

# MALLA REDDY ENGINEERING COLLEGE

(AUTONOMOUS)

I B.Tech II SEMESTER – II MID - OBJECTIVE QUESTIONS - 2015-16

Subject: Engineering Mechanics

Common for CE, MinE and ME branches

## Multiple choice questions

### Module-3

- 1) Moment of inertia of a rectangular area of base b and height h about its base is [ ]  
a)  $bh^3/3$       b)  $bh^3/12$       c)  $bh^3/6$       d)  $bh^2/3$
- 2) M.I of a circular area of diameter d about an axis perpendicular to the are and passing to its center. [ ]  
a)  $\pi d^4/64$       b)  $\pi d^4/12$       c)  $\pi d^4/32$       d)  $\pi d^4/16$
- 3) The M.I of a Semi circular lamina of radius r about its diametrical axis is [ ]  
a)  $0.11r^4$       b)  $1.1r^4$       c)  $0.125 r^4$       d) None
- 4) M.I of a quadrant (quarter circular area of radius about its centroidal axis [ ]  
a)  $0.055 r^4$       b)  $0.04 r^4$       c)  $0.065 r^4$       d) None
- 5) The Product of inertia of a given section can be [ ]  
a) only positive      b) only Negative      c) Positive or Negative      d) None
- 6) The Mass moment of inertia of a Circular disc of dia d about polar axis [ ]  
a)  $\pi d^4/32$       b)  $\pi d^4/64$       c)  $md^2/8$       d)  $md^2/16$
- 7) The Radius of Gyration of a solid square disc of side length a is given by [ ]  
a)  $a/2\sqrt{3}$       b)  $\sqrt{3}a$       c)  $a/3\sqrt{2}$       d)  $\sqrt{2}a$
- 8) The Mass moment of inertia of a solid sphere of mass m and radius r is [ ]  
a)  $2/3 mr^2$       b)  $3/4 mr^2$       c)  $4/3 mr^2$       d)  $2/5 mr^2$
- 9) The Expression of  $\int dA x^2$  is the M.I about [ ]  
a) x axis      b) y axis      c) z axis      d) all of the above
- 10) The M.I of a circular area of diameter is [ ]  
a)  $\pi d^4/64$       b)  $\pi d^4/12$       c)  $\pi d^4/32$       d)  $\pi d^4/16$
- 11) The moment of inertia of a semi circular lamina of radius r about centroidal axis parallel to its diameter is [ ]  
a)  $0.11r^4$       b)  $1.1r^4$       c)  $0.125 r^4$       d) None
- 12) The Mass moment of inertia of a slender bar of mass m and length l about an axis passing through its center and perpendicular to it is [ ]  
a)  $ml^2/32$       b)  $ml^2/12$       c)  $ml^2/64$       d)  $ml^2/16$

- 13) What are the units of M.I [ ]  
 a)  $\text{kg.m}^2$       b)  $\text{m}^4$     c) cm    d)  $\text{kg.m}^3$
- 14) What are the units of Mass moment of inertia [ ]  
 a)  $\text{kg.m}^2$       b)  $\text{m}^4$     c) cm    d)  $\text{kg.m}^3$
- 15) What are the units of Density [ ]  
 a)  $\text{kg.m}^2$       b)  $\text{m}^4$     c) cm    d)  $\text{kg.m}^3$
- 16) Mass per unit volume is called \_\_\_\_\_[ ]  
 a) volume      b) mass      c) density      d) none
- 17) The quantity of matter in a body is called\_\_\_\_[ ]  
 a) Volume      b) mass      c) density      d) none
- 18) Theorem of perpendicular axis is used in obtaining the M.I of a. [ ]  
 . a) Triangular lamina    b) square lamina      c) semi circular lamina      d) circular lamina
- 19) If the area of a section is in  $\text{mm}^2$  and the distance of the center of area from lines is in mm, then units of M.I of the section about the line is expressed in [ ]  
 a)  $\text{mm}^2$       b)  $\text{mm}^3$       c)  $\text{mm}^4$       d)  $\text{mm}^5$
- 20) The M.I of a triangular section of base b and height h about an axis passing through its vertex and parallel to the base is has that passing through its C.G and parallel to the base [ ]  
 a) 12 times      b) 9 times      c) 6 times      d) 4 times
- 21) .the area of circle is ----- [ ]  
 (a)  $\pi r^2$       (b)  $\pi r^2/2$     (c)  $\pi r^2/4$     (d) none of these
- 22). The area of quadrant is ----- [ ]  
 (a)  $\pi r^2/4$       (b)  $\pi r^2/2$   
 (c)  $\pi r^2$       (d) none of these
- 23).The area of right angle triangle is ----- [ ]  
 (a)  $1/2bh$       (b)  $b/3$   
 (c)  $h/3$       (d) none of these
- 24).the point , through which the whole weight of the body acts, irrespective of its position , is known as [ ]  
 (a) moment of inertia      (b) center of gravity    (c) center of percussion      (d) center of mass
- 25). An irregular body may have more than one center of gravity. [ ]  
 (a) yes      (b) no  
 (c) infinity      (d) none of these

