Chapter 3

MOTION AND FORCE

Each question has four possible answers, encircled the correct answer:

1. If a body changes its position with respect to its surroundings then it is said to be in:

(a) Rest **(b)** Motion

(c) Momentum **(d)** Force

2. If a body does not change its position with respect to its surroundings then it is said to be at:

(a) Rest **(b)** Motion

(c) Momentum **(d)** Force

3. The change in position of a body from initial to final position is called:

(a) Velocity **(b)** Displacement

(c) Acceleration **(d)** Speed

4. The rate of change of displacement is called:

(a) Velocity **(b)** Displacement

(c) Acceleration **(d)** Speed

5. The rate of change of distance is called:

(a) Velocity **(b)** Displacement

(c) Acceleration **(d)** Speed

6. The SI unit of velocity is:

(a) m/s **(b)** m-s

(c) s/m **(d)** None of these

7. The dimensions of velocity are:

(a) $[LT^2]$ **(b)** $[L^{-1}]$

(c) $[LT^{-1}]$ **(d)** $[L^2T]$

8. The expression $\underset{\Delta t \to 0}{\text{Limit}} \frac{\Delta \vec{d}}{\Delta t}$ represents:

(a) Average velocity **(b)** Displacement

(c) Instantaneous velocity **(d)** Acceleration

9. If the velocity of the body is increasing then its acceleration will be:

(a) Zero **(b)** Maximum

(c) Negative **(d)** Positive

10. The rate of change of velocity is called:

(a) Displacement **(b)** Velocity

(c) Speed **(d)** Acceleration

11. When the velocity of a body is increases at constant rate, it is said to be moving with:

(a) Constant velocity **(b)** Constant speed

(c) Constant displacement **(d)** None of these

12. With the help of velocity-time graph, we can find:

(a) Distance **(b)** Time

(c) Velocity **(d)** Momentum

13. The area under the curve of velocity-time graph gives:

(a) Acceleration **(b)** Velocity

(c) Distance **(d)** Direction

14. The motion and rest are:

(a) Relative **(b)** Discrete

(c) Absolute **(d)** None of these

15. When a body moves in straight line, displacement is:

(a) Circular **(b)** Curved

(c) Along the path **(d)** None of these

16. If the instantaneous velocity does not change, then the body is said to be moving with:

(a) Average velocity **(b)** Average acceleration

(c) Uniform velocity **(d)** Average speed

17. A man on the top of a tower throws an object upward with a certain velocity and allows another object to fall freely. The two objects strikes the Earth with:

(a) Different velocities **(b)** Same velocities

(c) Uniform velocities **(d)** None of these

18. If the velocity time graph becomes steeper and steeper then acceleration:

(a) Remains constant **(b)** Decreases

(c) Increases **(d)** None of these

19. Acceleration of a body sliding down a smooth inclined plane of constant angle is said to be:

(a) Variable **(b)** Increasing

(c) Decreasing **(d)** Constant

20. The dimensions of acceleration are:

(a) $[LT^{-1}]$ **(b)** $[LT^{2}]$

(c) $[L^{2}T]$ **(d)** $[LT^{-2}]$

21. Slope of velocity-time graph represents:

(a) Distance **(b)** Displacement

(c) Acceleration **(d)** None of these

22. A paratrooper moves downward with:

(a) Zero acceleration **(b)** Negative acceleration

(c) Positive acceleration **(d)** Acceleration due to gravity

23. If a body is moving with constant velocity of 20 m/s towards North then its acceleration is:

(a) $5\ m/s^2$ **(b)** $9\ m/s^2$

(c) $10\ m/s^2$ **(d)** Zero

24. Acceleration in a body is always produced in the direction of:

(a) Force **(b)** Velocity

(c) Weight **(d)** None of these

25. The velocity of a body at any instant of time is called:

(a) Average speed **(b)** Uniform velocity

(c) Instantaneous velocity **(d)** None of these

26. The unit of acceleration in SI unit is:

(a) m/s **(b)** m/s^2

(c) m-s **(d)** $\frac{1}{m\text{-}s^2}$

27. If a body covers equal displacement in equal interval of time then velocity of the body is:

(a) Uniform **(b)** Average

(c) Instantaneous **(d)** None of these

28. If a body covers unequal displacement in unequal interval of time then velocity of the body is:

(a) Uniform **(b)** Variable

(c) Instantaneous **(d)** None of these

29. The acceleration of a body at a particular instant of time is:

(a) Uniform acceleration **(b)** Variable acceleration

(c) Instantaneous acceleration **(d)** None of these

30. Graphs which are used to describe the variation of velocity with time are called:

(a) Speed-time graph **(b)** Velocity-time graph

(c) Distance-time graph **(d)** None of these

31. If a body is moving with constant acceleration then the velocity-time graph is:

(a) Parabola **(b)** Hyperbola

(c) Straight line **(d)** None of these

32. In displacement-time graph, if the slope of line increases then:

(a) The acceleration increases **(b)** The velocity becomes greater

(c) The speed decreases **(d)** None of these

33. The average and instantaneous accelerations will be equal when a body moves with:

(a) Constant acceleration **(b)** Variable acceleration

(c) Retardation **(d)** Positive acceleration

34. A frame of reference at rest is called:

(a) Non-inertial frame **(b)** Inertial frame

(c) Accelerated frame **(d)** None of these

35. Those frame of references which are moving with some acceleration is called:

(a) Non-inertial frame **(b)** Inertial frame

(c) Both (a) and (b) **(d)** None of these

36. If $\vec{\Delta V}$ is the change in the velocity of a body during time Δt, then its acceleration is given by:

(a) $\vec{a} = \frac{\vec{\Delta x}}{\Delta t}$ **(b)** $\vec{a} = \frac{\Delta t}{\vec{\Delta V}}$

(c) $\vec{a} = \frac{\vec{\Delta V}}{\Delta t}$ **(d)** $\vec{a} = \vec{\Delta V} \cdot \Delta t$

