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 – 5

CONJUGATE BEAM METHOD & DIRECT AND BENDING STRESSES

1. A hollow rectangular column of external depth 1.5 m and external width 0.8 m is 12 cm thick. Calculate the maximum and minimum stress in the section of the column if a vertical load of 220 KN is acting with an eccentricity of 16 cm.

2. A Simply supported beam of length 5 m carries a point load of 2.5 kN at a distance of 1 m from each end. If E = 2 x 105 N/mm2 and I = 1 × 108 mm4 for the beam, then using conjugate beam method determine: (i) slope at each end and under each load (ii) deflection under each load and at the centre.

3. A simply supported beam AB of span 6m carries appoint load of150KN at its centre C. The value of I for the left half is 2 x 108 mm4 and for the right half portion I is 3 x 108 mm4. Find the slopes at the two supports and deflection under the load. Take E = 200 GN/m2.

4. A short column of external diameter 30 cm and internal diameter 20 cm carries an eccentric load of 60 kN. Find the greatest eccentricity which the load can have without producing tension on the cross-section.

5. The load on a bolt consists of an axial pull of 15kN together with a transverse shear of 7.5kN. Determine the diameter of the bolt according to
   (a)Maximum principal stress theory
   (b)Maximum shear stress theory
   (c)Maximum strain energy theory.
   Elastic limit in tension may be taken as 285 MPa and Poisson's ratio as 0.23.
   Apply a factor of safety of 3 for all theories.

6. At a point in a two dimensional system, the stresses on two mutually perpendicular planes are 200MPa (Tensile) and 150 MPa (Compressive). These stresses are accompanied by a shear stress of 100MPa. Find out the location of principal planes. Also determine the magnitude and nature of principal stresses and that of maximum shear stress.

7. The load on a bolt consists of an axial pull of 25kN together with a transverse shear of 12.5kN. Determine the diameter of the bolt according to
(a) Maximum principal strain theory.
(b) Maximum shear stress theory
(c) Maximum shear strain energy theory. Elastic limit in tension may be taken as300 MPa and Poisson's ratio as 0.22. Apply a factor of safely of 3 for all theories.

8. At a point in a loaded specimen, the stresses on two mutually perpendicular planes are 100MPa and 50MPa both tensile in nature. These stresses are accompanied by a shear stress of 60MPa.Find out the location of principal planes. Also determine the magnitude and nature of principle stress and that of maximum shear stress.

9. In a two-dimensional stress system, the direct stresses on two mutually perpendicular planes are 120 MN/m2 and σ MN/m2. These planes also carry a shear stress of 40 MN/m2.
If factor of safety on elastic limit is 3, then find:
(i) The value of σ when shear strain energy is minimum and

(ii) The elastic limit of the material in simple tension.

10. Explain the following terms

a) Explain a real beam.

b) Write the conditions for stability

c) Explain the conjugate beam.

d) Direct and bending moment

e) Difference between real & conjugate beam

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QUESTION BANK (OBJECTIVE)

Subject with Code : SM-1(13A01301) **Course & Branch**: B.Tech - CE

Year & Sem: II-B.Tech & I-Sem **Regulation:** R13

UNIT–5

CONJUGATE BEAM METHOD

1) Flitched beam is also called [ ]

a) Flitched bar b) Flitched shaft c) Composite beam d) Flitched cantilever

2) A flitched beam has [ ]

a) Common neutral axis & both materials bend independently

b) Common neutral axis & both materials has common R (Radius of curvature)

c) Two neutral axis & both materials has common R (Radius of curvature)

d) Two neutral axis & both materials bend independently

3) Middle quarter rule is valid for a [ ]

a) Rectangular section b) Hexagonal section

c) Circular section d) Any section

4) Middle third rule is valid for a [ ]

a) Rectangular section b) Hexagonal section

c) Circular section d) Any section

5) RCC beams are designed assuming [ ]

a) Concrete can take no compressive load b) Concrete can take no compressive stress

c) Concrete can take no tensile stress d) Concrete can take no tensile load

6) Bending stress is [ ]

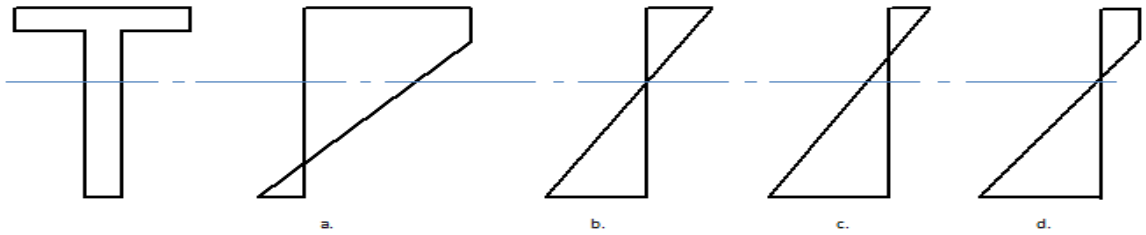
a) Neither tensile nor compressive stress

b) Tensile or compressive but cannot be added algebraically with direct tensile stress

c) Tensile or compressive and can also be added algebraically with direct tensile stress

d) None of the above

7) In a T-section beam, the bending stress distribution will be as shown [ ]



