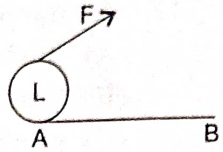
Choose the correct answer from the given options.

1. A rigid body when acted upon by a force, can have
   (A) linear motion
   (B) rotational motion
   (C) both (A) and (B)
   (D) none of these
2. The CGS unit of moment of force is
   (A) dyne-m
   (B) N-cm
   (C) N-m
   (D) dyne-cm

3. A boy drags a load 'L' along horizontal plane AB by applying a force F. The boy does

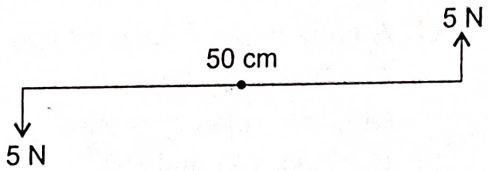


(A) no work
(B) some positive work
(C) negative work
(D) none of these

4. The direction of clockwise moment is along the axis of rotation.
(A) inwards
(B) outwards
(C) either (A) or (B)
(D) none of these

5. On applying a force on a pivoted body, its direction of rotation depends on
(A) the point of application of the force
(B) the direction of force
(C) both (A) and (B)
(D) none of these

6. Two forces each of 5 N act vertically upwards and downwards respectively on the two ends of uniform metre rule which is placed at its mid point as shown in the diagram. The resultant moment of these forces about the mid-point is

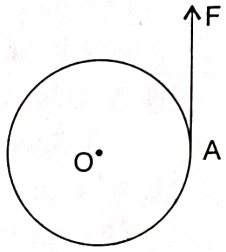


(A) 5 Nm in CWD
(B) 5 Nm in ACWD
(C) 10 Nm in CWD
(D) 10 Nm in ACWD

7. The perpendicular distance between the point of application of force and the turning point is 1.75 m, when a force of 80 N acts on a rigid body. The moment of force is
(A) 120 Nm
(B) 130 Nm
(C) 140 Nm
(D) 150 Nm

8 A force of 50 N produces a moment of force of 10 Nm in a rigid body. The perpendicular distance between the point of application of force and the turning point is
(A) 0.20 m
(B) 0.50 m
(C) 0.30 m
(D) 0.40 m

9. The diagram given alongside shows a force F = 5 N, acting at a point A produces a moment of force of 6 Nm about point O. The diameter of wheel is



(A) 1.2 m
(B) 2.4 m
(C) 4.8 m
(D) 0.6 m

10. To open and shut a door, we apply a force normal to the door at its handle which is provided at the
(A) minimum distance from the hinges
(B) maximum distance from the hinges
(C) any distance from the hinges
(D) none of these

11. For turning a steering wheel, a force is applied on the rim of the wheel
(A) at 45°
(B) tangentially
(C) along the rim
(D) any of these

12. The point of action of force on a rigid body is
(A) fixed point on rigid body
(B) fixed point, but can be transferred anywhere along the line of action of force
(C) fixed point, but can be transferred anywhere along the direction of force
(D) fixed point, but can be transferred anywhere opposite to the direction of force

13. The turning effect produced in a rigid body around a fixed point by the application of force is called
(A) turning force
(B) moment of force
(C) moment of couple
(D) none of these

14. In SI system, the unit of moment of force is
(A) Nm
(B) dyne-cm
(C) dyne-m
(D) N-cm

15. The moment of couple is mathematically the
(A) product of one force and the perpendicular distance between two forces
(B) product of both forces and the perpendicular distance between them
(C) product of one force and the perpendicular distance between the point of application of force and turning point.
(D) none of these

16. The condition for equilibrium is
(A) the resultant of all the forces acting on the body be zero only
(B) the resultant moments of all the forces acting on the body about the turning point should be zero
(C) both (A) and (B)
(D) none of these

17. A body is acted upon by two unequal and opposite forces along different lines of action of force. The body will have
(A) only rotatory motion
(B) only translatory motion
(C) both (A) and (B)
(D) neither (A) nor (B)

18. A force F acts on a rigid body capable of turning around a fixed point. The moment of force depends upon
(A) magnitude of force F
(B) magnitude of perpendicular distance between the point of action of force and the turning point
(C) both (A) and (B)
(D) none of these

19. The centre of gravity of a cricket ball is at
(A) its geometric centre
(B) its bottom touching the ground
(C) its top-most point
(D) any point on its surface

20. A body is describing a uniform circular motion: which of the following quantities is/are constant?
(A) Speed (B) Acceleration (C) Velocity (D) Both (A) and (B)

21. In a uniform circular motion
(A) speed of body continuously changes because the direction of motion changes
(B) velocity of body continuously changes because the direction of motion changes
(C) the motion of body is accelerated
(D) both (B) and (C)

22. The position of the centre of gravity of a body of given mass depends upon its
(A) mass (B) density (C) shape (D) none of these

23. The centre of gravity of the body changes, if it is
(A) deformed
(B) placed upside down
(C) changed its position
(D) none of these

24. A solid body can be balanced by supporting at its
(A) mid-point
(B) geometric centre
(C) centre gravity
(D) none of these

25. If the force rotates the body about the axis passing through the pivoted point. This is called the
(A) rotational effect of the force
(B) turning effect of the force
(C) translational effect of the force
(D) none of these

26. If a wheel is pivoted at its centre, and it rotates about its centre. It means force is applied at its rim
(A) normally (B) tangentially (C) at 45° (D) none of these

