

Q3) When two orthogonal ~~axes~~ ^{axes} of symmetry exist for an area, the centroid lies

- a) At their intersection.
- b) At the origin of reference axes
- c) Both of the above
- d) None of the above

Q4) Centroid of a line will always lie on the line. This is

- a) True
- b) False

c) Can be both d) None of the above

Q5) For a homogeneous, isotropic solid the centre of mass, centre of gravity and centre of volume

(a) will have to be calculated using different equations (b) will coincide

(c) ~~but~~ only two of them may coincide

(d) All three will be different.

~~but~~ ~~the~~ ~~mass~~ ~~is~~ ~~different~~

ENGG Mechanics

Objective Type Questions By Sanjay Sharma

pure

- 1) Neutral Axis in a beam subjected to ^{pure} bending can be
(a) Longitudinal (b) Transverse
(c) Both (d) Incomplete Information in question.
- 2) Principle of Transmissibility of a force is About :
(a) Transmissible force only (b) Force Along A given Axis
(c) Any Force (d) All of the above
- 3) 'Point of contraflexure' in a beam under loading can be
(a) Just at 1 point (b) At 2 points
(c) At 3 (d) Any number of points
- 4) For calculation of deformation at the point of application of a load, can the force be considered a transmissible vector?
(a) Yes (b) No (c) could be both yes or no
(d) None of these.
- 5) All free vectors are Transmissible, whereas all transmissible vectors are not free. This statement is
(a) correct (b) Incorrect (c) Ambiguous
(d) ~~Both a & b both are correct.~~
(d) (a) & (c) both.

(P2)

- 6) Action and Reaction always act at
(a) Two separate points (b) Two separate surfaces
(c) Two bodies (d) could be (a), (b), & (c)

- 7) An Inertial frame of reference has
(a) zero acceleration (b) steady acceleration
(c) zero or uniform speed
(d) ~~Question~~ None of the above answers is fully correct.

- 8) Line of Action ^{of a vector} & Transmissibility of a force ~~of a vector~~ are
(a) Related (b) Unrelated (c) ~~A bit related~~
(d) ~~Question~~ Question is not well defined
(e) None of the above

- 9) A 10 kg hanging mass is equivalent to
(a) A 10 kg (t) force (b) 10 kg force
(c) 98.1 N (d) All of the above (e) a & c
(f) None of the above

- 10) Lami's theorem & Law of Sines are:
(a) Same (b) Helping in finding out forces acting at a point
(c) Applicable for a body in equilibrium
(d) All of the above

11) Position vector

- a) Describes the position of a particle
- b) Positions a vector
- c) Is always opposite to displacement vector
- d) Is independent of origin.

12) Displacement Vector

- a) Is independent of the ~~point~~ origin
- b) Is independent of the reference frame
- c) ~~Is obtained by~~
- e) Describes the ~~positiv~~ displacement of a body / particle.
- d) All of the above.

13) Isotropic Material Assumption In Pure Bending of Beams means

- a) Material of beam has same property in at every point
- (b) All ~~parts~~ have same property in all directions at a given point
- (c) Have same property in all directions at all points
- (d) None of the above.

14) The transverse section, in pure bending theory assumption

- (a) Become warped
- (b) ~~Behave as longitudinal~~
- (c) Remain plane after bending
- (d) Get compressed
- (e) None of the above

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- a) In pure bending theory value of E is more in compression is more
- (a) More in Tension
- c) Same in both
- (d) ~~Un~~ taken equal to C , modulus of rigidity because of shearing effect.

PA

16 Neutral layer in bending

- (a) Is neither tensile nor compressed
- (b) ~~Remains neutral~~ and does not bend
- (c) For Part tensile & part compressive
- (d) ~~Doesn't~~ Is ~~not~~ stressed only to some extent

17 Length of Neutral layer

- (a) Changes slightly ~~by $\frac{1}{2}$ to $\frac{1}{3}$ bent~~
- (c) Doesn't change ~~of $\frac{1}{2}$ to $\frac{1}{3}$ bent~~ Increases in tension
- (d) None of the above

18) For neutral axis to coincide with centroidal axis, ~~value of E~~

- (a) ~~value of E~~ will have to be same in tension & compression
- (b) The neutral axis has to pass through centroid
- (c) ~~compressive stresses~~ ~~stresses~~ will have to be ignored
- (d) Pure bending theory needs to be followed.