## Answers:

### Module-3

- |       |       |       |
|-------|-------|-------|
| 1. a  | 11. a | 21. a |
| 2. c  | 12. b | 22. a |
| 3. d  | 13. b | 23. a |
| 4. a  | 14. a | 24. b |
| 5. c  | 15. d | 25. b |
| 6. c  | 16. c |       |
| 7. a  | 17. b |       |
| 8. d  | 18. b |       |
| 9. b  | 19. c |       |
| 10. a | 20. b |       |

### Module -4

- 1) A train moving with a velocity of 72 kmph is brought to rest in 8 seconds. Its acceleration is [ ]  
(a) 0 (b) 2.5 kmph (c)  $2.5 \text{ m/s}^2$  (d)  $-2.5 \text{ m/s}^2$
- 2) A car starts from a station and moves with an acceleration of  $2 \text{ m/s}^2$ . Distance travelled in  $10^{\text{th}}$  second is;  
(a) 20 m (b) 19 m (c) 12 m (d) 38 m [ ]
- 3) A body is projected vertically upwards with a velocity of 4 m/s. At the maximum height, its velocity is  
(a) Maximum (b) least (c) 0 (d) none [ ]
- 4) A particle is projected vertically upwards from the ground with an initial velocity of  $u \text{ m/s}$ , the time of flight is; [ ]  
(a)  $u/g$  (b)  $u/2g$  (c)  $2u/g$  (d) none
- 5) A particle is dropped from top of a tower of height 10 m. The velocity of particle on reaching the ground is; [ ]  
(a) 10 m/s (b) 14 m/s (c) 20 m/s (d) 28 m/s
- 6) The path of an object thrown into space under the gravity at certain angle is called [ ]  
(a) Projectile (b) trajectory (c) curvilinear path (d) circular path
- 7) The horizontal range of a projectile with usual notation is given as; [ ]  
(a)  $u^2 \sin 2\alpha / 2g$  (b)  $u^2 \cos^2 \alpha / 2g$  (c) both (d) none
- 8) A ball is thrown upwards from the ground with an initial velocity of  $u \text{ m/s}$  and at an angle  $\alpha$  with the horizontal the time required to reach the ground is; [ ]  
(a)  $2u \sin \alpha / g$  (b)  $u \sin \alpha / g$  (c) both (d) none
- 9) The angular velocity of flywheel increases from 3.14 rad/sec to 6.28 rad/sec in 10 seconds. Its angular acceleration is; [ ]  
(a)  $0.628 \text{ rad/sec}^2$  (b)  $4.71 \text{ rad/sec}^2$  (c)  $0.314 \text{ rad/sec}^2$  (d)  $3.14 \text{ rad/sec}^2$
- 10) The motion of the wheel of a car is [ ]  
(a) Pure rotational (b) translation (c) combined translation and rotation (d) none
- 11) In displacement- time curve the slope of curve represents [ ]  
(a) Acceleration (b) velocity (c) time (d) none
- 12) The path traced by the projectile is called ----- [ ]  
(a) Parabola (b) hyperbola (c) trajectory (d) none
- 13) A particle moving under the combined effect of vertical and horizontal motion is called ---- [ ]  
(a) Projectile (b) trajectory (c) curvilinear (d) none
- 14) The angle of projection of a particle for which the horizontal range and maximum height are equal is [ ]  
(a)  $\tan \theta = 4$  (b)  $\tan \theta = 2$  (c)  $\tan \theta = 3$  (d)  $\tan \theta = 5$

