PHYSICS – 3

1. Force acting on a charge moving in a magnetic field will not depend upon

A. its mass
B. amount of charge
C. its velocity
D. intensity of magnetic field

2. 200 W bulb works for 5 minutes, the energy consumed is

A. 70,000 J
B. 20,000 J
C. 63,000 J
D. 60,000 J

3. A 20 volt battery has a capacity of $10^6$ joules. How long it can supply a current of 10A ?

A. $5 \times 10^5$ sec
B. $5 \times 10^3$ sec
C. $2 \times 10^5$ sec
D. $2 \times 10^8$ sec

4. The calories of heat developed in 200 watt heater in 7 minutes is estimated

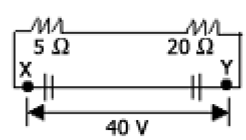
A. 15000
B. 100
C. 1000
D. 20000

5. A ball is thrown vertically upwards in free space. Its total mechanical energy

A. remains constant throughout the motion
B. increases during ascent and decreases during descent
C. is zero at maximum height
D. is equal to kinetic energy at a point just below the maximum height

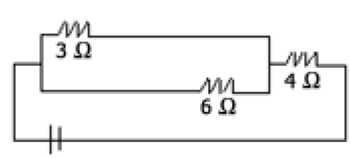
6. In the circuit shown, the current in the 20 ohms resistor, if the P.D. across *XY* is 50 volts is

A. 0.04 A
B. 10 A
C. 2.5 A
D. 1.8 A




7. If current through 3 ohms resistor is 1.2 amp, then potential drop through 4 ohms resistor is

A. 9.6 V
B. 2.6 V
C. 2.4 V
D. 1.2 V




8. The drift speed of electron in a conductor is of the order of

A. $10^{-3}$ m/s
B. $10^{2}$ m/s
C. $10^{-10}$ m/s
D. $10^{+8}$ m/s

9. What will happen to the capacity of a parallel plate capacitor in which a conductor plate is introduced?

A. Increase B. Decrease C. Remains same D. None of these

10. If charge remains constant, what will happen to the surface potential of a wire whose diameter is doubled but length remains same?

A. Double B. Half C. One-third D. Same

11. A proton is accelerated through a potential difference of 1V. Its energy is

A. 1 eV B. 0 C. 2 eV D. 4 eV

12. Electric field intensity on the axis of an electric dipole when (r/a) >> 1, varies as:

A. r B. $r^2$ C. $1/r^2$ D. $1/r^3$

13. A charge $Q$ is divided into two parts $q_1$ and $q_2$. The maximum coulomb repulsion between the two parts is obtained when the ratio $q_2/q_1$ is

A. 1 B. 2/3 C. 1/2 D. 1/4

14. Two bodies *A* and B have thermal emissivities of 0.01 and 0.81 respectively. The outer surface areas of the two bodies are the same. The two bodies emit total radiant power at the same rate. The wavelength $\lambda_B$ corresponding to maximum spectral radiancy in the radiation differs from that of *A*, by 1.00 μ m. If the temperature of *A* is 5802 K,

A. the temperature of B is 17406 K B. $\lambda_B = 1.5\mu$ m

C. the temperature of B is 11604 K D. the temperature of B is 2901 K

15. What will be the temperature when the r.m.s. velocity is double of that at 300 K ?

A. 300 K B. 600 K C. 900 K D. 1200 K

16. If Maxwell distribution is valid and if $V_p$ denotes the most probable speed, $V$ the average speed and $V_{rms}$ the root-mean-square velocity, then

A. $V < V_p < V_{rms}$ B. $V < V_{rms} < V_p$ C. $V_p < V < V_{rms}$ D. $V_p < V_{rms} < V$

17. A cubical box with porous walls containing an equal number of $O_2$ and $H_2$ molecules is placed in a large evacuated chamber. The entire system is maintained at a constant temperature *T*. The ratio of the number of $O_2$ molecules to the number of $H_2$ molecules found in the chamber outside the box after a short interval, is

