PHYSICS 7th

1. A small spherical lead shot is dropped into a highly viscous liquid. Then it
A. goes down with constant acceleration
B. first accelerates and then has constant velocity
C. has uniform retardation
D. has constant velocity at first and then accelerates
2. A soap bubble of radius r is blown till its diameter is trebled. What is the energy required to do this?
A. $4\pi r^2\sigma$ B. $64\pi r^2\sigma$
C. $32\pi r^2\sigma$ D. $24\pi r^2\sigma$
3. A strip of rubber 8 cm long is stretched until it is 10 cm long. What is the tensile strain?
A. 0.25 B. 0.30 C. 0.20 D. 0.35
4. A bimetallic strip consists of brass and iron. When it is heated, it bends into an arc with brass on the convex side of the arc while the iron is on the concave side. This is because
A. iron has a larger linear expansivity than brass
B. brass has a larger linear expansivity than iron
C. density of brass is less than that of iron
D. specific heat capacity of brass is less than that of iron
5. How many joules of heat are required to completely convert 10 kg of ice at 0^oC to water at the same temperature?
A. 3.36×10^8 J B. 3.36×10^6 J
C. 3.36×10^4 J D. 3.36×10^5 J
6. Which one of the following is most suitable to measure very high temperatures?
A. Mercury thermometer B. Pyrometer
C. Platinum resistance thermometer D. Thermoelectric thermometer
7. What are the dimensions of E in the relation $E = \sigma T^4$?
A. ML^0T^{-3} B. $M^2L^2T^{-4}$
C. $M^0L^0T^2$ D. $M^0L^1T^{-3}$
8. Keeping the temperature constant, the pressure of a certain mass of a gas is decreased to a very low value. Then its mean free path
A. will not be affected

B. will increase
C. will decrease
D. will increase or decrease depending upon the gas
9. A Carnot engine working between 300 K and 1000 K has an output of 1400 J per cycle. The heat energy absorbed from the source per cycle is
A. 1500 J B. 700 J C. 2000 J D. 800 J
10. The following four gases are at the same temperature and pressure. Which gas molecule will have the highest root mean square velocity?

A. Hydrogen B. Neon C. Helium D. Oxygen
11. 4 metallic bars of copper, silver, iron, and lead of same size and polish are coated with wax. They are fixed to the side of a vessel, filled with hot water. Wax will melt to the longest length in
A. copper B. silver C. lead D. iron
12. Find out the wrong statement.
A. A plane mirror produces virtual images only
B. A convex lens may produce real or virtual images
C. A concave lens always produces real images
D. A concave lens always diminished images
13. Choose the correct statement.
A. When light travels from air to glass, total internal reflection will take place
B. When light travels from glass to water, total internal reflection takes place
C. When light travels from water to glass, total internal reflection takes place
D. When light travels from air to water, total internal reflection takes place
14. Two plane mirrors are inclined at 60° with respect to each other. If a point source placed between the two mirrors, the total number of virtual images formed is
A. 7 B. 6 C. 3 D. 5
15. A real image magnified 4 times is required to be formed on a screen placed at a distance of 80 cm from a mirror. What kind of mirror should be used and what is its distance from the object?
A. Convex mirror, 30 cm B. Concave mirror, 30 cm
C. Concave mirror, 20 cm D. Convex mirror, 25 cm
16. A ray of light travelling in glass ($\mu_g = 1.5$) is incident on a plane boundary separating ***glass and air. The critical angle for the glass-air boundary is***
A. $\sin^{-1}(1/3)$ B. $\sin^{-1}(2/3)$ C. $\cos^{-1}(1/3)$ D. $\tan^{-1}(2/3)$
17. An equilateral prism is in the minimum deviation position when the angle of incidence at one of the faces is 50°. Then the angle of minimum deviation is
A. 30° B. 50° C. 40° D. 45°
18. An achromatic combination is made using a convex lens (of material of dispersive power ω_1) in contact with a concave lens (of material of dispersive power ω_2). If this combination is to be used as the objective of a microscope,
A. $\omega_1 > \omega_2$ B. $\omega_1 < \omega_2$
C. $\omega_1 = \omega_2$ D. $\omega_1 = \omega_2$
2
19. Which one of the following waves can't be polarised?
A. Radio waves B. Sound waves in a gas
C. Visible light waves D. Ultraviolet waves
20. The sky looks blue because
A. of reflection of light from the sea
B. sunlight is polarised by the atmosphere
C. light scattered by dust particles and air molecules is mostly blue
D. it is the natural colour of the sky
21. The velocity of sound wave in gas depends upon
A. the amplitude of the wave B. frequency of the wave
C. pressure of the gas D. all the above factors
22. A man fires a shot, standing in front of a cliff at a distance of 175 m. If the velocity of sound in air is 350 m/s, when will he hear the echo?
A. After 1/2 second B. After 1 second

