Elastic and Inelastic Collision

41. 100 *g* of a iron ball having velocity 10 *m/s* collides with a wall at an angle 30^o and rebounds with the same angle. If the period of contact between the ball and wall is 0.1 second, then the force experienced by the ball is

(a) 100*N* (b) 10 *N*

(c) 0.1 *N* (d) 1.0 *N*

42. Two bodies having same mass 40 *kg* are moving in opposite directions, one with a velocity of $10m/s$ and the other with $7m/s$. If they collide and move as one body, the velocity of the combination is

(a) $10m/s$ (b) $7m/s$

(c) $3m/s$ (d) $1.5m/s$

43. A body at rest breaks up into 3 parts. If 2 parts having equal masses fly off perpendicularly each after with a velocity of 12*m/s*, then the velocity of the third part which has 3 times mass of each part is

(a) $4\sqrt{2}m/s$ at an angle of 45^o from each body

(b) $24\sqrt{2}m/s$ at an angle of $135^o$from each body

(c) $6\sqrt{2}m/s$ at $135^o$from each body

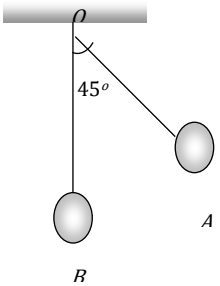
(d) $4\sqrt{2}m/s$ at 135^o from each body

44. A particle falls from a height *h* upon a fixed horizontal plane and rebounds. If *e* is the coefficient of restitution, the total distance travelled before rebounding has stopped is

(a) $h\left(\frac{1+e^2}{1-e^2}\right)$ (b) $h\left(\frac{1-e^2}{1+e^2}\right)$

(c) $\frac{h}{2}\left(\frac{1-e^2}{1+e^2}\right)$ (d) $\frac{h}{2}\left(\frac{1+e^2}{1-e^2}\right)$

45. The bob A of a simple pendulum is released when the string makes an angle of $45^o$with the vertical. It hits another bob *B* of the same material and same mass kept at rest on the table. If the collision is elastic



(a) Both *A* and *B* rise to the same height

(b) Both *A* and *B* come to rest at *B*

(c) Both *A* and *B* move with the same velocity of *A*

(d) A comes to rest and *B* moves with the velocity of *A*

46. A big ball of mass *M*, moving with velocity *u* strikes a small ball of mass *m*, which is at rest. Finally small ball obtains velocity *u* and big ball *v*. Then what is the value of *v*

(a) $\frac{M-m}{M+m}u$ (b) $\frac{m}{M+m}u$

(c) $\frac{2m}{M+m}u$ (d) $\frac{M}{M+m}u$

47. A body of mass 5 *kg* moving with a velocity 10*m/s* collides with another body of the mass 20 *kg* at, rest and comes to rest. The velocity of the second body due to collision is

(a) 2.5 *m/s* (b) 5 *m/s*

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

48. A ball of mass *m* moving with velocity *V*, makes a head on elastic collision with a ball of the same mass moving with velocity 2*V* towards it. Taking direction of *V* as positive velocities of the two balls after collision are

(a) $-V$ and $2V$ (b) $2V$ and $-V$

(c) V and $-2V$ (d) $-2V$ and V

49. A body of mass M_1 collides elastically with another mass M_2 at rest. There is maximum transfer of energy when

(a) $M_1 > M_2$

(b) $M_1 < M_2$

(c) $M_1 = M_2$

(d) Same for all values of M_1 and M_2

50. A body of mass 2*kg* makes an elastic collision with another body at rest and continues to move in the original direction with one fourth of its original speed. The mass of the second body which collides with the first body is

(a) 2 *kg* (b) 1.2 *kg*

(c) 3 *kg* (d) 1.5 *kg*

51. In the elastic collision of objects

(a) Only momentum remains constant

(b) Only K.E. remains constant

(c) Both remains constant

(d) None of these

52. Two particles having position vectors $\vec{r_1} = (3\hat{\imath} + 5\hat{\jmath})$ *metres* and $\vec{r_2} = (-5\hat{\imath} - 3\hat{\jmath})$ *metres* are moving with velocities $\vec{v}_1 = (4\hat{\imath} + 3\hat{\jmath})m/s$ and $\vec{v}_2 = (\alpha\hat{\imath} + 7\hat{\jmath})\ \ m/s$. If they collide after 2 seconds, the value of $'\alpha'$ is

(a) 2 (b) 4

(c) 6 (d) 8

53. A neutron makes a head-on elastic collision with a stationary deuteron. The fractional energy loss of the neutron in the collision is

(a) 16/81 (b) 8/9

(c) 8/27 (d) 2/3

54. A body of mass *m* is at rest. Another body of same mass moving with velocity V makes head on elastic collision with the first body. After collision the first body starts to move with velocity

