Q.P. Code: 16ME319 **R16**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.TECH III Year II Semester Supplementary Examinations Dec 2019

DESIGN OF MACHINE ELEMENTS-II

(Mechanical Engineering)

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

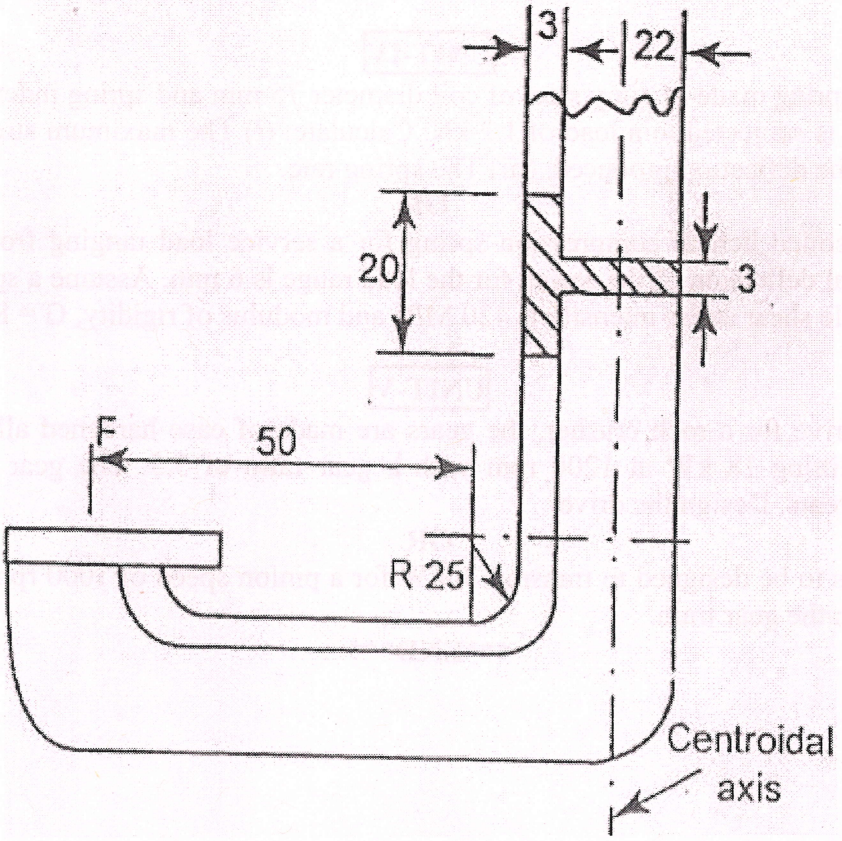
(Answer all Five Units **5 X 12 = 60** Marks)

UNIT-I

1 A rope drive is to transmit 250 kW from a pulley of 1.2 m diameter, running at a speed of 300 r.p.m. The angle of lap may be taken as π radians. The groove half angle is 22.5°. The ropes to be used are 50 mm in diameter. The mass of the rope is 1.3 kg per metre length and each rope has a maximum pull of 2.2 Kn, the coefficient of friction between rope and pulley is 0.3.Determine the number of ropes required. If the overhang of the pulley is 0.5 m, suggest suitable size for the pulley shaft if it is made of steel with a shear stress of 40 Mpa. **12M**

OR

2 C- clamp is to bear the force' F' applied on to it. It has a T-section as shown in fig. if the maximum tensile strength in the clamp is limited to 130MPa. Find 'F'. **12M**



UNIT-II

3 A 75 mm journal bearing 100mm long is subjected to 2.5kN at 600 rpm. If the room temperature is 240C, what viscosity of oil should be used to limit the bearing surface temperature at 550C.d/c1=1000. **12M**

OR

4 The radial load on a roller bearing varies as follows a load of 50 kN is acting 20% of time at 500 rpm and a load of 40kN is acting 50% of the time at 600 rpm. In the remaining time the load varies from 40kN to 10kN linearly at 700 rpm. Select a roller bearing from NU22 series for a life of at least 4000 hours. The operating temperature is 1750C. **12M**

UNIT-III

5 a. What is the function of piston? Explain piston troubles. **6M**

b. Explain why torsional vibrations are dangerous. **6M**

OR

6 Design a trunk type CI piston for an IC engine having a diameter of 100mm and length of 150mm. the max pressure is 3.5MPa. Maximum permissible tension for CI for the design and head thickness is 30MPa and for the piston ring material 45MPa, bearing pressure for the piston pin should not exceed 200MPa. **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. **12M**

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 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. **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. **12M**

END