- 15) The equations of a projectile motion of a particle is a ----- [ ]  
 (a) Equations of a parabola (b) hyperbola (c) ellipse (d) none
- 16) The analysis of motion of body by considering the force that cause the motion is known as. [ ]  
 (a) Statics (b) kinematics (c) kinetics (d) none
- 17). D' Alembert's principle is related to----- [ ]  
 (a) Dynamic Equilibrium (b) Static equilibrium (c) vibrations (d) none
- 18) The motion of wheel of a car is ----- [ ]  
 (a) pure rotation (b) pure translation (c) combined rotation and translation (d) none
- 19) The maximum velocity on a level circular path to avoid skidding is [ ]  
 (a)  $\sqrt{gr}$  (b)  $\sqrt{ugr}$  (c)  $\sqrt{ur}$  (d)  $\sqrt{ug}$
- 20) The force required to stop a body of mass 5 kg moving at a speed of 20m/sec in 20seconds is [ ]  
 (a) 1N (b) 5N (c) 50N (d) 100N
- 21) The relation between angle of banking  $\alpha$  Velocity of body  $v$  and radius of curvature of path  $r$  is give by  
 (a)  $\tan\alpha = v^2/2g$  (b)  $\tan\alpha = rg/v^2$  (c)  $\tan\alpha = v/g$  (d) none [ ]
- 22) When the body slides down an inclined plane of inclination  $\alpha$  the acceleration  $a$  is equal to [ ]  
 (a)  $g$  (b)  $g \sin\theta$  (c) Both a and b (d) none
- 23) The mathematical expression, with usual notations, of D' Alembert's principle is [ ]  
 (a)  $F= ma$  (b)  $F= mv$  (c)  $F-ma = 0$  (d)  $F-mv = 0$
- 24) In a rectilinear motion the accelerating forces acts through ----- [ ]  
 (a) Mass centre (b) mass moment of inertia (c) volume (d) none
- 25) The system of forces acting on a body in motion is in dynamic equilibrium is known as ----- principle  
 (a) D' Alembert (b) work energy principle (c) impulse momentum (d) none [ ]
- 26) Banking of a road is provided to avoid ----- [ ]  
 (a) Over turning of vehicle (b) over rotation of vehicle (c) Both a and b (d) none
- 27) In order to avoid over turning of a vehicle moving on a level curved path, the maximum permissible velocity must be ----- [ ]  
 (a) Less than  $\sqrt{gr/h}$  (b) greater than  $\sqrt{gr/h}$  (c) less than  $\sqrt{gr/h}$  (d) none
- 28) A particle is moving along straight line path is called ----- [ ]  
 (a) Rectilinear motion (b) curve linear motion (c) circular motion (d) none
- 29) A particle is moving along curved path is called ----- [ ]  
 (a) Rectilinear motion (b) curve linear motion (c) circular motion (d) none
- 30) A particle is moving along circular path is called ----- [ ]  
 (a) Rectilinear motion (b) curve linear motion (c) circular motion (d) none
- 31) Statics deals with ----- of bodies [ ]  
 (a) Equilibrium (b) motion (c) Both a and b (d) none
- 32) Dynamics deals with ----- of bodies [ ]  
 (a) Equilibrium (b) motion (c) Both a and b (d) none
- 33) The rate of change of velocity with respect to time is called ----- [ ]  
 (a) Acceleration (b) mass (c) velocity (d) displacement
- 34) The rate of change of Displacement with respect to time is called ----- [ ]  
 (a) Acceleration (b) mass (c) velocity (d) displacement
- 35) Capacity to do work is called ----- [ ]  
 (a) Energy (b) mass (c) power (d) none
- 36) The rate of doing work is called ----- [ ]  
 (a) Energy (b) mass (c) power (d) none
- 37) The mass moment of inertia of a body is  $I$  with an angular velocity  $\omega$ . Its kinetic energy of rotation is-----  
 (a)  $1/2I \omega^2$  (b)  $I \omega$  (c)  $\omega$  (d) none [ ]