A. $1/(2\sqrt{2})$ B. 1 C. $1/\sqrt{2}$ D. $\sqrt{2}$

18. Which of the following is not thermodynamical function?

A. Work done B. Gibb's energy C. Internal energy D. Enthalpy

19. The absolute zero temperature in Fahrenheit scale is

A. -273°F B. -32°F C. -460°F D. -132°F

20. $\lambda_1 = 100$ cm, $\lambda_2 = 90$ cm and velocity = 396 m/s. The number of beats are

A. 41 B. 42 C. 34 D. 44

21. One musical instrument has frequency 90 Hz; velocity of source = 1/10th of the velocity of light. What is the frequency of sound as heard by the observer?

A. 90 Hz B. $10^{-4}$ Hz C. 900 Hz D. $10^4$ Hz

22. Which phenomenon explains the shifting of galaxies from each other?

A. Red shift B. White dwarf C. Black hole D. Neutron star

23. Sound waves in air are always longitudinal because

A. the density of air is very small
B. this is an inherent characteristics of sound waves in all media
C. air does not have a modulus of rigidity
D. air is a mixture of several gases

24. Equation of a progressive wave is given by
$y = \sin \pi \{ (t/5- x/9) + \pi /6\}$
Then which of the following is correct?

A. V = 5cm/sec B. $\lambda$ = 18cm C. A = 0.04cm D. $f$ = 50Hz

25. Energy of a particle executing SHM depends upon:

A. amplitude only B. amplitude and frequency C. velocity only D. frequency only

26. Two particles are executing SHMs. The equations of their motion are
$y_1 = 10 \sin (\omega t + \pi T/4)$ ; $y2 = 25 \sin (\omega t + \sqrt{3} \pi T/4)$.
What is the ratio of their amplitudes ?

A. 1 : 1 B. 2 : 5 C. 1 : 2 D. none of these

27. A spherical ball of radius $1 \times 10^{-4}$ m and of density $10^4$ kg/m$^3$ falls freely under gravity through a distance $h$ in a tank of water before attaining the terminal velocity. What will be the value of $h$? ($\eta$ for water = $9.8 \times 10^{-6}$ sec/m$^2$)

A. 18.4m B. 20.4m C. 22.4 m D. 24.4 m

28. Surface tension of a liquid near the critical point

A. is maximum
B. is minimum but non-vanishing
C. vanishes
D. is maximum but not greater than unity in magnitude

29. The escape velocity of a projectile does not depend upon

A. mass of ball B. radius of earth C. *g* D. none of these

30. The momentum of the body having kinetic energy E is doubled. The new Kinetic energy is

A. E B. 4E C. 16E D. 32E

31. For a planet moving around the sun in an elipitical orbit of semi-measure and semi-minor axis *a* and *b* respectively and time period *T*, is

A. the average torque acting on the planet about the sun is non zero

B. the angular momentum of the planet about the sun is constant

C.the arial velocity is $\pi ab/T$

D.the planet moves with constant speed around the sun

32. Kepler's law states that square of the time period of any planet about the sun is directly proportional to

A. R B. 1/R C. $R^3$ D. $1/R^3$

33. Moment of inertia of a body depends upon .

A. Axis of Rotation B. Torque C. Angular Momentum D. Angular Velocity

34. A solid sphere, disc and solid cylinder all of same mass and made up of same material are allowed to roll down (from rest) on an inclined plane, then

A. solid sphere reaches the bottom first B. solid sphere reaches the bottom late

C. disc will reach the bottom first D. all of them reach the bottom at the same time

35. A mass *m* with velocity *u* strikes a wall normally and returns with the same speed. What is the change in momentum of the body when it returns:

A. $-mu$ B. $mu$ C. $2\ mu$ D. 0

36. A man can throw a ball to a maximum height of *h*. He can throw the same ball to a maximum horizontal distance of:

A. $h$ B. $2h$ C. $h^2$ D. $2h^2$

37. The velocity with which a projectile must be fired to escape from the earth does depend upon

A. mass of earth B. mass of projectile C. radius of earth D. none of these

38. Which of the following quantities can be written in SI units in $kgm^2A^{-2}s^{-3}$ ?

| | | | |
|---|---|---|---|
| A. Resistance | B. Inductance | C. Capacitance | D. Magnetic flux |

39. Unit of impulse is

| | | | |
|---|---|---|---|
| A. $ML^2T^{-1}$ | B. $ML^{-2}T^{-2}$ | C. $ML^{-1}T$ | D. $MLT^{-1}$ |

40. $N\text{-}m^2/kg^2$ is unit of

| | | | |
|---|---|---|---|
| A. torque | B. gravitational constant | C. permittivity | D. surface tension |

41. The number of free electrons per 10 mm of an ordinary copper wire is 2 x $10^{21}$. The average drift speed of the electrons is 0.25 mm/s. The current flowing is:

| | | | |
|---|---|---|---|
| A. 0.8 A | B. 8 A | C. 80 A | D. 5 A |

42. Which of the following cells is more likely to be damaged due to short circuiting?

| | | | |
|---|---|---|---|
| A. Daniel | B. Dry | C. Acid | D. Fuel |

43. A gas expands from 5 litre to 105 litre at a constant pressure $100N/m^2$. The work done is

| | | | |
|---|---|---|---|
| A. 1 Joule | B. 4 Joule | C. 8 Joule | D. 10 Joule |

44. The Helium nuclei can be formed from

| | |
|---|---|
| A. Hydrogen nuclei by process of chain reaction | B. Hydrogen nuclei through nuclear fission |
| C. Hydrogen nuclei through nuclear fusion | D. None of these |

45. In the atom bomb dropped by Americans in 1945 on Nagasaki, Japan, the fissionable material used was

| | | | |
|---|---|---|---|
| A. Helium 4 | B. Plutonium 239 | C. Uranium 235 | D. Uranium 233 |

46. The engine of a truck moving a straight road delivers constant power. The distance travelled by the truck in time *t* is proportional to

| | | | |
|---|---|---|---|
| A. $t$ | B. $t^2$ | C. $\sqrt{t}$ | D. $t^{3/2}$ |

47. The velocity of electron in ground state of hydrogen atom is

| | | | |
|---|---|---|---|
| A. 2 x $10^5$ m/s | B. 2 x $10^6$ m/s | C. 2 x $10^7$ m/s | D. 2 x $10^8$ m/s |

48. The radius of the first orbit of the electron in a hydrogen atom is 5.3 x $10^{-11}$ m; then the radius of the second orbit must be

| | | | |
|---|---|---|---|
| A. 15.9 x $10^{-11}$ m | B. 10.6 x 10 m | C. 21.2 x $10^{-11}$ m | D. 42.4 x $10^{-11}$ m |

49. A person pushes a rock of $10^{10}$Kg mass by applying a force of only 10N for just 4 seconds. The work done is

A. 1000 Joule B. 0 J C. nearly zero D. positive

50. One can take pictures of objects which are completely invisible to the eye using camera films which are sensitive to

A. ultra-violet rays B. sodium light C. visible light D. infra-red rays

51. Light from a 100 watt filament bulb is passed through an evacuated glass tube containing sodium vapour at a high temperature. If the transmitted light is viewed through a spectrometer, we will observe

A. $D_1$ and $D_2$ lines of sodium with good intensity
B. dark lines where $D_1$ and $D_2$ lines should have been observed
C. continuous radiation from the bulb only
D. the entire emission spectrum of sodium

52. Under the action of a constant force, a particle is experiencing a constant acceleration. The power is

A. zero
B. positive
C. negative
D. increasing uniformly with time

53. If in a plane convex lens the radius of curvature of the convex surface is 10 cm and the focal length of the lens is 30 cm, the refractive index of the material of the lens will be

