Strength of Materials

Question No. 01

According to Lami's theorem

    (A) Three forces acting at a point will be in equilibrium

    (B) Three forces acting at a point can be represented by a triangle, each side being proportional to force

    (C) If three forces acting upon a particle are represented in magnitude and direction by the sides of a triangle, taken in order, they will be in equilibrium

    (D) If three forces acting at a point are in equilibrium, each force is proportional to the sine of the angle between the other two

    Answer: Option D

Question No. 02

A number of forces acting at a point will be in equilibrium if

    (A) Their total sum is zero

    (B) Two resolved parts in two directions at right angles are equal

    (C) Sum of resolved parts in any two perpendicular directions are both zero

    (D) All of them are inclined equally

    Answer: Option C

Question No. 03

The center of gravity of a triangle lies at the point of

    (A) Concurrence of the medians

    (B) Intersection of its altitudes

    (C) Intersection of bisector of angles

    (D) Intersection of diagonals

    Answer: Option A

Question No. 04

Angle of friction is the

    (A) Angle between normal reaction and the resultant of normal reaction and the limiting friction

    (B) Ratio of limiting friction and normal reaction

    (C) The ratio of minimum friction force to the friction force acting when the body is just about to move

    (D) The ratio of minimum friction force to friction force acting when the body is in motion

    Answer: Option A

Question No. 05

Limiting force of friction is the

    (A) Tangent of angle between normal reaction and the resultant of normal reaction and limiting friction

    (B) Ratio of limiting friction and normal reaction

(C) The friction force acting when the body is just about to move

(D) The friction force acting when the body is in motion

Answer: Option C

Question No. 06

The necessary condition for forces to be in equilibrium is that these should be

    (A) Coplanar

    (B) Meet at one point

    (C) Both (A) and (B) above

    (D) All be equal

    Answer: Option C

Question No. 07

Which of the following is the example of lever of first order?

    (A) Arm of man

    (B) Pair of scissors

    (C) Pair of clinical tongs

    (D) All of the above

    Answer: Option D

Question No. 08

A cable with a uniformly distributed load per horizontal metre run will take the following shape

    (A) Straight line

    (B) Parabola

    (C) Hyperbola

    (D) Elliptical

    Answer: Option B

Question No. 09

In determining stresses in frames by methods of sections, the frame is divided into two parts by an imaginary section drawn in such a way as not to cut more than

    (A) Two members with unknown forces of the frame

    (B) Three members with unknown forces of the frame

    (C) Four members with unknown forces of the frame

    (D) Three members with known forces of the frame

    Answer: Option B

Question No. 10

According to principle of transmissibility of forces, the effect of a force upon a body is

    (A) Maximum when it acts at the center of gravity of a body

    (B) Different at different points in its line of action

    (C) The same at every point in its line of action

    (D) Minimum when it acts at the C.G. of the body

    Answer: Option C

Question No. 11

Which of the following do not have identical dimensions?

    (A) Momentum and impulse

    (B) Torque and energy

    (C) Torque and work

    (D) Moment of a force and angular momentum

    Answer: Option D

Question No. 12

If a number of forces act simultaneously on a particle, it is possible

    (A) Not a replace them by a single force

    (B) To replace them by a single force

    (C) To replace them by a single force through C.G.

    (D) To replace them by a couple

    Answer: Option B

Question No. 13

Two coplanar couples having equal and opposite moments

    (A) Balance each other

    (B) Produce a couple and an unbalanced force

    (C) Are equivalent

    (D) Produce a moment of couple

    Answer: Option D

Question No. 14

If a suspended body is struck at the centre of percussion, then the pressure on die axis passing through the point of suspension will be

    (A) Maximum

    (B) Minimum

    (C) Zero

    (D) Infinity

    Answer: Option C

Question No. 15

Kinetic friction is the

    (A) Tangent of angle between normal reaction and the resultant of normal reaction and the limiting friction

    (B) Ratio of limiting friction and normal reaction

    (C) The friction force acting when the body is just about to move

    (D) The friction force acting when the body is in motion
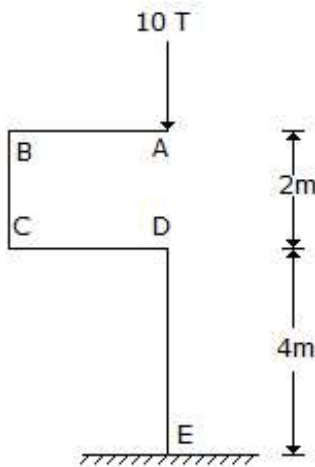
    Answer: Option D

Question No. 16

The center of gravity of a uniform lamina lies at

    (A) The center of heavy portion

(B) The bottom surface

(C) The midpoint of its axis

(D) All of the above

Answer: Option C

Question No. 17

The bending moment at *E* for the structure shown in below figure, is

(A) Zero

(B) 10 *Tm*

(C) 20 *Tm*

(D) 40 *Tm*

Answer: Option A

Question No. 18

The maximum twisting moment a shaft can resist, is the product of the permissible shear stress and

(A) Moment of inertia

(B) Polar moment of inertia

(C) Polar modulus

(D) Modulus of rigidly

Answer: Option C

Question No. 19

The deflection of any rectangular beam simply supported, is

(A) Directly proportional to its weight

(B) Inversely proportional to its width

(C) Inversely proportional to the cube of its depth

(D) Directly proportional to the cube of its length

Answer: Option C

Question No. 20

Pick up the correct statement from the following:

(A) The point through which the resultant of the shear stresses passes is known as shear centre

(B) In the standard rolled channels, the shear centre is on the horizontal line passing through and away from the C.G. beyond web

(C) In equal angles, the shear centre is on the horizontal plane and away from the C.G., outside of the leg projection

(D) All the above

Answer: Option D

Question No. 21

A heavy string attached at two ends at same horizontal level and when central dip is very small approaches the following curve

(A) Catenary

(B) Parabola

(C) Hyperbola

(D) Elliptical

Answer: Option B

Question No. 22

A beam is said to be of uniform strength, if

(A) B.M. is same throughout the beam

(B) Deflection is same throughout the beam

(C) Bending stress is same throughout the beam

(D) Shear stress is same throughout the beam

Answer: Option C

Question No. 23

Pick up the correct statement from the following:

(A) The distance of the eccentric axial load from the C.G. beyond which tension develops, is known as kern distance

(B) In visco-elastic material, stress-strain relation is dependent on time

(C) An orthotropic material has different properties in three mutually perpendicular directions

(D) All the above

Answer: Option D

Question No. 24

The ratio of limiting friction and normal reaction is known as

(A) Coefficient of friction

(B) Angle of friction

(C) Angle of repose

(D) Sliding friction

Answer: Option A

Question No. 25

If a three hinged parabolic arch carries a uniformly distributed load on its entire span, every section of the arch resists.

(A) Compressive force

(B) Tensile force

(C) Shear force

(D) Bending moment

Answer: Option A

Question No. 26

The under mentioned type is simple strain

(A) Tensile strain

(B) Compressive strain

(C) Shear strain
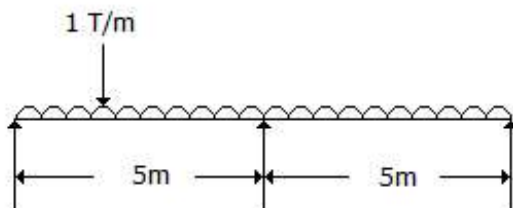
(D) All the above

Answer: Option D

Question No. 27

If rain is falling in the opposite direction of the movement of a pedestrian, he has to hold his umbrella

(A) More inclined when moving

(B) Less inclined when moving

(C) More inclined when standing

(D) Less inclined when standing

Answer: Option D

Question No. 28

The reaction at support *A* of the beam shown in below figure, is

(A) Zero

(B) 5 *T*

(C) 10 *T*

(D) 1 *T*

Answer: Option A

Question No. 29

In a solid arch, shear force acts

(A) Vertically upwards

(B) Along the axis of the arch

(C) Perpendicular to the axis of arch

(D) Tangentially to the arch

Answer: Option C

Question No. 30
The maximum frictional force which comes into play when a body just begins to slide over another surface is called
- (A) Limiting friction
- (B) Sliding friction
- (C) Rolling friction
- (D) Kinematic friction

Answer: Option A

Question No. 31
An arch with three hinges, is a structure
- (A) Statically determinate
- (B) Statically indeterminate
- (C) Geometrically unstable
- (D) Structurally sound but indeterminate

Answer: Option A

Question No. 32
Beams of uniform strength are preferred to those of uniform section because these are economical for
- (A) Large spans
- (B) Heavy weights
- (C) Light weights
- (D) Short spans

Answer: Option A

Question No. 33
The M.I. of hollow circular section about a central axis perpendicular to section as compared to its M.I. about horizontal axis is
- (A) Same
- (B) Double
- (C) Half
- (D) Four times

Answer: Option B

Question No. 34
The tensile force required to cause an elongation of 0.045 mm in a steel rod of 1000 mm length and 12 mm diameter, is (where $E = 2 \times 10^6$ kg/cm^2)
- (A) 166 kg
- (B) 102 kg
- (C) 204 kg
- (D) 74 kg

Answer: Option B

Question No. 35

A long vertical member, subjected to an axial compressive load, is called

(A) A column

(B) A strut

(C) A tie

(D) A stanchion

Answer: Option A

Question No. 36

In ideal machines

(A) Mechanical advantage is greater than velocity ratio

(B) Mechanical advantage is equal to velocity ratio

(C) Mechanical advantage is less than velocity ratio

(D) Mechanical advantage is unity

Answer: Option B

Question No. 37

The nature of the stress in horizontal members of the truss shown in below figure may be

(A) Compressive

(B) Tensile

(C) Shear

(D) Zero

Answer: Option B

Question No. 38

The property of a material by which it can be drawn to a smaller section, due to tension, is called

(A) Plasticity

(B) Ductility

(C) Elasticity

(D) Malleability

Answer: Option B

Question No. 39

The unit of force in S.I. units is

(A) Kilogram

(B) Newton

(C) Watt

(D) Dyne

Answer: Option B

Question No. 40

A bending moment may be defined as:

    (A) Arithmetic sum of the moments of all the forces on either side of the section

    (B) Arithmetic sum of the forces on either side of the section

    (C) Algebraic sum of the moments of all the forces on either side of the section

    (D) None of these

Answer: Option C

Question No. 41

If a circular beam of diameter d experiences a longitudinal strain P/E and a lateral strain $2P/mE$, the volumetric strain is

    (A) $(P/E) + (2P/mE)$

    (B) $(P/E) - (2P/mE)$

    (C) $(P/E) + (mE/2P)$

    (D) $(P/E) - (mE/2P)$

Answer: Option B

Question No. 42

The resolved part of the resultant of two forces inclined at an angle φ in a given direction is equal to

    (A) The algebraic sum of the resolved parts of the forces in the given direction

    (B) The sum of the resolved parts of the forces in the given direction

    (C) The difference of the forces multiplied by the cosine of φ

    (D) The sum of the forces multiplied by the sine of φ

Answer: Option A

Question No. 43

For structural analysis, Maxwell's reciprocal theorem can be applied to:

    (A) Plastic structures

    (B) Elastic structures

    (C) Symmetrical structures

    (D) All the above

Answer: Option B

Question No. 44

If all the dimensions of a bar are increased in the proportion $n : 1$, the proportion with which the maximum stress produced in the prismatic bar by its own weight, will increase in the ratio

    (A) $1 : n$

    (B) $n : 1$

    (C) $1 : (1/n)$

    (D) $1 : \sqrt{n}$

Answer: Option B

Question No. 45
Which of the following is a vector quantity?