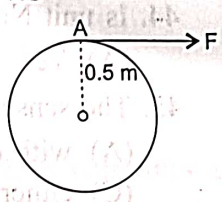
27. Which of the following relations is correct?
(A) 1 kgf-m = 980 dyne-cm
(B) 1 kgf-m = 9.8 Nm
(C) 1 kgf-m = 10^7 dyne-cm
(D) none of these

28. The moment of force is a
(A) scalar quantity
(B) vector quantity
(C) either (A) or (B)
(D) none of these

29. The direction of rotation of a body can be changed by
(A) changing the point of application of force
(B) changing the direction of force
(C) either (A) or (B)
(D) neither (A) nor (B)

30. A physical balance works on the principle of
(A) masses (B) forces (C) moments (D) torques

31. The diagram given alongside shows a force F acting at a point A, such that it produces a moment of force of 20 Nm in clockwise direction. The magnitude of force is



(A) 20 N (B) 30 N (C) 40 N (D) 50 N

32. In a circular motion
(A) the velocity of the body is variable
(B) the speed of the body is uniform
(C) it is accelerated motion
(D) all of these

33. The rotation is always produced by a
(A) single force
(B) pair of forces
(C) either (A) or (B)
(D) neither (A) nor (B)

34. A body is said to be in equilibrium, if
(A) the resultant of all forces is zero
(B) the algebraic sum of moments of all forces about the fixed point is zero.
(C) both (A) and (B)
(D) none of these

35. A book lying on a table is in
(A) static equilibrium
(B) dynamic equilibrium
(C) both (A) and (B)
(D) neither (A) nor (B)

36. When a body remains in the same state of motion, under the influence of the several forces, the body is said to be in
(A) static equilibrium
(B) dynamic equilibrium
(C) neutral equilibrium
(D) none of these

37. According to principle of moments, in equilibrium
(A) sum of the clockwise moments > sum of the anticlockwise moments
(B) sum of the clockwise moments < sum of the anticlockwise moments
(C) sum of the clockwise moments = sum of the anticlockwise moments
(D) any of these

38. The moment of a force of 5 N about a point X is 2 Nm. Calculate the distance of point of application of the force from the point P.
(A) 0.2 m (B) 0.3 m (C) 0.4 m (D) 0.5 m

39. A body is pivoted at a point. A force of 10 N is applied at a distance of 30 cm from the pivot. Calculate the moment of force about the pivot.
(A) 1 Nm (B) 2 Nm (C) 3 Nm (D) 4 Nm

40. The algebraic sum of moments due to weights of each particle of the body about its centre of gravity is
(A) zero (B) infinity (C) cannot be said (D) none of these

41. By the concept of centre of gravity, whole body weight can be considered as a point particle of whole weight at its
(A) centre of mass (B) centre of gravity
(C) geometric centre (D) none of these

42. The centre of gravity of a hollow cone of height h is at a distance x from its vertex where the value of x is:
(A) $h/4$ (B) $h/3$ (C) $\frac{2h}{3}$ (D) $\frac{3h}{4}$

43. A rigid body when acted upon by a force, can have
(A) linear motion (B) rotational motion (C) both (A) and (B) (D) neither (A) nor (B)

44. Is unit Nm of moment of force (or torque) written joule (J)?
(A) Yes (B) No (C) Cannot be said (D) None of these

45. The sense of rotation of wheel is changed by changing the point of application of force
(A) with changing the direction of force (B) without changing the direction of force
(C) either (A) or (B) (D) neither (A) nor (B)

46. A spanner used to tighten or loosen a nut, has a long handle to produce a large moment of force
(A) by a large force applied normally at the end of the handle
(B) by a small force applied normally at the end of the handle
(C) either (A) or (B)
(D) neither (A) nor (B)

47. The moment of the force of reaction about the pivot is
(A) zero (B) infinity
(C) either (A) or (B) (D) neither (A) nor (B)

48 A couple is always needed to produce a
(A) motion (B) linear motion (C) rotation (D) none of these

49. The turning of a body about an axis depends on
(A) magnitude of force
(B) the perpendicular distance of line of action of applied force from the axis of rotation.
(C) both (A) and (B)
(D) none of these

50. A single force applied on a pivoted body alone
(A) does not cause rotation of the body (B) causes rotation of the body
(C) does not cause linear motion of the body (D) none of these

51. A couple is always needed to produce
(A) linear motion (B) rotation (C) oscillatory motion (D) none of these

52. Two equal and opposite forces cannot produce
(A) linear motion (B) rotation (C) oscillatory motion (D) none of these

53. According to principle of moments, in equilibrium,
(A) sum of the anticlockwise moments = sum of clockwise moments
(B) sum of the anticlockwise moments > sum of clockwise moments
(C) sum of the anticlockwise moments < sum of clockwise moments
(D) none of these

54. A solid body can be balanced by supporting it at its
(A) geometric centre (B) mid-point (C) centre of gravity (D) none of these

55. For the stable equilibrium of a body, its centre of gravity must be
(A) as high as possible
(B) at its centre
(C) as low as possible
(D) none of these

56. For the stable equilibrium of a body, its centre of gravity must be
(A) above the base
(B) near the geometric centre
(C) both (A) and (B)
(D) none of these

57. The magnitude of moment of force is directly proportional to the
(A) magnitude of applied force
(B) the perpendicular distance between the point of application of force and the turning point (or axis).
(C) both (A) and (B)
(D) neither (A) nor (B)

