GOVERNMENT ENGINEERING COLLEGE ,BHUJ

MECHANICAL ENGINEERING DEPARTMENT

SEMESTER: 3rd

SUBJECT: Machine Design and Industrial Drafting

Assignment-2012

Design Consideration Of Machine Parts-1

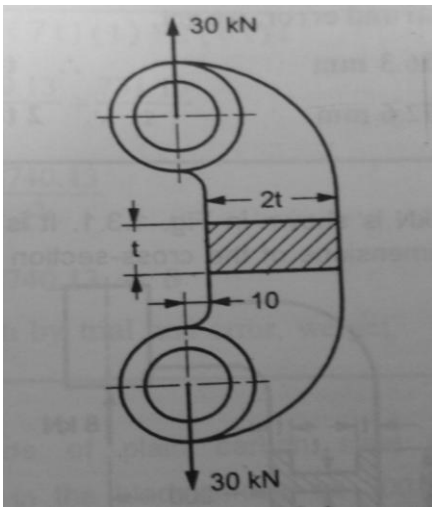
Q-1. Explain the various phases involved in the process of design of machine elements.

Q-2. What is standardization? Explain its significance.

Q-3. What is Creep? State the application where this phenomenon assumes considerable importance.

Q-4. Why factor of safety is necessary in the design of mechanical components? Discuss the important factor influencing the selection of factor of safety.

Q-5. An offset link is subjected to a force of 30KN is shown in Fig. If the permissible tensile stress is 55N/mm^2, determine the dimensions of the cross-section of link.



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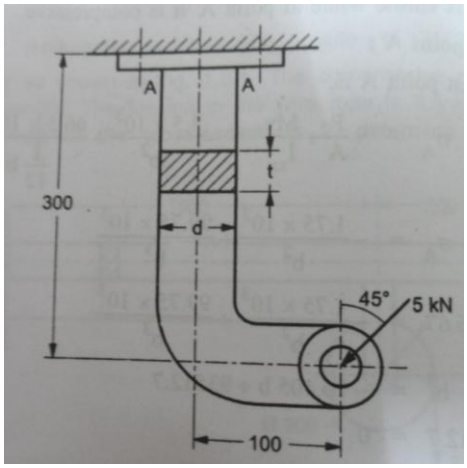
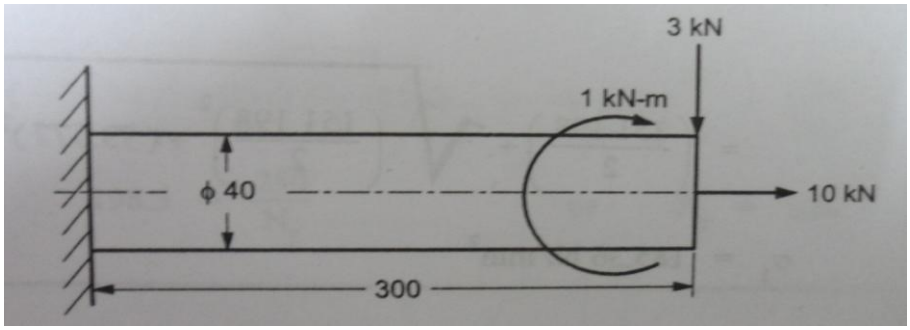
Q-6. A bracket shown in fig. is subjected to a pull of 5 KN acting at an angle of 45^0 to a vertical. The bracket has a rectangular section whose depth is two times its thickness. If the permissible tensile stress is 55 N/mm^2, determine the cross-section of the bracket.



Q-7. A steel bar 40 mm diameter and 300 mm length is subjected to a torque of 1 KN/m and two other loads as shown in figure. If the ultimate tensile strength and yield strength of the bar materials are 450 N/mm^2 and 250 N/mm^2 respectively, determine factor of safety using:

I. Maximum principal stress theory;
II. Maximum shear stress theory; and
III. Maximum strain energy theory.



Design of Fasteners-2

Q-1. Classify the types of joints used in machines elements.

Q-2. State the advantages and limitations of riveted joints.

