

**B.E. DEGREE EXAMINATIONS: APRIL / MAY 2009**

Fourth Semester

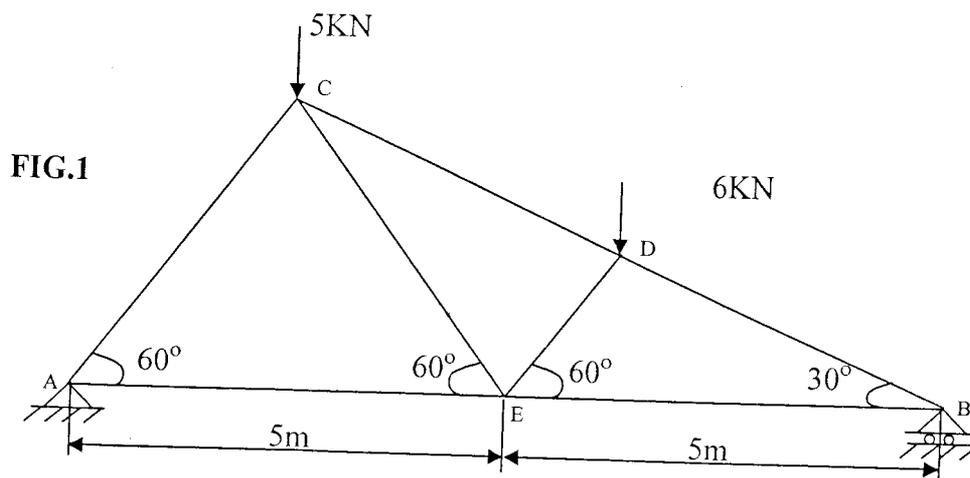
**AERONAUTICAL ENGINEERING****U07AR403 Aircraft Structures-I****Time: Three Hours****Maximum Marks: 100****Answer ALL the Questions:-****PART A (20 x 1 = 20 Marks)**

1. A member under tension is called
  - a. Tie
  - b. Column
  - c. Strut
  - d. All the above
2. A truss in which the number of members is more than  $(2J-3)$  is known as
  - a. Perfect truss
  - b. Deficient truss
  - c. Stable truss
  - d. redundant truss
3. Assumption made in computing the forces in the members of a perfect truss is
  - a. All members are pin jointed
  - b. The members are connected only at their ends
  - c. The frame is loaded only at the joint
  - d. All the above
4. Method used to find the forces in various members of a perfect truss is
  - a. Graphical method
  - b. Method of joint
  - c. Method of sections
  - d. All the above
5. The number of unknown reactions over and above the number of static equilibrium equations is called
  - a. Degree of indeterminacy
  - b. Degree of reactions
  - c. Degree of unknowns
  - d. All the above
6. Degree of redundancy for a beam simply supported at three points and subjected to three point loads at equal intervals is
  - a. 2
  - b. 3
  - c. 1
  - d. 4
7. A beam made up of two or more different materials is called
  - a. Composite beam
  - b. Indeterminate beam
  - c. Continuous beam
  - d. Beam of uniform strength
8. The ratio between the relative stiffness of a member and total relative stiffness at the joint is known as
  - a. Carry over factor
  - b. Distribution factor.
  - c. Relative factor
  - d. Both b and c
9. Expression for fixed end moment for a fixed -fixed beam of length  $L$ , subjected to UDL of intensity  $q$  over the entire length is
  - a.  $qL^2/24$
  - b.  $qL^2/12$
  - c.  $qL^2/36$
  - d.  $qL^2/48$
10. A cantilever beam of length  $L$  is subjected to a transverse load  $P$  at a distance of  $L/3$  from the tip. The transverse deflection at the tip is
  - a.  $14PL^3/31EI$
  - b.  $31PL^3/14EI$
  - c.  $14PL^3/21EI$
  - d.  $21PL^3/14EI$

11. Expression for strain energy stored ( $U$ ) in a beam due to bending is  
 a.  $\int(M^2/2EI) dx$       b.  $\int(M^2/EI) dx$       c.  $\int(2M^2/EI) dx$       d.  $\int(M^2/4EI) dx$
12. Expression for strain energy stored ( $U$ ) in a bar due to tension is  
 a.  $\int(P^2/2EI) dx$       b.  $\int(P^2/AE) dx$       c.  $\int(2P^2/AE) dx$       d.  $\int(P^2/2AE) dx$
13. End conditions for an Euler column is  
 a. Fixed-Fixed      b. Fixed-Free      c. Fixed-Hinged      d. Hinged-Hinged
14. Critical load of a column with Fixed-Fixed end condition is given by  
 a.  $\pi^2EI/L^2$       b.  $2\pi^2EI/L^2$       c.  $4\pi^2EI/L^2$       d.  $\pi^2EI/4L^2$
15. The ratio between buckling load and safe load is known as  
 a. Slenderness ratio      b. Buckling factor      c. Factor of safety      d. Poisson's ratio
16. A beam column is one which carries  
 a. Axial load      b. Transverse load      c. Eccentric load      d. Both axial and transverse loads
17. The secant formula is used for  
 a. Long column under eccentric loading      b. Long column under axial loading  
 c. Short column under eccentric loading      d. Short column under axial loading
18. Rankine's constant for the compression strength is generally taken as  
 a.  $150\text{MN/m}^2$       b.  $320\text{MN/m}^2$       c.  $400\text{MN/m}^2$       d.  $550\text{MN/m}^2$
19. Column are classified using the parameter  
 a. Length      b. Equivalent length      c. Slenderness ratio      d. All the above
20. Elastic stability assumes for a column  
 a. Material is homogeneous      b. Material is isotropic  
 c. Stresses within proportionality limit      d. Slenderness ratio