58. Two equal and unlike parallel forces which lines of action are not same constitute a
(A) couple
(B) moment of force
(C) moment of couple
(D) none of these

59. The perpendicular distance between the two equal and unlike parallel forces which contitutes a couple is called
(A) side of the couple
(B) arm of the couple
(C) arm of the force
(D) none of these

60. The turning effect of a couple around a fixed point or axis is called
(A) moment of force
(B) moment of couple
(C) either (A) or (B)
(D) neither (A) nor (B)

61. The centre of gravity of a triangular lamina is situated at
(A) its centre
(B) the point of intersection of medians
(C) mid point of vertical axis
(D) none of these

62. The centre of gravity of a rectangular lamina is situated at
(A) its centre
(B) the point of intersection of diagonals
(C) either (A) or (B)
(D) neither (A) nor (B)

63. Calculate the length of arm of couple, if a force of 13 N produces a moment of couple of 14.3 Nm.
(A) 2.1 m (B) 1.5 m (C) 1.3 m (D) 1.1 m

64. At each point of the circular path, the centripetal force is directed
(A) away from the centre
(B) towards the centre
(C) either (A) or (B)
(D) neither (A) nor (B)

65. For a body moving in a circular path, a force is needed which acts as the
(A) centripetal force
(B) centrifugal force
(C) either (A) or (B)
(D) neither (A) nor (B)

66. The moon revolving around the earth is in
(A) static equilibrium
(B) dynamic equilibrium
(C) neutral equilibrium
(D) none of these

67. The turning effect on the body about an axis is due to the
(A) moment of force applied on the body
(B) torque applied on the body
(C) either (A) or (B)
(D) neither (A) nor (B)

68. The anticlockwise moment is taken as
(A) positive
(B) negative
(C) either (A) or (B)
(D) neither (A) nor (B)

69. The clockwise moment is taken as
(A) positive
(B) negative
(C) either (A) or (B)
(D) neither (A) nor (B)

70. Actually the rotation is produced by a
(A) single force
(B) pair of forces
(C) either (A) or (B)
(D) neither (A) nor (B)

71. The body is in equilibrium, if the algebraic sum of moments of all the forces, acting on the body, about the axis of rotation is
(A) a positive value
(B) a negative value
(C) zero
(D) none of these

72. A force of 525 N produces a moment of force of 420 Nm. The shortest distance between the point of application of force and the turning point is
(A) 0.5 m (B) 0.8 m (C) 0.9 m (D) 1.2 m

73. Two equal and unlike parallel forces of magnitude 16 N acting on a rigid body, such that moment of couple is 12 Nm. The arm of couple is
(A) 0.25 m (B) 0.50 m (C) 0.75 m (D) 0.85 m

74. The position of the centre of gravity of a body of given mass depends on its
(A) shape
(B) on the distribution of particles
(C) either (A) or (B)
(D) none of these

75. For the stable equilibrium of a body,
(A) its centre of gravity must be as low as possible
(B) it must be above the base and near the geometric centre of the body
(C) both (A) and (B)
(D) none of these

76. In uniform linear motion,
(A) speed is constant
(B) velocity is constant
(C) acceleration is zero
(D) all of these

Choose the correct answer from the given options.

1. The SI unit of work is joule. It is expressed in terms of mass, length and time as
   (A) kgm^2s^{-3} (B) kgm^3s^{-2} (C) $kg^2m^2s^{-2}$ (D) kgm^2s^{-2}
2. The SI unit of power is watt. It is expressed in terms of mass, length and time as
   (A) $kg\ m^2s^{-3}$ (B) $kg\ ms^{-3}$ (C) $kg^2\ m^2s^{-2}$ (D) $kg\ ms^{-2}$
3. A stone resting on the roof of a building has
   (A) gravitational potential energy (B) elastic potential energy
   (C) translational kinetic energy (D) rotational kinetic energy
4. A falling raindrop has
   (A) only kinetic energy (B) only potential energy
   (C) both (A) and (B) (D) none of these
5. The work done depends on
   (A) the magnitude of force
   (B) magnitude of displacement
   (C) the angle between the force and displacement
   (D) all of these
6. The S.I. unit of work is
   (A) erg (B) joule (C) dyne (D) newton
7. Power is a
   (A) scalar quantity (B) vector quantity
   (C) either (A) or (B) (D) none of these
8. The rate of doing work is called
   (A) energy (B) capacity (C) power (D) none of these

9. Power is a
(A) scalar quantity
(B) vector quantity
(C) either (A) or (B)
(D) none of these

10. If the displacement is normal to the direction of force, then work done is
(A) positive
(B) negative
(C) zero
(D) none of these

11. When a coolie walks on a horizontal ground while carrying a load on his head, no work is done against
(A) the force of friction
(B) the force of gravity
(C) either (A) or (B)
(D) none of these

12. When a ball is thrown upwards to a height, then the work done by the force of gravity is
(A) positive
(B) negative
(C) either (A) or (B)
(D) neither (A) nor (B)

13. If a body comes down from a certain height using stairs or slope or a lift, then the work done by the force of gravity is
(A) different
(B) same
(C) cannot be said
(D) none of these

14. The amount of work done by a force is zero when
(A) there is no displacement
(B) displacement is normal to the direction of force
(C) either (A) or (B)
(D) none of these

15. The power spent by a source is measured as the amount of work done by the source in
(A) a given time
(B) seconds
(C) one second
(D) none of these

