

17553

16117

4 Hours / 100 Marks

Seat No.

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Instructions : (1) All Questions are *compulsory*.

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

(5) Use of Non-programmable Electronic Pocket Calculator is permissible.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE :

20

(a) What is design data book ? Write advantages of using design data book.

(b) State causes & remedies of stress concentration.

(c) Explain effect of keyways on strength of shaft.

(d) What is caulking & fullering of rivet ?

(e) Explain various stresses observed in screwed fastenings.

(f) Write advantages & disadvantages of welded joints.

(g) Explain perfect frame and deficient frame.

2. Attempt any TWO :**16**

- (a) Explain design procedure of circular flanged pipe joint, with neat sketch.
- (b) Explain general procedure of machine design. What is velocity factor and service factor ?
- (c) Design a rectangular key for a shaft of 50 mm dia. The shearing and crushing stress are limited to 42 N/mm^2 and 70 N/mm^2 respectively. Same material are used for shaft & key.

3. Attempt any TWO :**16**

- (a) Design the diameter of rotating shaft which is subjected to a maximum torque of 200 Nm and a bending moment of 350 Nm. Both the torque and bending moments are applied suddenly for following condition :
 - (1) Yield point value of shear material = 300 N/mm^2
 - (2) Factor of safety = 3
 - (3) $K_m = 2.0$ and $K_t = 1.5$ are combined shock and fatigue factor in bending & twisting respectively.
- (b) Explain detail design procedure for protected type flange coupling.
- (c) Explain design procedure for axially loaded unsymmetrical welded sections.

4. Attempt any TWO :

16

- (a) A plate 80 mm wide and 10 mm thick is joined with another plate by single transverse and double parallel fillet welds as shown in fig. 1. The maximum tensile and shear stresses are 70 N/mm^2 and 50 N/mm^2 respectively. Find the length of each parallel fillet if the joint is subjected to static load of 55 kN.

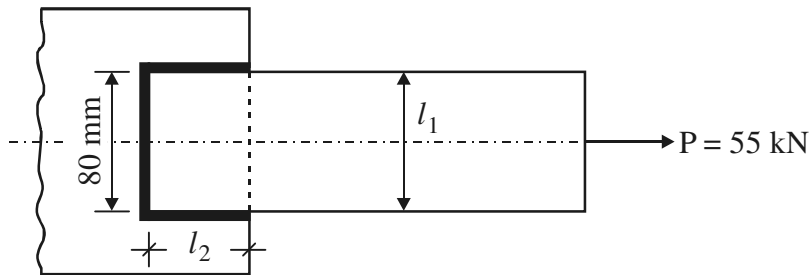


Figure-1

- (b) Explain failure of riveted joint. How efficiency of riveted joint is expressed ?
- (c) Explain design procedure of circumferential lap joint (riveted joint) for a boiler with sketch.

5. Attempt any TWO :

16

- (a) Explain advantages & disadvantages of screwed joint. Also explain bolts of uniform strength.
- (b) A cylinder head of a steam engine is held in position by M20 bolts. The effective diameter of the cylinder is 300 mm and steam pressure is 0.65 N/mm^2 . Assuming that bolts are not initially stressed, find the number of bolts required, if working stress for bolt material is not to exceed 20 N/mm^2 .
- (c) Explain various stresses in pipes. Sketch any two pipe joints.

P.T.O.

6. Attempt any TWO :

16

- (a) Explain in brief :
- (i) Stress strain curve for ductile material.
 - (ii) S-N curve & endurance limit
- (b) Analyse the truss shown in fig. 2. All the members are of 3 m length. Determine the forces in all members of truss. Use method of joints.

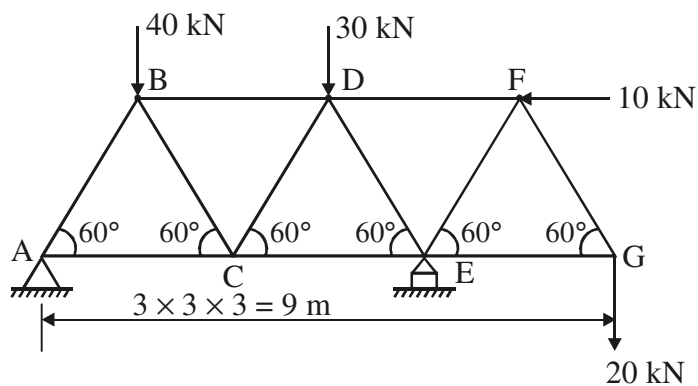


Figure-2

- (c) Explain method of sections used for analysis of trusses, using suitable example.

OR

Solve Q. 6 (b) by method of sections.