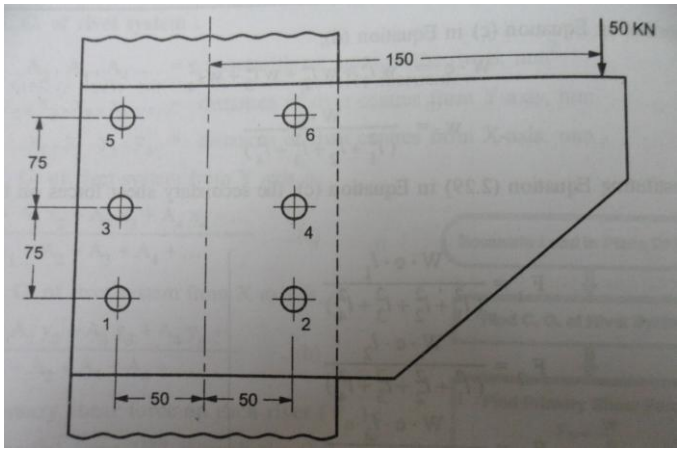
Q-3. What do you understand by caulking and fullering?

Q-4. A single riveted lap joint is to be made between the two 6 mm plates. If the tensile load acting on the plate is 50 KN, determine:

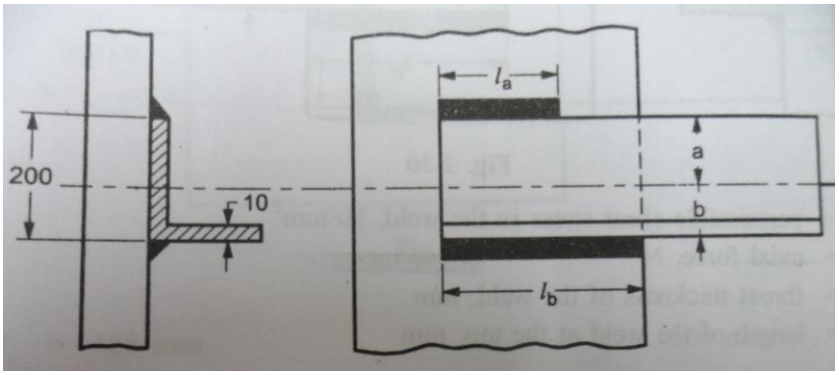
- The diameter of the rivets :
- The pitch of the rivets :
- The number of the rivets :
- The efficiency of the joint : and
- The width of the plate.

Draw the sketch of the joint with dimensions. Use the following permissible stresses.σ_t =120 N/mm^2,τ= 85/mm^2,σ_c= 185 N/mm^2.

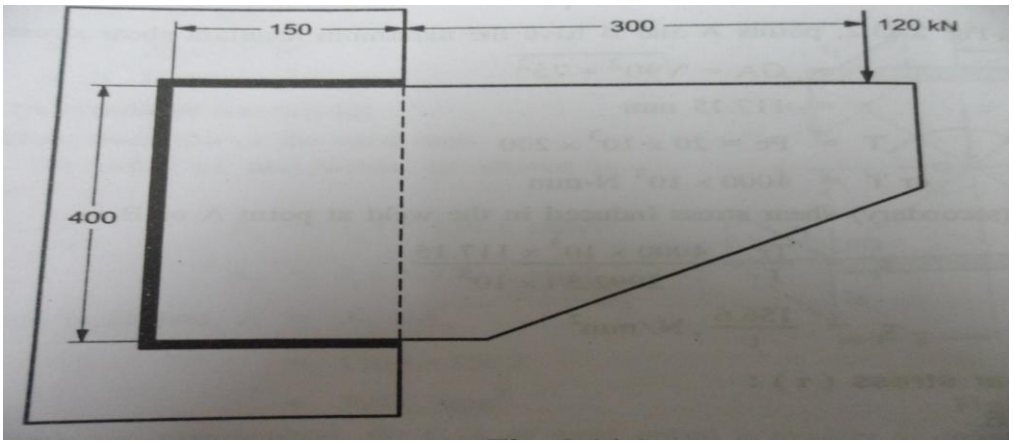
Q-5. A bracket plate of 12.5mm thickness is riveted to a column by 6 rivets of equal size as shown in figure. It carries a load of 50 KN at the distance of 150 mm from the centre of column. If the permissible shear stress and crushing stress for the rivets are 75 KN/mm^2 and 140 KN/mm^2 respectively, determine the diameter of the rivet.