16. The work done by the force of gravity is same whether the body comes down from a certain height
(A) using the stairs
(B) using the slope
(C) using a lift (or elevator)
(D) all of these

17. The power spent by a source depends on the
(A) amount of work done by the force
(B) the time taken by the source to do the said work
(C) both (A) and (B)
(D) none of these

18. A body capable of doing work is said to possess
(A) power
(B) capacity
(C) energy
(D) none of these

19. An energy of 4 kJ causes a displacement of 64 m in 2.5 s. Then force and power are
(A) 62.5 N and 1600 W
(B) 6.25 N and 160 W
(C) 625 N and 1600 W
(D) 62.5 N and 160 W

20. A bullet of an air gun weighs 0.01 kg. It is propelled out from the air gun with a velocity of 40 ms^{-1}. Then the potential energy of the spring is
(A) 2 J
(B) 4 J
(C) 6 J
(D) 8 J

21. A body of mass 4 kg is moving with a velocity of 4 ms^{-1}. If its mass is doubled and velocity is tripled, then the ratio of its initial and final kinetic energy will be
(A) 1 : 3
(B) 1 : 6
(C) 1 : 9
(D) 1 : 18

22. If a body of mass 100 g and having a momentum of 20 $kgms^{-1}$, then its kinetic energy is
(A) 1000 J
(B) 1500 J
(C) 2000 J
(D) 2500 J

23. Which of the following relations is correct?
(A) 1 J = 10^5 erg
(B) 1 J = 10^7 dyne
(C) 1 J = 10^7 erg
(D) 1 erg = 10^7 J

24. Power is a
(A) scalar quantity
(B) vector quantity
(C) either (A) or (B)
(D) neither (A) nor (B)

25. The rate of doing work is called
(A) energy
(B) capacity
(C) power
(D) none of these

26. The SI unit of energy is
(A) erg
(B) newton
(C) joule
(D) dyne

27. When a flash light is switched on, the electric energy
(A) directly changes to light energy
(B) first changes to light energy and then to heat energy
(C) first changes to heat energy and then to light energy
(D) none of these

28. If a force acts on a body and the body does not move, then
(A) no work is done
(B) some positive work is done
(C) some negative work is done
(D) none of these

29. Work is a
(A) vector quantity
(B) scalar quantity
(C) either (A) or (B)
(D) neither (A) nor (B)

30. We can determine the amount of work done by the force
(A) by finding the component of displacement of the body in the direction of force
(B) by finding the component of force in the direction of displacement
(C) either (A) or (B)
(D) neither (A) nor (B)

31. It is not necessary that the force always causes the displacement of the body in
(A) its own direction
(B) some other direction
(C) either (A) or (B)
(D) neither (A) nor (B)

32. A man exerts a force of 200 N in pulling a cart at a constant speed of $16\,ms^{-1}$. Then the power spent by the man is
(A) 3000 W
(B) 3200 W
(C) 3400 W
(D) 3600 W

33. Express 5 kWh into joule.
(A) 1.8×10^6 J
(B) 1.6×10^7 J
(C) 1.8×10^7
(D) 1.7×10^8 J

34. A body at a height possesses
(A) kinetic energy
(B) potential energy
(C) solar energy
(D) chemical energy

35. The work done depends on
(A) the magnitude of force
(B) the magnitude of displacement
(C) the angle between the force and displacement
(D) all of these

36. If the displacement is in the direction of force, then work done is
(A) positive
(B) negative
(C) either (A) or (B)
(D) neither (A) nor (B)

37. If the displacement is normal to the direction of force, then work done is
(A) positive (B) negative (C) zero (D) none of these

38. If the displacement is in a direction opposite to the force then work done is
(A) positive (B) negative
(C) zero (D) none of these

39. If 1 J of work is done in 1s, the power spent is said to be
(A) 1 W (B) 1 J s^{-1}
(C) either (A) or (B) (D) neither (A) nor (B)

40. Watt hour is the unit of
(A) force (B) energy
(C) power (D) none of these

41. A force of 10 N displaces a body by a distance of 2 m at an angle 60° to its own direction. Find the amount of work done.
(A) 10 J (B) 15 J (C) 20 J (D) 25 J

42. The work done by a force on moving body in the same direction is equal to the increase in its
(A) potential energy (B) kinetic energy
(C) power (D) none of these

43. A body of mass 5 kg is taken from a height 5 m to 10 m. Find the increase in its potential energy. ($g = 10\ ms^{-2}$)
(A) 200 J (B) 225 J (C) 250 J (D) 500 J

44. A body is acted upon by a force, the conditions for work done is zero, is/are
(A) the force must not cause displacement in its own direction
(B) the force must act at right angles to the direction of displacement
(C) either (A) or (B) (D) neither (A) nor (B)

45. A tennis ball and a table tennis ball have same momentum. Which of the two has more kinetic energy?
(A) Tennis ball (B) Table tennis ball
(C) Either (A) or (B) (D) Neither (A) nor (B)

46. When a body does work, its energy
(A) increases (B) decreases
(C) remains the same (D) none of these

47. If work is done on the body, its energy
(A) increases (B) decreases
(C) remains the same (D) none of these

48. Energy is a
(A) scalar quantity (B) vector quantity
(C) either (A) or (B) (D) neither (A) nor (B)

49. The speed of motor bike changes from 5 ms^{-1} to 20 ms^{-1}. The ratio of initial and final kinetic energies is
(A) 1:2 (B) 1:4 (C) 1:8 (D) 1:16

