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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech III Year II Semester Supplementary Examinations February-2022

DESIGN OF MACHINE ELEMENTS-II

(Mechanical Engineering)

Time: 3 hours Max. Marks: 60

PART-A

(Answer all the Questions **5 x 2 = 10** Marks)

1	a	Define velocity ratio of a belt drive.	**2M**
	b	What is a bearing?	**2M**
	c	How is the wear of the piston rings prevented?	**2M**
	d	Why gear drives are superior to belt drives or chain drives?	**2M**
	e	What is the function of a spring?	**2M**

PART-B

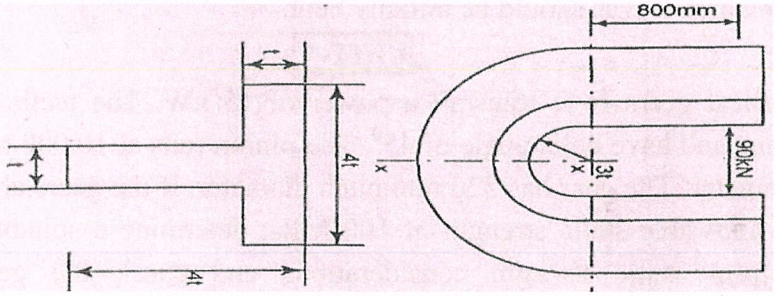
(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

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 eachbelt is 750 mm^2 and μ = 0.12. The density of the belt material is 1.2 Mg/m^3 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. **10M**

OR

3 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 ofthe frame. **10M**



UNIT-II

4 A full journal bearing of 50 mm diameter and 100 mm long has a bearing pressure of 1.4 N/mm^2. The speed of the journal is 900 rpm and the ratio of journal diameter to the diametric clearance is 1000. The bearing is lubricated with oil whose absolute viscosity at the operating temperature of 75°C may be taken as 0.011 kg/m-s. The room temperature is 35°C. Find:(i) The amount of artificial cooling required. (ii) The mass of the lubricating oil required, if the difference between the outlet and inlet temperature of theoil is 10°C. Take specific heat of the oil as 1850 J/kg/°C. **10M**

OR

5 The ball bearing for the drilling machine spindle is rotating at 3000rpm. It issubjected 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. **10M**

UNIT-III

6 **a** Enumerate the qualities of good cylinder liners. **4M**

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

OR

7 **a** What are the advantages of dry liners? **3M**

b A four-stroke diesel engine has the following specifications: Brake power= 6 kW, speed = 1000 rpm, indicated mean effective pressure = $0.45\,N/mm^2$, mechanical efficiency = 85%. Determine: (i) Bore and length of thecylinder. (ii) Thickness of cylinder head. (iii) Size of studs for the cylinder head. **7M**

UNIT-IV

8 **a** What is Whal's correction factor? **2M**

b 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: **8M**

(i) The maximum stress developed in the coil.(ii) The deflection produced.

(iii) The spring rate.

OR

9 A semi-elliptical laminated vehicle spring to carry a load of 6000 N is to consist of seven leaves 65 mm wide, two of the leaves extending the full length of the spring. The spring is to be 1.1 m in length and attached to the axle by two U-bolts 80 mm apart. The bolts hold the central portion of the spring so rigidly that they may be considered equivalent to a band having a width equal to the distance between the bolts. Assume a design stress for spring material as 350 MPa. Determine: (i) Thickness of leaves. (ii) Deflection of spring. (iii) Diameter of eye. (iv) Length of leaves. (v) Radius to which leaves should be initially bent. **10M**

UNIT-V

10 A Pair of helical gears is to transmit a power of 15 kW. The teeth are 20^0stub in diametral plane and have helix angle of 45^0. The pinion runs at 10,000 rpm and has 80 mm pitch diameter. The gear has 320 mm pitch diameter. If the gears are made of cast steel having allowable static strength of 100 MPa; determine a suitable module and face width from static strength considerations and check the gears for wear assuming σ_{es} = 618MPa. **10M**

OR

11 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 ratioof 3.5. The gear is to work 8 hours/day for 3 years. Design the drive. **10M**

END