C. After 3/2 seconds D. After 2 seconds

23. A sonometer wire under a tension T resonates to a tuning fork of frequency 250 Hz when its length is 20 cm. If 30 cm of the same wire under the same tension resonates to a frequency N, then N in Hz is

A. 376.7 B. 166.7 C. 366.7 D. 466.7

24. The velocity of sound in hydrogen at some temperature is V_1. The velocity of sound in some other gas which is nine times denser is V_2. Then V_2 is

A. $3V_1$ B. $V_1/3$ C. $9V_1$ D. $V_1/9$

25. In a Kundt's tube experiment with air, the distance between two consecutive nodes was 10 cm. If the total length of the clamped brass rod used in the experiment was one metre, the ratio V_s/V_a, where V_s is the velocity of sound in brass and V_a is the velocity of sound in air, is

A. 5 B. 15 C. 10 D. 25

26. In a pipe closed at one end of the fifth harmonic has a frequency of 2500 Hz. If the velocity of sound in air at room temperature is 350 m/s, calculate the length of the pipe.

A. 17.5 cm B. 20 cm

C. 15 cm D. 16.3 cm

27. Two trains approach each other at a speed of 54 km/h. If the note of the whistle emitted by one engine has a frequency of 335 Hz, calculate the apparent frequency of the note as heard by the driver of the other train. Velocity of sound in air = 350 m/s.

A. 350 Hz B. 365 Hz C. 375 Hz D. 360 Hz

28. The frequency of ultrasonic waves is

A. below 1000 Hz

B. below 10000 Hz

C. above 20000 Hz

D. between 10000 Hz and 20000 Hz

29. The vertical component of the earth's magnetic field is zero at

A. geographic poles B. magnetic poles

C. magnetic equator D. 35_o latitude

30. A small rod is placed close to the pole of a permanent magnet. It is repelled in whatever position it is held. Then it should be

A. paramagnetic B. diamagnetic

C. ferromagnetic D. non-magnetic

31. "Aurora Borealis" is seen

A. only at the earth's equator B. only at the earth's magnetic south pole

C. only at the earth's magnetic north pole D. all over the earth

32. The workdone in carrying a positive charge q from one point to another in a equipotential surface, of potential V is

A. zero B. V/q C. Vq D. none of the above

33. If the earth (radius R) stops rotating about its axis, the value of g at the equator would

A. increase by ωR B. remain the same

C. decrease by $\omega_2 R$ D. increase by $\omega_2 R$

34. If L, C, and R represents the physical quantities inductance, capacitance and resistance respectively, the combination having dimension of time is

A. C/L B. $1/\sqrt{LC}$ C. L/R D. $\sqrt{RC}$

35. An air column in a pipe which is closed at one end will be in resonance with a vibrating tuning fork of frequency 264 Hz, if the length of the column is

A. 125 cm B. 31.25 cm C. 93.75 cm D. 62.50 cm

36. In a X-ray tube, the intensity of the emitted X-ray beam is increased by
A. decreasing the filament current B. increasing the target potential
C. decreasing the target potential D. increasing the filament current
37. Steam at 100^oC is passed into 1.1 kg of water contained in a calorimeter of water equivalent 0.02 kg at 15^oC till the temperature of the calorimeter and its contents rises to 80^oC. The mass of the steam condensed in kg is
A. 0.065 B. 0.260 C. 0.130 D. 0.135
38. Seventy calories of heat are required to raise the temperature of 2 moles of an ideal gas at constant pressure from 30^oC to 35^oC. The amount of heat required in calories to raise the temperature of the same gas through the same range of temperature at constant volume is ($\gamma = 1.4$)
A. 50 B. 30 C. 90 D. 70
39. A narrow slit of width 1 mm is illuminated by monochromatic light of wagelength 600 nm. The distance between the first minima on either side of a screen at a distance of 2 m is
A. 1.2 cm B. 1.2 mm
C. 2.4 cm D. 2.4 mm
40. The distance between the object and its real image formed by a convex lens of focal length f can't be
A. greater than 4f B. greater than 2f C. less than 8f D. less than 4f
41. If force (F), acceleration (A) and time (T) are the fundamental physical quantities, the dimensions of energy is
A. $F^2A^{-1}T$ B. FAT^2 C. FAT^{-2} D. $FA^{-1}T$