50. Name the quantity which is measured in kWh.
(A) Force (B) Power (C) Energy (D) Momentum

51. Name the quantity which is measured in eV.
(A) Force (B) Momentum (C) Power (D) Energy

52. On doubling the velocity of motion of a body, its kinetic energy becomes
(A) half (B) twice (C) four times (D) none of these

53. The amount of work done by a force is zero,
(A) when there is no displacement
(B) when displacement is normal to the direction of force
(C) either (A) or (B)
(D) neither (A) or (B)

54. The power spent by a source depends on
(A) the amount of work done by the force
(B) the time taken by the source to do the work
(C) both (A) and (B)
(D) none of these

55. If 1 J of work is done in 1s, the power spent is said to be
(A) 1 HP (B) 1 kW (C) 1 W (D) 746 W

56. If a body is acted upon by a force normal to the direction of its displacement. Then
(A) there is transfer of energy (B) there is no transfer of energy
(C) either (A) or (B) (D) neither (A) nor (B)

57. A crane pulls up a car of mass 500 kg to a vertical height of 4 m. Then work done by the crane is
(A) 18000 J (B) 18600 J (C) 19600 J (D) 16900 J

58. If the height of the body from the ground increases, then its potential energy
(A) remains same (B) decreases (C) increases (D) none of these

59. The kinetic energy of a body depends on the
(A) mass of the body (B) square of its velocity of motion
(C) both (A) and (B) (D) none of these

60. When a force applied in the direction of motion of a body, it accelerates the motion, thus, kinetic energy
(A) increases (B) decreases (C) remains same (D) none of these

61. The moving parts of a machine get heated due to friction, thus, a part of mechanical energy changes into
(A) chemical energy (B) magnetic energy
(C) heat energy (D) none of these

62. A body of mass 5 kg is taken from a height 5 m to 10 m. The increase in its potential energy is
(A) 150 J (B) 200 J (C) 250 J (D) 300 J

SECTION II

Choose the correct answer from the given options.

1. The resistive or opposing force to be overcome by a machine is called the
   (A) load (B) fulcrum (C) effort (D) none of these
2. The force applied on the machine to overcome the load is called the
   (A) effort (B) load (C) fulcrum (D) none of these
3. A machine having the mechanical advantage less than 1,
   (A) acts as a force multiplier
   (B) gives the gain in speed
   (C) is generally used to change the direction of effort
   (D) any of these
4. A machine having the mechanical advantage less than 1,
   (A) acts as a force multiplier
   (B) gives the gain in speed
   (C) is generally used to change the direction of effort
   (D) any of these
5. The efficiency of an ideal machine is
   (A) 70 % (B) 80 % (C) 90 % (D) 100 %
6. The loss of energy in an actual machine due to
   (A) the moving parts in it are neither weightless nor smooth
   (B) the string in it is not perfectly elastic
   (C) its different parts are not perfectly rigid
   (D) all of these
7. The mechanical advantage of a machine is equal to the product of its efficiency and
   (A) effort (B) load (C) velocity ratio (D) none of thes

8. Mechanical advantage (M.A.), load (L) and effort (E) are related as
(A) E = M.A. × L (B) M.A. = L × E
(C) M.A. × E = L (D) none of these

9. A pulley which has its axis of rotation stationary in position, is called a
(A) fixed pulley (B) movable pulley
(C) either (A) or (B) (D) neither (A) nor (B)

10. A pulley whose axis of rotation is movable is called a
(A) fixed pulley (B) movable pulley
(C) either (A) or (B) (D) neither (A) nor (B)

11. The ratio of the displacement of effort to the displacement of load is called the
(A) mechanical advantage of the machine (B) velocity ratio of the machine
(C) efficiency of the machine (D) none of these

12. A machine in which the displacement of load is more than the displacement of effort, such a machine
(A) generally changes the direction of effort (B) acts as a force multiplier
(C) gives the gain in speed (D) none of these

13. A machine in which displacement of load is less than the displacement of effort, such a machine
(A) gives the gain in speed (B) acts as a force multiplier
(C) generally changes the direction of effort (D) none of these

14. A machine in which displacement of load is equal to the displacement of effort, such a machine
(A) gives the gain in speed (B) acts as a force multiplier
(C) generally changes the direction of effort (D) none of these

15. Mechanical advantage of a machine decreases due to
(A) friction (B) weight of the moving parts of a machine
(C) both (A) and (B) (D) none of these

16. The point at which the energy is supplied to a machine by appling the effort is called the
(A) load point (B) pivot (C) effort point (D) none of these

17. The point where the energy obtained by overcoming the load in a machine is called the
(A) load point (B) pivot (C) effort point (D) none of these

18. The product of efficiency and velocity ratio of a machine is called the
(A) work output (B) work input
(C) mechanical advantage (D) none of these

19. A machine in which there is no loss of energy in any manner is called
(A) an actual machine (B) an ideal machine
(C) either (A) or (B) (D) neither (A) nor (B)

20. A machine in which there is some loss of energy during its operation is called
(A) an actual machine (B) an ideal machine
(C) either (A) or (B) (D) neither (A) nor (B)

21. Calculate the ideal mechanical advantage of a machine in which the effort arm is 60 cm and the load arm is 4 cm.
(A) 10 (B) 15 (C) 20 (D) 25

22. A single pulley can be used in
(A) as a fixed pulley (B) as a movable pulley
(C) either (A) or (B) (D) neither (A) nor (B)