- 38) The product of the force and the distance moved by the body in the direction of force is ----- [ ]  
 (a) Work done (b) energy (c) power (d) none
- 39) Capacity to do work due to position of the body is called ----- [ ]  
 (a) Kinetic energy (b) potential energy (c) chemical energy (d) none
- 40) Capacity to do work due to motion of the body is called ----- [ ]  
 (a) Kinetic energy (b) potential energy (c) chemical energy (d) none
- 41) The quantity of matter in a body is called ----- [ ]  
 (a) Mass (b) weight (c) volume (d) none
- 42) What are the units of velocity? [ ]  
 (a) m/sec (b) m (c) m/sec<sup>2</sup> (d) none
- 43) What are the units of acceleration? [ ]  
 (a) m/sec (b) m (c) m/sec<sup>2</sup> (d) none
- 44) What are the units of displacement? [ ]  
 (a) m/sec (b) m (c) m/sec<sup>2</sup> (d) none
- 45) What are the units of time? [ ]  
 (a) m/sec (b) seconds (c) minutes (d) none
- 46) What are the units of power? [ ]  
 (a) W (b) KW (c) both a and b (d) none
- 47) What are the units of energy? [ ]  
 (a) Joules (b) kilojoules (c) both a and b (d) none
- 48) What are the units of mass? [ ]  
 (a) Kg (b) m/sec (c) kg/cm<sup>2</sup> (d) none
- 49) The object is moved by a certain distance is called ----- [ ]  
 (a) Displacement (b) acceleration (c) velocity (d) time
- 50) What are the units of Force? [ ]  
 (a) N (b) KN (c) both a and b (d) none

#### **Module-4**

Answers:

- |       |       |       |       |       |
|-------|-------|-------|-------|-------|
| 1. d  | 11. b | 21. a | 31. a | 41. a |
| 2. b  | 12. c | 22. b | 32. b | 42. a |
| 3. c  | 13. a | 23. c | 33. a | 43. c |
| 4. c  | 14. a | 24. a | 34. c | 44. b |
| 5. b  | 15. a | 25. a | 35. a | 45. b |
| 6. b  | 16. c | 26. a | 36. c | 46. c |
| 7. a  | 17. a | 27. c | 37. a | 47. a |
| 8. a  | 18. c | 28. a | 38. a | 48. a |
| 9. c  | 19. b | 29. b | 39. b | 49. a |
| 10. c | 20. b | 30. c | 40. a | 50. c |

## **Module -5**

1). Power is [   ]

- a) the rate at which energy is expended.
- b) work per unit of time.
- c) the rate at which work is done.
- d) any of the above.

2). According to the scientific definition of work, pushing on a rock accomplishes no work unless there is [   ]

- a) an applied force greater than its weight.
- b) a net force greater than zero.
- c) an opposing force.
- d) movement in the same direction as the force.

3). The metric unit of a joule (J) is a unit of [   ]

- a) potential energy.
- b) work.
- c) kinetic energy.
- d) all of the above.

4). A Nm/s is a unit of [   ]

- a) energy.
- b) power.
- c) force.
- d) work.

5). The kilowatt-hour is a unit of [   ]

- a) power.
- b) work.
- c) time.
- d) force.

6). The potential energy of a box on a shelf, relative to the floor, is a measure of [   ]

- a) the work done putting the box on the shelf from the floor.
- b) the weight of the box times the distance above the floor.

c) the energy the box has because of its position above the floor.

d) any of these.

7). Which quantity has the greatest influence on the amount of kinetic energy that a large truck has while moving down the highway? [ ]

a) mass

b) weight

c) velocity

d) size

8). Most energy comes to and leaves the earth in the form of [ ]

a) nuclear energy.

b) chemical energy

c) radiant energy.

d) kinetic energy.