    (A) Energy

    (B) Mass

    (C) Momentum

    (D) Angle

    Answer: Option C

Question No. 46
Pick up the incorrect statement

    (A) The cross-sectional area of the welded member is effective

    (B) A welded joint develops strength of its parent metal

    (C) Welded joints provide rigidity

    (D) Welding takes more time than riveting

    Answer: Option D

Question No. 47
A 8 metre long simply supported rectangular beam which carries a distributed load 45 kg/m. experiences a maximum fibre stress 160 kg/cm^2. If the moment of inertia of the beam is 640 cm^4, the overall depth of the beam is

    (A) 10 cm

    (B) 12 cm

    (C) 15 cm

    (D) 18 cm

    Answer: Option A

Question No. 48
A heavy ladder resting on floor and against a vertical wall may not be in equilibrium, if

    (A) The floor is smooth, the wall is rough

    (B) The floor is rough, the wall is smooth

    (C) The floor and wall both are smooth surfaces

    (D) The floor and wall both are rough surfaces

    Answer: Option C

Question No. 49
A triangular section having base *b*, height *h*, is placed with its base horizontal. If the shear stress at a depth *y* from top is *q*, the maximum shear stress is

    (A) 3*S/bh*

    (B) 4*S/bh*

    (C) 4*b/Sh*

    (D) 3*b/bS*

    Answer: Option A

Question No. 50

Maximum deflection of a

    (A) Cantilever beam carrying a concentrated load W at its free end is $WL^3/3EI$

    (B) Simply supported beam carrying a concentrated load W at mid-span is $WL^3/48EI$

    (C) Cantilever beam, carrying a uniformly distributed load over span is $WL^3/8EI$

    (D) All the above

    Answer: Option D

Question No. 51

From a circular plate of diameter 6 cm is cut out a circle whose diameter is a radius of the plate. Find the e.g. of the remainder from the center of circular plate

    (A) 0.5 cm

    (B) 1.0 cm

    (C) 1.5 cm

    (D) 2.5 cm

    Answer: Option A

Question No. 52

If a rectangular beam measuring 10 × 18 × 400 cm carries a uniformly distributed load such that the bending stress developed is 100 kg/cm². The intensity of the load per metre length, is

    (A) 240 kg

    (B) 250 kg

    (C) 260 kg

    (D) 270 kg

    Answer: Option B

Question No. 53

If two tensile forces mutually perpendicular act on a rectangular parallelepiped bar are equal, the resulting elongation of the pipe, is

    (A) $(P/E)\,(1 - m)$

    (B) $(E/P)\,(m - 1)$

    (C) $(E/P)\,(1 - m)$

    (D) $(P/E)\,(1 + m)$

    Answer: Option A

Question No. 54

On a ladder resting on smooth ground and leaning against vertical wall, the force of friction will be

    (A) Towards the wall at its upper end

    (B) Away from the wall at its upper end

    (C) Upwards at its upper end

    (D) Downwards at its upper end
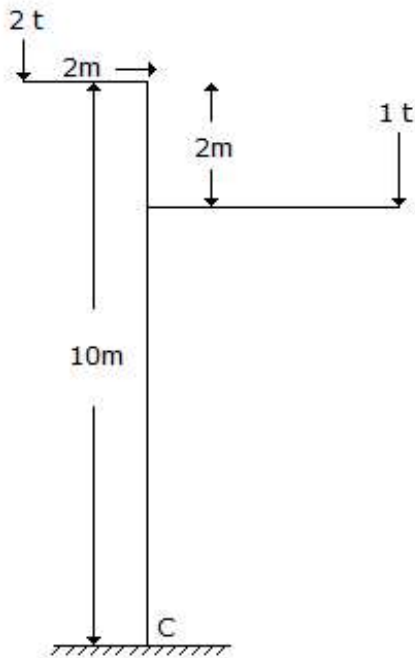
    Answer: Option C

Question No. 55

If the rivets in adjacent rows are staggered and outermost row has only one rivet, the arrangement of the rivets, is called

    (A) Chain riveting

    (B) Zig-zag riveting

    (C) Diamond riveting

    (D) None of these

    Answer: Option C

Question No. 56

The bending moment at *C* of a portal frame shown in below figure is

    (A) 8 *t*-m

    (B) 4 *t*-m

    (C) 28 *t*-m

    (D) Zero

    Answer: Option D

Question No. 57

If three forces acting in one plane upon a rigid body, keep it in equilibrium, then they must either

    (A) Meet in a point

    (B) Be all parallel

    (C) At least two of them must meet

    (D) All the above are correct

    Answer: Option D

Question No. 58

In a three hinged arch, the shear force is usually

    (A) Maximum at crown

(B) Maximum at springing

(C) Maximum at quarter points

(D) Varies with slope

Answer: Option B

Question No. 59

If *Z* and *I* are the section modulus and moment of inertia of the section, the shear force *F* and bending moment *M* at a section are related by

(A) $F = My/I$

(B) $F = M/Z$

(C) $F = dM/dx$
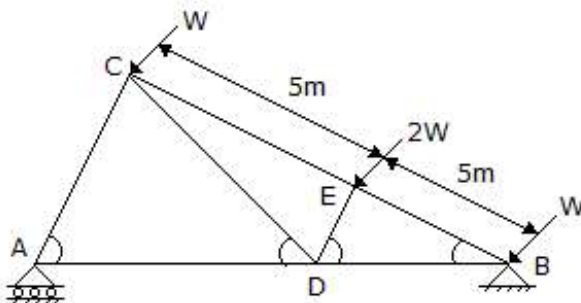
(D) $F = \int Mdx$

Answer: Option C

Question No. 60

A pair of smith's tongs is an example of the lever of

(A) Zeroth order

(B) First order

(C) Second order

(D) Third order

Answer: Option C

Question No. 61

The direction of the reaction at support *B* of a truss shown in below figure will be

(A) East of North

(B) West of North

(C) East of South

(D) West of South

Answer: Option A

Question No. 62

A beam of length *L* supported on two intermediate rollers carries a uniformly distributed load on its entire length. If sagging B.M. and hogging B.M. of the beam are equal, the length of each overhang, is

(A) 0.107 *L*

(B) 0.207 *L*

(C) 0.307 *L*

(D) 0.407 L

Answer: Option B

Question No. 63

The unit of work or energy in S.I. units is

(A) Newton

(B) Pascal

(C) Kilogram meter

(D) Joule

Answer: Option D

Question No. 64

The shear force on a simply supported beam is proportional to

(A) Displacement of the neutral axis

(B) Sum of the forces

(C) Sum of the transverse forces

(D) Algebraic sum of the transverse forces of the section

Answer: Option D

Question No. 65

Shear deflection of a cantilever of length _L_, cross sectional area _A_ and shear modulus _G_, subjected to w/m u.d.l., is

(A) $(3/4)(L^2 w/GA)$

(B) $(3/2)(L^2 w/GA)$

(C) $(2/3)(L^3 w/GA)$

(D) $(3/2)(Lw/GA^2)$

Answer: Option A

Question No. 66

Which of the following is not the unit of distance?

(A) Angstrom

(B) Light year

(C) Micron

(D) Milestone

Answer: Option D

Question No. 67

In a bar of large length when held vertically and subjected to a load at its lower end, its own-weight produces additional stress. The maximum stress will be

(A) At the lower cross-section

(B) At the built-in upper cross-section

(C) At the central cross-section

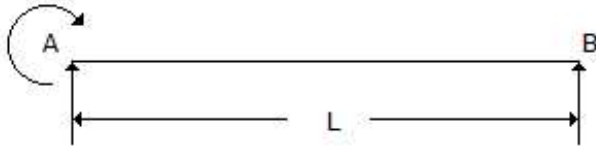(D) At every point of the bar

Answer: Option B

Question No. 68
The value of Poisson's ratio always remains

    (A) Greater than one

    (B) Less than one

    (C) Equal to one

    (D) None of these

    Answer: Option B

Question No. 69
The B.M. diagram of the beam shown in below figure, is

    (A) A rectangle

    (B) A triangle

    (C) A trapezium

    (D) A parabola

    Answer: Option A

Question No. 70
Which of the following is not a vector quantity?

    (A) Weight

    (B) Velocity

    (C) Acceleration

    (D) Force

    Answer: Option A

Question No. 71
The greatest eccentricity which a load *W* can have without producing tension on the cross-section of a short column of external diameter *D* and internal diameter *d*, is

    (A) $4W/\pi\,(D^2 - d^2)$

    (B) $\pi\,(D^2 - d^2)/32D$

    (C) $(D^2 + d^2)/8D$

    (D) $(D^2 - d^2)/8D$

    Answer: Option C

Question No. 72
If *'S'* is the shear force at a section of an *I*-joist, having web depth *'d'* and moment of inertia *'I'* about its neutral axis, the difference between the maximum and mean shear stresses in the web is,

    (A) $Sd^2/8I$

    (B) $Sd^2/12I$

    (C) $Sd^2/16I$

(D) $Sd^2/24I$

Answer: Option D

Question No. 73

Center of gravity of a thin hollow cone lies on the axis at a height of

(A) One-fourth of the total height above base

(B) One-third of the total height above base

(C) One-half of the total height above base

(D) Three-eighth of the total height above the base

Answer: Option B

Question No. 74

A rectangular bar of width *b* and height *h* is being used as a cantilever. The loading is in a plane parallel to the side *b*. The section modulus is

(A) $bh^3/12$

(B) $bh^2/6$

(C) $b^2h/6$

(D) None of these

Answer: Option C

Question No. 75

A beam is said to be of uniform strength, if

(A) B.M. is same throughout the beam

(B) Shear stress is same throughout the beam

(C) Deflection is same throughout the beam

(D) Bending stress is same at every section along its longitudinal axis

Answer: Option D

Question No. 76

The coefficient of friction depends on

(A) Area of contact

(B) Shape of surfaces

(C) Strength of surfaces

(D) Nature of surface

Answer: Option D

Question No. 77

A closely coiled helical spring of radius *R*, contains *n* turns and is subjected to an axial load *W*. If the radius of the coil wire is *r* and modulus of rigidity of the coil material is *C*, the stress developed in the helical spring is

(A) $WR/\pi r^3$

(B) $2WR/\pi r^3$

(C) $2WR/\pi r^2$

(D) $4WR/\pi r^2$

Answer: Option B

Question No. 78

The intensity of direct longitudinal stress in the cross-section at any point distant r from the neutral axis, is proportional to

