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

QUESTION BANK (DESCRIPTIVE)

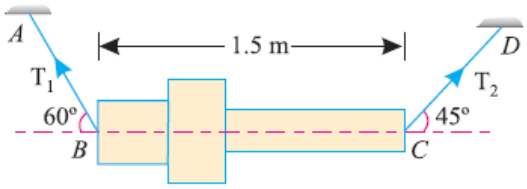
Subject with Code : ENGINEERING MECHANICS **Course & Branch**: B.Tech – CE&ME

Year & Sem: I-B.Tech & II-Sem **Regulation:** R16

UNIT –I

EQUILIBRIUM OF SYSTEM OF FORCES

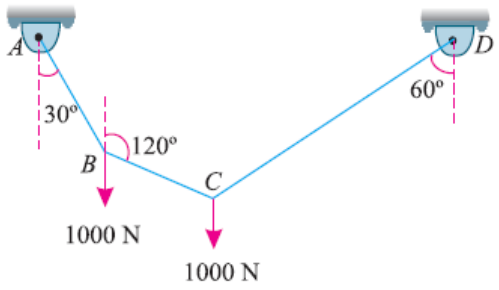
1. A machine component 1.5 m long and weight 1000 N is supported by two ropes AB and CD as shown in Fig. given below. Find the tensions T_1 and T_2



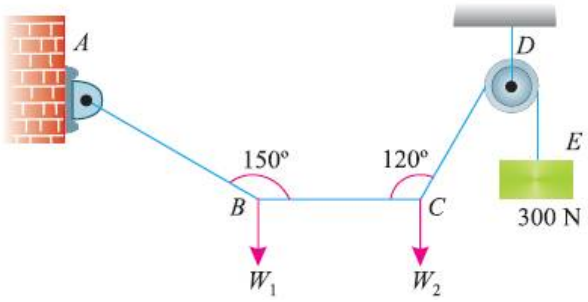
2. The following forces act at a point
   - i) 20N inclined at 30° towards north of East
   - ii) 25N towards North
   - iii) 30N towards North West, and
   - iv) 35N inclined at 40° towards South of West

   Find the magnitude and direction of the resultant of force

3. A string ABCD, attached to fixed points A and D has two equal weights of1000 N attached to it at B and C. The weights rest with the portions AB and CD inclined at angles as shown in Fig. Find the tensions in the portions AB, BC and CD of the string, if the inclination of the portion BC with the vertical is 120°.

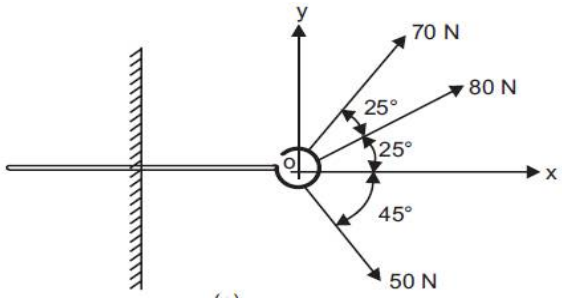


4. Light string ABCDE whose extremity A is fixed, has weights W1 and W2 attached to it at B and C. It passes round a small smooth peg at D carrying a weight of 300 N at the free end E as shown in Fig.

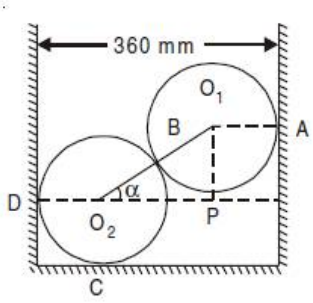


If in the equilibrium position, BC is horizontal and AB and CD make 150° and 120° with BC, find (i) Tensions in the portion AB, BC and CD of the string and (ii) Magnitudes of W1 and W2.

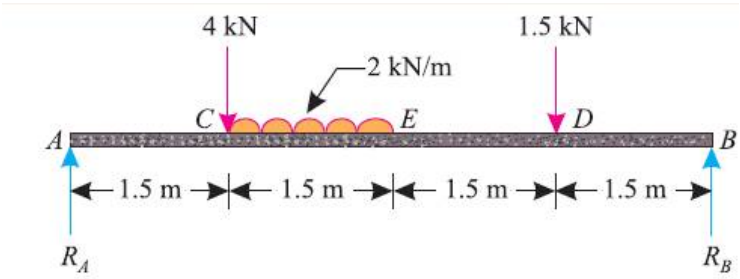
5. Determine the resultant of the three forces acting on a hook as shown in Fig



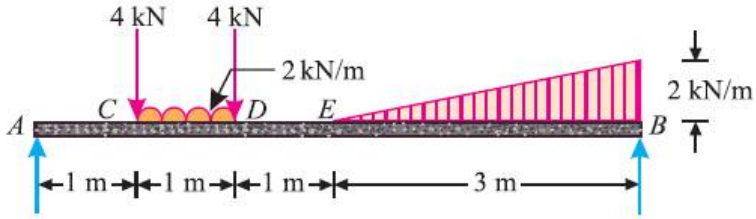
6. Two smooth spheres each of radius 100 mm and weight 100 N, rest in a horizontal channel having vertical walls, the distance between which is 360 mm. Find the reactions at the points of contacts A, B, C and D shown in Fig



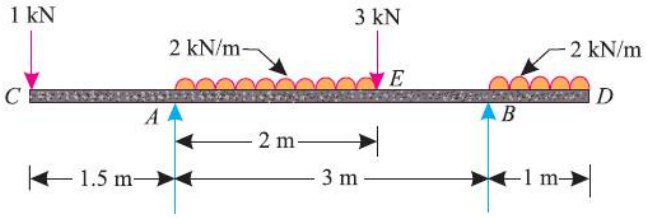
7. A simply supported beam, AB of span 6 m is loaded as shown in Fig. Determine the reactions RA and RB of the beam.



