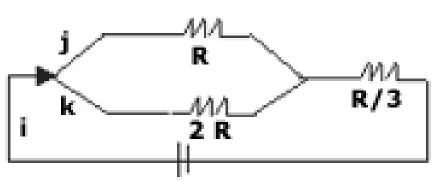
PHYSICS 4th

1. Sun releases energy by the process of
A. nuclear fusion
B. nuclear
disintegration
C. nuclear fission
D. spontaneous
combustion
2. The number of atoms per unit cell in a *sc, bcc,* and *fcc* are
A. 1, 2 and 4 respectively B. 8, 6 and 10 respectively
C. 1, 4 and 2 respectively D. 2, 4 and 1 respectively
3. In a diode, at saturation current, the plate resistance is
A. zero B. constant and finite C. infinite D. variable but finite
4. An *n*-type and a *p*-type silicon semi-conductor can be obtained by doping pure silicon with
A. sodium and magnesium respectively B. phosphorous and boron respectively
C. indium and sodium respectively D. boron and arsenic respectively
5. When the plate voltage of a triode is 150 V, its cut off voltage is -5 V. On increasing the plate voltage to 200 V, the cut off voltage can be
A. -4.5V B. -5.0V C. + 2.3 V D. -6.06 V
6. In a diode vacuum tube, the plate current is 5 mA when the plate voltage is 160 V. A grid is introduced between the plate and cathode and a voltage of -2 V is applied to it. The plate current then become
A. 20 mA B. 10 mA C. 4mA D. 7.5mA
7. A long spring is stretched by 2cm. Its potential energy is V. If the spring is stretched by 10cm, its potential energy would be
A. V/25 B. V/5 C. 5V D. 25V
8. The length of a rod as measured by an observer moving with respect to it is half of its proper length. The speed of the observer with respect to rod is
A. 3/2 c ms^{-1} B. c/2 ms^{-1} C. (√3)/2 c ms^{-1} D. 1/√2 c ms^{-1}
9. A + μ -meson with a proper half-life of 1.8 x 10^{-6} s is moving with a speed of 0.9 c with respect to an earth observer. The half-life of this μ -meson according to an observer sitting on it is
A. 1.8 x 10^{-6} s B. 1.8 x √0.19 x 10^{-6} s C. 1.8/√0.19 x 10^{-6} s D. 1.8 x 0.19 x 10^{6} s
10. The mass per nucleon in an ordinary hydrogen atom is
A. l/l6th mass per nucleon in an oxygen atom
B. slightly greater than the mass per nucleon in an oxygen atom
C. the same as mass per nucleon in an oxygen atom
D. slightly smaller than the mass per nucleon in an oxygen atom
11. Consider the following nuclear reaction
$_2He_4 + {_Z}X_A = {_{Z+2}}Y_{A+3} + W$

What particle does *W* denote ?
A. electron B. positron C. proton D. neutron
12. The function of graphite and the control rods in a nuclear reactor are
A. to produce neutrons and to shield the reactor
B. to slow down the neutrons and to absorb the excess neutrons respectively
C. to absorb the excess neutrons and to shield the reactor respectively
D. to absorb neutrons and to reduce the energy of the neutrons respectively
13. In the first observed nuclear reaction, $_7N_{14}$ was bombarded with α -particles. The reaction could be represented as
$_7N_{14} + {}_2He_4 = X + {}_1H_1$
The element in this reaction is
A. $_8O_{17}$ B. $_8F_{17}$ C. $_8N_{17}$ D. $_8Ne_{17}$
14. In a Bucherer's experiment, the specific charge of some β particles is found to be 1/4th of the value determined by J.J. Thomson. The speed of these β particles is
A. √ 5/4 c B. √ 15/4 c C. 1/4 c D. c
15. When the mass is rotating in a plane about a fixed point, its angular momentum is directed along
A. the radius B. the tangent to orbit
C. line at an angle of 45° to the plane of
rotation
D. the axis of rotation
16. A photo-cell with a constant p.d. of *V* volts across it, is illuminated by a point source from a distance 25 cm. When the source is moved to a distance of 1 m, the electrons emitted by the photo-cell
A. carry 1/4th their previous energy B. are 1/16th as numerous as before
C. are 1/4th as numerous as before D. carry 1/4th their previous momentum
17. A convex lens of focal length 40 cm is in contact with a concave lens of focal length 25 cm. The power of combination is