37. The laws of motion shows the relation between:

(a) Distance and velocity **(b)** Displacement and velocity

(c) Mass and velocity **(d)** Force and acceleration

38. The quantity of matter in a body is called:

(a) Force **(b)** Mass

(c) Displacement **(d)** Speed

39. Newton's first law of motion is also called:

(a) Law of inertia **(b)** Law of momentum

(c) Ampere's law **(d)** None of these

40. The property of a body due to which it opposes its state of rest or of motion is called:

(a) Momentum **(b)** Torque

(c) Weight **(d)** Inertia

41. Laws of motion are valid in a frame which is:

(a) In motion **(b)** Inertial

(c) Both (a) and (b) **(d)** None of these

42. Laws of motion are not valid in a frame which is:

(a) Inertial **(b)** Non-inertial

(c) In the space **(d)** None of these

43. Newton's laws are applicable on the objects which have:

(a) High speed and light mass **(b)** Low speed and light mass

(c) Low speed and heavy mass **(d)** None of these

44. The magnitude of acceleration produced in an object is inversely proportional with:

(a) Momentum **(b)** Velocity

(c) Mass **(d)** Applied force

45. The SI unit of force is:

(a) Newton **(b)** Kilogram

(c) Joule **(d)** Metre

46. The force which produces an acceleration of 1 m/s^2 in an object of mass 1 kg is equal to:

(a) One Ampere **(b)** One Watt

(c) One Newton **(d)** One Coulomb

47. If the force acting on a body is doubled, then acceleration becomes:

(a) Half **(b)** Constant

(c) One forth **(d)** Double

48. A mass of 10 kg moves with an acceleration of 10 m/s^2, the force on it is:

(a) 5 N **(b)** 100 N

(c) 50 N **(d)** 25 N

49. Inertia of a body is measured in terms of its:

(a) Weight **(b)** Force

(c) Mass **(d)** Acceleration

50. The rate of change of momentum is equal to:

(a) Applied force **(b)** Torque

(c) Distance **(d)** Time

51. The product of mass and velocity is called:

(a) Impulse **(b)** Momentum

(c) Force **(d)** Power

52. The expression $I = \vec{F} \times \Delta t$ represents:

(a) Momentum **(b)** Impulse

(c) Force **(d)** Power

53. Impulse is equal to the:

(a) Change in momentum **(b)** Change of force

(c) Change of time **(d)** Change of velocity

54. The dimensions of weight are:

(a) $[LT^{-1}]$ **(b)** $[MLT^{-2}]$

(c) $[M^2LT]$ **(d)** $[ML^2T]$

55. SI unit of impulse is:

(a) kg m/s **(b)** N-m

(c) Ns **(d)** None of these

56. The motion of the rocket in the space is according to the law of conservation of:

(a) Energy **(b)** Mass

(c) Linear momentum **(d)** None of these

57. A force of 100 N acts in a body for 5 seconds, what will be the change in momentum:

(a) 20 N-s **(b)** 500 N-s

(c) 100 N-s **(d)** 1000 N-s

58. A body thrown upward making an angle with the horizontal and moving freely under the action of gravity is called:

(a) Linear motion **(b)** Projectile motion

(c) Both (a) and (b) **(d)** None of these

59. The path followed by the projectile is called:

(a) Height of projectile **(b)** Range of projectile

(c) Trajectory **(d)** None of these

60. During projectile motion, the horizontal component of velocity:

(a) Remains constant **(b)** Increases

(c) Decreases **(d)** Becomes zero

61. The trajectory of a projectile is:

(a) Circle **(b)** Parabola

(c) Hyperbola **(d)** Straight line

62. The vertical component of velocity at highest point during projectile motion is:

(a) Maximum **(b)** Constant

(c) Zero **(d)** Same

63. A foot ball kicked in a air is the example of:

(a) Linear motion **(b)** Circular motion

(c) Rotational motion **(d)** Projectile motion

64. The acceleration along x-direction in case of projectile is:

(a) Zero **(b)** Equal to gravity

(c) Maximum **(d)** Constant

65. Motion of a projectile is:

(a) One dimension **(b)** Two dimension

(c) Three dimension **(d)** None of these

66. Initial vertical velocity of a projectile is given by:

(a) $v_i \cos\theta$ **(b)** $v_i \sin\theta$

(c) $v_i^2 \sin\theta$ **(d)** $v_i \tan\theta$

67. The magnitude of the velocity of the projectile is:

(a) $v = \sqrt{v_x^2 + v_y^2}$ **(b)** $v = \sqrt{v_x^2 - v_y^2}$

(c) $v = v_x^2 + v_y^2$ **(d)** None of these

68. The expression for maximum height is:

(a) $\frac{v_i^2 \sin^2\theta}{2g}$ **(b)** $\frac{v_i^2 \sin\theta}{g}$

(c) $\frac{v_i \sin^2\theta}{2g}$ **(d)** $\frac{v_i \sin\theta}{2g}$

69. The SI unit of acceleration is:

(a) ms^2 **(b)** m/s^2

(c) m^2s **(d)** None of these

70. The horizontal component of velocity of a projectile thrown with initial velocity 300 m/s at an angle of 90° will be:

(a) 450 m/s **(b)** 200 m/s

(c) 150 m/s **(d)** Zero

71. Height attained by the projectile will be maximum when the angle of projection is:

(a) 30° **(b)** 60°

(c) 45° **(d)** 90°

72. Velocity of the projectile at the maximum height attained when projected with velocity v_i is:

(a) $v_x = v_i \sin\theta$ **(b)** $v_H = v_i \cos\theta$

(c) Zero **(d)** v_i

73. A body falling freely strikes the ground in 5 seconds, distance covered by it in 5 second is:

(a) 122.5 m **(b)** 25 m

(c) 24.5 m **(d)** 34.5 m

74. The total time for which the projectile remains in air is called:

(a) Time of projectile **(b)** Time period

(c) Time of flight **(d)** Time constant

75. The time of flight is given by:

(a) $\frac{2v_i \sin\theta}{g}$ **(b)** $\frac{v_i \sin\theta}{g}$

(c) $\frac{v_i^2 \sin\theta}{2g}$ **(d)** $\frac{v_i \sin\theta}{2g}$

76. The angle of projection to cover maximum horizontal range is:

(a) 90° **(b)** 120°

(c) 18° **(d)** 45°

77. The expression for maximum range of projectile is given by:

(a) $\frac{v_i^2}{g}$ **(b)** $\frac{2v_i}{g}$

(c) $\frac{2v_i^2}{g}$ **(d)** $\frac{v_i^2}{2g}$

78. The path followed by the ballistic missile is called:

(a) Missile displacement **(b)** Ballistic trajectory

(c) Missile acceleration **(d)** Ballistic time

79. The ballistic missiles are useful only for:

(a) Long range **(b)** Vertical range

(c) Short range **(d)** Normal range

80. For long range, the missiles used are called:

(a) Long range missiles **(b)** Normal missiles

(c) Guided missiles **(d)** Rocket missiles

81. An object can have a constant speed even its velocity is:

(a) Constant **(b)** Changing

(c) Zero **(d)** Maximum

82. The system in which no external force acts called:

(a) Inertial system **(b)** Isolated system

(c) Non-material system **(d)** Thermal system

83. When there is no loss of K.E and momentum then the collision is called:

(a) Elastic collision **(b)** In-elastic collision

(c) Inertial collision **(d)** None of these

84. The ballistic trajectory is the path followed by:

(a) The powered guided missile **(b)** An un-powered and guided missile

(c) An un-powered and un-guided missile **(d)** None of these

85. The range of projectile is directly proportional to the:

(a) $\sin 2\theta$ **(b)** $\sin^2\theta$

(c) $\cos^2\theta$ **(d)** $\tan^2\theta$

86. The magnitude of vertical and horizontal range will be equal if angle of projection is:

(a) 120° **(b)** 45°

(c) 70° **(d)** 76°

87. A rocket propulsion is based on the principle of:

(a) Law of conservation of mass **(b)** Law of conservation of energy

(c) Law of conservation of momentum **(d)** None of these

88. The path of projectile is determined by:

(a) Magnetic field **(b)** Gravitational field

(c) Electric field **(d)** Electromagnetic field

89. The equation of parabola is:

(a) $y = bx - ax^2$ **(b)** $y = ax - bx^2$

(c) Both (a) and (b) **(d)** None of these

90. In a projectile motion, the horizontal range R depends upon:

(a) Angle of projection **(b)** Initial velocity

(c) Both (a) and (b) **(d)** None of these

91. The horizontal component of a projectile moving with initial velocity of 200 m/s at an angle of 60° to x-axis is:

(a) 100 m/s **(b)** 250 m/s

(c) 50 m/s **(d)** 200 m/s

92. The velocity of projectile is maximum at:

(a) Highest point **(b)** One forth of height

(c) Half of height **(d)** Before striking the ground

93. Horizontal range of projectile is:

(a) Equal to height **(b)** One fourth of height

(c) One half of height **(d)** Double of height

94. A force of 15 N acts on a body of mass 5 kg for 5 sec. to a distance of 10 cm, the rate of change of momentum is:

(a) 75 N **(b)** 45 N

(c) 15 N **(d)** 30 N

95. A fighter plane is chasing another plane, when it opens fire its speed.

(a) Increases **(b)** Decreases

(c) Remains same **(d)** It stops

96. If the horizontal range of a projectile is four times its maximum height, the angle of projection is:

(a) 30° **(b)** 45°

(c) $\sin^{-1}\left(\frac{1}{4}\right)$ **(d)** $\tan^{-1}\left(\frac{1}{4}\right)$

97. A train covers the first half distance between two stations at a speed of 40 kmh^{-1} and the other half at 60 kmh^{-1} then its average speed is:

(a) 45 kmh^{-1} **(b)** 48 kmh^{-1}

(c) 40 kmh^{-1} **(d)** None of these

98. During the projectile motion, the horizontal component of velocity.

(a) Changes with time **(b)** Becomes zero

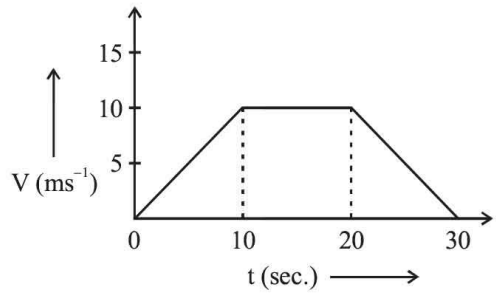
(c) Remains constant **(d)** Increases with time

99. A ball is projected at angle of 45° to the horizontal. If the horizontal range is 20 m, the maximum height to which the ball rises is:

(a) 2.5 m **(b)** 5.0 m

(c) 7.5 m **(d)** 10 m

100. In the following velocity time graph, the distance travelled by the body in metres is:



(a) 200

(b) 250

(c) 300

(d) 400

101. Newton's first law of motion gives definition of:

(a) Mass **(b)** Force

(c) Acceleration **(d)** Speed

102. Motion of rocket is based upon:

(a) Newton's third law of motion **(b)** Law of conservation of momentum

(c) Newton's law of gravitation **(d)** Both (a) and (b)

103. The acceleration of projectile at the highest point is:

(a) Zero **(b)** Increases

(c) Decreases **(d)** Constant

104. A force of 12 N gives an acceleration 4 ms^{-2} to an object. The force required to give it an acceleration of 10 ms^{-2} is:

(a) 15 N **(b)** 20 N

(c) 25 N **(d)** 30 N

105. Acceleration of 1.5 ms^{-2} expressed in kmh^{-2} is:

(a) 324 **(b)** 5.4

(c) 5400 **(d)** 19440

106. A bomb of mass 12 kg initially at rest, explodes into two pieces of masses 4 kg and 8 kg. The speed of the 8 kg mass is 6 ms^{-1}. The K.E of the 4 kg mass is:

(a) 32 J **(b)** 48 J

(c) 114 J **(d)** 288 J

107. The range of projectile when launched at an angle of 15° with the horizontal is 1.5 m. Its range, when launched at 45° with the same speed is:

(a) 3.0 m **(b)** 1.5 m

(c) 6.0 km **(d)** 0.75 km

108. For a projectile, the ratio of maximum height reached to the square of flight time is:

(a) 5 : 4 **(b)** 5 : 2

(c) 5 : 1 **(d)** 10 : 1

109. A stone is thrown vertically upward with a velocity of 30 ms^{-1}. If the acceleration due to gravity is 10 ms^{-2}, what is the distance travelled by the particle during the first second of its motion.

