Reg. No:

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.TECH III Year II Semester Regular Examinations May 2019
**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   4M
   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.
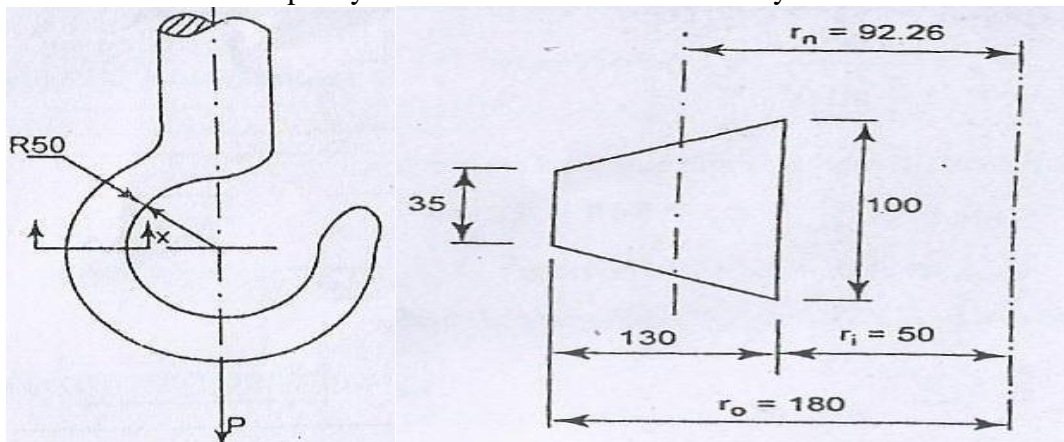
                                                                                                         8M
OR

2   A belt drive consists of two V-belts in parallel, on grooved pulleys of the same size. The angle of the groove is 30°. The cross-sectional area of each belt is 750 mm2 and μ = 0.12. The density of the belt material is 1.2 Mg / m3 and the maximum safe stress in the material is 7 Mpa. Calculate the power that can be transmitted between pulleys of 300 mm diameter rotating at 1500 r.p.m. Find also the shaft speed in r.p.m. at which the power transmitted would be a maximum.   12M

UNIT-II

3   Following data is given for 3600 hydrodynamic bearings: journal diameter =100 mm, radial clearance =0.12mm, radial load =50kN,bearing length =100 mm, journal speed =1440rpm and viscosity of lubricant = 16CP. Calculate (i) minimum film thickness (ii) coefficient of friction and (iii) power lost in friction.   12M

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.   12M

UNIT-III

5 a. Enumerate the qualities of good cylinder liners.   6M
   b. Explain reasons for the failure of a crank shaft.   6M

OR

6   Design overhung crank shaft for a 0.25 m × 0.4 m horizontal gas engine, explosion pressure2.38 MPa, weight of flywheel 16 kN, total belt pull 3 kN. When the crank is at 300, the torque on the crank shaft is maximum and the gas pressure at this position is 1.015 MPa. Length of the connecting rod is 0.95 m.   12M

UNIT-IV

7 a. Explain what you understand by A.M. Wahl's factor and state its importance in the design of helical springs.   5M

   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/mm2, find the axial load which the spring can carry and the deflection per active turn.   7M

OR

8   Design a close coiled helical compression spring for a service load ranging from 2250 N to 2750 N. The axial deflection of the spring for the load range is 6 mm. Assume a spring index of 5. The permissible shear stress intensity is 420 MPa and modulus of rigidity, G = 84 kN/mm2.   12M

UNIT-V

9   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.   12M

OR

10   A pair of helical gears in a milling machine is used to transmit 4.5 kW at 1000 rpm of the pinion and the velocity ratio is 3:1. The helix angle of the gear is 150 and both gears are made of steel C45. The gears are 200 FDI and the pinion is to have minimum of 20 teeth. The gear is to work 8 hrs/day for 3 years. Design the helical gears. Take the required hardness for both gears is more than 350 BHN.   12M

END