SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

Subject with Code : SM-1(15A01303) **Course & Branch**: B.Tech - CE

Year & Sem: II-B.Tech & I-Sem **Regulation:** R15

UNIT – 4

DEFLECTION OF BEAMS

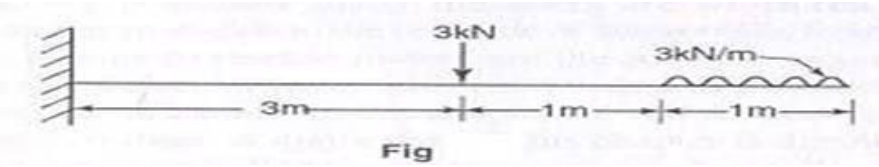
1. Derive the relation between slope, deflection and radius of curvature.

2. Determine: (i) slope at the left support, (ii) deflection under the load and (iii) maximum deflection of a simply supported beam of length 6 m, which is carrying a point load of 5 KN at a distance of 2 m from the left end. Take E = 2 x 1055 N/mm2 and I = 1 x 108 mm^4.

3. A beam of length 8 m is simply supported at its ends and carries two point loads of 36 KN and 46 KN at a distance of 1.5 m and 4 m from the left support. Find: (i) deflection under each load. (ii) Maximum deflection and (iii) The point at which maximum deflection occurs, given E = 2 x 105 N/mm2 and I = 85 x 106 mm4. Use Macaulay's method.

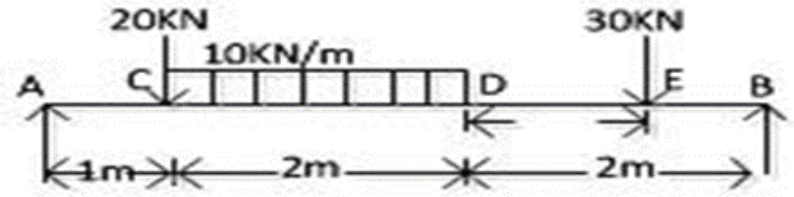
4. A cantilever of length 4 m carries a uniformly distributed load 3 kN/m over a length of 1.5 m from the free end and a point load of 2 KN at the free end. Find the slope and deflection at the free end if E = 2.1 x 105 N/mm2 and I = 6.667 x 107 mm4.

5. Find the slope and deflection at the free end of the cantilever shown in figure.
Take EI = 1 x1010kN-mm^2.



Fig

6. Determine the deflections at points C, D and E in the beam shown in the figure.
Take E=200KN/mm2 and I=60 x106mm^4.



7. Determine the slope and deflection of a simply supported beam carrying a uniformly distributed load by Mohr's Theorem.

8. Find the expression for the slope and deflection of a cantilever of length L, which carries a uniformly distributed load over a length "a" from the fixed end by Moment area method starting from fundamentals.

9. Write the expressions for maximum slope and deflection of a cantilever beam with a point load at free end.

10. Explain the following terms

a) Double integration method.

b) The elastic line of a beam.

c) Mohr's theorem

d) Moment area method

e) Macaulay's method

SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (OBJECTIVE)

Subject with Code : SM-1(15A01303) **Course & Branch**: B.Tech - CE **Year & Sem:** II-B.Tech & I-Sem **Regulation:** R13

UNIT–4

DEFLECTION OF BEAMS

1) Distance of maximum deflection from the center in a S.S.Beam with 'W' not at the center will be
a) $[2 (L^2—b^2)/3]^{0.5}$ b) $[(L^2—b^2)/3]^{0.5}$ c) $[(3L^2—b^2)/3]^{0.5}$ d) None [ ]

2) Maximum slope in a cantilever beam with a moment M at the free end will be [ ]
a) 3ML/EI b) 2ML/EI c) ML/EI d) None

3) Maximum deflection in a cantilever beam with a moment M at the free end will be [ ]
a) $3M^2L/2EI$ b) $2M^2L/2EI$ c) $M_2L/2EI$ d) None

4) Which bracket is used in Macaulay's Method of slope and deflection [ ]
a) Parentheses ( ) b) square brackets [ ]
c) braces { } d) None

5) Difference in slopes between two points A and B by the moment area method is given by[ ]
a) Area of BMD between A and B/2EI b) Area of BMD between A and B/3EI
c) Area of BMD between A and B/EI d) None

6) Difference in deflections between two points A and B by the moment area method is given by[ ]
a) (Area of BMD between A and B) . XB/2EI b) (Area of BMD between A and B) . XB /3EI
c) (Area of BMD between A and B) . XB /EI d) None

7) In the strain energy method of slope and deflection, load is applied [ ]
a) Gradually b) Suddenly c) With an impact d) None

8) A prop is used to cause [ ]
a) Less deflection b) More deflection c) No change in deflection d) None

9) Props can be used in [ ]
a) S.S.Beam b) Cantilever beam c) S.S. beam as well as cantilever d) None

10) Deflection due to shear is significant in [ ]
a) Long beams b) Short beams c) Long as well as short beams d) None

11) Macaulay's method is more convenient for beams carrying [ ]
a) Single concentrated load b) UDL c) Multi-loads d) None