    (A) r

    (B) $1/r$

    (C) r^2

    (D) $1/r^2$
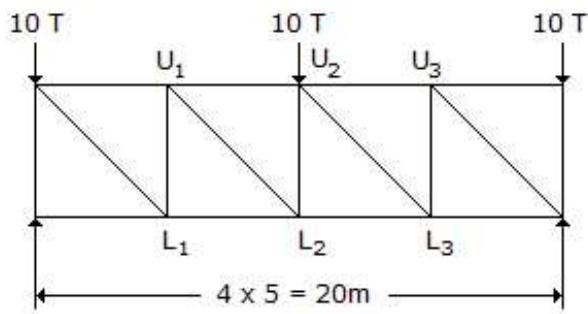
Answer: Option A

Question No. 79

The coefficient of friction depends upon

    (A) Nature of surfaces

    (B) Area of contact

    (C) Shape of the surfaces

    (D) All of the above

Answer: Option A

Question No. 80

The force in member U_2L_2 of the truss shown in below figure, is

    (A) 10 T tension

    (B) 10 T compression

    (C) Zero

    (D) 15 T compression

Answer: Option B

Question No. 81

The ratio of the moments of resistance of a solid circular shaft of diameter D and a hollow shaft (external diameter D and internal diameter d), is

    (A) $D^4/(D^4 - d^4)$

    (B) $D^3/(D^3 - d^3)$

    (C) $(D^4 - d^4)/D^4$

    (D) $(D^3 - d^3)/D^3$

Answer: Option A

Question No. 82

The angle which an inclined plane makes with the horizontal when a body placed on it is about to move down is known as angle of

(A) Friction
(B) Limiting friction
(C) Repose
(D) Kinematic friction
Answer: Option C

Question No. 83
When loads are applied proportionately to a frame structure containing its members in one plane, the structure is called
(A) Grid frame
(B) Plane frame
(C) Space frame
(D) Truss frame
Answer: Option C

Question No. 84
The maximum stress intensity due to a suddenly applied load is x-times the stress intensity produced by the load of the same magnitude applied gradually. The value of x is
(A) 1
(B) 2
(C) 3
(D) 1/2
Answer: Option B

Question No. 85
The unit of power in S.I. units is
(A) Newton meter
(B) Watt
(C) Joule
(D) Kilogram meter/sec
Answer: Option B

Question No. 86
The maximum bending moment due to a moving load on a simply supported beam, occurs
(A) At the mid span
(B) At the supports
(C) Under the load
(D) Anywhere on the beam
Answer: Option C

Question No. 87
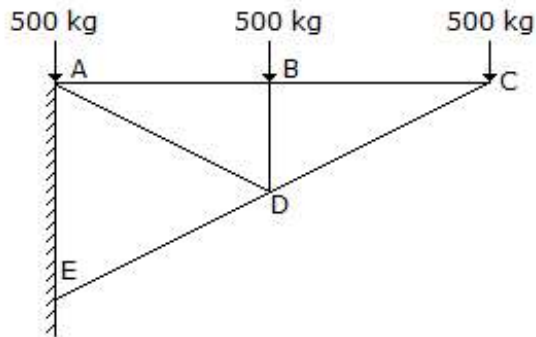Which of the following is not the unit of pressure?
(A) kg/cm
(B) atm
(C) kg/cm²

(D) Newton

Answer: Option D

Question No. 88

The force in *BD* of the truss shown in below figure is:

(A) 500 kg compressive

(B) 500 kg tensile

(C) 1500 kg tensile

(D) 1500 kg compressive

Answer: Option A

Question No. 89

The maximum resistance against rotation, is offered by the weld at a point

(A) Most distant

(B) Least distant

(C) At either end

(D) Centrally located

Answer: Option A

Question No. 90

During a tensile test on a ductile material

(A) Nominal stress at fracture is higher than the ultimate stress

(B) True stress at fracture is higher than the ultimate stress

(C) True stress at fracture is the same as the ultimate stress

(D) None of these

Answer: Option B

Question No. 91

A framed structure is perfect if it contains members equal to

(A) $2n^3$

(B) nl

(C) $2nl$

(D) $3n^2$

Where n = number of joints in a frame

Answer: Option A

Question No. 92

When equal and opposite forces applied to a body, tend to elongate it, the stress so produced, is called

    (A) Shear stress

    (B) Compressive stress

    (C) Tensile stress

    (D) Transverse stress

    Answer: Option C

Question No. 93

A joint of a frame is subjected to three tensile forces P, Q and R equally inclined to each other. If P is 10 tonnes, the other forces will be

    (A) $Q = 10$ tonnes and $R =$ zero

    (B) $R + 10$ tonnes and $Q =$ zero

    (C) $Q + R = 10$ tonnes

    (D) Q and R each is equal to 10 tonnes
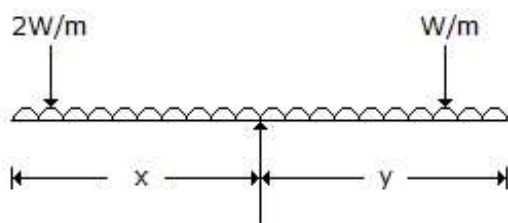
    Answer: Option D

Question No. 94

In the equation of virtual work, following force is neglected

    (A) Reaction of any smooth surface with which the body is in contact

    (B) Reaction of a rough surface of a body which rolls on it without slipping

    (C) Reaction at a point or an axis, fixed in space, around which a body is constrained to turn

    (D) All of the above

    Answer: Option D

Question No. 95

The structure shown in below figure is stable, if

    (A) $x = \sqrt{3}y/2$

    (B) $x = 2y$

    (C) $\sqrt{x} = y$

    (D) $\sqrt{(2x)} = y$

    Answer: Option D

Question No. 96

Pick up the correct statement from the following:

    (A) The rate of change of bending moment is equal to rate of shear force

    (B) The rate of change of shear force is equal to rate of loading

    (C) Neither (a) nor (b)

(D) Both (a) and (b)

Answer: Option D

Question No. 97

Tangent of angle of friction is equal to

(A) Kinetic friction

(B) Limiting friction

(C) Angle of repose

(D) Coefficient of friction

Answer: Option D

Question No. 98

The type of butt joints in common use, is:

(A) Single inverted V-butt joint

(B) Double V-butt joint

(C) Double U-butt joint

(D) Single V-butt joint

Answer: Option A

Question No. 99

For keeping the stress wholly compressive the load may be applied on a circular column anywhere within a concentric circle of diameter

(A) $d/2$

(B) $d/3$

(C) $d/4$

(D) $d/8$

Answer: Option C

Question No. 100

The C.G. of a solid hemisphere lies on the central radius 3r

(A) At distance — from the plane base 3r

(B) At distance — from the plane base 3r

(C) At distance — from the plane base 3r

(D) At distance — from the plane base or

Answer: Option D

Question No. 101

In a loaded beam, the point of contraflexure occurs at a section where

(A) Bending moment is minimum

(B) Bending moment is zero or changes sign

(C) Bending moment is maximum

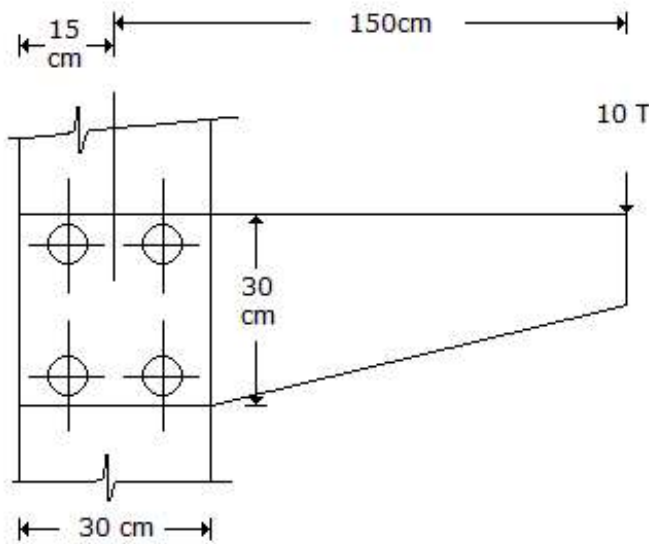(D) Shearing force is maximum

Answer: Option B

Question No. 102

In actual machines

(A) Mechanical advantage is greater than velocity ratio

(B) Mechanical advantage is equal to velocity ratio

(C) Mechanical advantage is less than velocity ratio

(D) Mechanical advantage is unity

Answer: Option C

Question No. 103

In the given below figure, the rivets with maximum stress, are:

(A) 1 and 2

(B) 1 and 3

(C) 3 and 4

(D) 2 and 4

Answer: Option D

Question No. 104

If two forces acting at a joint are not along the straight line, then for the equilibrium of the joint

(A) One of the forces must be zero

(B) Each force must be zero

(C) Forces must be equal and of the same sign

(D) Forces must be equal in magnitude but opposite in sign

Answer: Option B

Question No. 105

Shear deflection of a cantilever of length *L*, cross sectional area *A* and shear modulus *G*, under a concentrated load *W* at its free end, is

(A) $(2/3) (WL/AG)$

(B) $(1/3) (WL^2/EIA)$

(C) $(3/2) (WL/AG)$

(D) $(3/2)(WL^2/AG)$

Answer: Option C

Question No. 106

Forces are called concurrent when their lines of action meet in

(A) One point

(B) Two points

(C) Plane

(D) Perpendicular planes

Answer: Option A

Question No. 107

The ratio of the maximum deflections of a beam simply supported at its ends with an isolated central load and that of with a uniformly distributed load over its entire length, is

(A) 3/2

(B) 15/24

(C) 24/15

(D) 2/3

Answer: Option C

Question No. 108

At either end of a plane frame, maximum number of possible bending moments, are

(A) Zero

(B) One

(C) Two

(D) Three

Answer: Option A

Question No. 109

Which of the following is not the unit of work, energy and heat?