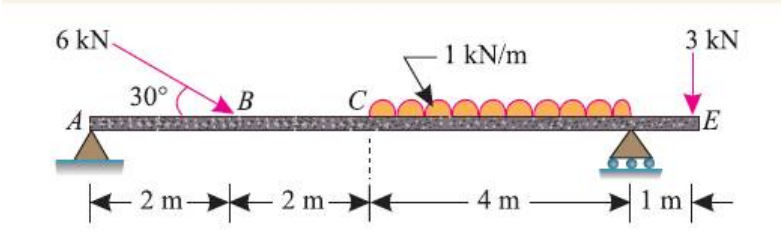
8. A simply supported beam AB of 6 m span is subjected to loading as shown in Fig. Find the support reactions at A and B.



9. A beam AB of span 3m, overhanging on both sides is loaded as shown in Fig Determine the reactions at the supports A and B.



10. A beam ABCDE hinged at A and supported on rollers at D, is loaded as shown in Fig. Find the reactions at A and D.



11. Derive the expressions of parallelogram law of forces and lami's theorem.

12. a) What do you understand by action and reaction? Give examples.
b) Explain and define the term : 'free body diagram'. Draw the free body diagram of a ball of weight W, placed on a horizontal surface.

13. a) Explain the term 'support reactions'. What are the different types of supports.
b) What is the difference between a roller and a hinged support?

14. a) What is the main advantage of roller support in case of the steel trusses of the bridges?
b) What are the important types of loading on a beam? Differentiate between uniformly distributed load and uniformly varying load on a beam.

15. Explain the classification of a force system with neat sketch.

16. Define the following terms

a) Overhanging beam
b) Reaction
c) Concurrent forces
d) Vector quantities
e) Lami's theorem

UNIT – II:FRICTION

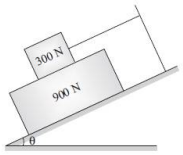
1. A pull of 20N, inclined at 25^o to the horizontal plane, is required just to move a body placed on a rough horizontal plane. But the push required to move the body is 25N. If the push is inclined at 15^o to the horizontal, find the weight of the body and coefficient of friction.

2. Find the least force required to drag a body of weight W, placed on a rough inclined plane having inclination α to the horizontal. The force is applied to the body in such a way that it makes an angle θ to the inclined plane and the body is (a) On the point of motion up the plane, (b) On the point of motion down the plane.

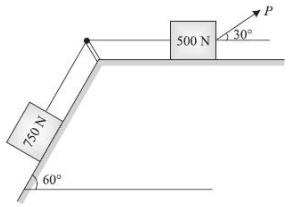
3. A) A body of weight 500N is pulled up on an inclined plane, by a force of 350N. The inclination of the plane is 30^o to the horizontal and the force is applied parallel to the plane. Determine the coefficient of friction.

   B) The force required to pull a body of weight 50N on a rough horizontal plane is 15N. Determine the coefficient of friction If the force is applied at an angle of 15^o with the horizontal

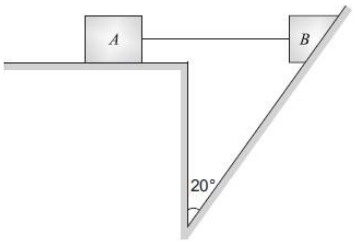
4. What should be the value of θ in Fig. which will make the motion of 900 N block down the plane to impend? The coefficient of friction for all contact surfaces is 1/3.



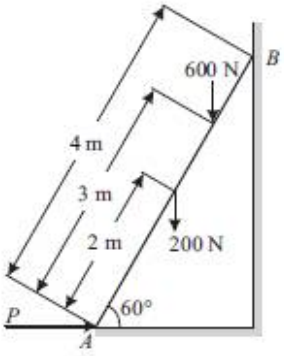
5. What is the value of P in the system shown in Fig. to cause the motion to impend? Assume the pulley is smooth and coefficient of friction between the other contact surfaces is 0.2.



6. Two blocks connected by a horizontal link AB are supported on two rough planes as shown in Fig. 5.11(a). The coefficient of friction on the horizontal plane is 0.4. The limiting angle of friction for block B on the inclined plane is 20°. What is the smallest weight W of the block A for which equilibrium of the system can exist if weight of block B is 5 kN?



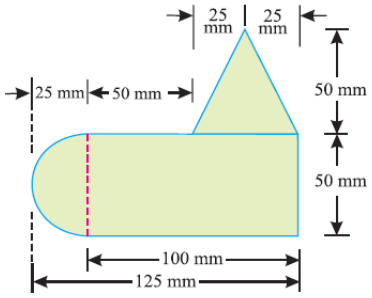
7. A ladder of length 4 m, weighing 200 N is placed against a vertical wall as shown in Fig. 5.14(a). The coefficient of friction between the wall and the ladder is 0.2 and that between floor and the ladder is 0.3. The ladder, in addition to its own weight, has to support a man weighing 600 N at a distance of 3 m from A. Calculate the minimum horizontal force to be applied at A to prevent slipping.



