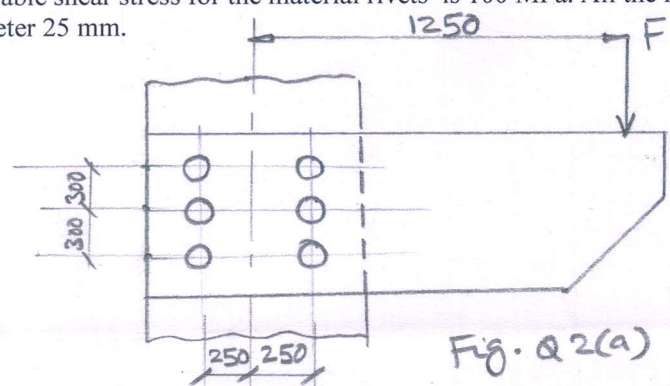


USN

**Internal Assessment Test 2 – Oct 2018**

Sub:	Design of Machine Elements-I	Sub Code:	15ME 54	Branch:	ME
Date:	17.10.18	Duration:	90 min	Max Marks:	50
			Sem / Sec:	V/A&B	
<b>Answer any TWO FULL Questions</b>					

		MARKS	CO	RBT
1(a)	<p>A cylindrical pressure vessel with 1 meter inner diameter is subjected to an internal steam pressure of 1.5 MPa. The permissible stresses for the cylinder plate and the rivets, in tension, shear and compression are 80, 60 and 120 N/mm<sup>2</sup> respectively. The efficiency of longitudinal joint can be taken as 80% for the purpose of calculating the plate thickness. The efficiency of circumferential lap joint should be at least 62%. Design the circumferential lap joint and calculate i) Thickness of plate ii) Diameter of rivets iii) Number of rivets iv) Pitch of rivets v) No. of rows of rivets vi) Overlap of plates.</p>	[12]	CO5	L3
(b)	<p>A tie bar bridge consists of a flat, 350 mm wide and 20 mm thickness. Design an economical double cover Butt joint, if the permissible stresses are <math>\sigma_t = 90 \text{ N/mm}^2</math>, <math>\sigma_c = 150 \text{ N/mm}^2</math> and <math>\tau = 60 \text{ N/mm}^2</math>.</p>	[13]	CO5	L3
2(a)	<p>Determine the load carrying capacity of the riveted joint as shown in Fig. Q2(a), if the allowable shear stress for the material rivets is 100 MPa. All the rivets are of diameter 25 mm.</p>  <p style="text-align: center;">Fig. Q2(a)</p>	[12]	CO5	L3
(b)	<p>A vertical two start square threaded screw of 100 mm mean diameter and 20 mm pitch supports a vertical load of 18KN. The nut of screw is fitted in the hub of gear wheel having 80 teeth which meshes with a pinion of 20 teeth. The mechanical efficiency of the gear drive is 90%. The axial thrust on the screw is taken by a collar 250 mm outside diameter and 100 mm inside diameter. Assuming uniform pressure conditions, find the maximum diameter of pinion shaft and the height of nut if the co efficient of friction for the vertical screw and nut is 0.15 and that for the collar is 0.20. The permissible shear stress for the shaft material is 56MPa and the allowable bearing pressure in the threads is 1.4N/mm<sup>2</sup>.</p>	[13]	CO6	L3
3(a)	<p>The lead screw of a lathe has Acme threads of 50 mm outer diameter and a pitch of 8 mm. The axial load on the lead screw is 3000N. The thrust is carried by a collar of 120 mm outer diameter and 60 mm inner diameter. The lead screw rotates at 40 rpm. Find the power required to drive the power screw. Assume friction in the threads as 0.15 and that at the collar as 0.12. Evaluate the results based on uniform pressure theory and uniform wear theory.</p>	[10]	CO6	L3

Refer to the C clamp as shown in the Figure Q 3(b) . It has the following details.

Thread type: ISO metric threads

Nominal diameter= 12 mm.

Pitch= 1.75 mm

Root diameter= 9.853 mm.

Root area= 76.25 mm<sup>2</sup>

$\mu$  in threads= 0.12

$\mu$  in collar= 0.25

Mean collar radius= 6 mm

Clamping force= 4500N

Operating force= 100N

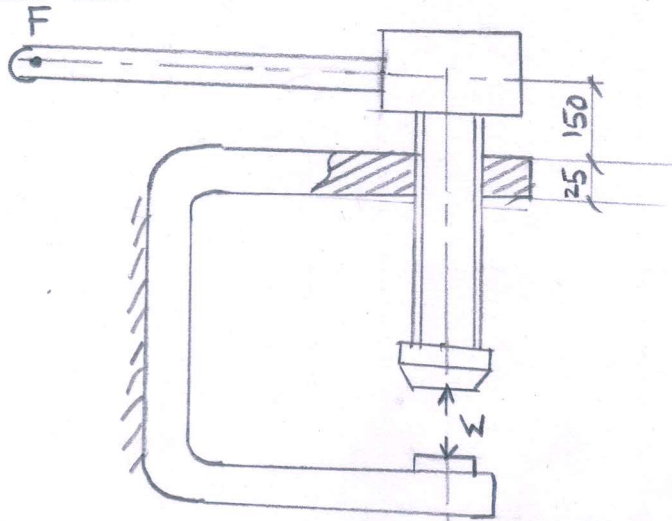


Fig. Q 3(b)

3(b)

[15]

CO6

L3

Determine

- i) Length of lever
- ii) Max. shear stress in the body of screw and its location.
- iii) Bearing pressure on the threads

BRPC 2-8  
CI

*Khyam*  
ECI

*Abhay*  
HOD