KATHMANDU UNIVERSITY
End Semester Examination [C]
April/May, 2023

Marks Scored:

Level : B.E./B.Tech.
Year : II

Course : MEEG 216
Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date : 27 APR 2023

SECTION "A"
[20Q. × 1 = 20 marks]

Choose and mark [X] in the most appropriate option.

1. A car travels on a horizontal circular track of radius 9 m, starting from rest at a constant tangential acceleration of 3 m/s^2. What is the resultant acceleration of the car, 2 seconds after starting?
[ ] 3 m/sec^2 [ ] 4 m/sec^2 [ ] 5 m/sec^2 [ ] 7 m/sec^2

2. Two cars are 10 km apart and moving in the same direction at speed of 40 km/hr. A car moving in opposite direction meets these cars at interval of 8 minutes. At what speed the other car is moving?
[ ] 75 km/hr [ ] 60 km/hr [ ] 45 km/hr [ ] 35 km/hr

3. The greatest and least resultants of two forces F_1 and F_2 are 17 N and 3 N respectively. The angle between them is _____when their resultant is $\sqrt{149}$ N.
[ ] 45° [ ] 30° [ ] 60° [ ] 90°

4. A moment of a force about any point P is geometrically equal to _____ area of the triangle whose base is the line representing the force and vertex is the point about which the moment is taken
[ ] Half [ ] Same [ ] Twice [ ] No relation

5. During inelastic collision of two particles, which one of the following is conserved?
[ ] Total linear momentum only
[ ] Total kinetic energy only
[ ] Both linear momentum and kinetic energy
[ ] Neither linear momentum nor kinetic energy

6. A block weighing 981 N is resting on a horizontal surface, the coefficient of friction between the block and the horizontal surface is 0.2. A vertical cable attached to the block provides partial support as shown in the Figure 1. A man can pull horizontally with a force of 100 N. What will be the tension, T (in N) in the cable if the man is just able to move the block to the right?
[ ] 176.2 [ ] 196
[ ] 481 [ ] 981

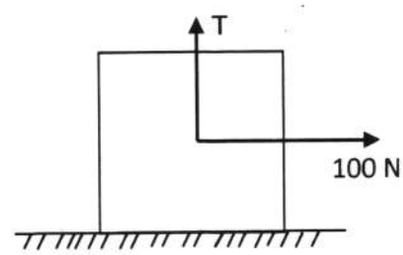

Figure 1

7. Which of the following is valid if two forces are represented by two sides of a triangle in order?
   [ ] the resultant of two forces is represented by the third side in the same sequence.
   [ ] the resultant of two forces is represented by the third side in reverse order.
   [ ] The resultant's magnitude is zero.
   [ ] The resultant's magnitude is impossible to determine.

8. Moment of inertia of an area about a non-centrodial axis is found out with the help of _____.
   [ ] Theorem of perpendicular axis [ ] Theorem of parallel axis
   [ ] Polygon law of forces [ ] Theorem of parallelogram of forces

9. The range of a projectile is maximum, when the angle of projection is _____.
   [ ] 30° [ ] 45° [ ] 60° [ ] 90°

10. The centre of gravity of an equilateral triangle with each side 'a' is _____ from any of the three sides.
    [ ] $\frac{a\sqrt{3}}{2}$ [ ] $\frac{2\sqrt{3}}{a}$ [ ] $\frac{a}{2\sqrt{3}}$ [ ] $3\sqrt{2}a$

11. A block resting on an inclined plane begins to slide down the plane when the angle of inclination is gradually increased to 30°, then the coefficient of friction between the block and plane is closest to _____.
    [ ] 0.50 [ ] 0.58 [ ] 0.72 [ ] 0.87

12. The work done by a 2 N force directed at a 30° angle to the vertical to move a 500 gram box to a horizontal distance of 400 cm across a rough floor at a constant speed of 0.5 m/s is _____.
    [ ] 7 J [ ] 4 J [ ] 2 J [ ] 0

13. When a body of mass moment of inertia I (about a given axis) is rotated about that axis with an angular velocity ω, then the kinetic energy of rotation is _____.
    [ ] I ω [ ] I ω^2 [ ] 0.5 I ω [ ] 0.5 I ω^2

14. A tennis ball is dropped onto a plane surface from height 1 meter. After rebound, the ball rises to 0.64 meter height. The coefficient of restitution is _____.
    [ ] 0.64 [ ] 0.8 [ ] 0.97 [ ] 0.51

15. Which of the following statement is **WRONG**?
    [ ] Impulse equals the change in momentum.
    [ ] action and reaction are equal and opposite and hence cancel each other.
    [ ] the momentum of a system of two bodies is conserved when there is no external force acting on either body.
    [ ] the work done on a particle must equal change in its kinetic energy.

16. When will the tension in the cable supporting a lift be more?
    [ ] When the lift is moving upward with uniform acceleration.
    [ ] When the lift is moving downward with uniform acceleration.
    [ ] When the lift is moving upward with uniform velocity.
    [ ] When the lift is moving downward with uniform velocity.

17. A particle is making curvilinear motion under the action of force is withdrawn, then
[ ] The particle will continue to move along the curved path with uniform velocity.
[ ] The particle will move along a straight line which is tangent to the curve with uniform velocity.
[ ] The particle will move along a straight line which is tangent to the curve with variable velocity.
[ ] The particle will come to rest at once.

18. A system of connected rigid bodies is in equilibrium, provided the virtual work done by all the external forces and couples acting on the system is _____ for each independent virtual displacement of the system.
[ ] one
[ ] Zero
[ ] Infinite
[ ] Twice the external force

19. In a framed structure as shown in Figure 2, the force in the member BC is _____.
[ ] W/√3 (Compression)
[ ] W/√3 (Tension)
[ ] 2W/√3 (Compression)
[ ] 2W/√3 (Tension)

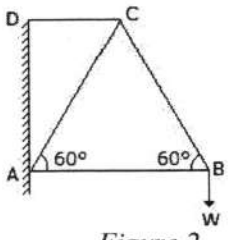

Figure 2

20. A barge is pulled by two tugboats as shown in the figure. The resultant of the forces exerted by the tugboats is 1000 kg force. What will be the value of angle θ so that tension in rope 2 is minimum?
[ ] 30 °
[ ] 45°
[ ] 60°
[ ] 90°

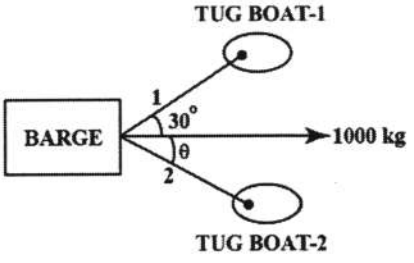

Figure 3