B.E. Fourth Semester (Mechanical Engineering) (CGS)

10839 : Machine Design & Drawing - I : 4 ME 05

P. Pages : 5 | AU - 2572

Time : Four Hours | Max. Marks : 80

Notes :
1. Answer **two** question from Section A and **two** question from Section B.
2. Assume suitable data wherever necessary.
3. Retain the construction lines.
4. Use of Drawing instrument is permitted.
5. Use of machine Design data book is permitted.
6. Use of pen Blue/Black ink/refill only for writing the answer book.

SECTION – A

1. a) Figure 1. Shows the pictorial view of a component. Draw the following views using first angle projection method. **10**

i) Sectional front view using section at A – A.

ii) Top view.

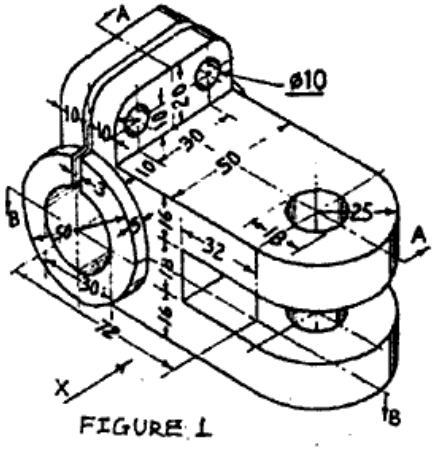

FIGURE 1

b) Draw by third angle projection method. **10**

i) Sectional Top view using section plane A – A.

ii) Sectional side view using section plane B – B (Refer Figure. 2)

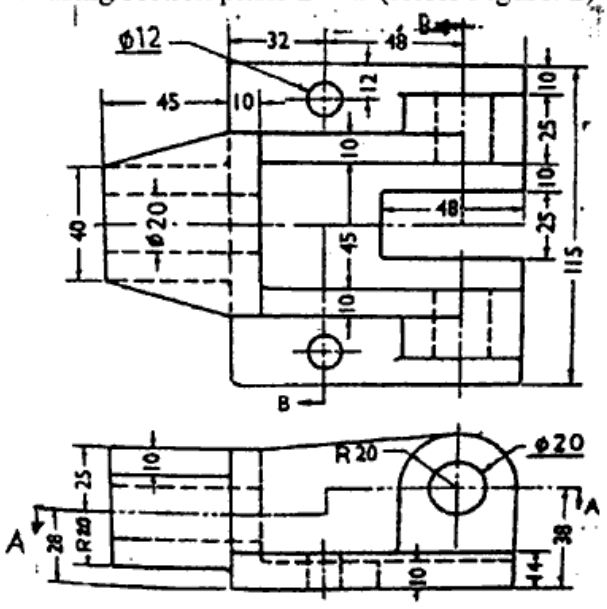

FIGURE. 2

OR

2. a) Figure. 3 Shows the pictorial view of the component. Draw following views using Third angle projection method- **10**
   i) Top view
   ii) Sectional front view using section plane A – A.
   iii) Side view from right

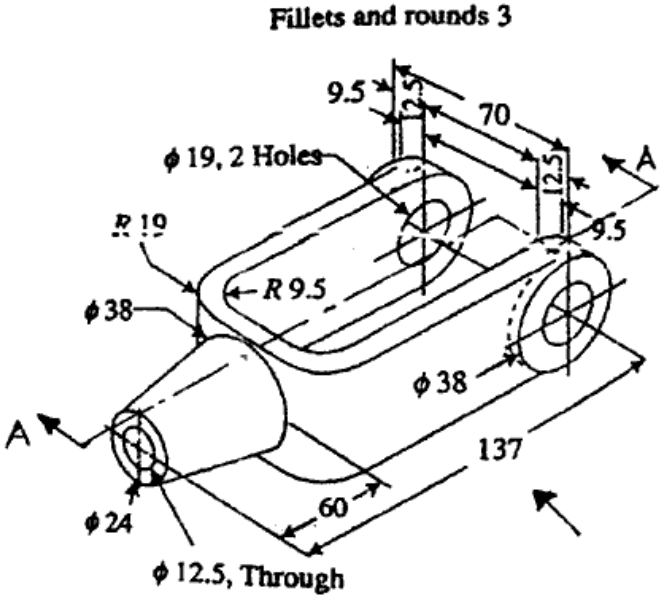

FIGURE.3

b) Draw by first angle method, following views of the component shown in figure 4. **10**
   i) Front view
   ii) Top view
   iii) Sectional side view from left using section plane A – A