(A) kcal

(B) kg m

(C) kWhr

(D) hp

Answer: Option D

Question No. 110

If a shaft is rotating N revolutions per minute with an applied torque T kg-m, the horse power being transmitted by the shaft, is

(A) $2\pi NT/550$

(B) $2\pi NT/750$

(C) $2\pi NT/4500$

(D) $2\pi NT/55$

Answer: Option C

Question No. 111

In a shaft shear stress intensity at a point is not

  (A) Directly proportional to the distance from the axis
  (B) Inversely proportional to the distance from the axis
  (C) Inversely proportional to the polar moment of inertia
  (D) Directly proportional to the applied torque

Answer: Option B

Question No. 112

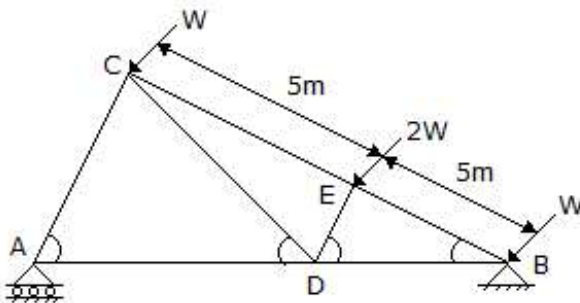**Center of gravity of a solid cone lies on the axis at the height**

  (A) One-fourth of the total height above base
  (B) One-third of the total height above base
  (C) One-half of the total height above base
  (D) Three-eighth of the total height above the base

Answer: Option A

Question No. 113

The force in *DB* of the truss shown in below figure is

  (A) √3 *W* compression
  (B) √*W* tension
  (C) 2 *W* compression
  (D) 5 *W* tension

Answer: Option B

Question No. 114

A diagram which shows the variations of the axial load for all sections of the span of a beam, is called

  (A) Bending moment diagram
  (B) Shear force diagram
  (C) Thrust diagram
  (D) Stress diagram

Answer: Option C

Question No. 115

The resultant of the following three couples 20 kg force, 0.5 m arm, +ve sense 30 kg force, 1 m arm, -ve sense 40 kg force, 0.25 m arm, +ve sense having arm of 0.5 m will be

  (A) 20 kg, -ve sense

(B) 20 kg, +ve sense

(C) 10 kg, +ve sense

(D) 10 kg, -ve sense

Answer: Option A

Question No. 116

A cantilever beam rectangular in cross-section is subjected to an isolated load at its free end. If the width of the beam is doubled, the deflection of the free end will be changed in the ratio of

(A) 8

(B) 1/8

(C) 1/2

(D) 3

Answer: Option C

Question No. 117

In rectangular columns (cross-section $b \times h$), the core is a

(A) Rectangle of lengths $b/2$ and $h/2$

(B) Square of length $b/2$

(C) Rhombus of length $h/2$

(D) Rhombus of diagonals $b/3$ and $h/3$

Answer: Option D

Question No. 118

Pick up the correct assumption of the theory of simple bending

(A) The value of the Young's modulus is the same in tension as well as in compression

(B) Transverse section of a beam remains plane before and after bending

(C) The material of the beam is homogeneous and isotropic

(D) All the above

Answer: Option D

Question No. 119

Dynamic friction as compared to static friction is

(A) Same

(B) More

(C) Less

(D) May be less of more depending on nature of surfaces and velocity

Answer: Option C

Question No. 120

The property of a material by which it can be beaten or rolled into thin plates, is called

(A) Malleability

(B) Ductility

(C) Plasticity

(D) Elasticity

Answer: Option A

Question No. 121

A closely coiled helical spring of radius R, contains n turns and is subjected to an axial load W. If the radius of the coil wire is r and modulus of rigidity of the coil material is C, the deflection of the coil is

   (A) WR^3n/Cr^4

   (B) $2WR^3n/Cr^4$

   (C) $3WR^3n/Cr^4$

   (D) $4WR^3n/Cr^4$

   Answer: Option D

Question No. 122
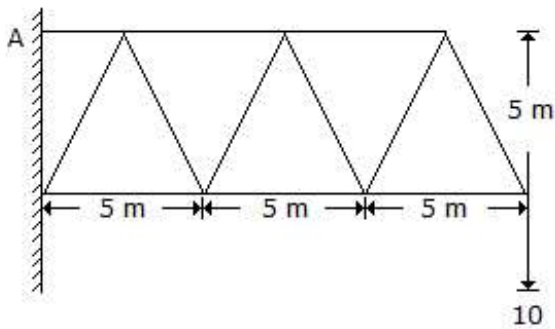
In the lever of third order, load W, effort P and fulcrum F are oriented as follows

   (A) W between P and F

   (B) F between W and P

   (C) P between W and F

   (D) W, P and F all on one side

   Answer: Option A

Question No. 123

In the cantilever truss as shown in below figure, the horizontal component of the reaction at A, is

   (A) 30 tonnes

   (B) 60 tonnes

   (C) 90 tonnes

   (D) 120 tonnes

   Answer: Option A

Question No. 124

The property by which a body returns to its original shape after removal of the force, is called

   (A) Plasticity

   (B) Elasticity

   (C) Ductility

   (D) Malleability

   Answer: Option B

Question No. 125
Forces are called coplanar when all of them acting on body lie in
   (A) One point
   (B) One plane
   (C) Different planes
   (D) Perpendicular planes
   Answer: Option B

Question No. 126
The slenderness ratio of a vertical column of a square cross-section of 2.5 cm sides and 300 cm length, is
   (A) 200
   (B) 240
   (C) 360
   (D) 416
   Answer: Option D

Question No. 127
The stress necessary to initiate yielding, is considerably
   (A) More than that necessary to continue it
   (B) Less than that necessary to continue it
   (C) More than that necessary to stop it
   (D) Less than that necessary to stop it
   Answer: Option A

Question No. 128
Which of the following is not a scalar quantity?
   (A) Time
   (B) Mass
   (C) Volume
   (D) Acceleration
   Answer: Option D

Question No. 129
Influence lines are drawn for structures
   (A) Of any type
   (B) Statically determinate
   (C) Pin-jointed truss
   (D) None of these
   Answer: Option A

Question No. 130
A cast iron *T* section beam is subjected to pure bending. For maximum compressive stress to be three times the maximum tensile stress, centre of gravity of the section from flange side is
   (A) $h/4$

(B) *h*/3

(C) *h*/2

(D) 2/3 *h*

Answer: Option A

Question No. 131

The units of moment of inertia of an area are

(A) kg m²

(B) m^4

(C) kg/m²

(D) m^3

Answer: Option B

Question No. 132

The radius of gyration of a rectangular section is not proportional to

(A) Square root of the moment of inertia

(B) Square root of the inverse of the area

(C) Square root of the moment of inertia divided by area of the section

(D) None of these

Answer: Option D

Question No. 133

Ties are load carrying members of a frame, which are subjected to

(A) Transverse loads

(B) Axial tension loads

(C) Axial compressive loads

(D) Torsional loads

Answer: Option B

Question No. 134

On the ladder resting on the ground and leaning against a smooth vertical wall, the force of friction will be

(A) Downwards at its upper end

(B) Upwards at its upper end

(C) Perpendicular to the wall at its upper end

(D) Zero at its upper end

Answer: Option D

Question No. 135

The phenomenon of slow extension of materials having constant load, i.e. increasing with the time is called

(A) Creeping

(B) Yielding

(C) Breaking

(D) None of these

Answer: Option A

Question No. 136
The maximum deflection of
    (A) A simply supported beam carrying a uniformly increasing load from either end and having the apex at the mid span is $WL^3/60EI$
    (B) A fixed ended beam carrying a distributed load over the span is $WL^3/384EI$
    (C) A fixed ended beam carrying a concentrated load at the mid span is $WL^3/192EI$
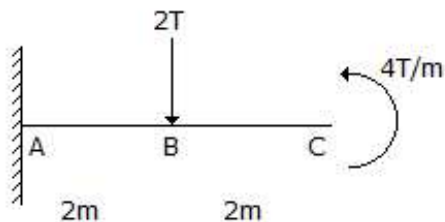   (D) All the above
Answer: Option D

Question No. 137
A flywheel on a motor goes from rest to 1000 rpm in 6 sec. The number of revolutions made is nearly equal to
    (A) 25
    (B) 50
    (C) 100
    (D) 250
Answer: Option B

Question No. 138
The B.M. of a cantilever beam shown in below figure at *A*, is

    (A) Zero
    (B) 8 Tm
    (C) 12 Tm
    (D) 20 Tm
Answer: Option A

Question No. 139
A cantilever carries is uniformly distributed load *W* over its whole length and a force *W* acts at its free end upward. The net deflection of the free end will be
    (A) Zero
    (B) $(5/24)$ (WL^3/EI) upward
    (C) $(5/24)$ (WL^3/EI) downward
    (D) None of these
Answer: Option B

Question No. 140
The C.G. of a plane lamina will not be at its geometrical centre in the case of a

  (A) Right angled triangle
  (B) Equilateral triangle
  (C) Square
  (D) Circle
  Answer: Option A

Question No. 141
Struts are load carrying members of a frame structure which are subjected to

  (A) Axial tension loads
  (B) Axial compressive loads
  (C) Torsional loads
  (D) Transverse loads
  Answer: Option B

Question No. 142
Strain energy of a member may be equated to

  (A) Average resistance × displacement
  (B) ½ stress × strain × area of its cross-section
  (C) ½ stress × strain × volume of the member
  (D) ½ (stress)^2 × volume of the member + Young's modulus E
  Answer: Option D

Question No. 143
A force acting on a body may

  (A) Introduce internal stresses
  (B) Balance the other forces acting on it
  (C) Retard its motion
  (D) All of the above
  Answer: Option D

Question No. 144
A simply supported beam (l + 2a) with equal overhangs (a) carries a uniformly distributed load over the whole length, the B.M. changes sign if

  (A) $l > 2a$
  (B) $l < 2a$
  (C) $l = 2a$
  (D) $l = 4a$
  Answer: Option A

Question No. 145
The stress in the wall of a cylinder in a direction normal to its longitudinal axis, due to a force acting along the circumference, is known as

  (A) Yield stress

(B) Longitudinal stress

(C) Hoop stress

(D) Circumferential stress

Answer: Option C

Question No. 146

According to principle of moments

    (A) If a system of coplanar forces is in equilibrium, then their algebraic sum is zero

    (B) If a system of coplanar forces is in equilibrium, then the algebraic sum of their moments about any point in their plane is zero

    (C) The algebraic sum of the moments of any two forces about any point is equal to moment of their resultant about the same point

    (D) Positive and negative couples can be balanced

Answer: Option B

Question No. 147

The ratio of strengths of solid to hollow shafts, both having outside diameter *D* and hollow having inside diameter *D*/2, in torsion, is

    (A) 1/4

    (B) 1/2

    (C) 1/16

    (D) 15/15

Answer: Option D

Question No. 148

Along the neutral axis of a simply supported beam

    (A) Fibres do not undergo strain

    (B) Fibres undergo minimum strain

    (C) Fibres undergo maximum strain

    (D) None of these

Answer: Option A

Question No. 149

A trolley wire weighs 1.2 kg per meter length. The ends of the wire are attached to two poles 20 meters apart. If the horizontal tension is 1500 kg find the dip in the middle of the span

    (A) 2.5 cm

    (B) 3.0 cm

    (C) 4.0 cm

    (D) 5.0 cm

Answer: Option C

Question No. 150

In case of an eccentric loading on a bracket subjected to moment *M*, the tangential force developed in any rivet, at right angles to its radius vector *r* is
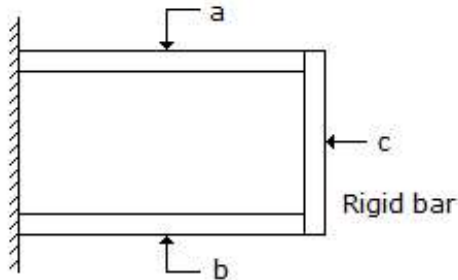
    (A) $Mr/\Sigma r^2$

(B) $\Sigma r^2/Mr$

(C) $Mr^2/\Sigma r^2$

(D) $\sqrt{Mr}/\Sigma r^2$

Answer: Option A

Question No. 151

A composite member shown in below figure was formed at 25°C and was made of two materials *a* and *b*. If the coefficient of thermal expansion of *a* is more than that of *b* and the composite member is heated upto 45°C, then

(A) *a* will be in tension and *b* in compression

(B) Both will be in compression

(C) Both will be in tension

(D) *a* will be in compression and *b* in tension

Answer: Option D

Question No. 152

Coulomb friction is the friction between

(A) Bodies having relative motion

(B) Two dry surfaces

(C) Two lubricated surfaces

(D) Solids and liquids

Answer: Option A

Question No. 153

The ratio of the moment of inertia of a circular plate and that of a square plate for equal depth, is

(A) Less than one

(B) Equal to one

(C) More than one

(D) Equal to $3\pi/16$

Answer: Option D

Question No. 154

The principal stresses at a point are 100, 100 and -200 kgf/cm^2, the octahedral shear stress at the point is:

(A) 100 $\sqrt{2}$ kg/cm^2

(B) 200 $\sqrt{2}$ kg/cm^2

(C) 300 $\sqrt{2}$ kg/cm^2

(D) 400 √2 kg/cm^2

Answer: Option A

Question No. 155

A sample of metal weighs 219 gms in air, 180 gms in water, 120 gms in an unknown fluid. Then which is correct statement about density of metal

(A) Density of metal can't be determined

(B) Metal is twice as dense as water

(C) Metal will float in water

(D) Metal is twice as dense as unknown fluid

Answer: Option A

Question No. 156

The energy stored in a beam of length 'L' subjected to a constant B.M. is

(A) $M^2L/2EI$

(B) $ML^2/2EI$

(C) M^2L/EI

(D) ML^2/EI

Answer: Option A

Question No. 157

In a simply supported beam L with a triangular load W varying from zero at one end to the maximum value at the other end, the maximum bending moment is

(A) $WL/3$

(B) $WL/9\sqrt{3}$

(C) $WL/4$

(D) $WL^3/9\sqrt{3}$

Answer: Option D

Question No. 158

Which is the correct statement about law of polygon of forces?