23. In case of a single fixed pulley, in the ideal case, the mechanical advantage will be
(A) 1 (B) 1.5 (C) 2 (D) 2.5

24. A fixed pulley is used
(A) as a force multiplier
(B) as a speed multiplier
(C) only to change the direction of effort to be applied
(D) any of these

25. A pulley whose axis of rotation is movable is called a
(A) fixed pulley
(B) movable pulley
(C) either (A) or (B)
(D) neither (A) nor (B)

26. The ratio of the work output to the work input is called
(A) mechanical advantage
(B) velocity ratio
(C) efficiency
(D) none of these

27. The most prominent loss in energy is
(A) in overcoming the force of friction between the moving parts of a machine
(B) due to the string in it (if any) is not perfectly elastic
(C) due to its different parts are not perfectly rigid
(D) none of these

28. If tension is not same throughout the string, the string will then move when the pulley is
(A) rotating
(B) not rotating
(C) either (A) or (B)
(D) neither (A) nor (B)

29. For gain in speed, velocity ratio must be less than 1, but velocity ratio of a single fixed pulley is always
(A) 1
(B) greater than 1
(C) either (A) or (B)
(D) neither (A) nor (B)

SECTION A

Choose the correct answer from the given options.

1. When a ray of light travelling in an optically denser medium, emerges into an optically less denser medium, it

   (A) deviates towards the normal
   (B) deviates away from the normal
   (C) does not deviate
   (D) passes along the normal

2. A ray of light strikes a glass slab at 90°. The angle of incidence is
   (A) 90°
   (B) zero degree
   (C) less than 90°, but not zero
   (D) none of these

3. Two mediums '*a*' and '*b*' have same refractive index. A ray of light travelling from medium '*a*' to medium '*b*' will suffer
   (A) refraction at the interfaces
   (B) partly suffer reflection at the interfaces
   (C) partly gets absorbed in medium '*b*'
   (D) both (B) and (C)

4. A ray of light on entering from medium '*a*' to '*b*' does not suffer refraction. The angle of incidence in medium '*a*' is
   (A) 90°
   (B) zero degree
   (C) 45°
   (D) 60°

5. During sunrise or sunset, the sun appears bigger because the rays of light coming from it pass through
   (A) larger length of the atmosphere
   (B) smaller length of the atmosphere
   (C) the earth gets closer to the sun
   (D) none of these

6. The maximum refractive index is of
   (A) glass
   (B) water
   (C) diamond
   (D) cold air

7. During spear fishing a fisherman aims at the
   (A) tail of fish
   (B) head of fish
   (C) slightly ahead of the head of the fish
   (D) none of these

8. When a ray of light enters into another optical medium, its wavelength and velocity change. The material in which wavelength and velocity decrease maximum, when the ray is travelling through air is
   (A) alcohol
   (B) diamond
   (C) glass
   (D) water

9. The velocity of light in air is 3×10^8 ms^{-1} and in glass 2×10^{-8} ms^{-1}. The refractive index of glass is
   (A) 0.67
   (B) 1.5
   (C) 1.33
   (D) 1.25

10. When an equilateral prism is in minimum deviation position the angle of incidence is
   (A) greater than angle of emergence
   (B) smaller than the angle of emergence
   (C) equal to the angle of emergence
   (D) none of these

11. A prism has:
   (A) two rectangular and three triangular surfaces
   (B) two triangular and three rectangular surfaces
   (C) three rectangular and three triangular surfaces
   (D) none of these

12. When a ray of light passes through an equilateral glass prism:
   (A) it suffers refraction on the first refracting surface
   (B) it suffers refraction on both the refracting surfaces
   (C) it bends towards the base on both refracting surfaces
   (D) both (B) and (C)

13. The point on the principal axis of a convex lens, such that rays of light starting from it on passing through the lens move parallel to the principal axis is called:
   (A) first focal point
   (B) second focal point
   (C) optical centre
   (D) aperture of lens

14. A convex lens can be regarded as a set of prisms and a glass slab, such that refracting angle of prisms.
(A) continuously decreases in outward direction
(B) continuously increases in outward direction
(C) remains same in outward direction
(D) none of these

15. A lens forms an inverted image of an object equal to its own size. The object is
(A) beyond infinity and $2F_1$
(B) at $2F_1$
(C) between $2F_1$ and F_1
(D) in between F_1 and optical centre

16. A convex lens will form a virtual, erect and enlarged image, when object is:
(A) in between $2F_1$ and F_1
(B) at $2F_1$
(C) in between $2F_1$ and infinity
(D) in between F_1 and optical centre

17. While performing experiment with glass slab, a student observed that when a ray of light, on passing from one medium to another medium changes its path in the second medium. According to him, this is called:
(A) reflection (B) refraction (C) scattering (D) Tyndall effect

18. If an object moves towards a convex lens, the image size
(A) remains the same
(B) decreases
(C) increases
(D) first increases then decreases

19. Choose the statement which can never be true for description of image formed by convex lens for any position of the object in front of it:
(A) real, inverted and magnified
(B) virtual, erect and magnified
(C) real, inverted and diminished
(D) virtual, erect and diminished

20. A ray of light passes undeviated from one medium to another, if
(A) the angle of incidence at the boundary of two media is zero degree
(B) refractive index of both the medium is same
(C) either (A) or (B)
(D) none of these

21. With increase in temperature, the speed of light in medium
(A) remains the same (B) decreases (C) increases (D) none of these

22. With increase in temperature, the refractive index of medium
(A) remains the same (B) increases (C) decreases (D) none of these