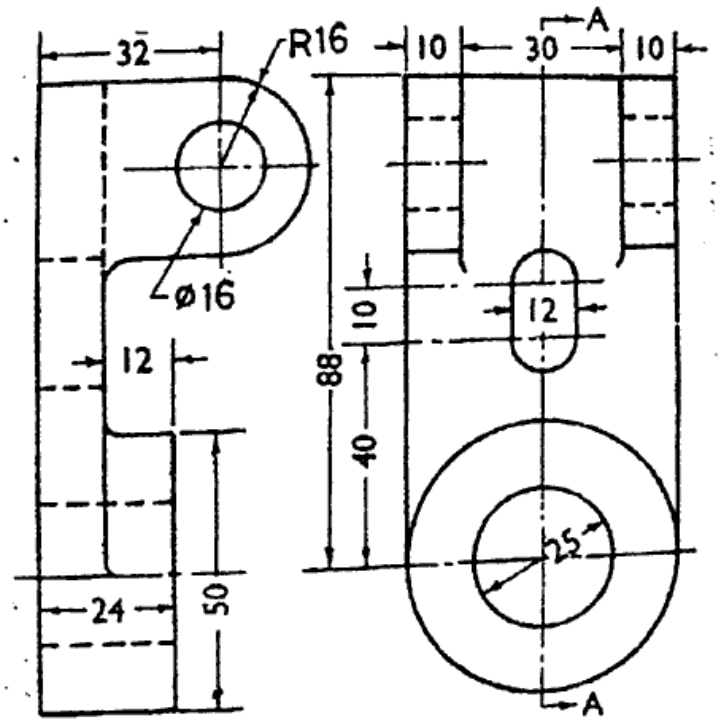

FIGURE.4

3. a) 10

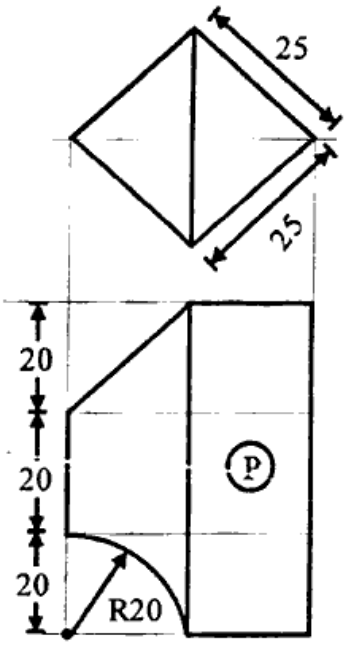

Figure 5

Draw the development of Lateral surfaces of 'P' part of the square prism.

b) A vertical cylinder of 90mm diameter resting on the horizontal plane is penetrated by a horizontal triangular prism of 50mm side of the base. The axis of which is parallel to vertical plane and 10mm away from the axis of the cylinder. The equilateral triangular prism has two of its faces equally inclined to HP. Draw the projections showing curves of intersection. 10

OR

4. a) 10

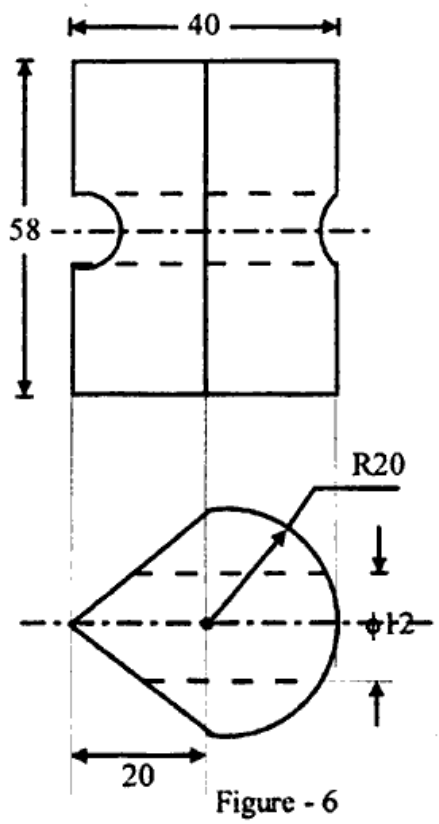

Figure - 6

Draw development of Lateral surface of the part shown in figure 6.