9). The law of conservation of energy is a statement that [ ]

a) energy must be conserved and you are breaking a law if you waste energy.

b) the supply of energy is limited so we must conserve.

c) the total amount of energy is constant.

d) energy cannot be used faster than it is created.

10). Energy is [ ]

a) the ability to do work.

b) the work needed to create potential or kinetic energy.

c) the work that can be done by an object with PE or KE.

d) all of the above.

11). A block with a mass of  $m$  crosses a rough horizontal surface at a constant speed of  $v$ . The coefficient of kinetic friction between the block and the surface is  $\mu$ . How much power must be produced in order to overcome the friction force? [ ]

a)  $mg$  b)  $\mu mg$  c) zero d)  $\mu$

12). A motorbike engine can develop a power of 90000 W in order to keep a constant velocity of 30 m/s. What is the pushing force? [ ]

a) 3000 N b) 30000 N c) 300000 N d) 300 N

13). A truck drives slams on the brakes of a moving truck with a constant velocity  $v$ , as a result of his action the truck stops after traveling a distance  $d$ . If the driver had been traveling with twice the velocity, what would be the stopping distance compared to the distance in the first trial? [ ]

a) Two times greater

b) Four times greater

c) The same

d) Half as much

- 14). What happens to the total energy of a moving object if all the applied forces are conserved? [ ]
- It increases
  - It decreases
  - It remains constant
  - The velocity is required to answer this question
- 15). A machine does 2500 J of work in 1 min. What is the power developed by the machine? [ ]
- 21 W
  - 42 W
  - 150 W
  - 2500 W
- 16). A heavy block is suspended from a vertical spring. The elastic potential energy is stored in the spring is 0.8 J. What is the elongation of the spring if the spring constant is 100 N/m? [ ]
- 2 cm
  - 4 cm
  - 8 cm
  - 13cm
- 17). What happens to the kinetic energy of a moving object if the net work done is positive? [ ]
- The kinetic energy increases
  - The kinetic energy decreases
  - The kinetic energy remains the same
  - The kinetic energy is zero
- 18). A construction worker holds a heavy tool box. How much work is done by the worker? [ ]
- FGd
  - FGd
  - mgh
  - Zero
- 19). A container with a mass of 5 kg is lifted to a height of 8 m. How much work is done by the gravitational force?[ ]
- 400 J
  - 400 J
  - zero
  - 50 J
- 20). A container with a mass of 5 kg is lifted to a height of 8 m. How much work is done by the external force? [ ]
- 400 J
  - 400 J
  - zero
  - 50 J
- 21). A container with a mass of 5 kg is lifted to a height of 8 m and then returned back to the ground level. How much work is done by the gravitational force? [ ]
- 400 J
  - 400 J
  - zero
  - 50 J
- 22). Which of the following refers to the rate at which energy is transferred? [ ]
- work
  - kinetic energy
  - mechanical energy
  - power
- 23). Which of the following refers to the rate at which work is done? [ ]
- energy
  - kinetic energy
  - mechanical energy
  - power
- 24). The SI unit for power is [ ]
- N•m.
  - J.
  - W
  - hp.
- 25). If a machine increases the distance over which work is done, [ ]
- the force required to do the work is less.
  - the force required to do the work is greater.
  - the force required to do the work is the same.
  - the amount of work done is increased.
- 26). If a machine decreases the distance over which work is done, [ ]
- the force the machine applies is less.
  - the force the machine applies is greater.
  - the force the machine applies is the same.
  - the amount of work done is decreased.
- 27). A 100 W light bulb [ ]



- a. converts 100 J of kinetic energy to potential energy each second.
- b. converts 100 J of potential energy to kinetic energy each second.
- c. converts 100 J of mechanical energy to nonmechanical energy each second.
- d. converts 100 J of electrical energy to other forms of energy each second.

28). A truck driver slams on the brakes of a moving truck with a constant velocity  $v$ , as a result of his action the truck stops after traveling a distance  $d$ . If the driver had been traveling with twice the velocity, what would be the stopping distance compared to the distance in the first trial? [ ]

- a) Two times greater
- b) Four times greater
- c) The same
- d) Half as much

29). What happens to the total energy of a moving object if all the applied forces are conserved? [ ]

- a) It increases
- b) It decreases
- c) It remains constant
- d) The velocity is required to answer this question

30). Which of the following is not a unit for power? [ ]

- a) Joule – second
- b) Watt
- c) Newton-meter per second
- d) Horsepower.