A. 1.5 B. 1.66 C. 1.33 D. 3

54. A plane convex lens has radius of curvature 30 cm. If the refractive index is 1.33, the focal length of lens is

A. 10 cm B. 90 cm C. 30 cm D. 60 cm

55. A beam of light is converging towards a point *I* on a screen. A plane parallel plate of glass (thickness in the direction of the beam = *t*, refractive index = $\mu$ ) is introduced in the path of the beam. The convergence point is shifted by

A. $t (\mu - 1)$ away B. $t (1 + 1/\mu)$ away C. $t (1 - 1/\mu)$ nearer D. $t (1 + 1/\mu)$ nearer

56 . In Young's double silt experiment the separation between the silts is halved and the distance between the silts and screen is doubled. The fringe width will be

A. unchanged B. halved C. doubled D. quadrupled

57. Wavelength of red light is $\lambda_r$, violet rays is $\lambda_v$ and X -ray is $\lambda_x$ then the order of wavelengths is

A. $\lambda_x > \lambda_v > \lambda_r$ B. $\lambda_v > \lambda_x > \lambda_r$ C. $\lambda_r > \lambda_x > \lambda_v$ D. $\lambda_r > \lambda_v > \lambda_x$

58. The amount of work done by the labourer who carries *n* bricks, each of mass *m*, to the roof of a house whose height is *h* is

A. *n mgh* B. *mgh*/*n* C. zero D. *ghn*/*m*

59. In LCR circuit in the state of resonance, which of the following statements is correct ? ($\cos \phi$)=

A. 0 B. 0.5 C. 1 D. None of these

60. In LCR circuit, phase difference between voltage and current cannot be

A. 80° B. 90° C. 145° D. 0°

61. If speed is plotted along x-axis and Kinetic energy against y-axis, then the graph obtained has a shape similar to that of

A. circle B. ellipse C. hyperbola D. parabola

62. A magnetic needle lying parallel to a magnetic field requires *w* units of work to turn it through 60°. The torque needed to maintain the needle in this position will be

A. $(\sqrt{3})\,w$
B. w
C. $(\sqrt{3}w)/2$
D. 2w

63. A vertical straight conductor carries a current vertically upwards. A point *p* lies to the east of it at a small distance and another point *Q* lies to west of it at the same distance. The magnetic field at *p* is

A. greater than at *Q*
B. same as at *Q*
C. less than at *Q*
D. greater or less at *Q* depending upon the strength of the current

64. In a parallel arrangement if $(R_1 > R_2)$, the power dissipated in resistance $R_1$ will be

A. less than $R_2$ B. same as $R_2$ C. more than $R_2$ D. none of these

65. For a fuse wire to be installed in the supply line in a house which one of the following is immaterial ?

A. the specific resistance of the material of the fuse wire
B. the diameter of the fuse wire
C. the length of the fuse wire
D. none of these

66. If *V* is voltage applied, $E_a$ is emf drop across the armature, the armature current of a d.c. motor $I_a$ is given by

A. $(V + E_a)/R_a$ B. $E_a/R_a$ C. $V- E_a/R_a$ D. $V/R_a$

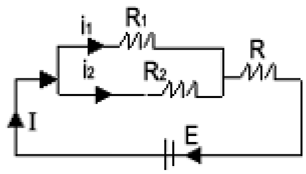
67. The current of 2.0 amperes passes through a cell of e.m.f. 1.5 volts having internal resistance of 0.15Ω . The potential difference measured in volts across both the terminals of the cell will be

A. 1.35 B. 1.50 C. 1.00 D. 1.20

68. In this circuit, current ratio $i_1/i_2$ depends upon

A. $R_1$, $R_2$ and R B. R, $R_1$, $R_2$ and E

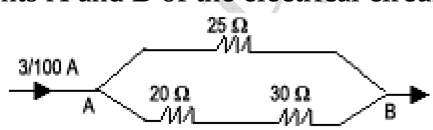
C. $R_1$ and $R_2$ D. E and R




69. A cell of emf $E$ is connected across a resistance $r$. The potential difference between the terminals of the cell is found to be $V$. The internal resistance of the cell must be
A. 2(E - V)V/r B. 2(E - V)r/E C. (E - V) r/V D. (E- V)/r