b) A vertical cylinder of 60mm diameter and height 70mm is penetrated by a horizontal square prism base 40mm side, the axis of which parallel to V.P. and 12mm away from axis of cylinder. A face of prism makes an angle of 30° to H.P. Draw the projections showing curves of intersection. **10**

SECTION – B

5. a) What is factor of safety? Explain its significance. Suggest its higher and lower limit. Explain the factors to be considered while selecting factors of safety. **7**

b) A plate 100mm wide and 12mm thick is to be welded to another plate by means of parallel fillet welds. The plates are subjected to a load of 50kN. Find the length of the weld so that the maximum stress does not exceed 50MPa. consider the joint first under static loading and then under fatigue loading. **8**

c) Explain the factors to be considered while designing machine components. **5**

OR

6. a) A crane hook has a trapezoidal section at A – A as shown in figure 7. Find the maximum stress at points 'P' and 'Q'. **10**

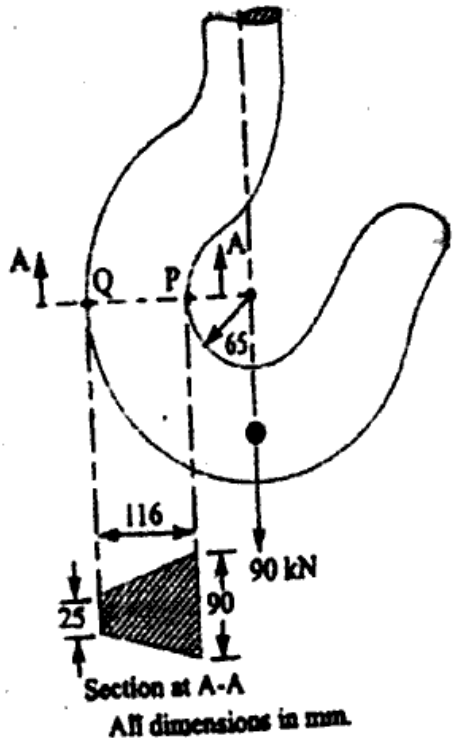

FIGURE. 7

b) Find the efficiency of the following riveted joints: **6**

i) Single riveted lap joint of 6mm plates with 20mm diameter rivets having a pitch of 50mm.

ii) Double riveted lap joint of 6mm plates with 20mm diameter rivets having a pitch of 65mm

Permissible tensile stress in plate – 120 N/mm^2
Permissible shearing stress in rivets – 90 N/mm^2
Permissible crushing stress in rivets – 180 N/mm^2

c) Explain the probable modes of failure for riveted joints. **4**

7. a) Explain following terms related to springs:- **9**

i)	Spring Index	ii)	Spring Rate
iii)	Stress factor	iv)	Solid length
v)	Free length	vi)	Pitch.

b) A vertical two start square threaded screw of a 100mm mean diameter and 20mm pitch supports a vertical load of 18 kN. The axial thrust on the screw is taken by a collar bearing of 250mm outside diameter and 100 mm inside diameter. Find the force required at the end of a lever which is 400mm long in order to lift and lower the load. The coefficient of friction for the vertical screw and nut is 0.15 and that for collar bearing is 0.20. **7**

c) What do you understand by overhauling and Self locking screws? **4**

OR

8. a) design a helical spring for a spring loaded safety valve for the following conditions – **14**

→ Operating pressure – 1N/mm^2
→ Maximum pressure when the valve blows off freely – 1.075N/mm^2
→ Maximum lift of the valve when the pressure is 1.075N/mm^2 – 6mm
→ Diameter of valve seat – 100mm
→ Maximum shear stress – 400MPa
→ Modulus of rigidity – 86 kN/mm^2
→ Spring Index – 5.5.

b) What is power screw? Why are square threads preferable to 'V' Threads for power transmission. **6**

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