(A) If any number of forces acting at a point can be represented by the sides of a polygon taken in order, then the forces are in equilibrium

(B) If any number of forces acting at a point can be represented in direction and magnitude by the sides of a polygon, then the forces are in equilibrium

(C) If a polygon representing forces acting at a point is closed then forces are in equilibrium

(D) If any number of forces acting at a point can be represented in direction and magnitude by the sides of a polygon taken in order, then the forces are in equilibrium

Answer: Option D

Question No. 159

If a member carries a tensile force P on its area of cross-section A, the normal stress introduced on an inclined plane making an angle θ with its transverse plane, is

(A) $(P/A)\sin^2 θ$

(B) $(P/A)\cos^2 θ$

(C) $(P/A) \tan^2 \theta$

(D) $(P/2A) \sin^2 \theta$

Answer: Option B

Question No. 160

Failure of riveted joints is due to

    (A) Tearing of the plates between the rivet hole and the edge of the plate

    (B) Tearing of plates between rivets

    (C) Shearing of rivets

    (D) All the above

    Answer: Option D

Question No. 161

Two non-collinear parallel equal forces acting in opposite direction

    (A) Balance each other

    (B) Constitute a moment

    (C) Constitute a couple

    (D) Constitute a moment of couple

    Answer: Option C

Question No. 162

A simply supported wooden beam 150 cm long and having a cross section 16 cm × 24 cm carries a concentrated load, at the centre. If the permissible stress ft = 75 kg/cm^2 and f_s= 10 kg/cm^2 the safe load is

    (A) 3025 kg

    (B) 3050 kg

    (C) 3075 kg

    (D) 3100 kg

    Answer: Option C

Question No. 163

If a steel rod of 20 mm diameter and 5 metres long elongates by 2.275 mm when subjected to an axial pull of 3000 kg, the stress developed, is

    (A) 9.5541 kg/cm^2

    (B) 95.541 kg/cm^2

    (C) 955.41 kg/cm^2

    (D) 9554.1 kg/cm^2

    Answer: Option C

Question No. 164

Least force required to draw a body up the inclined plane is W sin (plane inclination + friction angle) applied in the direction

    (A) Along the plane

    (B) Horizontally

    (C) Vertically

(D) At an angle equal to the angle of friction to the inclined plane

Answer: Option D

Question No. 165

If a constant section beam is subjected to a uniform bending moment throughout, its length bends to

(A) A circular arc
(B) A parabolic arc
(C) A catenary
(D) None of these

Answer: Option A

Question No. 166

The width *b* and depth *d* of a beam cut from a wooden cylindrical log of 100 cm diameter for maximum strength are:

(A) $b = 57.73$ cm $d = 81.65$ cm
(B) $b = 81.65$ cm $d = 57.73$ cm
(C) $b = 50.00$ cm $d = 50.00$ cm
(D) $b = 40.00$ cm $d = 80.00$ cm

Answer: Option A

Question No. 167

Which of the following is the locus of a point that moves in such a manner that its distance from a fixed point is equal to its distance from a fixed line multiplied by a constant greater than one

(A) Ellipse
(B) Hyperbola
(C) Parabola
(D) Circle

Answer: Option B

Question No. 168

As compared to uniaxial tension or compression, the strain energy stored in bending is only

(A) 1/8
(B) 1/4
(C) 1/3
(D) 1/2

Answer: Option C

Question No. 169

Strain energy of any member may be defined as work done on it

(A) To deform it
(B) To resist elongation
(C) To resist shortening
(D) All the above

Answer: Option D

Question No. 170

Effect of a force on a body depends upon

    (A) Magnitude

    (B) Direction

    (C) Position or line of action

    (D) All of the above

    Answer: Option D

Question No. 171

If *n* is the ratio of internal and external diameters of a hollow shaft, the ratio of the weight of the hollow shaft and that of solid shaft of same strength, will be

    (A) $(1 - n^2)/(1 - n^2)^{1/2}$

    (B) $(1 - n^2)/(1 - n^4)^{2/3}$

    (C) $(1 + n^3)/(1 + n^4)^{1/2}$

    (D) $(1 + n^1)/(1 + n^4)^{2/3}$

    Answer: Option B

Question No. 172

The effect of arching a beam, is

    (A) To reduce the bending moment throughout

    (B) To increase the bending moment throughout

    (C) Nothing on the bending throughout

    (D) All the above

    Answer: Option A

Question No. 173

D' Alembert's principle is used for

    (A) Reducing the problem of kinetics to equivalent statics problem

    (B) Determining stresses in the truss

    (C) Stability of floating bodies

    (D) Designing safe structures

    Answer: Option A

Question No. 174

The range within which a load can be applied on a rectangular column, to avoid any tensile stress, is

    (A) One-half of the base

    (B) One-fifth of the base

    (C) One-fourth of the base

    (D) One-fifth of the base

    Answer: Option B

Question No. 175

For the same height, the bottom width for no tension,

    (A) For triangular section is more than rectangular section

(B) For rectangular section is more than triangular section

(C) For triangular section is same as that of a rectangular section

(D) None of these

Answer: Option C

Question No. 176

Coefficient of friction is the

(A) Angle between normal reaction and the resultant of normal reaction and the limiting friction

(B) Ratio of limiting friction and normal reaction

(C) The friction force acting when the body is just about to move

(D) The friction force acting when the body is in motion

Answer: Option B

Question No. 177

An arch may be subjected to

(A) Shear and axial force

(B) Bending moment and shear force

(C) Bending moment and axial force

(D) Thrust, shear force and bending moment

Answer: Option D

Question No. 178

The shape of the bending moment diagram over the length of a beam, carrying a uniformly increasing load, is always

(A) Linear

(B) Parabolic

(C) Cubical

(D) Circular

Answer: Option C

Question No. 179

The C.G. of a right circular solid cone of height h lies at the following distance from the base

(A) $h/2$

(B) $J/3$

(C) $h/6$
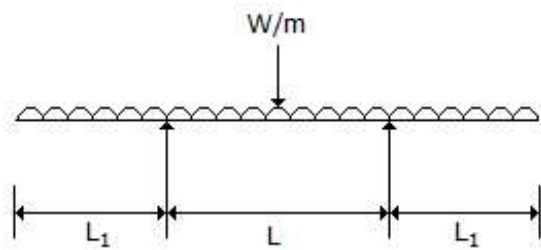
(D) $h/4$

Answer: Option D

Question No. 180

For a channel section, the shear centre lies at a distance of

(A) $dbt/2I$

(B) $d^2bt/3I$

(C) $d^2b^2t/4I$

(D) $db^2t/5I$

Answer: Option C

Question No. 181

For the beam shown in below figure, the maximum positive bending moment is nearly equal to negative bending moment when L_1 is equal to

(A) 1.0 L

(B) 0.7 L

(C) 0.5 L

(D) 0.35 L

Answer: Option D

Question No. 182

A force is completely defined when we specify

(A) Magnitude

(B) Direction

(C) Point of application

(D) All of the above

Answer: Option D

Question No. 183

In a three hinged arch, the third hinge is generally kept at

(A) Crown of the arch

(B) Midpoint of the crown and left support hinge

(C) Midpoint of the crown and right support hinge

(D) None of these

Answer: Option A

Question No. 184

The stiffness factor for a prismatic beam of length L and moment of inertia I, is

(A) IE/L

(B) $2EI/L$

(C) $3EI/L$

(D) $4EI/L$

Answer: Option A

Question No. 185

Center of percussion is

(A) The point of C.G.

(B) The point of metacentre

(C) The point of application of the resultant of all the forces tending to cause a body to rotate about a certain axis

(D) Point of suspension

Answer: Option C

Question No. 186
The weakest section of a diamond riveting, is the section which passes through

(A) First row

(B) Second row

(C) Central row

(D) One rivet hole of end row

Answer: Option A

Question No. 187
If a solid shaft is subjected to a torque 'T' at its end such that maximum shear stress does not exceed f_s the diameter of the shaft will be

(A) $16T/\pi f_s$

(B) $\sqrt{(16T/\pi f_s)}$

(C) $\sqrt[3]{(16T/\pi f_s)}$

(D) None of these

Answer: Option C

Question No. 188
Pick up wrong statement about friction force for dry surfaces. Friction force is

(A) Proportional to normal load between the surfaces

(B) Dependent on the materials of contact surface

(C) Proportional to velocity of sliding

(D) Independent of the area of contact surfaces

Answer: Option C

Question No. 189
The shape of the bending moment diagram over the length of a beam, carrying a uniformly distributed load is always

(A) Linear

(B) Parabolic

(C) Cubical

(D) Circular

Answer: Option B

Question No. 190
The maximum load to which a fillet joint of length 'L' can be subjected to, is

(A) $0.7 \times S \times$ fillet size $\times L$

(B) $2 \times S \times$ fillet size $\times L$

(C) Permissible shear stress $\times$ fillet size $\times L$

(D) $(S \times$ fillet size $\times L)/3$

Answer: Option A

Question No. 191
Which of the following is not the unit of energy?