42. The acceleration of free fall is found from the formula $g = [(4\pi^2 l)/T^2]$. If the value of l is subject to 2% uncertainty and the value of T to 5% uncertainty, the maximum uncertainty in the value of g is
A. 9% B. 3% C. 8% D. 12%
43.A motor car travelling due north at 10 m/s turns left through an angle of 90^o. If its speed remains constant during this time, the change in the velocity of the car is
A. 14.1 m/s in a S-W direction
B. 14.1 m/s in a N-W direction
C. 10 m/s in a westerly direction
D. zero
44. A container of volume V contains a mixture of an ideal gas and an unsaturated vapour. If the mixture is slowly compressed keeping the temperature constant until the volume is reduced to V/2, then
A. the vapour pressure is reduced but the gas pressure is doubled
B. the vapour pressure is doubled and the gas pressure remains constant
C. the vapour pressure and the gas pressure are both doubled
D. the vapour pressure remains constant but the gas pressure is doubled
45. A small amplitude progressive wave in a stretched string has a velocity of 10 m/s and a frequency of 100 Hz. The phase difference in radians between points 2.5 cm apart in the string is
A. $\pi/8$ B. $\pi/2$ C. $3\pi/8$ D. $\pi/4$
46. What is the fractional change in tension necessary in a sonometer wire of fixed length to produce a note one octave lower than before?
A. 3/4 B. 2/3 C. 1/2 D. 1/4
47. Two equal negative charges -q each are fixed at the points (0, a) and (0, -a) on the Yaxis.

A positive charge Q is released from rest at the point (2a, 0) on the X-axis. The charge Q will
A. move to origin and remain at rest
B. execute oscillatory but not simple harmonic motion
C. execute simple harmonic oscillations about the origin
D. remain static at the point (2a, 0)
48. A mass m is moving with a constant velocity parallel to the X-axis. Its angular momentum with respect to the origin
A. remains constant B. is zero

C. goes on decreasing D. goes on increasing
49. A ball hits the ground and rebounds after an inelastic collision. In this case,
A. the total momentum of the ball and the earth is conserved
B. the momentum of the ball just before collision is the same as that just after collision
C. the mechanical energy of the ball remains the same in the collision
D. the total energy of the ball and earth is conserved
50. A tube closed at one end and containing air produces when excited a fundamental note of frequency 512 Hz. If the tube is open at both ends, the fundamental frequency that can be excited in Hz is
A. 1024 B. 512 C. 256 D. 128
51. A pendulum is suspended from the roof of a car. If it deviates through an angle of 2^o from the vertical, the acceleration of the car in m/s^2 is
A. 2g B. 2 C. $90^o/\pi g$ D. $\pi g/90^o$
52. The potential difference applied to an X-ray tube is increased. As a result, in the emitted radiations
A. the intensity increases B. the minimum wavelength increases
C. the intensity decreases D. the minimum wavelength decreases
53. The ratio of the energy of a photon of 2000 Å wavelength radiation to that of 4000 Å radiation is
A. 1/4 B. 4 C. 1/2 D. 2
54. The half-life period of a radioactive element is 140 days. After 560 days, one gram of the element will reduce to
A. (1/2)g B. (1/4)g C. (1/8)g D. (1/16)g
55. When alpha particles are sent through a thin metal foil, most of them go through the foil because
A. alpha particles are attracted by the
electrons
B. alpha particles are positively charged
C. most part of the atom is empty space D. alpha particles move with high velocity
56. The displacement of particles in a string stretched in the X-direction is represented by y, those describing wave motion are
A. cos kx sin ωt B. $k^2x^2 + \omega^2t^2$
C. $\cos^2 (kx + \omega t)$ D. $\cos^2 (k^2x^2 + \omega^2t^2)$
57. A parallel plate capacitor is charged and the charging battery is then disconnected. If ***the plates of the capacitors are moved farther apart by means of insulating handle, then***
A. the charge on the capacitor increases
B. the voltage across the plates increases
C. the capacitance increases
D. the electrostatic energy stored in the capacitor decreases