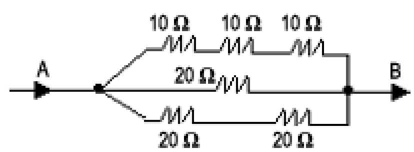
70. Copper and germanium are both cooled to 70 K from room temperature, then
A. resistance of copper increases while that of germanium decreases
B. resistance of copper decreases while that of germanium increases
C. resistance of both decreases
D. resistance of both increases

71. The potential difference between the points A and B of the electrical circuit given is
A. 1.5 V B. 1.0 V
C. 0.75 V D. 0.5 V




72. A moving coil galvanometer has a resistance of 9.8Ω and gives a full scale deflection when a current of 10 mA passes tbrough it. The value of the shunt required to convert it into a mini ammeter to measure current upto 500 mA is
A. 0.02Ω B. 0.2Ω C. 2Ω D. 0.4Ω

73. The total electrical resistance between the points $A$ and $B$ of the circuit shown in the figure is
A. 9.02 Ω A. 15 Ω
C. 30 Ω D. 100 Ω



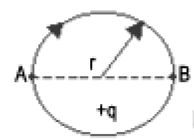

74. If the plates of a charged parallel plate capacitor are pulled away from each other
A. capacitance increases B. energy increases C. voltage increases D. voltage decreases

75. A parallel plate capacitor is charged by connecting its plates to the terminals of a battery. The battery remains connected and a glass plate is interposed between the plates of the capacitor, then
A. the charge on plates will be reduced
B. the charge on plates will increase

C. the potential difference between the plates of the capacitor will be reduced
D. the potential difference between the plates of the capacitor will increase

76. A person weighing 70Kg wt lifts a mass of 30 Kg to the roof of a building 10 m high. If he takes 50 sec to do so,then the power spent is
A. 19.6 W B. 196 W C. 300 W D. 50 W

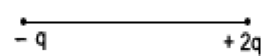
77. Work done in carrying a charge $q$ from $A$ to $B$ along a semi-circle is
A. $2\pi rq$ B. $4\pi rq$
C. $\pi rq$ D. 0




78. A particle $A$ has charge $+q$ and particle B has charge $+4q$ with each of them having the same mass m. When allowed to fall from rest through same electrical potential difference, the ratio of their speed $V_A : V_B$ will become
A. 2:1 B. 1:2 C. 1:4 D. 4:1

79. The electric field at a small distance $R$ from an infinitely long plane sheet is directly proportional to
A. $R^2/2$ B. R/2 C. $R^{-2}$ D. none of these

80. In the diagram, the electric field intensity will be zero at a distance
A. between -q and +2q charge
B. towards +2q on the line drawn
C. away from the line towards +2q
D. away from the line towards -q




81. Wein's displacement law is given by
A. $\lambda_m$ = constant B. $T/\lambda_m$ = constant C. $\lambda_m T$ = constant D. $T = \lambda_m$ = constant

82. If two electrons are forced to come closer to each to each other, then the potential energy
A. becomes zero B. increases C. decreases D. becomes infinite

83. The specific heat at constant pressure is greater than that of the same gas at constant volume because
A. at constant volume work is done in expanding the gas
B. at constant pressure work is done in expanding the gas
C. the molecular attraction increases more at constant pressure
D. the molecular vibration increases more at constant pressure

84. The specific heats of $CO_2$ at constant pressure and constant volume are 0.833 J/kg.K and 0.641 J/kg.K respectively. If molecular weight of $CO_2$ is 44, what is the universal constant *R?*
A. $4.19 \times 10^7$ erg/cal B. 848.8 J/gm/K C. 8.448 J/mol/K D. 4.19 J/cal