(a) 30 m **(b)** 25 m

(c) 10 m **(d)** None of these

110. A body is dropped from a tower with zero velocity reaches ground in 4 seconds. The height of the tower is about:

(a) 80 m **(b)** 20 m

(c) 160 m **(d)** 40 m

111. A body starting from rest covers a distance of 0.45 km and acquires a velocity of 300 km/h. Its acceleration will be:

(a) 0.092 ms^{-2} **(b)** 0.5 ms^{-2}

(c) 7.71 ms^{-2} **(d)** 0.15 ms^{-2}

112. The distance covered by a body in time 't' starting from rest is:

(a) $\frac{at^2}{2}$ **(b)** vt

(c) $\frac{a^2t}{2}$ **(d)** at^2

113. At what angle, the range and maximum range are equal?

(a) 45° **(b)** 90°

(c) 60° **(d)** 0°

114. A cricket ball is hit so that it travels straight up in air and it can acquires 3 seconds to reach the maximum height. Its initial velocity is:

(a) 10 ms^{-1} **(b)** 15 ms^{-1}

(c) 29.4 ms^{-1} **(d)** 12.2 ms^{-1}

115. A bullet of mass 10 g hits a target and penetrates 2 cm into it. If the average resistance offered by the target is 100 N then the velocity with which the bullet hits the target is:

(a) 10 ms^{-1} **(b)** 1052 ms^{-1}

(c) 20 ms^{-1} **(d)** $20\sqrt{2}$ ms^{-1}

ANSWERS

1.	(b)	**2.**	(a)	**3.**	(b)	**4.**	(a)
5.	(d)	**6.**	(a)	**7.**	(c)	**8.**	(c)
9.	(d)	**10.**	(d)	**11.**	(a)	**12.**	(a)
13.	(a)	**14.**	(a)	**15.**	(c)	**16.**	(c)
17.	(a)	**18.**	(c)	**19.**	(d)	**20.**	(d)
21.	(c)	**22.**	(a)	**23.**	(d)	**24.**	(a)
25.	(c)	**26.**	(b)	**27.**	(a)	**28.**	(b)
29.	(c)	**30.**	(b)	**31.**	(c)	**32.**	(b)
33.	(a)	**34.**	(b)	**35.**	(a)	**36.**	(c)
37.	(d)	**38.**	(b)	**39.**	(a)	**40.**	(d)
41.	(b)	**42.**	(b)	**43.**	(c)	**44.**	(c)
45.	(a)	**46.**	(c)	**47.**	(d)	**48.**	(b)
49.	(c)	**50.**	(a)	**51.**	(b)	**52.**	(b)
53.	(a)	**54.**	(b)	**55.**	(c)	**56.**	(c)
57.	(a)	**58.**	(b)	**59.**	(c)	**60.**	(a)
61.	(b)	**62.**	(c)	**63.**	(d)	**64.**	(a)
65.	(b)	**66.**	(b)	**67.**	(a)	**68.**	(a)
69.	(b)	**70.**	(d)	**71.**	(c)	**72.**	(c)
73.	(a)	**74.**	(c)	**75.**	(a)	**76.**	(d)
77.	(a)	**78.**	(b)	**79.**	(c)	**80.**	(c)
81.	(b)	**82.**	(b)	**83.**	(a)	**84.**	(c)
85.	(a)	**86.**	(d)	**87.**	(c)	**88.**	(b)
89.	(b)	**90.**	(c)	**91.**	(a)	**92.**	(a)
93.	(a)	**94.**	(c)	**95.**	(b)	**96.**	(b)
97.	(b)	**98.**	(c)	**99.**	(b)	**100.**	(a)
101.	(b)	**102.**	(d)	**103.**	(d)	**104.**	(d)
105.	(d)	**106.**	(d)	**107.**	(a)	**108.**	(a)
109.	(b)	**110.**	(a)	**111.**	(c)	**112.**	(a)
113.	(a)	**114.**	(c)	**115.**	(c)		