

# 17553

**21718**

**4 Hours / 100 Marks**

Seat No.

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- Instructions* –
- (1) All Questions are *Compulsory*.
  - (2) Answer each next main Question on a new page.
  - (3) Illustrate your answers with neat sketches wherever necessary.
  - (4) Figures to the right indicate full marks.
  - (5) Assume suitable data, if necessary.
  - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
  - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

- 1. Attempt any FIVE of the following: **20****
- a) Define the terms:
    - (i) Creep
    - (ii) Endurance limit
  - b) For a square key equally strong in shearing and crushing, show that the permissible crushing stress is twice the shear stress.
  - c) State advantages and disadvantages of welded joints.
  - d) Show by neat sketches the various ways in which a riveted joint may fail.
  - e) Sketch any four profiles used for screwed joints.
  - f) What is perfect frame? Explain with example.
  - g) Explain stresses to be considered while designing pipes and pipe joints.

P.T.O.

2. Attempt any TWO of the following:

16

- a) (i) What is stress concentration? Illustrate any four methods to reduce it with neat sketches.
- (ii) Determine the smallest size of hole, that can be punched in 12 mm thick plate having an ultimate shear stress of  $390 \text{ N/mm}^2$  and permissible crushing stress for punch material is  $84 \text{ N/mm}^2$ . Assume FOS – 6.
- b) (i) State the meaning of following:
- 1) FeE230
  - 2) WM400
  - 3) 35C8
  - 4) 15Cr16Ni2
- (ii) Explain the term “Preferred numbers series”.
- c) Figure No. 1 shows a shaft of uniform diameter supported in two self aligning bearings at C and D, the two pulleys A and B are mounted having belt tensions 1800 N and 800 N respectively the shaft transmits 15 kW power at 350 rpm. The pulleys weigh 300 N and 500 N respectively. Take safe working stress as 45 MPa.

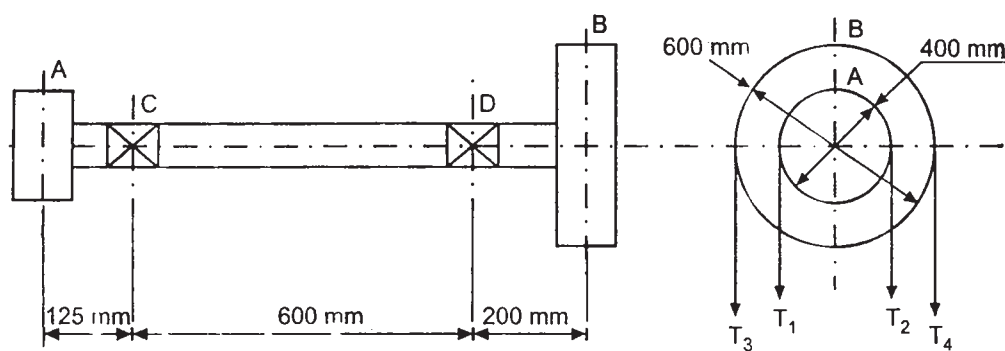


Fig. No. 1

**3. Attempt any TWO of the following:****16**

- a) Design cast iron protective type Flange coupling for a steel shaft is used for transmitting 40 kW at 300 rpm. The following permissible stresses may be used.
- Shear stress for shaft, bolt and key material =  $40 \text{ N/mm}^2$
  - Crushing stress for bolt and key =  $80 \text{ N/mm}^2$
  - Shear stress for cast iron =  $8 \text{ N/mm}^2$
- b) (i) Discuss the various types of shafts and standard sizes of transmission shaft.
- (ii) State the functions of coupling.
- c) A plate 100 mm wide 12.5 mm thick is to be joined with another plate by a single transverse and double parallel fillet weld. The strength of the welded joint should be equal to the strength of plates to be joined. The permissible tensile and shear stress for the weld material and the plates are  $80 \text{ N/mm}^2$  and  $50 \text{ N/mm}^2$  resp. Find the length of weld. Assume tensile Force acting on plates as static.

**4. Attempt any TWO of the following:****16**

- a) (i) What is difference between caulking and fullering? Explain with the help of neat sketches.
- (ii) Define the following terms used in riveted joint
- 1) Pitch
  - 2) Back Pitch
  - 3) Diagonal pitch
  - 4) Margin

- b) Find the efficiency of the following riveted joints
- (i) Single riveted lap joint of 6 mm plates with 20 mm diameter rivets having a pitch of 50 mm.
  - (ii) Double riveted lap joint of 6 mm plates with 20 mm diameter rivets having a pitch of 70 mm.  
Assume – Permissible  $\sigma_t$ ,  $\sigma_c$ ,  $\tau$  are 120 MPa, 180 MPa and 90 MPa respectively.
- c) A wall bracket attached to a wall by means of four bolts, two at a distance of 50 mm from the lower edge and remaining two at a distance of 450 mm from lower bolts. It supports a load of 60 kN at a distance of 500 mm from the wall. Sketch the arrangement and estimate the diameter of bolt. Assume safe working stress in tension is 90 N/mm<sup>2</sup>.

**5. Attempt any TWO of the following:**

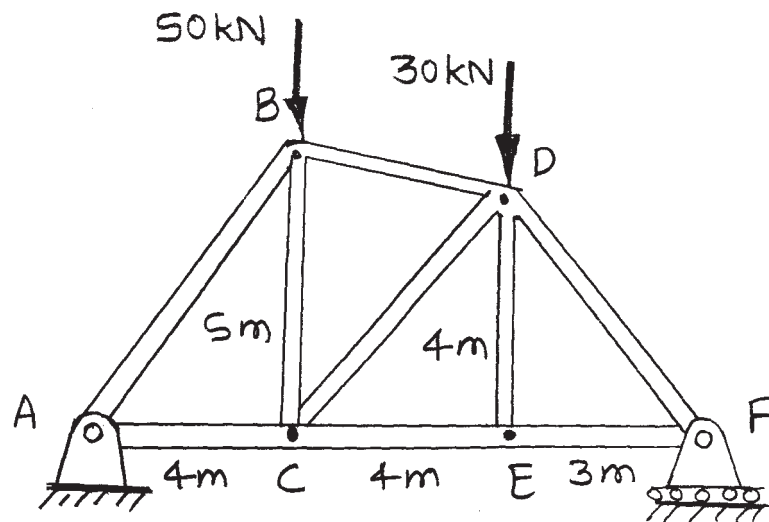
**16**

- a) (i) What are the steps involved in general design procedure? Explain.
- (ii) Explain ASME code of design for line shaft subjected to fluctuating load.
- b) Explain design procedure for axially loaded unsymmetrical welded sections.
- c) Explain the design procedure for bolting cylinder cover of a pressure vessel.

6. Attempt any TWO of the following:

16

- Design and draw an oval flanged pipe joint for a pipe having 50 mm bore. It is subjected to an internal fluid pressure of  $10 \text{ N/mm}^2$ . The maximum tensile stress in pipe and bolt material is not to exceed 25 MPa and 65 MPa respectively.
- Explain method of sections used for analysis of trusses, using suitable example.
- Find the force acting in each member of the truss shown in Figure No. 2 by using method of joint.

Fig. No. 2