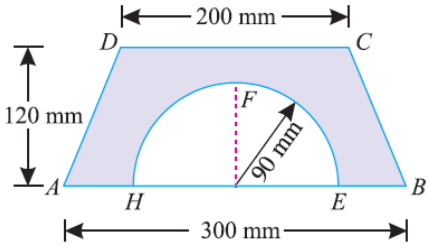
8. A) What is the screw jack? What are the applications of it?
   B) What is the differential screw jack? Explain the working principle of with neat sketch.
9. A) Prove that the angle of friction(Φ) is equal to the angle made by an anclined plane with the horizontal when a solid body, placed on the inclined plane, is about to slide down.
   B) A body of weight 100N is placed on a rough inclined plane. Determine the coefficient of friction if a horizontal force of 60n just causes the body to slide over the horizontal plane.
10. Define the following terms
    A) Limiting force of friction
    B) Co-efficient of friction
    C) Angle of friction
    D) Angle of repose
    E) Cone of friction

UNIT-III:CENTRE OF GRAVITY & MOMENT OF INERTIA

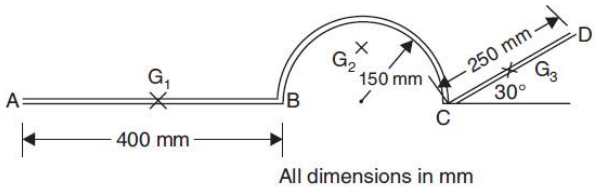
1. A uniform lamina shown in Fig. 6.14 consists of a rectangle, a circle and a triangle. Determine the centre of gravity of the lamina. All dimensions are in mm



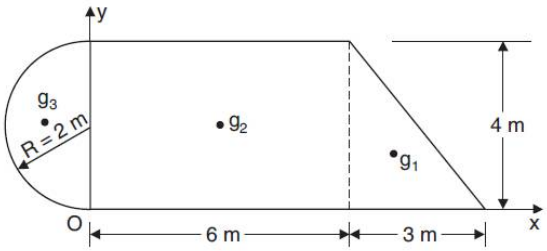
2. A semicircle of 90 mm radius is cut out from a trapezium as shown in Fig. Find the position of the centre of gravity of the figure.



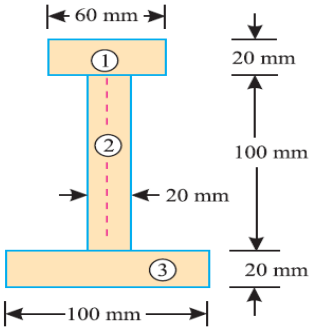
3. Locate the centroid of the uniform wire bent as shown in Fig.



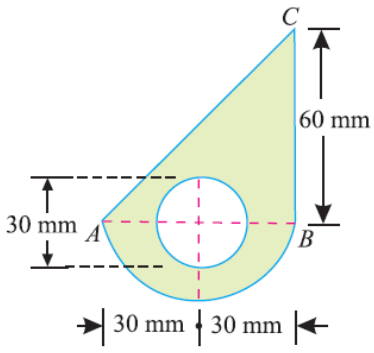
4. Determine the centroid of the area shown in Fig. 4.33 with respect to the axis shown



5. An I-section is made up of three rectangles as shown in Fig. Find the moment of inertia of the section about the horizontal axis passing through the centre of gravity of the section.



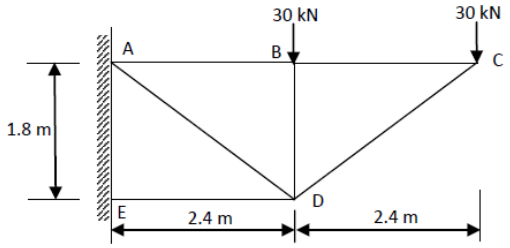
6. Find the moment of inertia of the lamina with a circular hole of 30 mm diameter about the axis *AB* as shown in Fig.



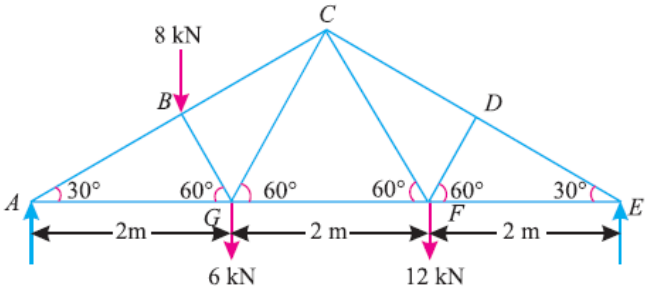
7. Describe the method of finding out the moment of inertia of a composite section.
8. Prove the parallel axis theorem in the determination of moment of inertia of areas with the help of a neat sketch.
9. Derive an equation for moment of inertia of the following sections about centroidal axis:
   a) a rectangular section,
   b) a circular section
10.
   a) Define the term 'Centre of gravity'
   b) State the parpedicular axis theorem
   c) Define the term 'Mass moment of inertia'
   d) How would you find out the centre of gravity of a section, with a cut out hole?
   e) How would you find out the moment of inertia of a plane area ?

UNIT-IV ANALYSIS OF PERFECT FRAMES

1. Find the forces in the members of a truss as shown in fig.

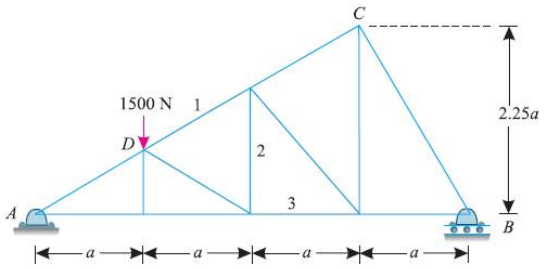


2. An inclined truss loaded as shown in fig.

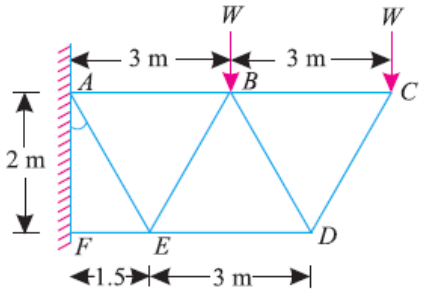


Determine the nature and magnitude of the forces in the members BC, GC and GF of the truss.