58. If the velocity of light in vacuum, acceleration due to gravity 10 m/s^2 and normal atmospheric pressure 1 X 10^5 N/m^2 are taken
A. the fundamental unit of mass is 81 X 10^{34}
kg
B. the unit of length is 18 X 10^{15} m
C. the unit of time is 9 X 10^7 s D. the unit of mass is 3 X 10^8 kg
59. A particle is acted upon by a force of constant magnitude which is always perpendicular to the velocity of the particle. The motion of the particle takes place in a plane. It follows that
A. its velocity is constant B. its acceleration is constant
C. it moves in a circular path D. the force does work on the particle
60. If g is the acceleration due to gravity on the earth's surface, the gain in the potential energy of an object of mass m raised from the surface of the earth to a height equal to the radius R of the earth is
A. (1/2) mgR B. 2mgR
C. mgR D. (1/2) mgR^2
61. A ship of mass 3 X 10^7 kg, initially at rest is pulled by a force of 5 X 10^4 N through a distance of 3 m. Assuming that the resistance due to water is negligible, the speed of the ship is
A. 1.5 m/s B. 60 m/s C. 0.1 m/s D. 5 m/s
62. A block of mass 2 kg rests on a rough inclined plane making an angle of 30^o with the horizontal. The coefficient of static friction between the block and the plane is 0.7. The frictional force on the block is
A. 9.8 N B. 0.7 X 9.8 X √3 N
C. 9.8 X √3 N D. 0.7 X 9.8 N
63. The period of revolution of a satellite around a planet of radius R is T. The period of the same satellite around another planet whose radius is 3R, is
A. T B. 3T C. 3√3T D. 9T
64. A solid spherical ball rolls on a table without slipping. The fraction of its total energy associated with rotation is

A. 2/7 B. 2/5 C. 3/5 D. 3/7
65. When an air bubble rises from the bottom of a lake to the surface, its radius doubles. The atmospheric pressure is equal to that of a column of water of height H. The depth of the lake is
A. 2H B. H
C. 8H D. 7H
66. Two waves Y = 0.25 sin 316 T and Y = 0.25 sin 310 T are travelling in the same direction. The number of beats produced per second will be
A. π/3 B. 3/π C. 3π D. 6π
67. A flask containing air at 27^oC at atmospheric pressure is corked up. A pressure of 2.5 atmospheres inside the flask would force the cork out. The temperature at which it will happen is
A. 67.5^oC B. 577^oC
C. 750^oC D. 670^oC
68. A sphere, a cube and a thin circular plate all made of the same material and having the same mass are initially heated to a temperature of 200^oC. Which of then cools fastest when left in air at room temperature?
A. Sphere B. Cube