19. SECTION MODULUS

- (a) Represents the strength of the section
- (b) Is $\frac{I}{Y_{max}}$
- (c) Is critical in considering stress at the farthest point in a beam-section
- (d) All ~~of~~ of the above.

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Number of sections at which shear force in a beam under load is zero can be

- (a) Just 1
- (b) Not more 2
- (c) Not more than 3 in any case
- (d) Any number

- (21) I-section in case of a beam helps in obtaining \textcircled{B}
- (a) High value of Z (b) ^{high value.} of I (c) ~~high~~ high value of Y_{max}
- (d) ^{high value} of I , Y_{max} and Z_{max} ~~etc etc~~

~~for us~~

(22) Strain energy stored in ~~an~~ an axial loading case ~~is~~ when loaded suddenly is

- a) Twice that in case of gradual loading b) Three times
- c) Four times (c) Same

23) Stress in above case is

a) Twice b) Four times

c) Same.

Q47) Proof resilience is

- a) Dependent on Volume of ~~a~~ bar (b) Independent
- c) Sometime dependent (c) Sometime independent

(25) A stepped bar of same length, material and volume can store (as compared to a uniform bar)

- (a) Less strain energy (b) More strain energy
- c) Same (d) Depends on loading situation.

(26) The couple moment is a

- (a) ~~is~~ Free vector b) Not -to-free vector
- c) Transmissible vector (d) None of the above

27) Moment of a ^{force} ~~couple~~ About An Axis

- a) Same as its moment about a point on its axis
- b) Dot product of the above moment with a unit vector along the axis
- c) M_x
- d) M_{xx} or M_{yy} or M_{zz}

28) Varignon's Theorem is About

- a) A system of concurrent forces
- b) A number of components of a single force
- c) ~~All~~ All the ~~of~~ components of each of a system of concurrent forces
- d) (a), (b) & (c) all.

29) Shifting of a force acting on a rigid body from one point to another gives

- a) Null vector
- b) A moment
- c) A moment & a force
- d) A couple.

(30)

A couple and a force in a coplanar system of forces can be replaced by

- a) couple
- b) A force
- c) A moment
- d) ~~Varignon's~~ none of the above.

Engg Mechanics Questions By Sanjay Sharma
(Contd.)

31) The moment of a force about an axis equals _____ component in the direction of the axis of the moment vector taken along any point along the axis

- a) Vector
- b) biaxial
- c) Scalar
- d) None of the above

32) In general, Any force system can be ^{most simply} replaced at any point by

- a) Single force
- b) A single force & a couple moment
- c) A couple moment
- d) All of the above.

33) The simplest resultant of a parallel force system is either

- a) Couple Moment or Force
- b) A force or a couple moment or a null vector
- c) A Couple Moment or Null vector
- d) All of the above.

34) In a wrench the resultant force & resultant couple moment are

- a) Perpendicular to each other
- b) Parallel

- c) Angle between them depends on the question.
- d) Insufficient information in the question.

25) In normal circumstances centre of gravity & centre of mass are

- (a) Different
- (b) Same
- (c) Can be both different & same
- (d) None of the above.

26) Centre of pressure over a plane surface can be determined by equivalent of a

- (a) Parallel force system
- (b) Coplanar force system
- (c) Coordinated force system
- (d) General force system

27) $M = \frac{wL^3}{8}$ for a simply supported beam under udl is found with

- (a) Parallel force distribution
- (b) Coplanar parallel force distribution
- (c) Coplanar force distribution
- (d) Transverse loading

28) Free body is

- (a) A body which is free to move
- (b) Isolated body ~~either~~ or a part of the body
- (c) Body with forces shown
- (d) None of the above

29) Ball and socket joint has, in general,

- (a) Three reactions
- (b) Three forces
- (c) Three force reactions
- (d) a ball and socket in it.