A. -1.5D B. -6.5D C. 1.5 D D. 6.5 D
18. A prism splits a beam of white light into its seven constituent colours. This is so because
A. phase of different colour is different B. amplitude of different colours is different
C. energy of different colours is different D. velocity of different colours is different
19. A prism has a refracting angle of 60° when a ray of light is incident on its face at *45°,* it suffers minimum deviation. The angle of minimum deviation is
A. 30° B. 60° C. 45° D. 90°
20. A car driver sees an image of a bus in his driving mirror, which has a radius of curvature of 4 m. The bus which is 10 m long, is parallel to and following the car in front of the bus 18 m from the mirror. The apparent length of the bus as seen in the mirror is
A. 700 mm B. 670 mm C. 800 cm D. 800 mm
21. A single slit of width *d* is placed in the path of a beam of wavelength λ . The angular width of principal maximum obtained is
A. d/λ B. λ/d C. $2\lambda/d$ D. $2d/\lambda$
22. A closed tube, partly filled with a liquid & set horizontal, is rotated about a vertical axis passing through its centre. In the process, the moment of inertia of the system about its axis would
A. increase always B. decrease always

C. remain constant
D. increase if tube is less than half filled,
decrease otherwise
23. In an A.C. circuit the instantaneous current through and voltage across a capacitor are represented as $I = I_0 \sin(\omega t + \pi/4)$ and $v = V_0 \sin(\omega t + \pi/8)$ respectively. The current leads the voltage by
A. $\pi/4$ B. $3\pi/8$ C. $\pi/2$ D. $\pi/8$
24. A transformer having 2100 turns in the primary and 4200 turns in the secondary has an a.c. source of 120 V, 10 A connected to its primary. Then the secondary voltage and current are
A. 240 V and 5 A B. 120 V and 10 A C. 240 V and 10 A D. 120 V and 20 A
25. When a magnet falls through a metal ring, acceleration through the metal ring during the free falls is
A. less than g throughout its fall
B. less than g when it is above the ring and more than g when it is below the ring
C. more than g throughout its fall
D. more than g when it is above the ring and less than g when it is below the ring
26. A copper rod is suspended in a non-homogeneous magnetic field region. The rod when in equilibrium, will then align itself
A. in the region where the magnetic field is strongest
B. in the direction in which it was originally suspended
C. in the region where the magnetic field is weakest and parallel to the direction of the magnetic field there
D. none of these
27. The substance which shows permanent magnetism is called
A. anti-ferromagnetic B. paramagnetic C. diamagnetic D. ferromagnetic
28. A magnetic substance is heated to 800 K and then cool down slowly to 300 K, then it
A. retains its magnetism B. retains its magnetism below curie points
C. does not retain magnetism D. none of these
29. Two heater wires of equal length are first connected in series and then in parallel. The ratio of heat produced in the two cases is
A. 2 : 1 B. 1 : 2 C. 4 : 1 D. 1 : 4
30. A galvanometer with a coil resistance of 100Ω gives a full-scale deflection when a current of 1 mA is passed through it. The resistance of the shunt needed to convert this galvanometer into an ammeter 5 of range 10 A is nearly
A. 0.01Ω B. 0.001Ω C. 0.1Ω D. 0.099Ω
31. The resistance of a 50 cm long wire is 10Ω . The wire is stretched to uniform wire of length 100 cm. The resistance now will be
A. 15Ω B. 30Ω C. 20Ω D. 40Ω
32. In the given circuit, the currents i, j, and k are in the ratio
A. 1:2:3 B. 3:2:1
C. 2:1:3 D. 3:1:2