C. Circular plate D. All at the same rate
69. The temperature coefficient of resistance of a wire is 0.00125 $(^oC)^{-1}$. At 300 K its resistance is one ohm. The resistance of the wire will be 2 ohm at
A. 1154 K B. 1100 K
C. 1400 K D. 1127 K
70. A convex lens of focal length 40 cm is in contact with a concave lens of focal length 25 cm. The power of the combination is
A. - 1.5 dioptres B. - 6.5 dioptres
C. + 6.5 dioptres D. + 1.5 dioptres
71. In Young's double slit experiment, the separation between the slits is halved and the distance between the slits and the screen is doubled. The fringe width is
A. unchanged B. halved
C. doubled D. quadrupled
72. The dimensional formula for the relative refractive index is
A. $M^0L^0T^0$ B. $M^1L^1T^1$
C. $M^0L^0T^1$ D. $M^0L^0T^{-1}$
73. A thin circular ring of mass M and radius R is rotating about its axis with a constant ***angular velocity ω. Two objects each of mass m are attached gently to the opposite ends*** of a diameter of the ring. The ring now rotates with an angular velocity
A. $\omega M/(M + m)$ B. $\omega(M - 2M)/(M + 2m)$
C. $\omega M/(2M + m)$ D. $\omega(M + 2m)/M$
74. Two masses of 1 gm and 4 gm are moving with equal kinetic energies. The ratio of the magnitudes of their linear momenta is
A. 4 : 1 B. $\sqrt{2}$: 1
C. 1 : 2 D. 1 : 16
75. A particle moves such that its acceleration 'a' is given by a = -kx, where x is the displacement from the equilibrium position and k is a constant. The period of oscillation is
A. $2\pi\sqrt{k}$ B. $2\pi/\sqrt{k}$ C. $2\pi/k$ D. $2(\sqrt{\pi/k})$
76. The escape velocity on the earth is 11.2 km/s. If a body is projected in a direction making an angle of 45^o to the vertical, then the escape velocity is
A. (11.2 X 2) km/s B. 11.2 km/s
C. [11.2 X $(1/\sqrt{2})$] km/s D. (11.2 X $\sqrt{2}$) km/s
77. Workdone by an ideal gas in process A is double the workdone in process B. The temperature rises through the same amount in the two processes. If C_A and C_B be the molar heat capacities for the two processes, then
A. $C_A = C_B$
B. $C_A < C_B$
C. $C_A > C_B$
D. $C_A = C_B$ can't be defined
78. If the distance of a planet from the sun is 4 times that of the earth, find the period of revolution of the planet around the sun
A. 10 years B. 9 years
C. 8 years D. 6 years
79. The electric field and the electric potential at a point are E and V respectively, then
A. if E = 0, V need not be zero B. if V = 0, E must be zero
C. if E = 0, V must be zero D. if V ≠ 0, E can't be zero
80. A cricket ball is hit for a six at an angle 45^o to the horizontal with kinetic energy K_1.

At the top of the flight, its kinetic energy is (neglecting air resistance)
A. zero B. $K_1/4$
C. $K_1/2$ D. K_1
81. A helicopter is lifting a mass of 600 kg and rising at a constant acceleration of 2 m/s^2.
The tension in the rope carrying the mass is (assuming g = 10 m/s^2)
A. 6000 N B. 7200 N
C. 4800 N D. 8400 N
82. A single force is applied to a block of mass M which is in contact with another block of mass m, causes both the masses to accelerate. The force of interaction between the two masses is
A. mF/(M + m) B. mF/M
C. mF/(M - m) D. MF/(M + m)
83. 10 g of ice cubes at 0^oC are released in a tumbler (of water equivalent 55 g) at 40^oC. Assuming that negligible heat is taken from the surroundings, the resultant temperature of water in the tumbler will be nearly
A. 25^oC B. 28^oC
C. 18^oC D. 22^oC
84. Steam is passed into 22 g of water at 20^oC. The mass of water that will be present when water acquires a temperature of 90^oC is (Take L of steam to be 540 cal/g)
A. 23.8 g B. 26.5 g C. 24.8 g D. 25.2 g
85. The temperature of air in a room is 20^oC and the dew point is 10^oC. The S.V.P. at these temperatures are 17 mm and 9 mm of Hg respectively. Then the relative humidity of air in the room is nearly
A. 53 % B. 58 % C. 63 % D. 44 %
86. Two smooth spheres A and B are moving directly towards one another, the sphere A having mass m and speed u. After impact, the spheres move in opposite directions and the speed of A is v. The magnitude of impulse given to B is
A. mu B. mv
C. mu - mv D. mu + mv
87. A golf ball of mass 0.05 kg is driven from the tee with a velocity of 70 m/s. If the period of contact with the club was 5 X 10^{-4} s, the mean accelerating force on the ball was
A. 1.4 X 10^3 N B. 3.5 X 10^3 N
C. 2.5 X 10^3 N D. 7.0 X 10^3 N
88. The distance between the earth and the star Sirius is 10 light years. The distance when converted to metres is
A. 9.47 X 10^{16} B. 9 X 10^{16}
C. 3 X 10^9 D. 6.67 X 10^{12}
89. A car of mass M is driven with acceleration 'a' along a straight level road around a
constant external resistance R. When the velocity is V, the rate at which the enging is working is
A. RV B. (Ma - R)V
C. (R + Ma)V D. (R - Ma)V
90. Two cars of masses M_1 and M_2 with $M_2 > M_1$ are travelling along a straight road. Their kinetic energies are equal. If the coefficient of friction between the tires and the road is the same for both cars,
A. car 1 comes to rest in a shorter distance than car 2
B. both cars come to rest in the same distance
C. car 2 comes to rest in a shorter distance than car 1

