22/05/2017

T.E. SEM VI / MECH / CBGS / MAY 2017

Q.P.Code:13217

(3 Hours) **Total Marks:80**

N.B. 1) **Question No. 1 is compulsory**
2) Solve **Any Three** from remaining **Five** questions.
3) Use of standard data book like PSG and Mahadevan is permitted
4) Assume suitable data if necessary, giving justification

Q1 Answer any **Four** from the following

a) How do you classify materials for engineering use? **5**

b) List and explain the important factors that influence the magnitude of factor of safety? **5**

c) What are the assumptions made in analysis of curved beam? **5**

d) Discuss on various types of threads used for power screw? **5**

e) Explain clearly the bearing stress developed at the area of contact between two members? **5**

Q2 A screw press is to be designed to exert an axial force of 80 KN. **20**

a) Select suitable material and design the nut and screw assume the height of the screw press to be 250 mm.

b) Design the horizontal section of the frame if the axis of the screw is at a distance of 210 mm from the inner edge of the frame. Give the reasons for the selection of material of the frame.

Q3 a) A solid circular shaft of 30mm diameter is welded to a vertical plate by fillet weld all around. It carries a vertical load of 10KN at a distance of 100 mm from the plate. Determine the size of weld if permissible shear stress for the weld is 90 N/mm^2. **10**

Q3 b) The leaf spring has 12 numbers of leaves, two of which are full length leaves. The spring supports are 1.1 m apart and the central band is 90 mm wide. The central load is to be taken 5.5 KN with the permissible stress of 300 N/mm^2. **10**
Determine i) thickness and width of the steel leaves ii) deflection of the spring
Take the ratio of the total depth to the width of the spring as 3.

Turn Over

Q4 Two tie rods are connected by sleeve using cotter. They are subjected to an axial pull of 50KN. Design the joint using following stresses. **20**

For rod and cotter (C-30): $\sigma_t = 60$ N/mm^2, $\sigma_c = 70$ N/mm^2 and $\tau = 30$ N/mm^2. For sleeve (cast iron): $\sigma_t = 65$ N/mm^2, $\sigma_c = 100$ N/mm^2 and $\tau = 45$ N/mm^2.

Q5 a) Design and draw a protective type of cast iron flange coupling for a steel shaft transmitting 15 kW at 200 r.p.m. and having an allowable shear stress of 40 MPa. The working stress in the bolts should not exceed 30 MPa. Assume that the same material is used for shaft and key and that the crushing stress is twice the value of its shear stress. The maximum torque is 25% greater than the full load torque. The shear stress for cast iron is 14 MPa. **10**

Q5 b) A helical spring is subjected to the load varying from 500 N to 1100 N having spring index 6, free length is to be lie between 100 mm to 150 mm The maximum compression under the variation of load is 3 cm. Assume stresses for spring material and G = 0.8 X 10^5 N/mm^2. Design the spring and find out the energy stored in spring. **10**

Q6 a) Design a Knuckle joint to transmit a reversible load of 12 KN. The material of all parts is C-20 steel. **15**

Q6 b) Explain use of preferred numbers in engineering design? **05**
