

B.E DEGREE EXAMINATIONS: NOV/DEC 2014

(Regulation 2009)

Fourth Semester

AERONAUTICAL ENGINEERING

AER106: Aircraft Structures I

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Minimum _____ member required for framing a perfect truss.
 - a) 4
 - b) 6
 - c) 2
 - d) 3
2. Six equilibrium equation required for analyzing _____ truss
 - a) Plane truss
 - b) Redundant truss
 - c) Space truss
 - d) Deficient truss
3. _____ are constructed from more than one material to increase stiffness or strength
 - a) Fibrous composite beam
 - b) Metal matrix composite beam
 - c) Composite beam
 - d) Alloy beam
4. The moment required to produce a unit slope in a beam is called as _____
 - a) Strength
 - b) Stiffness
 - c) Distribution factor
 - d) Load factor
5. Energy stored in a structure due to external loading is called as _____.
 - a) Resilience
 - b) Potential energy
 - c) Proof resilience
 - d) Kinetic energy
6. Strain energy stored in a beam of length 'dl' due to bending moment 'M' is _____.
 - a) $\frac{M^2 ds}{EI}$
 - b) $\frac{M^2 ds}{2EI}$
 - c) $\frac{Mds}{2EI}$
 - d) $\frac{M^2 dl}{2EI}$

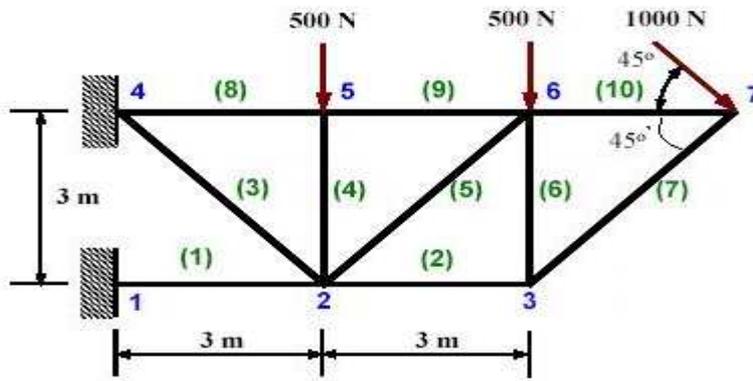


Figure-1

(OR)

- b) Find the member force in the members of the truss shown in figure-2.

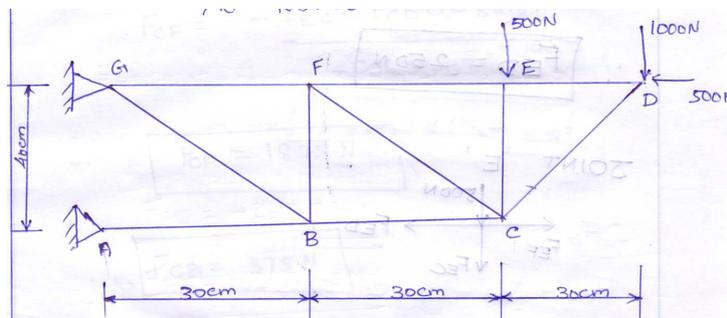


Figure-2

22. a) Draw shear force and bending moment diagram for a continuous beam shown in figure-3. By using moment distribution method.

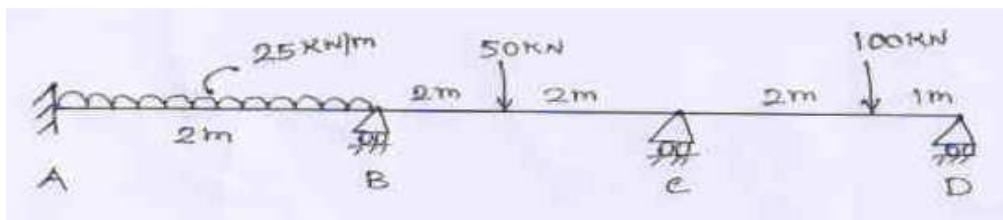


Figure-3

(OR)

- b) Draw shear force and bending moment diagram for the continuous beam shown in figure-4

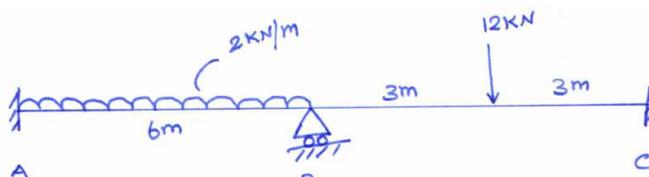


Figure-4

23. a) (i) Calculate the maximum deflection and slope for a cantilever beam of length 5 m subjected to UDL of 3kN/m. Using energy method. Take $E=200 \text{ GPa}$ and $I=250 \times 10^6 \text{ mm}^4$ (7)
- (ii) State and explain Castigliano's theorem. (7)

(OR)

- b) Find the vertical and horizontal deflection of the joint C of the truss shown in figure-5. The cross section area of the horizontal member is 150 mm^2 and the inclined member is 200 mm^2 . Take $E=200 \text{ kN/mm}^2$

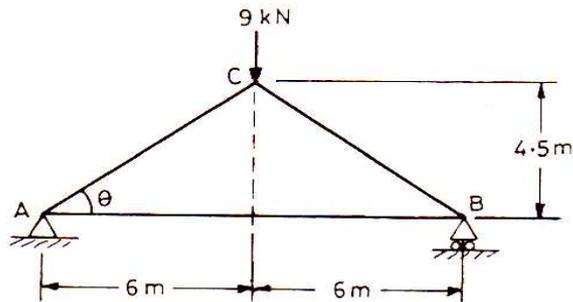


Figure-5

24. a) (i) A column made of aluminum having 2 m long and $20 \text{ cm} \times 20 \text{ cm}$ cross section both the ends are fixed. Find the buckling load. Tak $E = 70 \text{ GPa}$ (10)
- (ii) Obtain expression for the buckling load of a fixed pinned column. (4)

(OR)

- b) Explain the theories used for analyzing short and medium columns.

25. a) Explain the following theories of failures:

(i) Tresca Theory (7)

(ii) Von-Mises Theory (7)

(OR)

- b) Explain the following:

(i) Maximum shear stress theory (7)

(ii) Distortion theory (7)