    (A) kg m

    (B) kcal

    (C) watt

    (D) watt hours

    Answer: Option C

Question No. 192
In a beam, the neutral plane

    (A) May be its centre

    (B) Passes through the C.G. of the area of cross-section

    (C) Does not change during deformation

    (D) None of these

    Answer: Option C

Question No. 193
The moment diagram for a cantilever whose free end is subjected to a bending moment, will be a

    (A) Triangle

    (B) Rectangle

    (C) Parabola

    (D) Cubic parabola

    Answer: Option B

Question No. 194
The algebraic sum of the resolved parts of a number of forces in a given direction is equal to the resolved part of their resultant in the same direction. This is as per the principle of

    (A) Forces

    (B) Independence of forces

    (C) Dependence of forces

    (D) Resolution of forces

    Answer: Option D

Question No. 195
The law which states, "Within elastic limits strain produced is proportional to the stress producing it", is known as

    (A) Bernoulli's law

    (B) Stress law

    (C) Hooke's law

    (D) Poisson's law

    Answer: Option C

Question No. 196
For a beam of uniform strength keeping its depth constant, the width will vary in proportion to

(A) Bending moment (M)

(B) $\sqrt{M}$

(C) M^2

(D) None of these

Answer: Option A

Question No. 197
The product of either force of couple with the arm of the couple is called

(A) Resultant couple

(B) Moment of the forces

(C) Resulting couple

(D) Moment of the couple

Answer: Option D

Question No. 198
While testing a cast iron beam (2.5 cm × 2.5 cm) in section and a metre long simply supported at the ends failed when a 100 kg weight is applied at the centre. The maximum stress induced is:

(A) 960 kg/cm^2

(B) 980 kg/cm^2

(C) 1000 kg/cm^2

(D) 1200 kg/cm^2

Answer: Option A

Question No. 199
Simple bending equation is

(A) $M/I = R/E = F/Y$

(B) $I/M = E/R = Y/F$

(C) $M/I = E/R = F/Y$

(D) $M/I = R/E = Y/F$

Answer: Option C

Question No. 200
The algebraic sum of moments of the forces forming couple about any point in their plane is

(A) Equal to the moment of the couple

(B) Constant

(C) Both of above are correct

(D) Both of above are wrong

Answer: Option A

Question No. 201
'n' and 'j' are numbers of members and joints in a frame. It contains redundant members if

(A) $n = 2j - 3$

(B) $n = 3j - 2$

(C) $n < 2j - 3$

(D) $n > 2j - 3$

Answer: Option D

Question No. 202

The equivalent length of a column fixed at both ends, is

(A) $0.5\,l$

(B) $0.7\,l$

(C) l

(D) $1.5\,l$

Answer: Option A

Question No. 203

Which of the following is not the unit of power?

(A) kW (kilowatt)

(B) hp (horse power)

(C) kcal/sec

(D) kcal/kg sec

Answer: Option D

Question No. 204

The ratio of elongations of a conical bar due to its own weight and that of a prismatic bar of the same length, is
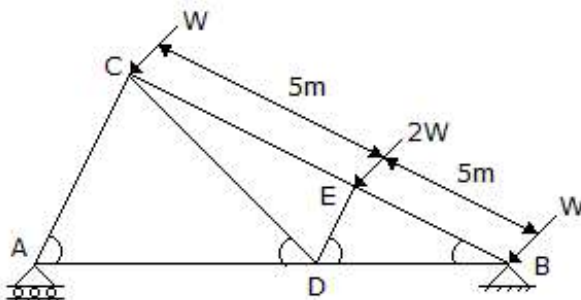
(A) 1/2

(B) 1/3

(C) 1/4

(D) 1/5

Answer: Option B

Question No. 205

The force in the member *DE* of the truss shown in below figure will be

(A) Zero

(B) 2 *W* tensile

(C) 2 *W* compressive

(D) 4 *W* compressive

Answer: Option C

Question No. 206
The possible loading in various members of framed structures are
  (A) Compression or tension
  (B) Buckling or shear
  (C) Shear or tension
  (D) All of the above
  Answer: Option A

Question No. 207
A simply supported beam of span *L* carries a concentrated load *W* at its mid-span. The maximum bending moment *M* is
  (A) $WL/2$
  (B) $WL/4$
  (C) $WL/8$
  (D) $WL/12$
  Answer: Option B

Question No. 208
The following assumption is not true in the theory of pure torsion:
  (A) The twist along the shaft is uniform
  (B) The shaft is of uniform circular section throughout
  (C) Cross-section of the shaft, which is plane before twist remains plane after twist
  (D) All radii get twisted due to torsion
  Answer: Option D

Question No. 209
If three forces acting in different planes can be represented by a triangle, these will be in
  (A) Non-equilibrium
  (B) Partial equilibrium
  (C) Full equilibrium
  (D) None of the above
  Answer: Option A

Question No. 210
A simply supported beam carrying a uniformly distributed load over its whole span, is propped at the centre of the span so that the beam is held to the level of the end supports. The reaction of the prop will be
  (A) Half the distributed load
  (B) 3/8th the distributed load
  (C) 5/8th the distributed load
  (D) Distributed load
  Answer: Option C

Question No. 211

Shear force for a cantilever carrying a uniformly distributed load over its length, is

    (A) Triangle

    (B) Rectangle

    (C) Parabola

    (D) Cubic parabola

    Answer: Option B

Question No. 212

The weight of a body is due to

    (A) Centripetal force of earth

    (B) Gravitational pull exerted by the earth

    (C) Forces experienced by body in atmosphere

    (D) Gravitational force of attraction towards the centre of the earth

    Answer: Option D

Question No. 213

For structural analysis of forces, the method refers to

    (A) Moment-area-theorem

    (B) Three-moment equation

    (C) Maxwell's reciprocal theorem

    (D) None of these

    Answer: Option A

Question No. 214

The section modulus of a rectangular section is proportional to

    (A) Area of the section

    (B) Square of the area of the section

    (C) Product of the area and depth

    (D) Product of the area and width

    Answer: Option A

Question No. 215

Pick up the incorrect statement from the following:

    (A) The C.G. of a circle is at its center

    (B) The C.G. of a triangle is at the intersection of its medians

    (C) The C.G. of a rectangle is at the intersection of its diagonals

    (D) The C.G. of a semicircle is at a distance of r/2 from the center

    Answer: Option D

Question No. 216

According to Unwin's formula, the diameter *'d'* of a rivet of plate of thickness *'t'* is :

    (A) $d = 6.05 \sqrt{t}$

    (B) $d = 1.5\ t + 4$

    (C) $d = \sqrt{5}\ t$

(D) $d = \sqrt{t} + 1.5$

Answer: Option A

Question No. 217

For a beam having fixed ends, the unknown element of the reactions, is

 (A) Horizontal components at either end

 (B) Vertical components at either end

 (C) Horizontal component at one end and vertical component at the other

 (D) Horizontal and vertical components at both the ends

Answer: Option D

Question No. 218

If a rigid body is in equilibrium under the action of three forces, then

 (A) These forces are equal

 (B) The lines of action of these forces meet in a point

 (C) The lines of action of these forces are parallel

 (D) Both (B) and (C) above

Answer: Option D

Question No. 219

The materials which have the same elastic properties in all directions, are called

 (A) Isotropic

 (B) Brittle

 (C) Homogeneous

 (D) Hard

Answer: Option A

Question No. 220

A solid circular shaft of diameter d is subjected to a torque T. The maximum normal stress induced in the shaft, is

 (A) Zero

 (B) $16T/\pi d^3$

 (C) $32T/\pi d^3$

 (D) None of these

Answer: Option B

Question No. 221

Frictional force encountered after commencement of motion is called

 (A) Post friction

 (B) Limiting friction

 (C) Kinematic friction

 (D) Dynamic friction

Answer: Option D

Question No. 222
A three-hinged arch is said to be:
    (A) Statically determinate structure
    (B) Statically indeterminate structure
    (C) A bent beam
    (D) None of these
    Answer: Option A

Question No. 223
The areas of cross-section of a square beam and a circular beam subjected to equal bending moments, are same.
    (A) Circular beam is more economical
    (B) Square beam is more economical
    (C) Both the beams are equally strong
    (D) Both the beams are equally economical
    Answer: Option B

Question No. 224
A single force and a couple acting in the same plane upon a rigid body
    (A) Balance each other
    (B) Cannot balance each other
    (C) Produce moment of a couple
    (D) Are equivalent
    Answer: Option B

Question No. 225
If the shear force along a section of a beam is zero, the bending moment at the section is
    (A) Zero
    (B) Maximum
    (C) Minimum
    (D) Average of maximum-minimum
    Answer: Option B

Question No. 226
The moment diagram for a cantilever carrying a concentrated load at its free end, will be
    (A) Triangle
    (B) Rectangle
    (C) Parabola
    (D) Cubic parabola
    Answer: Option A

Question No. 227
The forces, which meet at one point, but their lines of action do not lie in a plane, are called
    (A) Coplanar non-concurrent forces
    (B) Non-coplanar concurrent forces

(C) Non-coplanar non-concurrent forces

(D) Intersecting forces

Answer: Option B

Question No. 228

The shear stress at any section of a shaft is maximum

(A) At the centre of the section

(B) At a distance $r/2$ from the centre

(C) At the top of the surface

(D) At a distance $3/4$ r from the centre

Answer: Option C

Question No. 229

If the width b and depth d of a beam simply supported with a central load are interchanged, the deflection at the centre of the beam will be changed in the ratio of

(A) b/d

(B) d/b

(C) $(d/b)^2$

(D) $(b/d)^2$

Answer: Option D

Question No. 230

The centre of percussion of a solid cylinder of radius 'r' resting on a horizontal plane will be

(A) $r/2$

(B) $2r/3$

(C) r/A

(D) $3r/2$

Answer: Option D

Question No. 231

A three hinged parabolic arch hinged at the crown and springing, has a horizontal span of 4.8 m and a central rise of 1 m. It carries a uniformly distributed load of 0.75 tonne per metre over half left hand span. The horizontal thrust at the support will be

(A) 10.8 tonnes

(B) 1.08 tonnes

(C) 1.8 tonnes

(D) 0.8 tonnes

Answer: Option B

Question No. 232

A member which is subjected to reversible tensile or compressive stress may fail at a stress lower than the ultimate stress of the material. This property of metal, is called

(A) Plasticity of the metal

(B) Elasticity of the metal

(C) Fatigue of the metal

(D) Workability of the metal

Answer: Option C

Question No. 233

A body moves, from rest with a constant acceleration of 5 m per sec. The distance covered in 5 sec is most nearly

(A) 38 m

(B) 62.5 m

(C) 96 m

(D) 124 m

Answer: Option B

Question No. 234

Stress in a beam due to simple bending, is

(A) Directly proportional

(B) Inversely proportional

(C) Curvilinearly related

(D) None of these

Answer: Option A

Question No. 235

The ratio of the tensile stress developed in the wall of a boiler in the circumferential direction to the tensile stress in the axial direction, is

(A) 4

(B) 3

(C) 2

(D) 1

Answer: Option C

Question No. 236

According to law of triangle of forces

(A) Three forces acting at a point will be in equilibrium

(B) Three forces acting at a point can be represented by a triangle, each side being proportional to force

(C) If three forces acting upon a particle are represented in magnitude and direction by the sides of a triangle, taken in order, they will be in equilibrium

(D) If three forces acting at a point are in equilibrium, each force is proportional to the sine of the angle between the other two

Answer: Option C

Question No. 237

The deflection due to couple M at the free end of a cantilever length L is

(A) ML/EI

(B) $2ML/EI$

(C) $ML^2/2EI$

(D) $M^2L/2EI$

Answer: Option C

Question No. 238

The bending moment is maximum on a section where shearing force

(A) Is maximum

(B) Is minimum

(C) Is equal

(D) Changes sign

Answer: Option D

Question No. 239

Which one of the following statements is not correct?