D. none of the above
91. Two satellites S_1 and S_2 descibes circular orbits of radii r and 2r respectively around a planet. If the angular velocity of S_1 is ω, the angular velocity of S_2 is
A. $(\omega\sqrt{2})/3$ B. $\omega/(2\sqrt{2})$
C. $\omega/2$ D. $\omega/\sqrt{2}$
92. An ordinary beam balance is known to have one arm slightly longer than the other. A body is placed in one pan and counterpoised by a mass m_1. When the body is placed in other pan, it needs m_2 to counterpoise it. The true weight of the body is then
A. $(m_1 + m_2)/2$ B. $(2m_1 + m_2)/2$
C. $\sqrt{(m_1 m_2)}$ D. $m_1 - m_2$
93. A particle executes simple harmonic motion of amplitude $2 X 10^{-3}$ m and a period of 0.10 s. Its maximum speed is
A. $4\pi X 10^{-2}$ m/s B. $2\pi X 10^{-2}$ m/s
C. $3\pi X 10^{-4}$ m/s D. $2\pi X 10^{-4}$ m/s
94. When a particle performs simple harmonic motion, the velocity leads the displacement by a phase angle of
A. π/4 radians B. 3π/4 radians
C. π/2 radians D. π radians
95. In an inelastic collision, state which of the following statements is true.
A. Momentum is conserved and kinetic energy is conserved
B. Momentum is not conserved but kinetic energy is conserved
C. Momentum is conserved and kinetic energy is not conserved
D. Momentum and kinetic energy are not conserved
96. A car moves along a straight horizontal road with a speed i) v and ii) 2v. The ratio of the shortest distance in which the car can be stopped, under identical conditions, is
A. 1 : 4 B. 1 : 3 C. 1 : 2 D. 1 : 1
97. A spring balance A and a beam balance B are used to weigh an object at different points on the earth. It will be observed that
A. the readings of A and B will be different at different points of the earth
B. the readings of A will be the same but the readings of B will be different at different places
C. both A and B will have the same reading at all points on the earth
D. the readings of A will be different but the readings of B will be same at different points on the earth
98. A plumb line is kept hanging from the roof of an engine. When the engine is moving along a straight track with an acceleration 'a', the plumb line will get inclined at an angle
A. $\tan^{-1}(a/g)$ B. $\tan^{-1}(g/a)$
C. $\cos^{-1}(a/g)$ D. $\sin^{-1}(g/a)$
99. A tractor on land pulls a laden barge in a canal beside, by a wire rope. The tension in the rope between the tractor and barge is 3000 N. If the rope makes an angle of 30^o with line of travel of the barge, which moves at 2m/s, the power of the tractor in the pulling is
A. 1732 W B. 3464 W C. 5196 W D. 6928 W
100. The velocity of a satellite moving around the earth at a height h above the surface is related to the acceleration due to gravity g' at that height by the formula
A. $\sqrt{[2g' (R + h)]}$ B. $\sqrt{[g' (R + h)]}$
C. $\sqrt{[g'/(R + h)]}$ D. $\sqrt{[g'/2(R + h)]}$
Solutions:
1 2 3 4 5 6 7 8 9 10

B B A B B B A B C A
11 12 13 14 15 16 17 18 19 20
B C B D C B C B B C
21 22 23 24 25 26 27 28 29 30
C B B B C A B C C B
31 32 33 34 35 36 37 38 39 40
C A D C B D C A D D

41 42 43 44 45 46 47 48 49 50
B D A C B A B A A A
51 52 53 54 55 56 57 58 59 60
D D D D C A B A C A
61 62 63 64 65 66 67 68 69 70
C B B A D B C C D A
71 72 73 74 75 76 77 78 79 80
D A C C B B C C A C
81 82 83 84 85 86 87 88 89 90
B D D C A B D A C C
91 92 93 94 95 96 97 98 99 100
B C A C C B D A C B