

Reg. No:

--	--	--	--	--	--	--	--	--	--

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech III Year II Semester Regular Examinations August-2022

DESIGN OF MACHINE ELEMENTS - II

(Mechanical Engineering)

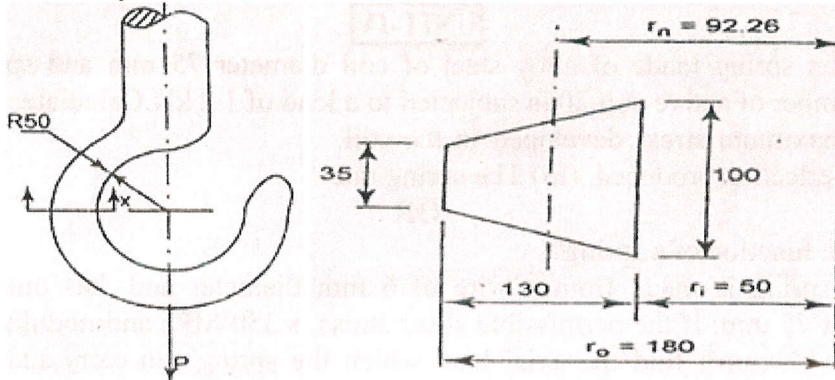
Time: 3 hours

Max. Marks: 60

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

UNIT-I

- 1 a Differentiate the straight and curved beams. 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 a yield strength of 350Mpa in tension. Determine the load capacity of the hook for a factor of safety 3. L5 10M



OR

- 2 Two shafts whose centres are 1 metre apart are connected by a V-belt drive. The driving pulley is supplied with 95 Kw power and has an effective diameter of 300 mm. It runs at 1000 r.p.m. while the driven pulley runs at 375 r.p.m. The angle of groove on the pulleys is 40°. Permissible tension in 400 mm² cross-sectional area belt is 2.1 MPa. The material of the belt has density of 1100 kg / m³. The driven pulley is overhung, the distance of the centre from the nearest bearing being 200 mm. The coefficient of friction between belt and pulley rim is 0.28. Estimate:
 i) The number of belts required; ii) Diameter of driven pulley shaft, if permissible shear stress is 42 MPa. L5 12M

UNIT-II

- 3 Design a journal bearing for centrifugal pump from following data: L5 12M
 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

OR

- 4 The ball bearing for the drilling machine spindle is rotating at 3000rpm. It is subjected to radial load of 2500N and an axial load of 1500N. It is to work 50 hours per week for one year. Design a suitable bearing if the diameter of the spindle is 40mm. L6 12M

UNIT-III

- 5 The following data is given for the piston of a four-stroke diesel engine: Cylinder bore = 250 mm **L5 12M**
 Material of piston rings = Gray cast iron
 Allowable tensile stress = 100 N/mm^2
 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.

OR

- 6 a Explain why torsional vibrations are dangerous. **L2 6M**
 b Explain reasons for the failure of a crank shaft. **L2 6M**

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: **L5 12M**
 (i) The maximum stress developed in the coil.
 (ii) The deflection produced. (iii) The spring rate.

OR

- 8 a What is the function of a spring? **L1 3M**
 b 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. **L5 6M**

UNIT-V

- 9 A compressor running at 300 rpm is driven by 15kW, 1200rpm motor through 20° full depth involute gears. The centre distance is 375mm. Choose the suitable materials for pinion and gear, design drive. **L5 12M**
- OR**
- 10 A pair of gears is to be designed to transmit 30kW for a pinion speed of 1000 rpm and a speed ratio of 5. Design the gear train. **L6 12M**

***** END *****