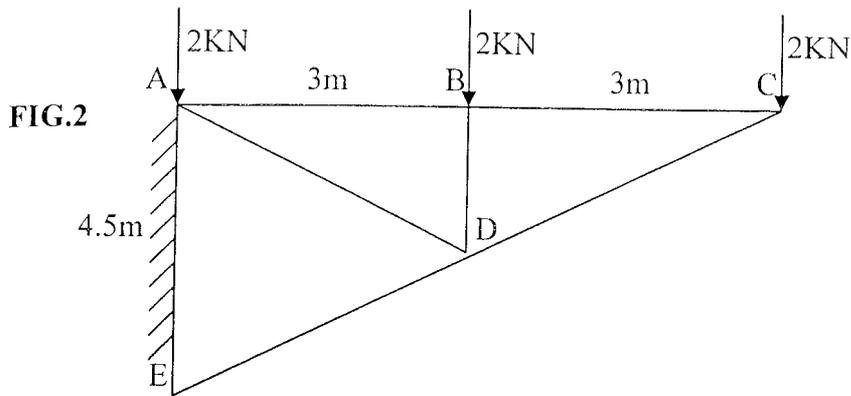
**PART B (5 x 16 = 80 Marks)**

21. (a) Find the forces in the members of the truss shown in Fig.1.

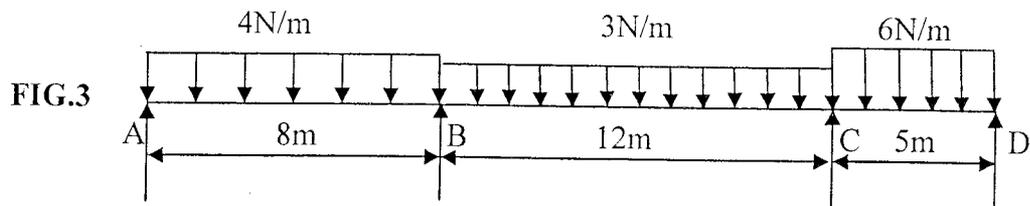


(OR)

21. (b) Find the forces in the members of the truss shown in Fig. 2.

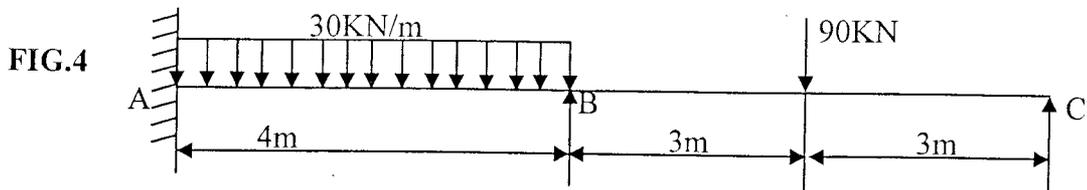


22. (a) Find the support moments of the beam shown in Fig.3 using moment distribution method and draw the bending moment diagram.

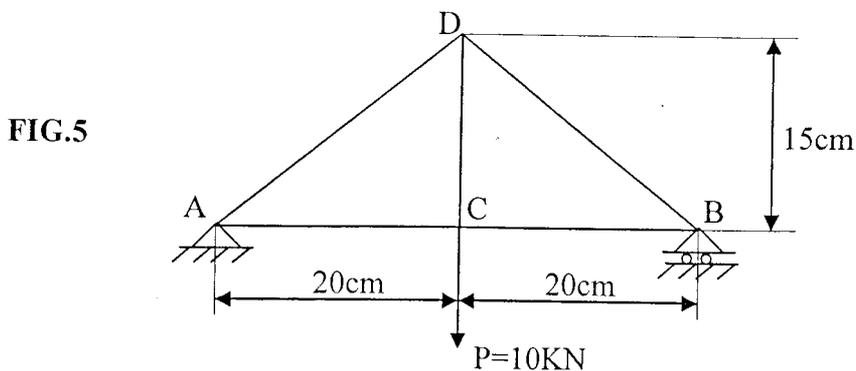


(OR)

22. (b) Find the support moments of the beam shown in Fig.4 using three-moment equation and draw BMD.



23. (a) For the truss shown in Fig.5, the cross sections of the bars in compression are  $30\text{cm}^2$  and others are  $12\text{cm}^2$ . Determine the vertical displacement of the point C and the horizontal displacement of point B. Take Young's modulus  $E=210\text{GPa}$



(OR)

23. (b) A beam of length  $L$  is fixed at both ends and carries a concentrated load  $P$  at the mid point. Find the support moment and deflection at the center.

24. (a) An I-section with 10cm x 2cm top and bottom flange and 10cm x 2cm middle web is as a column of length 3m with both ends hinged. If  $E=210\text{GPa}$ , calculate the load the column can carry. Derive the formula used.

(OR)

24. (b) A beam column of length  $L$  is subjected to an axial load  $P$  and a uniformly distributed load  $q$  N/m in the transverse direction. Derive the expression for the deflection curve and find the maximum deflection.

25. (a) A shaft is subjected to a maximum torque of 12kNm and a maximum bending moment of 9kNm at a particular section. If the allowable equivalent stress in simple tension is  $160\text{MN/m}^2$ , find the diameter of the shaft according to

i) The maximum shear stress theory and

(8)

ii) The strain energy theory.

(8)

(OR)

25. (b) Write Short notes on

i) Distortion energy theory

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ii) Maximum Principal strain theory

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Time: 7

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(c)

2. In a  
(a)  
(b)  
(c)  
(d)

3. Effi  
(a)  
(c)

4. Pic  
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(b)  
(c)  
(d)

5. Pic  
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6. Th  
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(c)

7. Be  
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(b)  
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(d)

8. T  
(a)  
(c)

9. T  
(a)  
(c)