[Total No. of Questions - 9] [Total No. of Printed Pages - 4]

Dec.-22-0244

ME-603 (Machine Design-II)

B.Tech. 6th (CBCS)

Time : 3 Hours Max. Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Notes : 1. This question paper contains five sections: Section A, B, C, D, and E.

2. Attempt five questions in all. Attempt one question from each Section A, B, C & D. Attempt all subparts of Section E.

3. Supplement your answer with suitable sketches wherever required.

4. Assume the data suitably, if required.

5. Use of design data book compiled by PSG College of Engg. & Tech. Coimbatore, India is permitted to be used during the examination. There should not be anything handwritten / corrections in Design Data Book. Each candidate should bring his / her own Design Data Book.

SECTION - A

1 Discuss the design procedure of a journal bearing and its housing. (10)

2. A 100 mm long and 60 mm diameter journal bearing supports a load of 2500 N at 600 r.p.m. If the room temperature is 20°C, what should be the viscosity of oil to limit the bearing surface temperature to 60°C? The diametral clearance is 0.06 mm and the energy dissipation coefficient based on projected area of bearing is 210 W/m^2/°C. (10)

SECTION - B

3. Select a single row deep groove ball bearing for a radial load of 2500 N and an axial load of 4000 N, operating at a speed of 1000 r.p.m. for an average life of 4 years and one work shift daily. Assume uniform and steady load and a work shift of 8 hours. Assume only 10 holidays per year. (10)

4. A rolling contact bearing is subjected to the following work cycle:

(a) Radial load of 6000 N at 150 r.p.m. for 25% of the time.

(b) Radial load of 7500 N at 600 r.p.m. for 20% of the time;

(c) Radial load of 2000 N at 300 r.p.m. for 55% of the time.

The inner ring rotates and loads are steady. Select a bearing for an expected average life of 2500 hours. (10)

SECTION - C

5. A micarta pinion rotating at 1200 r.p.m. is to transmit 1 kW to a cast iron gear at a speed of 192 r.p.m. Assuming a starting overload of 20% and using 20° full depth involute teeth, determine the module, number of teeth on the pinion and gear and face width. Take allowable static strength for micarta as 40 MPa and for cast iron as 53 MPa. Check the pair in wear. (10)

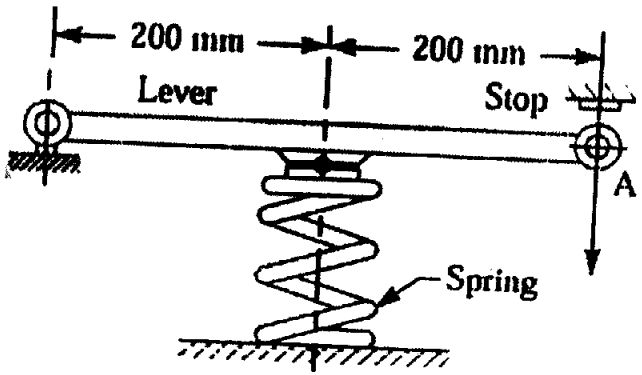
6. A pair of cast iron bevel gears connects two shafts at right angles. The pitch diameters of the pinion and gear are 80 mm and 100 mm respectively. The tooth profiles of the gears are of $14\frac{1^{o}}{2}$ composite form. The allowable static stress for both the gears is 55 MPa. If the pinion transmits 2.75 kW at 1100 r.p.m., find the module and number of teeth on each gear from the standpoint of strength and check the design from the standpoint of wear. Take surface endurance limit as 630 MPa and modulus of elasticity for cast iron as 84 kN/mm^2. (10)

[P.T.O.]

SECTION - D

7. Design the leaf springs that can be used in a truck. Make any assumptions, if required, suitably. (10)

8. Design the spring to be used in a spring controlled lever as shown in the figure. The spring is to be inserted with an initial compression to produce a force equal to 125 N between the right hand end of the lever and the stop. When the maximum force at A reaches to a value of 200 N, the end of the lever moves downward by 25 mm. (10)



SECTION - E

9. Short answer type compulsory questions:

(i) Name the material commonly used for manufacturing of bearing housings.

(ii) Which material is generally used for fabricating balls of a ball bearing?

(iii) Differentiate between static equivalent load and dynamic equivalent load.

(iv) What are antifriction bearings?

(v) Which is the most important parameter of a gear?

(vi) How many minimum number of teeth are required on smaller sprocket of a chain drive to ensure smooth operation under moderate speed conditions?

(vii) Which mechanical drive is preferred in scooters and why?

(viii) Discuss the materials and practical applications for the various types of springs.

(ix) What is the function of a spring? In which type of spring the behaviour is non-linear?

(x) In leaf springs, what is the name given to the longest leaf? (10×2=20)