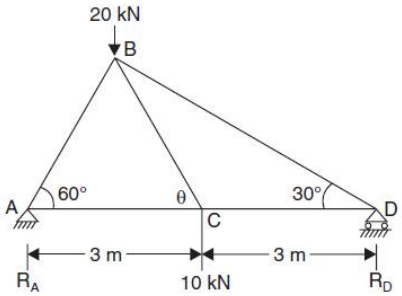
3. A plane is loaded & suppoerted as shown in fig. Determine the nature and magnitude of the forces in the members 1,2 and 3.



4. A cantilever truss is loaded as shown in Fig. Find the value W, which would produce the force of magnitude 15 kN in the member AB.

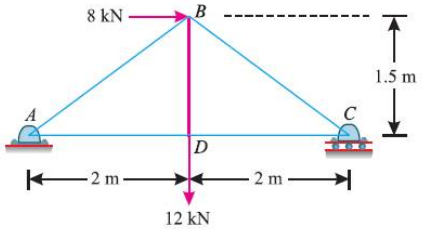


5. Determine the forces in all the members of the truss shown in Fig.

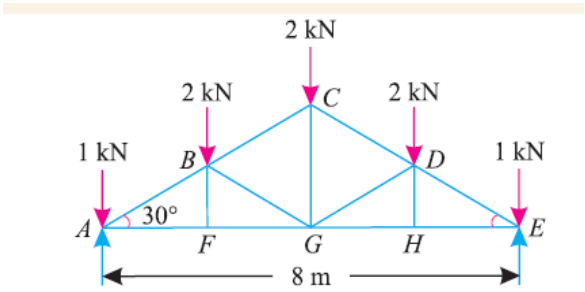


6. Explain the procedure to find forces in members of truss by using method of joints.

7. Figure shows a framed structure of 4 m span and 1.5 m height subjected to two point loads at B and D.



8. Explain the procedure to find forces in members of truss by using method of sections.
9. A king post truss of 8 m span is loaded as shown in Fig. Find the forces in each member of the truss and tabulate the results.



10.
   a) What is a cantilever truss? How will you find out its reactions?
   b) State the assumptions made in the analysis of pin jointed trusses.
   c) How method of joint differs from the method of section in the analysis of pin jointed trusses?
   d) What is meant by perfect frame?
   e) What are the types of vibrations.

UNIT-V:KINEMATICS & KINETICS

1. A stone is dropped from the top of a tower. During the last second of its flight it is found to fall 1/4th of the whole height of tower. Find the height of the tower. What is the velocity with which the stone hits the bottom of the tower?
2. A small steel ball is shot vertically upwards from the top of building 50 m above the street with an initial velocity of 25 m/sec.
   (i) In what time, it will reach the maximum height?
   (ii) How high above the building will the ball rise?
   (iii) Compute the velocity with which it will strike the street and the total time for which the ball is in motion.
3. A stone is thrown from the top of building upward at an angle of 400 with the horizontal with an initial speed of 30 m/sec. The height of the building above ground level is 30 m. Determine:
   a) The greatest height reached by the stone above the ground level.
   b) The horizontal distance from the point of projection to the point where the stone strikes the ground.
   c) The velocity with which the stone strikes the ground.
   d) Time of flight
4. The motion of a particle along a straight line is defined by relation x = t3 – 4.5t2 + 5, where 'x' is in meters and 't' in seconds. Plot motion curves from t = 0 to t = 5 s with $\Delta t = 0.5$ s.

5. A particle moves along a straight line so that its displacement in metre from a fixed point is given by $x = t^3 + 3.0\ t^2 + 4.0\ t + 5$, where 'x' is in meters and 't' in seconds. Find. (i) Velocity at start and after 4 seconds. (ii) Acceleration at start and after 4 seconds.
6. The acceleration of a particle in rectilinear motion is defined by the relation a = 25 – 4S2. Where 'a' is expressed in m/sec2 and 'S' is position coordinate in meters. The particle starts with no initial velocity at the position S = 0. Determine:
   (i) The velocity when S = 3 m
   (ii) The position where the velocity is again zero
   The position where the velocity is maximum.
7. A body moves along a straight line and its acceleration (a) which varies with time (t) is given by a = 2 – 3t. After 5 seconds , from start of observations, its velocity is observed to be 20 m/s. After 10 seconds, from start of observation, the body was at 85 metres from the origin. Determine
   (a) its acceleration and velocity at the time of start
   (b) distance from the origin at the start of observations,
   (c) the time after start of observation in which the velocity becomes zero.
8. A car moves along a straight line whose equation of motion is given by $s = 12t + 3t^2 – 2t^3$, where (s) is in metres and (t) is in seconds. Calculate (i) velocity and acceleration at start, and (ii) acceleration, when the velocity is zero
9. The equation of motion of a particle moving in a straight line is given by :s = 18t + 3t2 – 2t3 where (s) is in metres and (t) in seconds. Find (1) velocity and acceleration at start, (2) time, when the particle reaches its maximum velocity, and (3) maximum velocity of the particle.
10. Define the following terms
    a) Velocity
    b) Acceleration
    c) Uniform acceleration
    d) Variable acceleration
    e) rectilinear motion