(A) The tangent of the angle of friction is equal to coefficient of friction

(B) The angle of repose is equal to angle of friction

(C) The tangent of the angle of repose is equal to coefficient of friction

(D) The sine of the angle of repose is equal to coefficient to friction

Answer: Option D

Question No. 240

For a simply supported beam with a central load, the bending moment is

(A) Least at the centre

(B) Least at the supports

(C) Maximum at the supports

(D) Maximum at the centre

Answer: Option D

Question No. 241

A member is balanced at its end by two inclined members carrying equal forces. For equilibrium the angle between the inclined bars must be

(A) 3°

(B) 45°

(C) 90°

(D) 120°

Answer: Option D

Question No. 242

When trying to turn a key into a lock, following is applied

(A) Coplanar force

(B) Non-coplanar forces

(C) Couple

(D) Moment

Answer: Option C

Question No. 243

A reinforced concrete beam is assumed to be made of

    (A) Homogeneous material

    (B) Heterogeneous material

    (C) Isotropic material

    (D) None of these

    Answer: Option B

Question No. 244

For a stable frame structure, number of members required, is

    (A) Three times the number of joints minus three

    (B) Twice the number of joints minus three

    (C) Twice the number of joints minus two

    (D) Twice the number of joints minus one

    Answer: Option B

Question No. 245

The units of moment of inertia of mass are

    (A) $kg\ m^2$

    (B) m^4

    (C) kg/m^2

    (D) kg/m

    Answer: Option A

Question No. 246

The reaction at the supports will be vertical to the plane of the support if the frame structure rests on

    (A) Roller supports

    (B) Free supports

    (C) Hinged supports

    (D) All the above

    Answer: Option D

Question No. 247

If the stress produced by a prismatic bar is equal to the working stress, the area of the cross-section of the prismatic bar, becomes

    (A) Zero

    (B) Infinite

    (C) Maximum

    (D) Minimum

    Answer: Option B

Question No. 248

The center of percussion of the homogeneous rod of length 'L' suspended at the top will be

    (A) $L/2$

(B) $L/3$

(C) $3L/4$

(D) $2L/3$

Answer: Option D

Question No. 249

A beam of length L is pinned at both ends and is subjected to a concentrated bending couple of moment M at its centre. The maximum bending moment in the beam is

(A) M

(B) $M/2$

(C) $M/3$

(D) $ML/2$

Answer: Option A

Question No. 250

If b is the width of a plate joined by diamond riveting of diameter d, the efficiency of the joint is given by

(A) $(b + d)/b$

(B) $(b - d)/b$

(C) $(d - b)/d$

(D) $(b - d)/d$

Answer: Option B

Question No. 251

A projectile is fired at an angle θ to the vertical. Its horizontal range will be maximum when θ is

(A) $0°$

(B) $30°$

(C) $45°$

(D) $60°$

Answer: Option C

Question No. 252

For a simply supported beam of length 'L', the bending moment 'M' is described as $M = a\,(x - x^3/L^2)$, $0 \le x < L$; where 'a' is a constant. The shear force will be zero at

(A) The supports

(B) $x = L/2$

(C) $x = L/\sqrt{3}$

(D) $x = L/3$

Answer: Option C

Question No. 253

A column is said to be of medium size if its slenderness ratio is between

(A) 20 and 32

(B) 32 and 120

(C) 120 and 160

(D) 160 and 180
Answer: Option B

Question No. 254
The length of a column, having a uniform circular cross-section of 7.5 cm diameter and whose ends are hinged, is 5 m. If the value of *E* for the material is 2100 tonnes/cm^2, the permissible maximum crippling load will be
   (A) 1.288 tonnes
   (B) 12.88
   (C) 128.8 tonnes
   (D) 288.0
   Answer: Option B

Question No. 255
The moment diagram for a cantilever which is subjected to a uniformly distributed load will be a
   (A) Triangle
   (B) Rectangle
   (C) Parabola
   (D) Cubic parabola
   Answer: Option C

Question No. 256
If the normal cross-section '*A*' of a member is subjected to tensile force '*P*', the resulting normal stress in an oblique plane inclined at angle 'θ' to transverse plane will be
   (A) $(P/A) \sin^2 \theta$
   (B) $(P/A) \cos^2 \theta$
   (C) $(P/2A) \sin 2\theta$
   (D) $(P/2A) \cos 2\theta$
   Answer: Option B

Question No. 257
In a shaft rotated by a couple, the shear force varies
   (A) From zero at the centre to a maximum at the circumference
   (B) From minimum at the centre of maximum at the circumference
   (C) From maximum at the centre to zero at the circumference
   (D) Equally throughout the section
   Answer: Option A

Question No. 258
The shape of the bending moment diagram over the length of a beam, having no external load, is always
   (A) Linear
   (B) Parabolic
   (C) Cubical
   (D) Circular

Answer: Option A

Question No. 259
The stress at which extension of a material takes place more quickly as compared to the increase in load, is called
(A) Elastic point
(B) Plastic point
(C) Breaking point
(D) Yielding point
Answer: Option D

Question No. 260
A shaft turning 150 r.p.m. is subjected to a torque of 150 kgm. Horse power transmitted by the shaft is
(A) π
(B) $10\,\pi$
(C) π^2
(D) $1/\pi$
Answer: Option B

Question No. 261
In a simply supported beam (l + 2a) with equal overhangs (a) and carrying a uniformly distributed load over its entire length, B.M. at the middle point of the beam will be zero if
(A) $l = 2a$
(B) $l = 4a$
(C) $l < 2a$
(D) $l > a$
Answer: Option A

Question No. 262
A simply supported beam of span 'L' carries a uniformly distributed load 'W'. The maximum bending moment 'M' is
(A) $WL/2$
(B) $WL/4$
(C) $WL/8$
(D) $WL/12$
Answer: Option C

Question No. 263
A member which does not regain its original shape after removed of load producing deformation is said
(A) Plastic
(B) Elastic
(C) Rigid
(D) None of these

Answer: Option A

Question No. 264
A solid cube is subjected to equal normal forces on all its faces. The volumetric strain will be *x*-times the linear strain in any of the three axes when
(A) $x = 1$
(B) $x = 2$
(C) $x = 3$
(D) $x = 4$
Answer: Option C

Question No. 265
A three hinged arch is loaded with an isolated load 1000 kg at a horizontal distance of 2.5 m from the crown, 1 m above the level of hinges at the supports 10 metres apart. The horizontal thrust is
(A) 1250 kg
(B) 125 kg
(C) 750 kg
(D) 2500 kg
Answer: Option A

Question No. 266
A uniform girder simply supported at its ends is subjected to a uniformly distributed load over its entire length and is propped at the centre so as to neutralise the deflection. The net B.M. at the centre will be
(A) WL
(B) $WL/8$
(C) $WL/24$
(D) $WL/32$
Answer: Option D

Question No. 267
When a rectangular beam is loaded transversely, the maximum compressive stress develops on
(A) Bottom fibre
(B) Top fibre
(C) Neutral axis
(D) Every cross-section
Answer: Option B

Question No. 268
In a tension test, the yield stress is 300 kg/cm^2, in the octahedral shear stress at the point is:
(A) 100 √2 kg/cm^2
(B) 150 √2 kg/cm^2
(C) 200 √2 kg/cm
(D) 250 √2 kg/cm^2
Answer: Option A

Question No. 269
Columns of given length, cross-section and material have different values of buckling loads for different end conditions. The strongest column is one whose
    (A) One end is fixed and other end is hinged
    (B) Both ends are hinged or pin jointed
    (C) One end is fixed and the other end entirely free
    (D) Both the ends are fixed
    Answer: Option D

Question No. 270
A cantilever carrying a uniformly distributed load *W* over its full length is propped at its free end such that it is at the level of the fixed end. The bending moment will be zero at its free end also at
    (A) Midpoint of the cantilever
    (B) Fixed point of the cantilever
    (C) 1/4th length from free end
    (D) 3/4th length from free end
    Answer: Option D

Question No. 271
If the depth of a simply supported beam carrying an isolated load at its centre, is doubled, the deflection of the beam at the centre will be changed by a factor of
    (A) 2
    (B) 1/2
    (C) 8
    (D) 1/8
    Answer: Option D

Question No. 272
The minimum number of rivets for the connection of a gusset plate, is
    (A) 1
    (B) 2
    (C) 3
    (D) 4
    Answer: Option B

Question No. 273
The cross sections of the beams of equal length are a circle and a square whose permissible bending stress is same under same maximum bending. The ratio of their flexural weights is,
    (A) 1.118
    (B) 1.338
    (C) 1.228
    (D) 1.108
    Answer: Option A

Question No. 274
Pick up the correct statement from the following:
   (A) A ductile material has large plastic zone
   (B) A brittle material has no plastic zone
   (C) A rigid material has no plastic zone
   (D) All the above
   Answer: Option D

Question No. 275
The section modulus of a rectangular light beam 25 metres long is 12.500 cm^3. The beam is simply supported at its ends and carries a longitudinal axial tensile load of 10 tonnes in addition to a point load of 4 tonnes at the centre. The maximum stress in the bottom most fibre at the mid span section, is
   (A) 13.33 kg/cm^2 tensile
   (B) 13.33 kg/cm^2 compressive
   (C) 26.67 kg/cm^2 tensile
   (D) 26.67 kg/cm^2 compressive
   Answer: Option C

Question No. 276
Stress in members of statically determinate simple frames, can be determined by
   (A) Method of joints
   (B) Method of sections
   (C) Graphical solution
   (D) All the above
   Answer: Option D

Question No. 277
The point of contraflexure occurs in
   (A) Cantilever beams only
   (B) Continuous beams only
   (C) Over hanging beams only
   (D) All types of beams
   Answer: Option C

Question No. 278
A rectangular beam 20 cm wide is subjected to a maximum shearing force of 10,000 kg, the corresponding maximum shearing stress being 30 kg/cm^2. The depth of the beam is
   (A) 15 cm
   (B) 20 cm
   (C) 25 cm
   (D) 30 cm
   Answer: Option C

Question No. 279

If a member is subjected to a tensile force *P*, having its normal cross-section *A*, the resulting shear stress in an oblique plane inclined at an angle θ to its transverse plane, is

    (A) $(P/A) \sin^2 θ$

    (B) $(P/2A) \sin 2θ$

    (C) $(P/2A) \cos 2θ$

    (D) $(P/A) \cos^2 θ$

    Answer: Option B

Question No. 280

If a shaft is simultaneously subjected to a toque *T* and a bending moment *M*, the ratio of maximum bending stress and maximum shearing stress is

    (A) M/T

    (B) T/M

    (C) $2M/T$

    (D) $2T/M$

    Answer: Option C

Question No. 281

The ratio of the effective length of a column and minimum radius of gyration of its cross-sectional area, is known

    (A) Buckling factor

    (B) Slenderness ratio

    (C) Crippling factor

    (D) None of these

    Answer: Option B

Question No. 282

The region of the cross-section of a column in which compressive load may be applied without producing any tensile stress, is known as the core of the cross-section. In circular columns the radius of the core, is

