9. In a double shoe brake the diameter of brake drum is 350 mm and the contact angle for shoe is 120°. The coefficient of friction for the brake lining and drum is 0.35, find the necessary spring force to transmit a torque of 40 Nm. The distance of the centre of brake drum from the fulcrum and spring is 250 mm and 300 mm respectively.   20

Roll No. ....

24258

B. Tech. 5th Semester (ME)

Examination – December, 2016

MECHANICAL MACHINE DESIGN - I

Paper : ME-303-F

Time : Three Hours]   [Maximum Marks : 100

Before answering the question, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any *five* questions in total, at least *one* question from each Section. Question Number 1 is *compulsory.* Each question carries equal marks. (20 marks). Use of PSG design data book is permitted.

1. Discuss the following $5 \times 4 = 20$

    (i)   Advantage of reamed rivet hole

    (ii) Types of fits

    (iii) Bolt, screw and stud

    (iv) Turning moment diagram of flywheel.

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SECTION – A

2. (a) Describe the factors to be considered in design for economy and societal feasibility. 10

   (b) Explain the importance of material selection decision for machine elements. 10

3. (a) Explain the need for tolerances even after we have standards and preferred numbers. 10

   (b) Why metals in their pure form are not suitable in industrial applications. Substantiate with examples. 10

SECTION – B

4. (a) Design a sleeve and cotter joint to connect to circular steel rods. The rods are subjected to an axial tensile load of 150 kN. You may use σ_d = 65 N/mm^2, σ_{dc} = 95 N/mm^2, and τ_d = 35 N/mm^2. 10

   (b) What are the different types of stresses to which a bolt is subjected ? How will you designate ISO metric thread ? 10

5. (a) A machine device has single start square threads M 22 × 5. The outer and inner diameters of collar are 55 and 45 mm respectively. An operator applies 125 N load on a lever of 150 mm length. Determine the efficiency if the coefficient of friction is 0.15. 10

   (b) Derive the expression for the maximum stress induced in weld subjected to torsional loading. 10

SECTION – C

6. (a) Describe Oldhum and Universal coupling. 10

   (b) Design a flat belt drive to transmit 50 kW from an electric motor running at 900 rpm to a centrifugal pump at 300 rpm. take μ = 0.4, σd=2 MPa. 10

7. (a) Describe the construction of a wire rope and classification of wire rope. 10

   (b) Derive the expression for centrifugal tension in flywheel. Also discuss various stresses in flywheel. http://haryanapapers.com 10

SECTION – D

8. Design a centrifugal clutch to transmit 20 kW at 800 rpm. Take inside radius of the pulley rim to be 150 mm. assume all missing data. Also discuss the working of single plate clutch. 20

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