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BIT BANK (OBJECTIVE)

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UNIT –I

INTRODUCTION OF ENGINEERING MECHANICS

1) Which deals with the engineering mechanics [ ]
A) Statics B) dynamics C) both statics and dynamics D) none

2) Two essential properties of force are [ ]
A) Magnitude and sense B) sense and direction C) magnitude and direction D) none

3) Following represents the lami's theorem [ ]
A) Cosine angle between the other two forces B) sine angle between the all three forces
C) Sine angle between the other two forces D) all the above

4) What is meant by concurrent forces [ ]
A) All forces meet at one point B) all the forces not meet at one point
C) Having same line of action D) both B & C

5) Coplanar forces may be [ ]
A) Concurrent B) non concurrent C) either concurrent or non concurrent D) none of these

6) Dynamics deals with [ ]
A) Lami's theorem B) static bodies C) kinetics D) kinetics and kinematics

7) Rolling support develops following reactions [ ]
A) Only one vertical reaction B) only horizontal reaction
C) both vertical and horizontal D) inclined

8) For UDL total load is [ ]
A) Load of UDL B) load of UDL * distance C) load of UDL*distance/2 D) at center of gravity

9) For UVL total load is equal to [ ]
A) Area of rectangle B) total area of triangle C) area of square D) area of pentagon

10) The algebraic sum of all the forces is equal to zero when it is a [ ]
A)Rigid body B)equilibrium body C) resultant body D) deformable body

11) The product of resultant force and the perpendicular distance is [ ]
A) Couple B) moment of a force C) moment D) magnitude

12) All the forces acting simultaneous on a body are called [ ]
A) Equilibrium forces B) system of forces C) moment of a force D) all the above

13) Equation for resultant of the forces is [ ]
A) $\sqrt{(\sum X^2+\sum Y^2)}$ B) $\sqrt{(\sum X+\sum Y)}$ C) $\sqrt{(\sum X^2-\sum Y^2)}$ D) $\sqrt{(\sum X-\sum Y)}$

14) Free body diagram represents the diagram of a body having [ ]
A) All the forces B) all the reactions C) including self-weight D) all the above

15) If a body is in equilibrium. The resultant may be [ ]
A) 0 B) 1 C) no force is acting on the body D) all the above

16) Rigid bodies are [ ]
A)Deformable bodies B) having negligible deformation C) at rest D)all the above

17) In which type of supports the beam end is simply supported on rollers [ ]
A)Roller support B) simple support C) hinged support D) fixed support

18) Which forces passes through a single straight line [ ]
A) Concurrent forces B) coplanar concurrent forces C) coplanar forces D) collinear forces

19) One kg force is equal to [ ]
(A) 7.8 N (B) 8.9 N (C) 9.8 N (D) 12 N

20) The resultant of two equal forces P making an angle θ , is given by [ ]
(A) 2 P sin θ (B) 2 P cos θ (C) 2 P tan θ (D) 2 P cot θ

21) If the resultant of two equal forces has the same magnitude as either of the forces, then the angle between the two forces is [ ]
(A) 30^0 (B) 60^0 (C) 90^0 (D) 120^0

22) Two forces are acting at an angle of 120^0. The bigger force is 40N and the resultant is perpendicular to smaller one. The smaller force is [ ]
(A) 20 N (B) 40 N (C) 80 N D) none of these

23) The forces, which meet at one point and their lines of action also lie on the same plane, are known as [ ]
(A) coplanar concurrent forces (B) coplanar non-concurrent forces
(C) non-coplanar concurrent forces (D) non-coplanar non-concurrent forces

24) The forces which do not meet at one point and their lines of action do not lie on the same plane are known as [ ]
(A) co-planar concurrent forces (B) coplanar non-concurrent forces
(C) non-co-planar concurrent forces (D) none of these

25) Co-planar concurrent forces are [ ]
(A) Meet at one point, but their lines of action do not lie on the same plane
(B) Do not meet at one point and their lines of action do not lie on the same plane
(C) Meets at one point and their lines of action also lie on the same plane
(D) Do not meet at one point, but their lines of action lie on the same plane

26) Non-coplanar non-concurrent forces are those forces which [ ]
(A) meet at one point, but their lines of action do not lie on the same plane
(B) do not meet at one point and their lines of action do not lie on the same plane
(C) do not meet at one point, but their lines of action lie on the same plane
(D) non of the above

27) According to Lami's theorem [ ]
(A) The three forces must be equal

(B) The three forces must be at 120 degrees to each other
(C) The three forces must be in equilibrium

28) The forces, whose lines of action are parallel to each other and act in the same directions, are known as [ ]
(A) Coplanar concurrent forces (B) coplanar non-concurrent forces
(C) Like parallel forces (D) unlike parallel forces

29) Resultant of forces 20KN & 15KN inclined 60° each other is [ ]
A) 30.41KN B) 30.41N C) 15.20KN D) 15.20N

30) A uniformly distributed load of 20KN/m which acting through a distance of 2 m then the Point load is [ ]
A)40KN B) 10KN C) 0.1KN D) None

31) The weight of an object vertically downward then reaction acts [ ]
A) Upward B) Inclined C) Downward D) None

32) Vector quantity of the following [ ]
A) Velocity **B)** Mass **C)** Time **D)** Speed

