



17553

15162

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) *Figures to the right indicate full marks.*
 - (4) *Assume suitable data, if necessary.*
 - (5) *Use of Non-programmable Electronic Pocket Calculator is permissible.*

Marks

- 1. Attempt any five of the following :** **(5×4=20)**
 - a) State the General Considerations in machine design.
 - b) What are various types of shaft ? State two materials used for shaft ?
 - c) Give the classification of welded joints.
 - d) Explain the method of riveting.
 - e) List and draw different types of screw threads.
 - f) State the various types of pipe joints.
 - g) Explain imperfect frame and deficient frame.

- 2. Attempt any four of the following :** **(4×4=16)**
 - a) Define Ductility and Toughness.
 - b) Define factor of safety. State any two factors influencing while selecting it.
 - c) What is the effect of keyways on the strength of the shaft ?
 - d) State the advantages and disadvantages of welded joints (any two).
 - e) State the terms used in riveted joints.
 - f) Write down the criteria for a perfect frame.

- 3. Attempt any two of the following :** **(2×8=16)**
 - a) Design the rectangular key for a shaft of 50 mm in diameter. The shear stress and crushing stress for the key material are 42 MPa and 70 MPa respectively.
 - b) A plate 75 mm wide and 10 mm thick is joined with another steel plate by means of single transverse and double parallel fillet weld. The permissible tensile and shear stress in weldment are 70 MPa and 50 MPa respectively. Determine the required length of each fillet weld.
 - c) A steam engine cylinder has an effective diameter of 350 mm and the maximum steam pressure acting on an cylinder cover 1.25 N/mm^2 . Calculate no. of studs required to fix the cylinder cover assuming the permissible stress in the stud as 33 MPa.

P.T.O.



4. Attempt **any two** of the following :

(2×8=16)

- A line shaft is rotating at 200 rpm transmitted a power of 20 kW. The shaft may be assumed to be made up of mild steel with an allowable shear stress of 42 MPa. Determine the diameter of shaft neglecting the bending moment of shaft.
- Draw stress-strain diagram for brittle material as well as for ductile material showing important points on it.
 - State the functions of coupling.
- A stainless pipe carries 2400 m³/hr steam at a pressure 1.4 N/mm². The velocity of steam is 30 m/sec. Assuming the tensile strength as 40 MPa. Find the inside diameter of pipe and valve thickness. Assume C = 3.

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

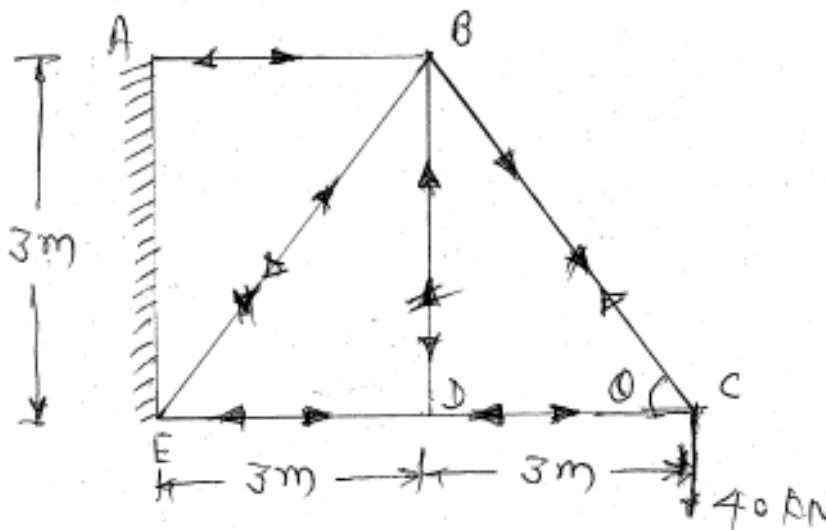
(2×8=16)

- A 200×100×10 mm angle is welded to plate by means of fillet weld. The angle is subjected to static load of 160 kN and permissible shear stress of weld is 70 N/mm². Determine the length of weld if the force at lower section is acting at a distance 72 mm from C. G.
- What is stress concentration ? State its causes (any two) ?
 - State the steps involved in designing a machine component.
- Write down the procedure of method of joints in analysing frame structure.
 - Draw a neat sketch of muff coupling.

6. Attempt **any one** of the following :

(1×16=16)

- Two plates of 10 mm thickness each are to be joined by means of a single rivetted double strap butt joint. Determine the diameter, rivett pitch strap thickness and efficiency of the joint. Take the working stress in tension and shearing as 80 MPa and 60 MPa respectively. **12**
 - State the advantages and disadvantages of screwed joints (any two). **4**
- Find the forces in all members of the truss shown in figure (A). Calculate the result. **12**



- Explain the term caulking and fullering with a neat sketch. **4**