(a) *V* (b) 2*V*

(c) Remain at rest predictable (d) No

55. A body of mass *M* moves with velocity *v* and collides elastically with a another body of mass *m* (*M*>>*m*) at rest then the velocity of body of mass *m* is

(a) *v* (b) 2*v*

(c) *v*/2 (d) Zero

56. Four smooth steel balls of equal mass at rest are free to move along a straight line without friction. The first ball is given a velocity of 0.4 *m/s*. It collides head on with the second elastically, the second one similarly with the third and so on. The velocity of the last ball is

(a) $0.4m/s$ (b) $0.2m/s$

(c) $0.1m/s$ (d) $0.05m/s$

57. A space craft of mass '*M*' and moving with velocity '*v*' suddenly breaks in two pieces of same mass *m*. After the explosion one of the mass '*m*' becomes stationary. What is the velocity of the other part of craft

(a) $\frac{Mv}{M-m}$ (b) v

(c) $\frac{Mv}{m}$ (d) $\frac{M-m}{m}v$

58. Two masses m_A and m_B moving with velocities v_A and v_B in opposite directions collide elastically. After that the masses m_A and m_B move

with velocity v_B and v_A respectively. The ratio (m_A/m_B) is

(a) 1 (b) $\frac{v_A - v_B}{v_A + v_B}$

(c) $(m_A + m_B)/m_A$ (d) v_A/v_B

59. A ball is allowed to fall from a height of 10 *m*. If there is 40% loss of energy due to impact, then after one impact ball will go up to

(a) 10 *m* (b) 8 *m*

(c) 4 *m* (d) 6 *m*

60. Which of the following statements is true

(a) In elastic collisions, the momentum is conserved but not in inelastic collisions

(b) Both kinetic energy and momentum are conserved in elastic as well as inelastic collisions

(c) Total kinetic energy is not conserved but momentum is conserved in inelastic collisions

(d) Total kinetic energy is conserved in elastic collisions but momentum is not conserved in elastic collisions

61. A tennis ball dropped from a height of 2 *m* rebounds only 1.5 *m* after hitting the ground. What fraction of its energy is lost in the impact

(a) $\frac{1}{4}$ (b) $\frac{1}{2}$

(c) $\frac{1}{3}$ (d) $\frac{1}{8}$

62. A body of mass *m* moving with velocity *v* makes a head-on collision with another body of mass 2 *m* which is initially at rest. The loss of kinetic energy of the colliding body (mass *m*) is

(a) $\frac{1}{2}$ of its initial kinetic energy

(b) $\frac{1}{9}$ of its initial kinetic energy

(c) $\frac{8}{9}$ of its initial kinetic energy

(d) $\frac{1}{4}$ of its initial kinetic energy

63. The quantities remaining constant in a collision are

(a) Momentum, kinetic energy and temperature

(b) Momentum and kinetic energy but not temperature

(c) Momentum and temperature but not kinetic energy

(d) Momentum but neither kinetic energy nor temperature

64. An inelastic ball is dropped from a height of 100 *m*. Due to earth, 20% of its energy is lost. To what height the ball will rise

(a) 80 *m* (b) 40 *m*

(c) 60 *m* (d) 20 *m*

65. A ball is projected vertically down with an initial velocity from a height of 20 *m* onto a horizontal floor. During the impact it loses 50% of its energy and rebounds to the same height. The initial velocity of its projection is

(a) $20ms^{-1}$ (b) $15ms^{-1}$

(c) $10ms^{-1}$ (d) $5ms^{-1}$

66. A tennis ball is released from height *h* above ground level. If the ball makes inelastic collision with the ground, to what height will it rise after third collision

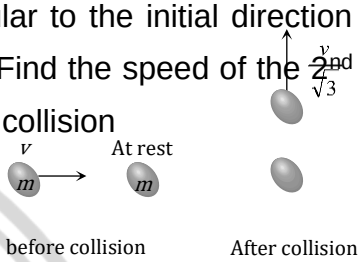
(a) he^6

(b) e^2h

(c) e^3h

(d) None of these

67. A mass '*m*' moves with a velocity '*v*' and collides inelastically with another identical mass. After collision the Ist mass moves with velocity $\frac{v}{\sqrt{3}}$ in a direction perpendicular to the initial direction of motion. Find the speed of the 2nd mass after collision



(a) $\frac{2}{\sqrt{3}}v$

(b) $\frac{v}{\sqrt{3}}$

(c) *v*

(d) $\sqrt{3}v$

68. A sphere collides with another sphere of identical mass. After collision, the two spheres move. The collision is inelastic. Then the angle between the directions of the two spheres is

(a) 90°

(b) 0°

(c) 45°

(d) Different from 90°