33) Scalar quantity of the following [ ]
A) Velocity **B)** Mass **C)** Time **D)** Speed

34) For every action there will be equal and opposite reactions denotes [ ]
A) Newton I-law B) Newton II-law C) Newton III-law D) None

35) Cantilever beam is [ ]
A)Fixed at one end only B) Fixed at both ends C) A&B D)None

36) The Centre of gravity of a triangle lies from one side [ ]
A)2/3L B)1/2L C)1/3L D)3/2L

37) The Centre of gravity of a triangle lies from one corner [ ]
A)2/3L B)1/2L C)1/3L D)3/2L

38) UDL means [ ]
A)Uniform Disturbance load B)Uniformly Distributed Load
C)Uniformly disturbing Load D) None

39) The point load of UVL represents [ ]
A)Area of Load diagram B)Volume Load diagram
C)Moment of Load diagram D) None

40) If three forces act at a point, which method we choose to resolve forces [ ]
A)lami's theorem B)Parallelogram law of forces
C)Polygon law of forces D)None

UNIT – II:FRICTION

1) The angle friction is [ ]
A)α B)β C)θ D)Φ

2) The co-efficient of friction is the ratio of [ ]
A)Limiting friction of force to Normal Reaction
B) Normal Reaction to Limiting friction of force
C)Angle of friction to the Normal reaction
D) Angle of repose to the angle of friction

3) The frictional force experienced by the body, when it is in a state of rest and under action of external forces is [ ]
A)static friction B)kinetic friction C)dry friction D)none of the above

4) When two surfaces in contact are smooth then the friction is [ ]
A)more than zero B)zero C)infinity D)none of the above

5) The coefficient of friction depends on [ ]
A. nature of surface B.area of contact C. shape of surface
D.strength of surface

6) The unit of coefficient of static friction is [ ]
A. mm B.pure number C. second
D.steradian

7) angle of friction is the angle between the…… [ ]
A. limiting friction and normal reaction
B.limiting friction and resultant of limiting
C. normal reaction and resultant of limiting Friction and normal reaction
D.none of the above

8) if friction is neglected ,then normal function is ……to surface in contact [ ]
A. normal B.parallel

9) force of friction in terms of normal reaction [ ]
A. F=μN B.F=N/μ
C. F=μ/N D. none of the above

10) The efficiency of a screw jack may be increased by [ ]
(*a*) increasing its pitch.
(*b*) decreasing its pitch.
(*c*) increasing the load to be lifted.
(*d*) decreasing the load to be lifted.

11) If a ladder is not in equilibrium against a smooth vertical wall, then it can be made in equilibrium by [ ]
(*a*) increasing the angle of inclination.
(*b*) decreasing the angle of inclination.
(*c*) increasing the length of the ladder.
(*d*) decreasing the length of the ladder.

12) The force of friction between two bodies in contact [ ]
(*a*) Depends upon the area of their contact
(*b*) Depends upon the relative velocity between them

(*c*) Is always normal to the surface of their contact
(*d*) All of the above

13) The magnitude of the force of friction between two bodies, one lying above the other, depends upon the roughness of the [ ]
(*a*) Upper body (*b*) Lower body
(*c*) Both the bodies (*d*) The body having more roughness

14) The force of friction always acts in a direction opposite to that [ ]
(*a*) In which the body tends to move
(*b*) In which the body is moving
(*c*) Both (*a*) and (*b*)
(*d*) None of the two

15) Which of the following statement is correct ? [ ]
(*a*) The force of friction does not depend upon the area of contact
(*b*) The magnitude of limiting friction bears a constant ratio to the normal reaction between the two surfaces
(*c*) The static friction is slightly less than the limiting friction.
(*d*) All (*a*), (b) and (*c*)

16) the maximum inclination of the plane on which the body, free from external forces, [ ]
A)Angle of friction B)Angle of friction C)Angle of force D)None

17) Choose the correct relation [ ]
A)$\alpha=\Phi$ B)$\mu=\alpha$ C)$\alpha=\theta$ D)None

18) Force of friction always acts in the direction_____to the motion [ ]
A)Same B)Opposite C)Perpendicular D)None

19) The maximum value of frictional force acting on a body, when the body is on point of motion, is called [ ]
A)Limiting force of friction B)Angle of repose
C)Coefficient of friction D)None

20) The force of friction, acting on a body when the body is moving [ ]
A)Static friction B)Dynamic friction C)Dry friction D)None

21) The symbol phi(Φ) used for [ ]
A)Angle of repose B)Angle of friction C)Coefficient of friction D)None

22) The force of friction (F)is always equal to [ ]
A)μR B)αR C)$\alpha\mu$ D)None

23) The angle of repose is equal to the [ ]
A)Angle of friction B)friction C)Normal reaction D)None

24) A body of weight placed on an inclined rough plane. The inclination of the plane with the horizontal is less than the angle of friction. Then the body will [ ]
A)Be in equilibrium B)Move downwards C)Move upwards D)None

25) A body of weight placed on an inclined rough plane. The inclination of the plane with the horizontal is greater than the angle of friction. Then the body will [ ]
A)Be in equilibrium B)Move downwards C)Move upwards D)None

26) If between the surfaces , no lubrication is used, the friction that exists between the surfaces is called [ ]
A)Static friction B)Dynamic friction C)Dry friction D)none

27) A wedge is used for [ ]
A)Lifting loads B)Slight adjustments C)A & B D)None

28) A screw jack is used for [ ]
A)Lifting heavy loads by applying small effort at handle
B) Lifting heavy loads by applying heavy effort at handle
C) Lifting heavy loads by without applying effort at handle
D)None