    (A) One-half of the radius

    (B) One-third of the radius

    (C) One-quarter of the radius

    (D) One-fifth of the radius

    Answer: Option C

Question No. 283

If the width of a simply supported beam carrying an isolated load at its centre is doubled, the deflection of the beam at the centre is changed by

    (A) 2 times

    (B) 4 times

    (C) 8 times

    (D) 1/2 times

    Answer: Option C

Question No. 284

A cylinder is said to be thin if the ratio of its thickness and diameter, is less than

(A) 1/25

(B) 1/20

(C) 1/15

(D) 1/10

Answer: Option D

Question No. 285

As the elastic limit reaches, tensile strain

(A) Increases more rapidly

(B) Decreases more rapidly

(C) Increases in proportion to the stress

(D) Decreases in proportion to the stress

Answer: Option A

Question No. 286

For a given material Young's modulus is 200 GN/m^2 and modulus of rigidity is 80 GN/m^2. The value of Poisson's ratio is

(A) 0.15

(B) 0.20

(C) 0.25

(D) 0.30

Answer: Option C

Question No. 287

The rise of a parabolic arch at quarter points, is equal to

(A) 1/3 times the rise of the crown

(B) 1/4 times the rise of the crown

(C) 1/2 times the rise of the crown

(D) 3/4 times the rise of the crown

Answer: Option D

Question No. 288

The number of points of contraflexure in a simple supported beam carrying uniformly distributed load, is

(A) 0

(B) 1

(C) 2

(D) 3

Answer: Option A

Question No. 289

When two plates butt together and are riveted with two cover plates with two rows of rivets, the joint is known as

(A) Lap joint

(B) Butt joint

(C) Single riveted single cover butt joint

(D) Double riveted double cover butt joint

Answer: Option D

Question No. 290

If the width of a simply supported beam carrying an isolated load at its centre is doubled, the deflection of the beam at the centre is changed by

(A) 1/2

(B) 1/8

(C) 2

(D) 8

Answer: Option A

Question No. 291

The moment diagram for a cantilever carrying linearly varying load from zero at its free end and to maximum at the fixed end will be a

(A) Triangle

(B) Rectangle

(C) Parabola

(D) Cubic parabola

Answer: Option D

Question No. 292

When a rectangular beam is loaded longitudinally, shear develops on

(A) Bottom fibre

(B) Top fibre

(C) Middle fibre

(D) Every-horizontal plane

Answer: Option D

Question No. 293

For a simply supported beam carrying uniformly distributed load W on it entire length L, the maximum bending moment is

(A) $WL/4$

(B) $WL/8$

(C) $WL/2$

(D) $WL/3$

Answer: Option B

Question No. 294

Along the principal plan subjected to maximum principal stress

(A) Maximum shear stress acts

(B) Minimum shear stress acts

(C) No shear stress acts

(D) None of these

Answer: Option C

Question No. 295

The width of a beam of uniform strength having a constant depth d length L, simply supported at the ends with a central load W is

(A) $2WL/3fd^2$

(B) $3WL/2fd^2$

(C) $2fL/3Wd^4$

(D) $3fL^2/2Wd$

Answer: Option B

Question No. 296

The distance between the centres of adjacent rivets in the same row, is called

(A) Pitch

(B) Lap

(C) Gauge

(D) Staggered pitch

Answer: Option A

Question No. 297

Hooke's law states that stress and strain are

(A) Directly proportional

(B) Inversely proportional

(C) Curvilinearly related

(D) None of these

Answer: Option A

Question No. 298

For a beam, if fundamental equations of statics are not sufficient to determine all the reactive forces at the supports, the structure is said to be

(A) Determinate

(B) Statically determinate

(C) Statically indeterminate

(D) None of these

Answer: Option C

Question No. 299

The tension coefficient of any member is

(A) Force divided by the length

(B) Tension divided by the length

(C) Tension per unit area

(D) Tension in the member

Answer: Option B

Question No. 300

Rankine-Golden formula accounts for direct as well as buckling stress and is applicable to

(A) Very long columns

(B) Long columns

(C) Short columns

(D) Intermediate columns

Answer: Option D

Question No. 301

The neutral axis of a beam cross-section must

(A) Pass through the centroid of the section

(B) Be equidistant from the top of bottom films

(C) Be an axis of symmetry of the section

(D) None of these

Answer: Option A

Question No. 302

In a continuous bending moment curve the point where it changes sign, is called

(A) Point of inflexion

(B) Point of contraflexure

(C) Point of virtual hinge

(D) All the above

Answer: Option D

Question No. 303

The equivalent length of a column fixed at one end and free at the other end, is

(A) 0.5 l

(B) 0.7 l

(C) 2 l

(D) 1.5 l

Answer: Option C

Question No. 304

For a given material, if _E, C, K_ and _m_ are Young's modulus, shearing modulus, bulk modulus and Poisson ratio, the following relation does not hold good

(A) $E = 9KC/3K + C$

(B) $E = 2K (1 + 2/m)$

(C) $E = 2C (1 + 1/m)$

(D) $E = 3C (1 - 1/m)$

Answer: Option C

Question No. 305

A short masonry pillar is 60 cm x 60 cm in cross-section, the core of the pillar is a square whose side is

(A) 17.32 cm

(B) 14.14 cm

(C) 20.00 cm

(D) 22.36 cm

Answer: Option B

Question No. 306

The ratio of the maximum deflection of a cantilever beam with an isolated load at its free end and with a uniformly distributed load over its entire length, is

(A) 1

(B) 24/15

(C) 3/8

(D) 8/3

Answer: Option D

Question No. 307

The slenderness ratio of a vertical column of square cross- section of 10 cm side and 500 cm long, is

(A) 117.2

(B) 17.3

(C) 173.2

(D) 137.2

Answer: Option C

Question No. 308

A steel rod of 2 cm diameter and 5 metres long is subjected to an axial pull of 3000 kg. If $E = 2.1 \times 10^6$, the elongation of the rod will be

(A) 2.275 mm

(B) 0.2275 mm

(C) 0.02275 mm

(D) 2.02275 mm

Answer: Option B

Question No. 309

A rectangular log of wood is floating in water with a load of 100 N at its centre. The maximum shear force in the wooden log is

(A) 50 N at each end

(B) 50 N at the centre

(C) 100 N at the centre

(D) None of these

Answer: Option C

Question No. 310

The maximum compressive stress at the top of a beam is 1600 kg/cm^2 and the corresponding tensile stress at its bottom is 400 kg/cm^2. If the depth of the beam is 10 cm, the neutral axis from the top, is

(A) 2 cm

(B) 4 cm

(C) 6 cm

(D) 8 cm

Answer: Option D

Question No. 311

At either end of a plane frame, maximum number of possible transverse shear forces, are

(A) One

(B) Two

(C) Three

(D) Four

Answer: Option A

Question No. 312

In a square beam loaded longitudinally, shear develops

(A) On middle fibre along horizontal plane

(B) On lower fibre along horizontal plane

(C) On top fibre along vertical plane

(D) Equally on each fibre along horizontal plane

Answer: Option D

Question No. 313

Reactions at the supports of a structure can be determined by equating the algebraic sum of

(A) Horizontal forces to zero

(B) Vertical forces to zero

(C) Moment about any point to zero

(D) All the above

Answer: Option D

Question No. 314

The phenomenon of slow growth of strain under a steady tensile stress, is called

(A) Yielding

(B) Creeping

(C) Breaking

(D) None of these

Answer: Option B

Question No. 315

If the stress in each cross-section of a pillar is equal to its working stress, it is called

(A) Body of equal

(B) Body of equal section

(C) Body of equal strength

(D) None of these

Answer: Option C

Question No. 316

Maximum deflection of a cantilever due to pure bending moment _M_ at its free end, is

 (A) $ML^2/3EI$

 (B) $ML^2/4EI$

 (C) $ML^2/6EI$

 (D) $ML^2/2EI$

 Answer: Option D

Question No. 317

The maximum deflection of a simply supported beam of length _L_ with a central load _W_, is

 (A) $WL^2/48EI$

 (B) $W^2L/24EI$

 (C) $WL^3/48EI$

 (D) $WL^2/8EI$

 Answer: Option C

Question No. 318

An open-ended cylinder of radius '_r_' and thickness '_t_' is subjected to internal pressure '_p_'. The Young's modulus for the material is '_E_' and Poisson's ratio is '_μ_'. The longitudinal strain is

 (A) Zero

 (B) pr/TE

 (C) $pr/2TE$

 (D) None of these

 Answer: Option A

Question No. 319

Euler's formula states that the buckling load '_P_' for a column of length '_l_', both ends hinged and whose least moment of inertia and modulus of elasticity of the material of the column are '_I_' and '_E_' respectively, is given by the relation

 (A) $P = \pi^2 EI/l^2$

 (B) $P = \pi l^2/EI$

 (C) $P = \pi EI/l^2$

 (D) $P = \pi^2 EI/l^3$

 Answer: Option A

Question No. 320

In a three hinged arch, the bending moment will be zero

 (A) At right hinge only

 (B) At left hinge only

 (C) At both right and left hinges

 (D) At all the three hinges

 Answer: Option D

Question No. 321

A simply supported beam carries two equal concentrated loads *W* at distances *L*/3 from either support. The maximum bending moment

(A) *WL*/3
(B) *WL*/4
(C) 5*WL*/4
(D) 3*WL*/12

Answer: Option A

Question No. 322

If the beam is supported so that there are only three unknown reactive elements at the supports. These can be determined by using the following fundamental equation of statics

(A) $\sum H = 0$
(B) $\sum V = 0$
(C) $\sum H = 0; \sum H = 0$
(D) $\sum H = 0; \sum V = 0; \sum M = 0$

Answer: Option D

Question No. 323

For a cantilever with a uniformly distributed load *W* over its entire length *L*, the maximum bending moment is

(A) *WL*
(B) ½ *WL*
(C) ⅓ *WL*
(D) ½ *WL*^{2}

Answer: Option B

Question No. 324

To ascertain the maximum permissible eccentricity of loads on circular columns, the rule generally followed, is

(A) Middle half rule of columns
(B) Middle third rule of columns
(C) Middle fourth rule of columns
(D) None of these

Answer: Option C

Question No. 325

A shaft 9 m long is subjected to a torque 30 *t*-m at a point 3 m distant from either end. The reactive torque at the nearer end will be

(A) 5 tonnes metre
(B) 10 tonnes metre
(C) 15 tonnes metre
(D) 20 tonnes metre

Answer: Option D

Question No. 326

Every material obeys the Hooke's law within its

   (A) Elastic limit

   (B) Plastic point

   (C) Limit of proportionality

   (D) None of these

   Answer: Option C

Question No. 327

If the length of a cantilever carrying an isolated load at its free end is doubled, the deflection of the free end will increase by

   (A) 8

   (B) 1/8

   (C) 1/3

   (D) 2

   Answer: Option B

Question No. 328

If $'p'$ is the internal pressure in a thin cylinder of diameter $'d'$ and thickness $'t'$, the developed hoop stress, is

   (A) $pd/2t$

   (B) $pd/4t$

   (C) pd/t

   (D) $2pd/t$

   Answer: Option A