8) They have same length, same weight and same material, then corresponding to maximum allowable stress [ ]

a) All beams will have same moments of resistance

b) Beam (1) will have maximum moments of resistance

c) Beam (2) will have maximum moments of resistance

d) Beam (3) will have maximum moments of resistance

9) The force will form a couple is [ ]

a) Compress b) direct stress c) bending stress d) tensile

10) Maximum slope of a cantilever subjected to a UDL w per unit run throughout is [ ]

a) $\frac{wL^5}{6EI}$ b) $\frac{wL^5}{24EI}$ c) $\frac{wL^5}{8EI}$ d) $\frac{wL^5}{3EI}$

11) deflection of beams, radius of curvature is constant so its shape of beam forms

a) rectangular b) circular arc c) square d) circular

12) The expression $\frac{EId^4y}{dx^3}$ at a section of a member represents [ ]

a) Shear Force b) Rate of loading c) Bending Moment d) Slope

13) The product of young's modulus and moment of inertia is known as [ ]

a) Modulus rigidity b) section modulus c) flexural rigidity d) rigidity

14) Conjugate beam method, fixed ends of the beam due to shear force and Bending moment is [ ]

a) Not exist b) exist c) not available d) none of them

15) Actual beam exist only for [ ]

a) Shear force b) slope and deflection c) only deflection d) all

16) The principal planes are the planes of [ ]

a) zero shear stress b) only shear stress c) no normal stress d) Any of the above

17) stress induced in a beam due to bending stress is [ ]

a) rigidity modulus b) flexural rigidity c) bulk modulus d) None of the above

18) The _____ between any two points is equal to the net area of bending moment diagram between these points divided by flexural rigidity [ ]

a) total deflection b) change of slope c) change of deflection d) none of the above

19) Moment area method is useful in determining the following in a beam [ ]

a) Slope and deflection at a point b) tensile and compressive stresses a point
c) S.F and B.M at a point d) none of the above

20) actual beam, free ends of the beam due to slope and deflection is [ ]

a) Exist b) not exist c) available is not exist d) All

21) Maximum deflection in a S.S. beam with W at center will be [ ]

(a) At the left hand support (b) At the Right support

(c) At the center (d) None

22) Maximum slope in a S.S. beam with W at center will be [ ]

(a) At the supports (b) At the center

(c) In between the support and the center (d) None

23) Maximum slope in a S.S. beam with W at centre will be [ ]

(a) WL2/16EI (b) WL2/32EI (c) WL2/48EI (d) None

24) Maximum deflection in a S.S. beam with UDL 'w' over the entire span will be [ ]

(a) 3wL4/584EI (b) 5wL4/384EI (c) 7wL4/384EI d) None

25) A beam of uniform strength has [ ]

a) same cross-section throughout the beam b) same bending stress at every section

c) same bending moment at every section d) same shear stress at every section

26) A beam of uniform strength has [ ]

a) same cross-section throughout the beam b) same bending stress at every section

c) same bending moment at every section d) same shear stress at every section

27) The extremeties of any diameter on Mohr's circle represent [ ]

a) principal stresses b) normal stresses on planes at 45°

c) shear stresses on planes at 45° d) normal and shear stresses on a plane

28) Bending of beam occurs under [ ]

(a) Axial load (b) Transverse load (c) Direct load (d) None

29) Buckling of a column occurs under [ ]

(a) Axial load (b) Transverse load (c) Direct load (d) None

30) Pure Buckling occurs in a [ ]

(a) Short column (b) Medium Column (c) Long column (d) None

31)Pure Buckling uses the equation of [ ]

(a) Rankin-Gordon (b) Euler (c) Stiffness (d) None

32) A steel column is a short column when the slenderness ratio is [ ]

(a) >120 (b) <30 (c) >30 (d) None

33)A steel column is a long column when the slenderness ratio is [ ]

(a) >120 (b) <30 (c) >30 (d) None

34) A steel column is a short column when the slenderness ratio is [ ]

(a) >120 (b) <30 (c) >30 (d) None

35) A steel column is a short column when the slenderness ratio is [ ]

(a) >120 (b) <30 (c) >30 (d) None

36) A steel column is a short column when the slenderness ratio is [ ]

(a) >120 (b) <30 (c) >30 (d) None

37) A steel column is a medium column when the slenderness ratio is [ ]

(a) >120 (b) <30 (c) >30 (d) None

38) With identical beam and column, buckling occurs as compared to bending under a [ ]

(a) Lesser load (b) Larger load (c) Equal load (d) None

39) Nature of stresses produced in buckling and bending are [ ]

(a) Same (b) Different (c) Only tensile (d) None

40) Keeping loading same but increasing the length, normal stresses in a beam will [ ]

(a) Increase (b) Decrease (c) No change (d) None