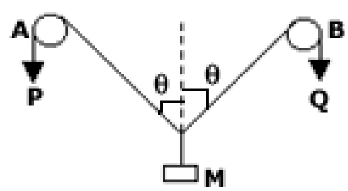
33. A conducting sphere of radius R is given a charge Q. Consider three points B at the

surface, *A* at centre and *C* at a distance *R/2* from the center. The electric potential at these points are such that
A. $V_A = V_B = V_C$ B. $V_A = V_B \neq V_C$ C. $V_A \neq V_B \neq V_C$ D. $V_A \neq V_B = V_C$

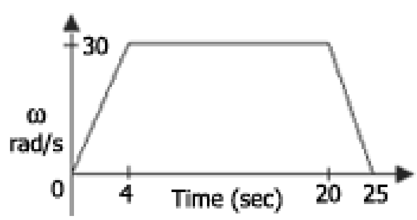
34. The mass of a proton is 1847 times that of an electron. An electron and a proton are projected into a uniform electric field in a direction of right angles to the direction of the field with the same initial kinetic energy. Then
A. both the trajectories will be equally curved
B. the proton trajectory will be less curved than the electron trajectory
C. the electron trajectory will be less curved than the proton trajectory
D. the relative curving of the trajectories will be dependent on the value of initial kinetic energy
35. The wavelength of maximum radiation from the moon is 14×10^{-6} m. If the value of the constant in Wein's displacement law is 0.00293 mK, the surface temperature of moon is
A. 207 K B. 146 K C. 227 K D. 103.5 K
36. A given mass of gas is subjected to an external pressure of 0.5×10^{10} N/m^2. If $K = 10^{10}$Nm^{-2}, the ratio of the density before and after applying the pressure is
A. 1 : 1 B. 1 : 2 C. 2 : 1 D. 1 : 4
37. The heat reservoir of an ideal Carnot engine is at 800 K and its sink is at 400 K. The amount of heat taken in it in one second to produce useful mechanical work at the rate of 750 K is
A. 2250 J B. 1125 J C.1500 J D. 750 J
38. A Carnot engine, with its cold body at 17°C has 50% efficiency. If the temperature of its hot body is now increased by 145°C, the efficiency becomes
A. 55% B. 60% C. 40% D. 45%
39. A wire of length 1m increases in length by 10^{-4}m when heated through 10^2 degree celsius. The coefficient of volume expansion of the wire is
A. 2×10^{-6} B. 1×10^{-6} C. 3×10^{-6} D. 4×10^{-6}
40. The pitch of a sound wave is related to its
A. frequency B. amplitude C. velocity D. beats
41. A mass *m* is hung to a string. After some time, it was observed that mass *m* moves up from its initial position; this is due to
A. decrease in temperature
B. increase in temperature
C. the statement is wrong
D. change in humidity
42. A light spring of force constant 8 Nm^{-1} is cut into two equal halves and the two are connected in parallel; the equivalent force constant of the system is

A. 16 Nm^{-1} B. 32 Nm^{-1} C. 8 Nm^{-1} D. 24 Nm^{-1}
43. A light spring of constant *k* is cut into two equal parts. The spring constant of each part is
A. *k* B. 2*k* C. *k*/2 D. 4*k*
44. A wave equation which gives the displacement along y-direction is given by $y = 10^{-4}$

