



**SE-8123**

**B. E. - II (Sem. - III) Examination**

**May / June - 2011**

**Machine Design & Industrial Drafting**

*(New Course)*

Time : 3 Hours]

[Total Marks : 100

**Instructions :**

(1)

नीचे दर्शावेक निशानीवाणी विगतो उत्तरवडी पर अवश्य लपवी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="text" value="B. E. - 2 (SEM. - 3)"/>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="text" value="MACHINE DESIGN &amp; INDUSTRIAL DRAFTING (NEW COURSE)"/>	<input type="text"/>
Subject Code No. : <input type="text" value="8"/> <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/>	<input type="text"/>
Section No. (1, 2,...): <input type="text" value="Nil"/>	
	Student's Signature

- (2) Attempt **all** questions.
- (3) Figures to the **right** indicate full marks.
- (4) Don't use programmable calculators
- (5) Notations used have a usual meaning.

- 1 Answer the following : 20
- (a) Attempt any **five** : 10
- (i) Explain in brief design morphology.
  - (ii) Define stress concentration.
  - (iii) Explain shortly the auto-cad commands  
Offsetting, chamfering
  - (iv) Differentiate briefly bearing and crushing failure
  - (v) Write down four characteristics of surface roughness
  - (vi) Define clearance and write down its types.
  - (vii) Explain briefly Auto-cad 3D commands  
Union, Subtract
  - (viii) Maximum shear stress theory of failure - Explain briefly.
- (b) Answer the following : 10
- (i) Explain residual stresses. 3

- (ii) A mild steel bracket as shown in figure 1 is subjected to a pull of 6000 N acting at  $45^\circ$  to the horizontal axis. the bracket has a rectangular section whose depth is twice the thickness. Find the cross-sectional dimensions of the bracket, if the permissible stress in the material of the bracket is limited to 650 MPa.

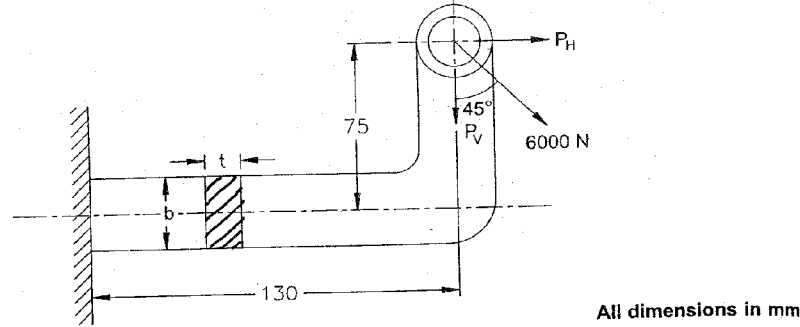


Fig.1

- 2 Attempt the following :  
Design a cotter joint to support a load varying from 20 kN in tension to 30 kN in compression. The following allowable stresses may be used for the material of the joint used. Tensile stress = compressive stress = 50 MPa; shear stress = 35 MPa and crushing stress = 90 MPa.

OR

- 2 The pull in the tie rod of an iron roof truss is 50 kN. Design a suitable adjustable screwed joint. The permissible stresses are 75 MPa in tension, 37.5 MPa in shear and 90 MPa in crushing.

- 3 Answer any two :

- (i) Design a right-angled bell-crank lever of elliptical section to compress a spring by 10 mm. The spring stiffness is 500 N/mm. Effort arm is 500 mm and the other arm is 200 mm. Determine the diameter of the pin. Use the following data.

(a) Material of pin is mild steel with  $\tau_a = 40$  MPa,  $\sigma_a = 60$  MPa with allowable shear and direct stresses.

(b) Material of bell crank lever, is medium-carbon steel with  $\sigma_a = 80$  MPa,

(c) Safe bearing pressure on bush = 10 N/mm<sup>2</sup>.

- (ii) Design a double riveted butt joint with two cover



Find the shaft dia on basis of strength and torsional rigidity if  $\theta = 0.7^\circ$ , Take  $G = 80000 \text{ MPa}$ .

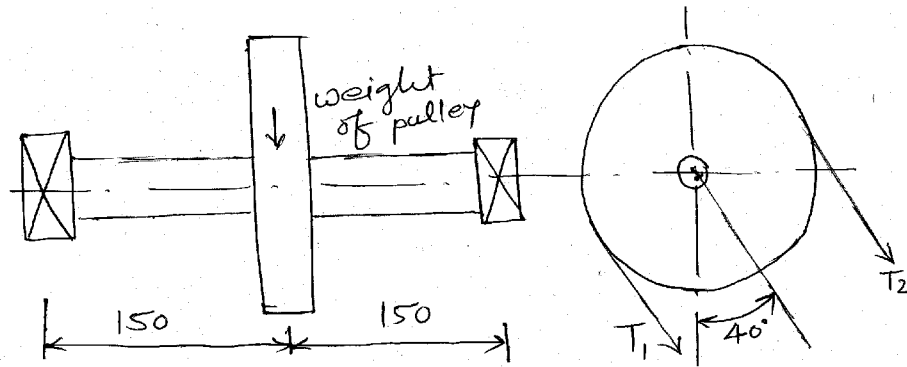


Fig.3

- (b) A power screw having double start square threads of 25 mm nominal dia and 5 mm pitch is acted upon by an axial load of 10 kN. The outer and inner dia of screw collar are 50 mm and 20 mm respectively  $\mu = 0.2$ ,  $\mu_c = 0.15$  The screw rotates at 12 rpm. Assuming uniform wear condition at collar and allowable thread bearing pressure of  $5.77 \text{ N/mm}^2$ . Find :
- Torque required to rotate the screw
  - Stresses in the screw and
  - The height of nut
- (c) Design a protective type of C.I. flange coupling to transmit 25 kW at 500 rpm. The shaft is made of plain carbon steel 45C8 with allowable shear stress of 50 MPa. The max. torque is 30% higher than mean torque. The bolts are made of 45 C8 ( $\sigma_{yt} = 380 \text{ MPa}$ ) Take FOS = 3, Design the coupling completely).