31). How many Joules of energy are in one kilowatt-hour? [ ]

- a) 1 J
- b) 60 J
- c) 60 kilojoules
- d) 3.6 megajoules

32). The sum of the change in kinetic and potential energy is always. [ ]

- a) Zero
- b) Positive
- c) Negative
- d) Positive

33). An object that has potential energy has this energy because of its \_\_\_\_\_. [ ]

- a) Speed.
- b) Acceleration.
- c) Momentum.
- d) Location.

34). If an object has kinetic energy, then it also must have \_\_\_\_\_. [ ]

- a) Speed
- b) Impulse
- c) Acceleration
- d) none

D. Force.

35). The energy acquired by a body because of its motion is called-----[ ]

- a) work
- b) kinetic energy
- c) mechanical energy
- d) potential energy.

- 36). Kinetic energy of a body in motion equals the product of half its mass and the square of its \_\_\_\_\_ [    ]
- a) Speed
  - b) Impulse
  - c) Acceleration
  - d) Velocity
- 37). \_\_\_\_\_ is the capacity to do work. [    ]
- a) Energy
  - b) Impulse
  - c) Acceleration
  - d) Velocity
- 38). By definition, work is done when a \_\_\_\_\_ moves through a distance. [    ]
- a) particle
  - b) Impulse
  - c) Acceleration
  - d) Velocity
- 39). Work is defined as [    ]
- a) Force per unit time
  - b) Force over a distance
  - c) Force per unit distance
  - d) None of the above
- 40). What is the sign of the work done by gravity on a man standing on a platform? [    ]
- a) Zero
  - b) Positive
  - c) Negative
  - d) Depends on the particular situation
- 41). The work done by a given force over a given distance is proportional to [    ]
- a) The velocity of the particle
  - b) The sine of the angle between the force and the displacement
  - c) The cosine of the angle between the force and the displacement
  - d) The time during which the force acts
- 42). What is the sign of the work performed on an object in uniform circular motion? [    ]
- a) Zero
  - b) Positive
  - c) Negative
  - d) Positive
- 43). How much work is performed by gravity on an object of mass  $m$  in free fall over a distance of  $h$  meters? [    ]
- a)  $mh$
  - b)  $mg/h$

c)  $mgh$

d)  $mh/g$

44). How is work related to acceleration? [   ]

a)  $W = ma$

b)  $W = mat$

c)  $W = max$

d)  $W = ma/x$

45). A mass is kept stationary by an external force. All of the following are true EXCEPT [   ]

a) The point of application of the force does not move

b) No work is done on the mass

c) There is no net force on the mass

d) The external force may perform work on the mass

46). What is the magnitude of the work done by a force acting on a particle instantaneously? [   ]

a) Zero

b) Positive

c) Negative

d) Positive

47). According to the work-energy theorem, a net work causes [   ]

a) A change in kinetic energy

b) A change in potential energy

c) A kinetic energy

d) A change in the direction of motion of a particle

48). What can be said about the kinetic energy of an object in uniform circular motion? [   ]

a) It is constantly increasing

b) It is constantly decreasing

c) It is constant

d) Its direction is changing, but its magnitude is constant

49). Kinetic energy is [   ]

a) A scalar

b) Dimensionless

c) A vector

d) None of the above

50). The work done by friction over any distance is always [   ]

a) Zero

b) Positive

c) Negative

d) Positive

### Module-5

Answers:

1.b	11. d	21.c	31.c	41.c
2. d	12. a	22.d	32.a	42.a
3. d	13. b	23.d	33 a	43.c
4. b	14. c	24.c	34. d	44.c
5. b	15. b	25.a	35. d	45.d
6. c	16. d	26. b	36. d	46.a
7. c	17. a	27. d	37. a	47.a
8. c	18. d	28. b	38. a	48.c
9. c	19. b	29. c	39.b	49.a
10.d	20. a	30. b	40. a	50.c