85. The freezing point of the liquids decreases when pressure is increased, if the liquid
A. expands while freezing B. contracts while freezing
C. does not change in volume while freezing D. none

86. The equation of a transverse wave on a stretched string is given by
$y = 0.05 \sin \pi (2t/0.002 - x/0.1)$ where x and y are expressed in metres and t in sec.
The speed of the wave is
A.100 m/sec B. 50 m/s C. 200 m/s D. 400 m/s

87. The ratio of velocity of the body to the velocity of sound is called
A. Magic number B. Laplace number C. Natural number D. Mach number

88. Television signals on earth cannot be received at distances greater than 100 km from the transmission station. The reason behind this is that
A. the receiver antenna is unable to detect the signal at a distance greater than 100 km
B. the TV programme consists of both audio and video signals
C. the TV signals are less powerful than radio signals
D. the surface of earth is curved like a sphere

89. A ball is thrown from a height of *h* m with an initial downward velocity $v_0$. It hits the ground, loses half of its Kinetic energy & bounces back to the same height. The value of $v_0$ is
A. $\sqrt{2gh}$ B. $\sqrt{gh}$ C. $\sqrt{3gh}$ D. $\sqrt{2.5gh}$

90. A thick rope of rubber of density $1.5 \times 10^3$ kg/m$^3$ and Young's modulus $5 \times 10^6$ N/m$^2$, 8m in length, when hung from ceiling of a room, the increase in length due to its own weight is
A. $9.6 \times 10^{-3}$m B. $19.2 \times 10^{-5}$m C. 9.6cm D. 9.6mm

91. Water is falling on the blades of a turbine at a rate 6000Kg/min. The height of the fall is100m. What is the power gained by the turbine?
A. 10KW B. 6KW C. 100KW D. 600KW

92. If momentum of alpha-particle, neutron, proton, and electron are the same, the minimum K.E. is that of

A. alpha-particle B. neutron C. proton D. electron

93. An electric motor while lifting a given load produces a tension of 4500 N in the cable attached to the load. If the motor winds the cable at the rate of 2m/s, then power must be
A. 9 kW B. 15 kW C. 225 kW D. 9000 H.P

94. If an electric iron electrons are accelerated through a potential difference of V volts. Taking electronic charge and mass to be respectively *e* and *m*, the maximum velocity attained by the electrons is
A. $2eV/\sqrt{m}$ B. $\sqrt{(2eV)/m}$ C. $2m/eV$ D. $v^2/8em$

95. A particle is moving on a circular track of radius 20 cm with a constant speed of 6 m/s. Its acceleration is
A. 0 B. 180 $m/s^2$ C. 1.2 $m/s^2$ D. 36 $m/s^2$

96. A satellite of the earth is revolving in a circular orbit with a uniform speed *v*. If gravitational force suddenly disappears, the satellite will:
A. continue to move with the speed *v* along the original orbit
B. move with the velocity *v* tangentially to the original orbit
C. fall downward with increasing velocity
D. ultimately come to rest somewhere on the original orbit

97. The kinetic energy *K* of a particle moving along a circle of radius *R* depends on the distance covered *s* as $K = as^2$. The force acting on the part1cle is
A. $2as^2/R$ B. $2as(1 + s^2/R)^{1/2}$ C. $as(1 + s^2/R^2)^{1/2}$ D. None of these

98. Einstein was awarded Nobel Prize for his work in
A. Photoelectric effect B. Special theory of relativity
C. General theory of relativity D. None of these

99. One second is defined to be equal to
A. 1650763.73 periods of the Krypton clock B. 652189.63 periods of the Krypton clock
C. 1650763.73 periods of the Cesium clock D. 9192631770 periods of the Cesium clock

100. The dimensions of energy and torque respectively are
A. $ML^2T^{-2}$ and $ML^2T^{-2}$ B. $MLT^2$ and $ML^2T^{-2}$ C. $ML^2T^{-2}$ and $MLT^{-2}$ D. $MLT^{-2}$ and $MLT^{-2}$

Solutions:

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