sin (60*t* + *x*) where *x* and *y* are in meters and *t* is time in seconds. This represents a wave
A. travelling with a velocity of 300 ms^{-1} in the -ve *x*-direction
B. of wavelength π meters
C. of frequency 30/π hertz
D. of amplitude 10^4 meter travelling along the positive *x*-direction
45. The periodic times *T* of a simple pendulum are observed for different length *l*. If a graph of log *T* against log l is plotted, the slope of the graph is
A. 2 B. 1/2
C. √ 2 D. 1/√ 2
46. Ordinarily, the value of coefficient of restitution varies from
A. 0 to1 B. 0 to 0.5 C. –1 to +1 D. -0.5 to +0.5
47. *In* a gravitational field, if a body is bound with earth, then total mechanical energy it has is
A. *a* +ve value B. a zero value C. a -ve value D. K.E. less than P.E.
48. The mass of a planet is twice the mass of earth and diameter of the planet is thrice the diameter of the earth, then the acceleration due to gravity on the planet's surface is
A. *g*/2 B. 2*g* C. 2*g*/9 D. 3*g*/√ 2
49. A stationary bomb explodes into two parts of masses 3 kg and 1 kg. The total K.E. of the two parts after explosion is 2400J. The K.E. of the smaller part is
A 600 J B 1800 J C 1200 J D 2160 J
50. In a perfectly elastic collision
A. both momentum and K.E. are conserved B. only momentum is conserved
C. only K.E. is conserved D. neither K.E. nor momentum is conserved
51. A bullet of mass 7g is fired at a velocity of 900 ms^{-1} from a rifle of mass 3.5 kg. What is the recoil velocity of the rifle?
A 0.9 ms^{-1} B 180 ms^{-1} C 900 ms^{-1} D 1.8 ms^{-1}
52. In the arrangement shown in the figure, P and Q are in inflexible strings moving *downward with uniform speed U, pulleys A and B are fixed. Mass M move upwards with* a speed of
A. 2 U cos θ B. U/cos θ
C. 2U/cos θ D. U cos θ



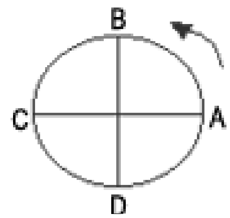
53. The figure shows the angular velocity-time graph of a flywheel. The angle, in radians, through which the flywheel turns during 25 sec is
A. 75 B 480
C. 615 D. 750



54. A ball is dropped from the top of a building 100m high. At the same instant another ball is thrown upwards with a velocity of 40 ms^{-1} from the bottom of the building. The

two balls will meet after
A. 5 sec B. 2.5 sec C. 2 sec D. 3 sec
55. A train accelerating uniformly from rest attains a maximum speed of 40 ms^{-1} in 20 seconds. It travels at this speed for 20 seconds and is brought to rest with uniform retardation in further 40 seconds. What is the average velocity during this period?
A. 80/3 ms^{-1} B. 40 ms^{-1} C. 25 ms^{-1} D. 30 ms^{-1}
56. Two bodies are held and separated by 19.8m vertically one above the other. They are released simultaneously to fall freely under gravity. After 2 seconds, the relative distance between them is:
A. 14.9m B. 19.6m C. 19.8m D. 39.2m
57. A particle starts with a velocity of 2 ms^{-1} and moves in a straight line with a retardation of 0.1 ms^{-2}. The time at which the particle is 1.5 m far from the starting point is
A. 10 sec B. 20 sec C. 30 sec D. 40 sec
58. The units of current in C.G.S. system is
A. 1 A B. 1/10 A C. 1/100 A D. 1/1000 A
59. The units of electric field are
A. volt/metre B. $volt^2$/metre C. volt x metre D. $metre^2$

***60.** The unit of moment of inertia is*
A. kg-m B. kg-m^2 C. kg/m D. kg/m^2
61. The radius of curvature of a spherical surface is measured using
A. a spherometer B. spectrometer C. screw gauge D. slide callipers
62. If the dimensions of length are expressed as G^x, C^y, h^z, where G, C, h are universal gravitational constant, speed of light and Plank's constant respectively, then
A. $x = 1/2$, $y = 1/2$ B. $x = 1/2$, $z = 1/2$ C. $y = 1/2$, $z = 3/2$ D. $y = + 3/2$, $z = 1/2$
63. The dimensional formula of electric field strength is:
A. $MLT^{-2} I^{-1}$ B. $MLT^{-3}A^{-1}$ C. $T^{-2}A^{-1}$ D. $MLTA^{-2}$
64. *A* man throws a ball in air in such a way that when the ball is in its maximum height he throws another ball. If the balls are thrown after the time difference of 1 sec, then what wilt be the height attained by them
A. 19.6 m B. 9.8 m C. 4.9 m D. 2.45 m
65. If the velocity time graph of a body is a straight line sloping downwards, the body has
A. acceleration B. declaration C. zero acceleration
D. constant
acceleration
66. Which one of the following equations represents the motion of body with finite constant acceleration?
A. $y = at$ B. $y = at + bt^2$ C. $y = at + bt^2 + ct^3$ D. $y = at + bt$
67. What is the magnitude of the velocity of the body when it is projected horizontally from a point above the ground after 0.2 seconds?
A. √2 ms^{-1} B. 2√2 ms^{-1} C. 3√2 ms^{-1} D. 4√2 ms^{-1}
68. A string can withstand a tension of 25 N. What is the greatest speed at which a body of mass 1 kg can be whirled in a horizontal circle using 1 m length of the string?
A. 25 ms^{-1} B. 5 ms^{-1} C. 75 ms^{-1} D. 10 ms^{-1}
69. An object tied to a piece of string is whirled in a vertical circle, at constant speed. The tention in the string is maximum at
A. *A* B. *B*
C. *C* D. *D*