40) If relative motion is ~~imposed~~ impeded by a connection or support

a) A reaction is born

b) A reaction in each direction of impediment is born

c) to stabilize the structure

d) to remove deformation ~~of~~ in a structure

41) In a frame

(a) Some members are joined in the middle of other members

b) All members are at ends

c) Some are ^{not} joined at ends whereas others are

d) None of the above

42) Frames & Trusses

a) ^{have} some difference

~~have no~~ ^{have} ~~no~~ difference. b) have no difference.

b) Are simply supported

c) Can be solved from equations of statics

In general

43) There are only _____ vector equations of equilibrium for any single free body

(a) One

b) Two

(c) Three

d) Six

Eng. Mechanics question by Sanjay Sharma 20.11.08

44) Beams are members which are ^{primarily} loaded:

a) Longitudinally b) Transversely

c) Axially d) Along x-axis

45) Thin prismatic members that are loaded transversely are called

a) shafts

b) columns

c) Beams

d) Trusses

46) The sense of the force or couple moment at a section when the left-hand and right hand FBD (free-body diagram) is used would be

a) Same b) Different

c) Sometime different, sometime same

d) Always same

47) The ~~three~~ ^{six} equations of equilibrium in general available for a structure when compared with number of unknowns will determine it

a) Kinematic determinacy b) Static determinacy

c) Simply determinacy

d) None of the above.

48) The value of the shear force at the position of a ^{purely a} point load in the beam is

- a) determinate
- b) Indeterminate
- c) Can be determined from SFD
- d) ~~not~~ idealized.

49) A beam loaded transversely can be idealized as a line when

a) Its length is much large compared to transverse dimensions.

b) The line-idealized ~~line~~ coincides with the ^{longitudinal} centroidal axis of the member

c) Both (a) & (b) above are correct.

d) The line idealized coincides with the transverse centroidal axis of the member.

50) Which of the following differential relations ~~may~~ ^{may} be ~~be~~ correct

a) $\frac{dV}{dx} = -w$, $\frac{dM}{dx} = V$

b) $\frac{dV}{dx} = -w$, $\frac{dM}{dx} = -V$

c) $\frac{dV}{dx} = w$, $\frac{dM}{dx} = -V$

d) $\frac{dV}{dx} = w$, $\frac{dM}{dx} = V$

e) All of the above.

Engg. Mechanics questions by Jayay Sharma (contd)

51) At how many points in a SFD and

a BMD can $\frac{dV}{dx} = 0$ and $\frac{dM}{dx} = 0$?

- a) One ~~each~~
- b) One each
- c) Two each
- d) Any number

52) The basic unit of construction of a space truss is

- a) Triangle
- b) Tetrahedron

c) ~~A~~ ^{more than one} plane truss combined will produce a space truss

- d) A hexagon

53) The basic unit of construction of a planar truss is

- a) An axial member
- b) Members under tension & compression
- c) A triangle
- d) A pin joint.

54) If the centerlines of the members are concurrent at the connections then we can replace the complex connection in real life in space trusses by an idealized

- a) Pin connection
- b) Ball-and-socket connection
- c) A roller
- d) Ring and rope connection

55) Impeding a movement at a connector or support will cause

- a) friction
- b) Reaction
- c) Normal static friction
- c) Normal static reaction

56) FBDs

- (a) is for a part of diagram
- (b) is for a part of member/body
- (c) can be either for the part or full of a member/body
- d) ~~are very neat~~, are neatly drawn diagrams

57) A frame is a system of connected straight or bent, long, slender members where some of the connecting pins:

- a) Only are at the ends of members
- b) Are at the ends of the members
- c) Are not at the ends of the members
- d) None of the above

58) The necessary conditions for a rigid body to be in equilibrium are that the resultant force is zero and resultant couple moment is zero for any point be zero? This just gives us force equilibrium ~~and couple equilibrium~~

whereas we require ~~3 or 6 equations~~ in determinate structures. ~~Are + unknowns~~

- a) True
- b) False
- c) True and sufficient

d) None of the above

Objective Type Mechanics questions by Sanjay Sharma

29. The location of the centroid of an area is

- a) reference axis - dependent b) independent of reference axis

can be found by $\int x^2 dA = 0$, $\int y^2 dA = 0$ d) only $\int x^2 dA = 0$ would suffice to give us its location

30. The first moment of an area about its centroidal axis is

a) first moment

b) moment which is calculated first

c) zero

d) finite

31. Two centroidal axes are possible, what is the need for x & y reference axes:

a) To make diagram beautiful

b) To calculate moment of inertia

c) To find centroidal axes

d) Nothing is possible without reference axes

The existence of

32. ~~the~~ x_c and y_c ~~the~~ centroidal coordinated ~~is~~ ~~not~~ make the centroidal location independent of reference dependent:

a) True

b) False

c) Insufficient data

d) None of the above