO4	L4	12M

UNIT-V

9	A compressor running at 300 rpm is driven by 15kW, 1200rpm motor through 200 full depth involute gears. The centre distance is 375mm. choose the suitable materials for the pinion and gear, design the drive.	CO5	L5	12M
	OR			
10	In a spur gear drive for a rock crusher, the gears are made of case hardened alloy steel. The pinion is transmitting 18 kW at 1200 rpm with a gear ratio of 3.5. The gear is to work 8 hours/day for 3 years. Design the drive.	CO5	L6	12M

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