70. The maximum force of friction that comes into play is called
A. limiting friction B. kinetic friction C. static friction D. minimum friction
71. A body of mass 5 Kg is raised vertically to a height of 10 m by a force of 170 N. The final velocity of the body is
A. 15 ms^{-1} B. 17 ms^{-1} C. 20 ms^{-1} D. 22 ms^{-1}
72. A cyclist moving at a speed of 17.64 km/h describes a circle of radius 9.8 m. If the cyclist is held in balance, the co-efficient of friction between the tyre and the ground is
A. 0.25 B. 0.29 C. 0.36 D. 0.35
73. Two bodies with masses m_1 and m_2 have equal kinectic energies. If P_1 and P_2 are their respective momenta, then $P_1 = P_2$ is
A. $m_1 : m_2$ B. $m_2 : m_1$ C. $m_1^2 : m_2^2$ D. $\sqrt{m_1} : \sqrt{m_2}$
74. In elastic collision,
A. only energy is conserved B. only momentum is conserved
C. both energy and momentum is conserved D. none of these
75. The velocity of a particle whose kinetic energy is equal to the rest energy is
A. (1/2) C B. C C. √3/3 D. √3 C
76. The propeller of a ship makes 350 rev. while its speed increases from 200 rpm to 500 rpm. Then the time taken for this is
A. 1 min B. 1.2 minute C. 5.3 seconds D. 53 seconds
77. The K.E. needed to project a body from the earth's surface to infinity is
A. mgR B. 2 mgR C. 1/2 (mgR) D. 1/4 (mgR)
78. The distance of two planets from the sun are 10^{13} and 10^{12} meters respectively. The ratio of time period of these two planets is
A. √10 B. 1/√10 C. 100 D. 10√10
79. Poisson ratio is the ratio of
A. the linear strain to the lateral strain B. the lateral strain to the linear strain
C. the linear stress to the lateral stress D. the lateral stress to the linear stress
80. Two wires L and M are of the same material and of the same length, but the diameter of L is twice that of M stretching force applied to L is four times that of M. Then the ratio of the elongation of L to that of M is
A. 1 : 4 B. 4 : 1 C. 1 : 1 D. 2 : 1
81. Which of the substance breaks just beyond the elastic limit?
A. Elastic B. Malleable C. Brittle D. Ductile
82. A stone of mass 16 kg is attached to a string 144-meter-long and is whirled in a horizontal circle. The maximum tension the string can stand is 16 N. The maximum velocity of revolution that can be given to the stone without breaking it will be
A. 12 ms^{-1} B. 14 ms^{-1}
C. 16 ms^{-1} D. 20 ms^{-1}
83. A vessel containing 0.1 m^3 of air at 76 cm of Hg pressure is connected to an