23. The refractive index of a medium decreases with the increase in
(A) time period (B) frequency (C) wavelength (D) amplitude

24. The highest refractive index is of
(A) glass (B) water (C) ruby (D) diamond

25. A given prism deviates the violet light
(A) least (B) most (C) moderately (D) none of these

26. A given prism deviates the red light
(A) least
(B) most
(C) moderately
(D) none of these

27. A light beam converges on passing through such a lens, so it is also called the
(A) converging lens
(B) diverging lens
(C) either (A) or (B)
(D) neither (A) nor (B)

28. A lens diverges the light rays incident on it, it is called
(A) concave lens (B) diverging lens (C) convex lens (D) both (A) and (B)

29. A ray of light directed towards the optical centre of a thin lens can be considered to pass through the lens
(A) deviated (B) undeviated
(C) either (A) or (B) (D) neither (A) nor (B)

30. If light slows down in going from liquid to glass, it means
(A) $\mu_{glass} < \mu_{liquid}$ (B) $\mu_{glass} > \mu_{liquid}$ (C) $\mu_{glass} = \mu_{liquid}$ (D) none of these

31. If light speeds up in going from liquid to glass, it means
(A) $\mu_{glass} < \mu_{liquid}$ (B) $\mu_{glass} > \mu_{liquid}$ (C) $\mu_{glass} = \mu_{liquid}$ (D) none of these

32. A light ray passing from liquid to glass travels without bending:
(A) when the light ray falls normally on glass from liquid
(B) when refractive index of liquid is same as that of the glass
(C) either (A) or (B) (D) none of these

33. The ratio of speeds of light of violet colour and red colour in vacuum is
(A) 2:1 (B) 1:2 (C) 2:3 (D) 1:1

34. The velocity of light in air is 3×10^8 ms^{-1}. Then the velocity of light in diamond of refractive index 2.5, is
(A) 2.5×10^8 ms^{-1} (B) 2.2×10^8 ms^{-1}
(C) 1.2×10^8 ms^{-1} (D) 1.8×10^8 ms^{-1}

35. A glass block 3.0 cm thick is placed over a stamp. The refractive index of glass is 1.54. Then the height through which the image of stamp raised will be
(A) 1 cm (B) 1.06 cm (C) 1.5 cm (D) 1.45 cm

36. A stone placed at the bottom of a water tank appears raised by 80 cm. If the refractive index of water is 4/3, then the actual depth of water in the tank is
(A) 300 cm (B) 310 cm (C) 320 cm (D) 330 cm

37. Name the colour of white light which is deviated the most.
(A) Violet (B) Blue (C) Green (D) Indigo

38. Name the colour of white light which is deviated the least.
(A) Violet (B) Green (C) Yellow (D) Red

39. An object placed in rarer medium when viewed from a denser medium appears to be at a greater distance then its
(A) real distance (B) actual distance (C) virtual distance (D) both (A) and (B)

40. The critical angle for a given pair of media depends on
(A) wavelength of light (B) speed of light
(C) frequency of light (D) their refractive indices

41. In case of total internal reflection, the entire light is
(A) reflected (B) refracted (C) absorbed (D) none of these

42. The point on the principal axis of a thin lens, such that a ray of light directed towards it, passes undeviated through it, is called
(A) focus (B) centre of curvature
(C) optical centre (D) pole

43. Convex lens has the
(A) real focus (B) virtual focus
(C) either (A) or (B) (D) neither (A) nor (B)

44. When a ray of light travels from a rarer medium to a denser medium, it bends
(A) away from the normal
(B) towards the normal
(C) either (A) or (B)
(D) neither (A) nor (B)

45. The ray of light incident normally on the surface separating the two media, passes
(A) deviated
(B) undeviated
(C) either (A) or (B)
(D) neither (A) nor (B)

46. When a ray of light passes from one medium to another medium, its direction changes because of the change in
(A) speed of light
(B) frequency of light
(C) density of the medium
(D) none of these

47. A ray of light passes undeviated from first medium to second medium if
(A) the angle of incidence at the boundary of two media is zero
(B) the refractive index of second medium is same as that of first medium
(C) either (A) or (B)
(D) none of these

48. When light passes from a rarer to a denser medium its wavelength
(A) increases (B) decreases (C) remains the same (D) none of these

49. A ray of light suffers refraction through an equilateral prism. The deviation produced by the prism does not depend on the
(A) angle of incidence (B) colour of light (C) material of prism (D) size of prism

50. A small air bubble in a glass block when seen from above appears to be raised because of
(A) reflection of light
(B) refraction of light
(C) both (A) and (B)
(D) none of these

51. A sharp image of a distant object is obtained on a screen by using a convex lens. In order to determine the focal length of the lens, you need to measure the distance between the
(A) lens and the object
(B) lens and the screen
(C) object and the screen
(D) both (A) and (B)

52. Samir obtained a sharp image of the grill of a window on a screen, using a convex lens. He then thought of focusing a distant building instead of the grill. What should he do to obtain clear image on screen?
(A) Keep lens behind the screen
(B) Move lens towards the screen
(C) Move lens away from the screen
(D) Keep distance between lens and screen unchanged

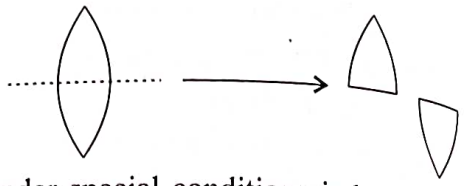
53. Saurabha places a convex lens in front of sun rays entering a room from a window. The rays would meet at
(A) focus of lens
(B) centre of curvature of lens
(C) pole of lens
(D) optical centre of lens