12) Slope is found by moment area method by using [ ]
a) First moment of the area b) Second moment of the area
c) Third moment of the area d) None

13) Deflection is found by moment area method by using [ ]
a) First moment of the area b) Second moment of the area
c) Third moment of the area d) None

14) Props are used to decrease [ ]

a) Slope b) Deflection c) Slope as well as deflection d) None

15) Deflection due to shear force as compared to bending moment will be [ ]

a) Equal b) Less c) More d) None

16) Deflection under a concentrated load not at the center (distance a from left support and distance b from right hand support) will be [ ]

a) $WL^3/48EI$ b) $5WL^3/384EI$ c) $Wa^2 b^2/3EI$ where a = L–b (d) None

17) Macaulay's method is more convenient for beams carrying [ ]

a) Multi concentrated loads b) Multi number of UDL

c) Multi-concentrated and multi UDL loads d) None

18) A beam is designed on the basis of [ ]

a) Maximum deflection b) Minimum deflection c) Maximum slope d) None

19) A beam is designed on the basis of [ ]

a) Maximum bending moment b) Minimum shear force

c) Maximum bending moment as well as for maximum shear force d) None

20) The second moment of a circular area about the diameter is given by (D is the diameter).[ ]

a) $\frac{\pi D^4}{4}$ b) $\frac{\pi D^4}{16}$ c) $\frac{\pi D^4}{32}$ d) $\frac{\pi D^4}{64}$

21) Moment of resistance of a beam should be [ ]

(a) Greater than the bending moment (b) Less than the bending moment

(c) Two times the bending moment (d) None

22) Variation of bending strain in a beam has [ ]

(a) Parabolic variation (b) Linear variation (c) Cubical variation (d) None

23) 1. Strain energy is the [ ]

a) energy stored in a body when strained within elastic limits
b) energy stored in a body when strained upto the breaking of a specimen
c) maximum strain energy which can be stored in a body
d) proof resilience per unit volume of a material

24) A vertical column has two moments of inertia (i.e. Ixx and Iyy). The column will tend to buckle in the direction of the [ ]

a) axis of load b) perpendicular to the axis of load
c) maximum moment of inertia d) minimum moment of inertia

25) The neutral axis of the cross-section a beam is that axis at which the bending stress is [ ]

a) zero b) minimum c) maximum d) infinity

26) Euler's formula holds good only for [ ]
a) short columns b) long columns c) both short and long columns d)weak columns

27) The object of caulking in a riveted joint is to make the joint [ ]

a) free from corrosion. b) stronger in tension

c) free from stresses d) leak-proof

28) A steel bar of 5 mm is heated from 15° C to 40° C and it is free to expand. The bar Will induce

a) no stress b) shear stress c) tensile stress d)compressive stress

29) A body is subjected to a tensile stress of 1200 MPa on one plane and another tensile stress of 600 MPa on a plane at right angles to the former. It is also subjected to a shear stress of 400 MPa on the same planes. The maximum normal stress will be [ ]

a) 400 MPa b) 500 MPa c) 900 MPa d) 1400 MPa

30) Two shafts 'A' and 'B' transmit the same power. The speed of shaft 'A' is 250 r.p.m. and that of shaft 'B' is 300 r.p.m. The shaft 'B' has the greater diameter. [ ]

a) True b) False c) not correct d) none of them

31) The stress induced in a body, when suddenly loaded, is _____ the stress induced when the same load is applied gradually. [ ]

a) equal to b)bone-half c) twice d)four times

32) Maximum deflection in a S.S.Beam with 'W' not at the center will be [ ]

(a) $Wb (L2 –b2)1.5/3\sqrt{3}EI$ (b) $Wb (L2 –b2)1.5 /6\sqrt{3}EI$

(c) $Wb (L2 –b2)1.5/ 9\sqrt{3}EI$ (d) None

33) Deflection under the load in a S.S.Beam with 'W' not at the center will be [ ]

(a) 4Wa2b2/3EIL (b) 2Wa2b2/3EIL (c) Wa2b2/3EIL (d) None

34)Difference in slopes between two points A and B by the moment area method is given by[ ]

(a) Area of BMD between A and B/2EI (b) Area of BMD between A and B/3EI

(c) Area of BMD between A and B/EI (d) None

35) Difference in deflections between two points A and B by the moment area method is given by

(a) (Area of BMD between A and B) . XB/2EI (b) (Area of BMD between A and B) . XB /3EI

(c) (Area of BMD between A and B) . XB /EI (d) None

36) Which one method is the best for finding slope and deflection [ ]

(a) Double integration method (b) Macaulay ’s method

(c) Strain energy method (d) None

37) Slope at a point in a beam is the [ ]

(a) Vertical displacement (b) Angular displacement (c) Horizontal displacement (d) None

38) Deflection at a point in a beam is the [ ]

(a) Vertical displacement (b) Angular displacement

(c) Horizontal displacement (d) None

39) Identify the differential equation for finding slope and deflection [ ]

(a) EI d2y/dx2 = –M (b) EI d2y/dx2 = +M

(c) EI d2y/dx2 = ±M (d) None

40) Maximum deflection in a S.S. beam with W at centre will be [ ]

(a) WL3/36EI (b) WL3/24EI (c) WL3/48EI (d) None