29) It is the friction experienced by a body when it is at rest [ ]
A)Static friction B)Dynamic friction C) Sliding friction D)None

30) It is the friction experienced by a body when it is in motion [ ]
A)Static friction B)Dynamic friction C) Sliding friction D)None

UNIT-III:CENTRE OF GRAVITY & MOMENT OF INERTIA

1) If the area of a section is in mm2 and the distance of the centre of area from a lines is in mm, then units of the moment of inertia of the section about the line is expressed in [ ]
(*a*) mm^2 (*b*) mm^3 (*c*) mm^4 (*d*) mm^5

2) Theorem of perpendicular axis is used in obtaining the moment of inertia of a [ ]
(*a*) triangular lamina (*b*) square lamina(*c*) circular lamina (*d*) semi circular lamina

3) The moment of inertia of a circle of diameter(d) is given by the relation [ ]
A)$\pi/16(d)^4$ B) $\pi/32(d)^4$ C) $\pi/64(d)^4$ D) $\pi/96(d)^4$

4) The moment of inertia of a triangular section of base (*b*) and height (*h*) about an axis through its *c.g*. and parallel to the base is given by the relation. [ ]
A)$(bh^3)/12$ B) $(bh^3)/24$ C) $(bh^3)/36$ D) $(bh^3)/48$

5) The moment of inertia of a triangular section of base (b) and height (h) about an axis passing through its vertex and parallel to the base is ... as that passing through its C.G. and parallel to the base. [ ]
(A) twelve times (B) nine times
(C) six times (D) four times

6) The centre of gravity of hemisphere lies at a distance of .....form its base measured along the vertical radius. [ ]
A) 3r/8 B) 3r/8 C) 8r/3 D) 8/3r

7) The centre of gravity of a right circular cone of diameter (*d*) and height (*h*) lies at a distance of ..... from the base measured along the vertical radius. [ ]
A)h/2 B) h/3 C)h/4 D) h/6

8) A circular hole of radius (r) is cut out from a circular disc of radius (2r) in such a way that the diagonal of the hole is the radius of the disc. The centre of gravity of the section lies at [ ]
(A) Centre of a disc (B) Centre of the hole
(C) Somewhere in the disc (D) Somewhere in the hole

9) The centre of gravity of a rectangle (or a parallelogram) is at the point, where its _____meet each other. [ ]
A)Diagonals B)Any two corners C) corners D) None

10) The centre of gravity of a semicircle is at a distance of_____from its base measured along with vertical radius [ ]

A)4r/3π B)3π/4r C) 4π/3r D) None

11) The centre of gravity of a sphere is at a distance of_____ from every point (where *d* is thediameter of the sphere). [ ]
A)d/2 B) d C)d/4 D) d/3

12) The centre of gravity of right circular solid cone is at a distance of_____ from its base, measured along the vertical axis [ ]
A)h/2 B)h/4 C) h/3 D) h

13) If moment is again multiplied by the perpendicular distance (*x*) between the point and the line of action of the force *i.e.* $P.x\ (x) = Px^2$, then this quantity is called [ ]
A)Moment of inertia B)Moment of force
C) mass moment of inertia D) none

14) The moment of inertia is expressed in____ [ ]
A)mm^4 B) mm^3 C) mm^2 D) mm

15) Radius of gyration (k)is given by [ ]
A) I/A B) (√A/I) C)A/I D) (√I/A)

16) Moment of inertia of a rectangle about the centroidal axis(I_{xx}) [ ]
A)$bd^3/34$ B) $bd^3/24$ C) $bd^3/12$ D) $bd^3/14$

17) Moment of inertia of a triangle about the base [ ]
A)$bh^3/34$ B) $bh^3/24$ C) $bh^3/12$ D) $bh^3/12$

18) Volume of a cone [ ]
A)$(\pi r^2h)/3$ B) $(\pi r^2h)/4$ C) $(\pi r^2h)/5$ D) $(\pi r^2h)/2$

19) Volume of a sphere [ ]
A)$(\pi R^3)(3/4)$ B) $(\pi R^3)(4/3)$ C) $(\pi R^3)(3/2)$ D) $(\pi R^3)(4/3)$

20) If the moment of inertia of a plane area about an axis through its centre of gravity is denoted by IG, then moment of inertia of the area about any other axis AB, parallel to the first, and at a distance h from the centre of gravity is given by: $I_{AB} = I_G + ah^2$ [ ]
A)Parallel axis theorem B)Perpendicular axis theorem
B)Pappu's theorem D)None

UNIT-IV ANALYSIS OF PERFECT FRAMES

1) It defined as a structure, made up of several bars, riveted or welded together [ ]
A)Frame B)Plate C)Tube D)None

2) The no. of members, in a perfect frame, may also be expressed by the relation [ ]
A)n = (2*j* – 2) B) *n* = (2*j* – 3) C) *n* = (2*j* +3) D)None

3) An imperfect frame is that which does not satisfy the equation : [ ]
A)n = (2*j* – 2) B) *n* = (2*j* – 3) C) *n* = (2*j* +3) D)None

4) It is an imperfect frame, in which the no. of members are less than (2*j* – 3). [ ]
A)Deficient B)Redundant C)Imperfect D)None

5) It is an imperfect frame, in which the no. of members are more than (2*j* – 3). [ ]
A)Deficient B)Redundant C)Imperfect D)None

6) while finding out the forces in the members of a perfect frame:choose correct assumption [ ]
A) All the members are pin-jointed
B) The frame is loaded only at the joints.
C) The frame is a perfect one
D)All