evacuated vessel of capacity 0.09 m^3. The resultant air pressure is
A. 20 cm of Hg B. 30 cm of Hg C. 40 cm of Hg D. 50 cm of Hg
84. Two gases *A* and *B* having the same temperature *T,* same pressure *P* and the same volume *V* are mixed. If the mixture is at the same temperature *T* and occupies a volume *V,* the pressure of the mixture is
A. *P* B. 2*P* C. *P*/2 D. 4*P*
85. A solid ball of metal has spherical cavity inside it. If the ball is heated, the volume of the cavity will
A. increase B. decrease C. remain the same D. disappear
86. If the law of heat conduction is written in the form of Ohm's law, then the quantity similar to electrical resistance is
A. A/dλ B. Ad/λ C. Aλ/d D. d/Aλ
87. The work done from 250 cals of heat is
A. 1045 ergs B. 1045 joules C. 1045 watt D. 1045 N
88. The time taken by a particle executing S.H.M of period *T* to move the mean position to half the maximum displacement is
A. *T*/2 B. *T*/4 C. *T*/8 D. *T*/12
89. Let *g* be the acceleration due to gravity at earth's surface and *K* be the rotational K.E. of the earth. Suppose the earth's radius decreases by 2%, then
A. *g* decreases by 2% and *K* decreases by
4%
B. *g* decreases by 4% and *K* increases by 2%
C. *g* increases by 4% and *K* decreases by 4% D. decreases by 4% and *K* increases by 4%
90. A particle of mass m is hanging vertically by an ideal spring of force constant K. If
the mass is made to oscillate vertically, its total energy is
A. maximum at the extreme position B. maximum at the equilibrium
C. minimum at the equilibrium D. same at all position
91. Velocity of sound in CO_2 is less than in hydrogen because
A. CO_2 is heavier than hydrogen
B. CO_2 is a compound and hydrogen is an
element
C. CO_2 is more soluble in water D. CO_2 can be more easily liquefied
92. The velocity of sound in air at room temperature is 110 m/sec. The length of the wave coming from a vibrating fork at frequency 275 is
A. 0.4 m B. 100 m C. 825 m D. 1375 m
93. The temperature at which velocity of sound in air is double its velocity at 0°C is
A. 435°C B. 694°C C. 781°C D. 819°C
94. Static electricity is produced by
A. induction B. friction
C. both induction and friction D. none of the above
95. Surface charge density on a pear shaped conductor is
A. maximum in the middle position B. maximum near the tapering end
C. maximum near the broad end D. equal throughout the surface
96. A given charge situated at a certain distance from an electric dipole in the end on position experiences a force *F.* If the distance of the charge is doubled, the force acting on the charge will be
A. 2*F* B. *F*/2 C. *F*/4 D. *F*/8
97. A piece of fuse wire melts when the current is 5 A. The energy produced then is 1 J/s. The resistance of the fuse in ohm is

A. 0.04 B. 0.1 C. 0.5 D. 10
98. The gravitational force between two point masses m_1 and m_2 at separation r is given by
F = $(m_1m_2)/r_2$ Then constant K
A. depends on systems of units only B. depends on medium between masses only
C. depends of both masses and units D. none of these
99. A piece of copper and another of germanium are cooled from room temperature to 80 K. The resistance of

A. each of them increases B. each of them decreases
C. copper increases and germanium decreases
D. germanium increases and copper decreases
100. In a given thermocouple, the temperature of the cold junction is 20°C, while the neutral temperature is 27°C. What will be the temperature of immersion ?
A. 420°C B. 425°C C. 520°C D. 525°C
Solutions:

1	2	3	4	5	6	7	8	9	10
A	A	C	B	D	C	D	C	A	C
11	12	13	14	15	16	17	18	19	20
D	B	B	B	D	B	A	D	A	A
21	22	23	24	25	26	27	28	29	30
C	A	C	A	A	C	B	C	A	D
31	32	33	34	35	36	37	38	39	40
D	B	B	B	A	A	C	B	C	A
41	42	43	44	45	46	47	48	49	50
A	B	B	C	B	A	C	C	B	A
51	52	53	54	55	56	57	58	59	60
D	B	C	B	C	C	D	A	A	B
61	62	63	64	65	66	67	68	69	70
A	B	B	C	B	B	B	B	B	A
71	72	73	74	75	76	77	78	79	80
A	A	D	C	B	A	A	D	B	C
81	82	83	84	85	86	87	88	89	90
C	A	C	B	A	D	B	D	C	D
91	92	93	94	95	96	97	98	99	100
A	A	C	C	B	D	A	A	D	C