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B. Tech 6th Semester Examination

Design of Automobile Components-II

AU-6002

Time : 3 Hours   **Max. Marks : 100**

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

Note :   Attempt five questions in all, selecting one each from section A, B, C and D. Section E is compulsory.

SECTION - A

1. (a)   What are the factors taken in considerations while designing a forging? Explain.   **(5)**

    (b)   Illustrate how the stress concentration in a component can be reduced.   **(10)**

2.   Determine the diameter of a circular rod made of ductile material with a fatigue strength (complete stress reversal), endurance limit is $265 N/mm^2$ and a tensile yield strength of $350 N/mm^2$. The member is subjected to a varying axial load from $W_{min} = -300 \times 10^3 N$ to $W_{max} = 700 \times 10^3 N$ and has a stress concentration factor 1.8. Use factor of safety as 2.0.   **(15)**

SECTION - B

3. (a)   A hollow shaft has greater strength and stiffens than solid shaft of equal weight. Explain.   **(8)**

 (b) When the shaft is subjected to fluctuating loads. What will be equivalent twisting moment and equivalent bending moment? **(7)**

4. Design a leaf spring for the following specifications total load = 140KN, number of springs supporting the load = 4, maximum number of leaves = 10, span of the spring = 1000 mm; permissible modules $E = 200$ kN/mm^2 and allowable stress in spring material is 600 N/mm^2. **(15)**

SECTION - C

5. (a) How the sliding contact bearings are classified? **(5)**

 b) Show with the help of sketch the various terms used in Hydrodynamic journal hearing. Explain each term and its significance. **(10)**

6. A shaft rotating at constant speed is subjected to variable load. The hearing supporting the shaft are subjected to stationary equivalent radial load of 3 KN for 10 per cent time, 2KN for 20 per cent time, 1KN for 30 percent time and no load for remaining time of a cycle, if the total life expected for the bearing is 20×10^6 revolutions at 95 per cent reliability; calculate dynamic load rating of the ball bearing. The value of K = 3 for ball bearing and the value of the constant b = 1.17. **(15)**

SECTION - D

7. Define the following terms of bevel gears with the help of a sketch: (i) cons distance (ii) pitch angle (iii) face angle (iv) root angle (v) crown height. **(3×5=15)**

8. A bronze spur pinnion rotating at 600 r.p.m. drives a cost iron spur gear at a transmission ratio 4:1. The allowable statui stresses for bronze pinnion and cost iron gear are 84N/mm² and 105 N/mm² respectively. The pinnion has 16 standard 20° full depth involute teeth of module 8mm. The face width of both the gear is 90mm. Find the power that can be transmitted from the stand point of strength.

The tooth factor $\gamma = 0.154 - \dfrac{0.912}{\text{No. of teeth}}$ and

Velocity factor $Cv = \dfrac{3}{3+v}$ (15)

SECTION - E

9. (i) Can the material of a machining element subjected to fatigue loading be cost iron? If not, then why?

(ii) Define index of sensitivity and reliability factor.

(iii) What is the surface factor in the fatigue strength equation?

(iv) Explain soderberg's criterion.

(v) In cyclei loading, stress concentration to more serious in which material.

(vi) Why leaf spring are graduated?

(vii) Why the shafts are not made of Brittle materials?

(viii)   What is the important of wahl's factor in the design of helical springs?

(ix)   How springs are classified?

(x)   What types of stresses are induced with shaft?

(xi)   What is the function of 'cage' in ball bearings?

(xii)   What is the bearing modulas?

(xiii)   What are the factors to the considered while selecting a material for plain bearing?

(xiv)   What is meant by hydrodynamic lubrication?

(xv)   What do you understand by mixed lubrication?

(xvi)   What do you understand by wear strength of gear tooth?

(xvii)   What is "Underculling" of gears?

(xviii)   What is "Strength factor" in the design of gears?

(xix)   What are the various forces acting on a barrel gear?

(xx)   What is the difference between shaft and axle?   (2×20)