7) The method for finding out the forces, in the members of a perfect frame, are important from the subject point of view : [ ]
A) Method of joints B)method of sections
C) Both A & B D)None

8) A truss, which is connected to a wall or a column at one end, and free at the other is known as [ ]
A)Simply supported truss B)Cantilever truss C)Wall truss D)None

9) in which case of trusses, determination of support reaction is not essential, [ ]
A)Simple truss B)Wall truss C)Cantilever truss D)none

10) A redundant frame is also called .....frame [ ]
(*a*) perfect (*b*) imperfect (*c*) deficient (*d*) none of these

11) When the motion is repeated in equal interval of time, is known as [ ]
A)Periodic motion B)Acceleration C)Speed D)None

12) Which type of vibrations are also known as transient vibrations [ ]
A)Un damped B)Damped C)Torsional D)Transverse

13) During transverse vibration, shaft is subjected to which type of stresses [ ]
A)Tensile B)Torsion C)Bending D)All of the above

14) What are deterministic vibrations [ ]
A)Vibrations caused due to known exciting force
B) Vibrations caused due to unknown exciting force
C)Vibrations which are periodic in nature
D)None

15) A framed structure is perfect, if the number of members are .....(2*j* – 3), where *j* is the number of joints. [ ]
(*a*) less than (*b*) equal to (*c*) greater than (*d*) either (*a*) or (*c*)

16) A framed structure is imperfect, if the number of members are .....(2*j* – 3), where *j* is the number of joints. [ ]
(*a*) less than (*b*) equal to (*c*) greater than (*d*) either (*a*) or (*c*)

17) A framed structure of a triangular shape is [ ]
(*a*) perfect (*b*) imperfect (*c*) deficient (*d*) redundant

18) Trusses generally used in [ ]
A) canals B)bridges C)tanks D)None

19) In cantilever trusses from which side we need start find the forces [ ]
A) Left B)Right C) Middle D)from any side

20) In equation n=(2j-3), n means… [ ]
A) No. of trusses B)no of joints C)No. of members
D)None

UNIT-V:KINEMATICS & KINETICS

1) It defined as its rate of change of displacement, [ ]
with respect to its surroundings, in a particular direction

A)Velocity B)Displacement C)Speed D)None

2) It is defined as the rate of change of its velocity. [ ]
A)Velocity B)Displacement C)Speed D)Acceleration

3) If a body moves in such a way that its velocity changes in equal [ ]
magnitudes in equal intervals of time, it is said to be moving with

A)Velocity B)Displacement C)Speed D)uniform Acceleration

4) If a body moves in such a way, that its velocity changes in unequal [ ]
magnitudes in equal intervals of time, it is said to be moving with a

A)Velocity B)Displacement C)Speed D)Variable Acceleration

5) The relationship $s = ut + (1/2)at^2$ is applicable to bodies [ ]
(*A*) moving with any type of motion
(*B*) moving with uniform velocity
(*C*) moving with uniform acceleration

6) The motion under gravity is a particular case of motion under constant velocity. [ ]
(A) Yes (*B*) No C)Moderate D)High

7) If two bodies *A* and *B* are projected upwards such that the velocity of *A* is [ ]
double the velocity of *B*, then the height to which the body *A* will rise will be
..... the height to which
the body *B* will rise
(*A*) two times (*B*) four times (C) eight times D)None

8) The relation for a body which is travelled in first nth second [ ]

A)$u+gt^2$ B) $u(1/2)+gt^2$ C) $u+(1/2)gt^2$ D)None

9) We are given an equation of displacement (*s*) in terms of time (*t*). If we differentiate it with respect to *t*, the equation so obtaned will give [ ]
(*a*) velocity (*b*) acceleration (*c*) distance traversed

10) If we differentiate an equation in terms of acceleration and time, it will give [ ]
(*a*) velocity (*b*) distance traversed (*c*) none of these two

11) Which of the following statement is wrong ? [ ]
(*a*) A body falling freely under the force of gravity is an exapmle of motion under variable acceleration.
(*b*) A bus going down the valley may have variable acceleration.
(*c*) A lift going down in a gold mine cannot have constant acceleration in the entire journey.
(*d*) In a cricket match, the ball does not move with constant acceleration.

12) The relative velocity of *A* with respect to *B* is the velocity with which *A* appears to move to an observer sitting in *B* when it is [ ]
(*a*) at rest (*b*) in motion (*c*) either (*a*) or (*b*)

13) The rain is falling vertically downwards, but it appears to fall at some angle to a man walking along a road. If the man increases his speed, the inclination of the rain with the vertical will [ ]
(*a*) increase (*b*) remain the same (*c*) decrease

14) When the two ships are moving along inclined directions, then the time when the two [ ]
ships will be closest together depends upon
(*a*) velocity of one of the ships
(*b*) velocity of both the ships
(*c*) angle between the two directions
(*d*) all of the above

15) When the body is moving with a variable velocity, the distance traversed by a body, [ ]
A)$ut+(2)at^2$ B) $t+(1/2)at^2$ C) $ut+(1/2)at^2$ D)None

16) if the motion takes place against the force of gravity, *i.e.*, the particle is projected upwards, the corresponding equation [ ]
A)v= -u+gt B) v= u+gt C) v= -u+t D)None

17) under a constant acceleration of (*g*) where its *value is taken [ ]
as 9.8 m/s2. If there is a free fall under gravity, the expression

A)v=u+gt B) v=u+(1/2)gt C) v=u(1/2)+gt D)None