Q-6. A 200X150X10 mm steel angle is to welded to a steel plate by the fillet welds along the edges of the 200 mm leg as shown in figure. The angle is subjected to a static load of 200 KN. The line of action of the load is the intersection of the centroidal plane of the angle and the plane of the weld. Find the lengths of the weld at the top and bottom, if allowable shear stress for the weld material is 75 MPa.



Q-7. A bracket plate carrying a load of 20 KN is to be welded to a column as shown in figure. Find the size of the weld, if the allowable shear stress in the weld is 110 MPa.



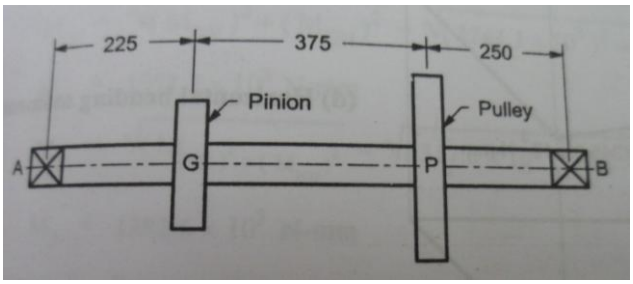
Design of shafts and keys-3

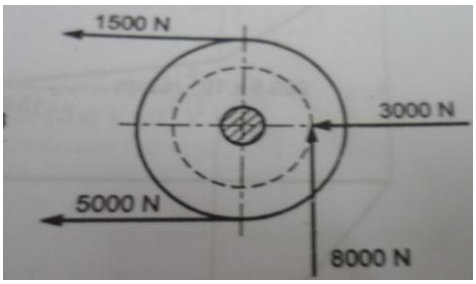
Q-1. What is A.S.M.C code for shaft design?

Q-2. What are the advantages of hollow shaft over solid shaft? State any two example where hollows shaft are used.

Q-3. Define “critical speed of shaft carrying single rotar”?

Q-4. A pulley weighing 1.2 KN and 600 mm diameter is driven by a horizontal belt drive. The power is transmitted through a solid shaft to a 262.5 mm diameter pinion keyed to the shaft which in turn meshes with a gear. The belt tension and the components of gear reaction on the pinion are as shown in figure. Design the shaft and square key using the suitable values of stresses for commercial shafting. Assume shaft and key are made of same material. The shock and fatigue factors are: K_b= 2.0 and K_f= 1.5. find the torsoinal deflection of the shaft.





Q-5. A hollow transmission shaft, having inside diameter 0.6 times the outside diameter, is made of plane carbon steel 40C8 (s_{yt} = 380 N/mm^2). A belt pulley of diameter 900 mm and weight 600 N is mounted on the shaft and overhangs left end bearing by 250 mm. a pulley transmit power to the machine shaft, which is below yhe pulley, through vertical belt. The tension in tight end slack sides of the belt are 3 KN and 1 KN respectively. The angle of wrap of the belt on the pulley is 180^0. If required F.O.S. is 3, determine the outside end and inside diameter of shafts.

Q-6. Design the rectangular key for a shaft of 75mm diameter. The shearing and crushing stresses for key material are 50 N/mm^2 and 75 N/mm^2 respectively.

Q-7. A Kennedy keys are used to transmit 30 KW power at 500 rpm from 40 mm diameter shaft to the hub. The keys are made up of steel 55C8 with yield strength of 400 N/mm^2 and ultimate tensile strength of 700 N/mm^2. If the F.O.S. required is 3 and overload factor is 1.5, design the keys.

Q-8. A vertical shaft of 12 mm diameter rotates in sleeve (journal) bearings and a disc of mass 15 kg is mounted on the shaft at mid span. The distance between two bearings is 0.8 m. if the C.G. of rotor is 0.8 mm is from the axis of the shaft, determine the critical speed of rotation of shaft.

Assume, $E = 2 \times 10^5$ N/mm^2.