54. A teacher obtains distinct image of a distance tree on a screen with the help of a convex lens and then asks her four students P,Q,R and S to describe the nature and size of image. Answer given by them were
(P) virtual, inverted, smaller than object
(Q) real, inverted, smaller than object
(R) virtual, erect, same size as that of object
(S) real, erect, same size as that of object

Correct answer was given by

(A) P (B) Q (C) R (D) S

55. A double convex lens of focal length 'f' is cut into two equal parts as shown. The focal length of each part will be



(A) $2f$ (B) f

(C) $f/2$ (D) zero

56. The splitting up of white light into its constituents colours under special conditions is known as

(A) reflection (B) refraction (C) interference (D) dispersion

57. When a ray of light is incident on the surface of prism

(A) it bends away from the normal (B) it bends towards the normal

(C) it goes parallel to the normal (D) it goes along the normal

58. The angle between the two refracting faces in a prism is called

(A) the refracting angle/angle of prism (B) incident angle

(C) emergent angle (D) angle of deviation

59. To trace the path of ray of light through the triangular glass prism, a student mostly observes that the emergent ray has:

(A) bent away from the base of the prism

(B) bent towards the base of the prism

(C) moved parallel to the direction of incident ray

(D) gone perpendicular to the incident ray

60. The number of triangular surfaces of the prism with which you do experiment–of tracing the path of light through a glass prism:

(A) only one (B) only two (C) only three (D) only four

61. Angle of deviation is the angle:

(A) between two refracting faces of prism

(B) between emergent ray and incident ray

(C) between refracted ray (inside prism) and incident ray

(D) between emergent ray and refracted ray (inside prism)

62. In order to form a real and diminished image by a convex lens, the object must be placed at

(A) infinity (B) beyond 2F

(C) optical centre (D) either (A) or (B)

63. The speed of light is maximum in

(A) diamond (B) glass (C) water (D) vacuum

64. The speed of light is minimum in

(A) diamond (B) glass (C) water (D) air

65. The refractive index of a medium depends on

(A) nature of the medium (B) physical condition such as temperature

(C) the colour or wavelength of light (D) all of these

66. The refractive index of water with respect to air is 4/3. What is the refractive index of air with respect to water?

(A) 1.33 (B) 1 (C) 0.9 (D) 0.75

67. The speed of light in air is 3×10^8 ms^{-1}. Calculate the speed of light in glass. The refractive index of glass is 1.5.

(A) 3×10^8 ms^{-1} (B) 2.5×10^8 ms^{-1} (C) 2×10^8 ms^{-1} (D) 1.8×10^8 ms^{-1}

68. The angle of deviation depends on the
(A) the angle of incidence
(B) the material of prism
(C) the angle of prism
(D) all of these

69. The shift by which the object appears to be raised, depends on
(A) the refractive index of the medium
(B) the thickness of the denser medium
(C) the colour (or wavelength) of incident light
(D) all of these

70. The apparent depth of a liquid in a vessel is 15 cm, when its real depth is 20 cm. Find the refractive index of the liquid.
(A) 1.25 (B) 1.33 (C) 1.5 (D) none of these

71. A water pond appears to be 2.7 m deep. If the refractive index of water is 4/3. Find the actual depth of the pond.
(A) 2.7 m (B) 3 m (C) 3.6 m (D) 4 m

72. There is no loss of energy in the phenomenon of
(A) reflection
(B) refraction
(C) total internal reflection
(D) dispersion

73. The ratio of speed of light in vacuum (or air) to the speed of light in a given medium is called
(A) frequency of the medium
(B) wavelength of the medium
(C) amplitude of the medium
(D) refractive index of the medium

74. The refractive index of diamond with respect to air is 2.4. Then the refractive index of air with respect to diamond will be
(A) 0.461 (B) 0.416 (C) 0.614 (D) 0.641

75. The wavelength of red light is 800 nm. Speed of light is 3×10^8 ms^{-1}. Then its frequency is
(A) 2.75×10^{14} Hz (B) 3.75×10^{13} Hz (C) 3.75×10^{14} Hz (D) 2.75×10^{13} Hz

76. The wavelength range of white light is
(A) 400 nm to 800 nm
(B) 4000 nm to 8000 nm
(C) 3000 nm to 7000 nm
(D) 5000 nm to 8000 nm

77. In the spectrum of white light by a prism, the colour at the extreme end opposite to the base of prism is
(A) Violet (B) Green (C) Blue (D) Red

78. When a white light ray falls on a prism, the ray at its first surface suffers
(A) dispersion (B) deviation (C) no refraction (D) both (A) and (B)

79. When a ray of light is incident on the surface of prism
(A) it bends away from the normal
(B) it bend towards the normal
(C) it goes parallel to the normal
(D) it goes along the normal

80. A student wants to draw diagram for formation of a real image at 2 F of a convex lens. For this he must take the object at
(A) infinity
(B) focus
(C) between optical centre and focus
(D) 2 F

81. The virtual image formed by a convex lens for an object placed between optical centre and focus was thrice the size of the object. The magnification produced in this case is
(A) +3 (B) –3 (C) –1/3 (D) +1/3

82. The device that has been used by a person to read small letters is a
(A) convex lens (B) concave lens (C) prism (D) convex mirror