Dogar's Testmaster
Latest & Up-to-Date

AMC ADMISSION TEST

ARMY MEDICAL COLLEGE

SOLVED PAPERS GUIDE

SALIENT FEATURES:

- ► 3 Solved Papers for Each Subject
- ► Personality Tests

DOGAR BROTHERS
A SYMBOL OF AUTHORITY IN PUBLICATION
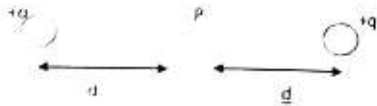
DOGAR.PK

PHYSICS
PRACTICE SOLVED PAPERS

PHYSICS PRACTICE SOLVED PAPER 1

1. The critical angle of glass is:
   a. 41.8°
   b. 42°
   c. 45°
   d. None of the above

2. Suppose a hollow sphere of mass 10 g is rolling down an inclined plane without slipping. Suppose the height of the inclined plane is 10m, then what is its speed at the bottom of the plane if it starts its journey from rest?
   a. $\sqrt{20}$ms⁻¹
   b. 10ms⁻¹
   c. 120ms⁻¹
   d. 60ms⁻¹

3. Which one of the following defects of the lens can be treated by combining the concave and convex lens.
   a. Chromatic aberration.
   b. Spherical aberration
   c. None of the above
   d. Both A and B

4. The absorption power of a black body is:
   a. Maximum
   b. Minimum
   c. Moderate
   d. None of the above

5. Compton's effect is explained using _____ nature of photon.
   a. Wave
   b. Particle
   c. Both A and B
   d. None of the above

6. If the operational amplifier is used as a non-inverting amplifier than what will be the gain considering that R_1 is 10 kilo ohm and R_2 is 100 kilo ohms?
   a. 10
   b. 100
   c. 1/100
   d. 11

7. By decreasing the distance between the source and the double slit, the fringe width:
   a. Remains same
   b. Decreases
   c. Increases
   d. None of the above

8. Transverse waves are those wave in which particles moves _____ to the direction of propagation of the waves.
   a. Parallel
   b. Transverse
   c. Perpendicular
   d. None of these

9. The location of an air craft after an hour's flight can be predicted within by NAVSTAR about _____, when relativistic effects are not encountered.
   a. 50 m
   b. 760 m
   c. 2 m
   d. 20 m

10. The simplest form of matter is:
    a. Solids
    b. Liquids
    c. Gases
    d. Plasma

11. If deforming force is released immediately then the temperature,
    a. Increases
    b. Decreases
    c. Remains constant
    d. Depends on the material

12. Photoelectric effect was explained by:
    a. Einstein
    b. Compton
    c. De Broglie
    d. None of the above

13. Which of the following statement is not true about triple point of water:
    a. Surface tension of triple point is high
    b. Solid liquid and gasses are the states of water
    c. 273.16 K is the absolute temperature
    d. Water and vapour coexists in equilibrium

14. At what phase the kinetic energy is half of the total energy in simple harmonic motion?
    a. 90°
    b. 45°
    c. 60°
    d. 30°

15. If a stone is moving in a circular path such that its angular velocity increases from $\frac{\pi}{4}$ to $\frac{\pi}{2}$ at the ends of one of the diameters. What is the angular acceleration of the stone?

    a. $\frac{3\pi}{30} radsec^{-2}$
    b. $\frac{3\pi}{32} radsec^{-2}$
    c. $\frac{3\pi}{16} radsec^{-2}$
    d. $\frac{\pi}{32} radsec^{-2}$

16. Best photoelectric effect is given by:
    a. UV
    b. Visible
    c. Infrared
    d. None of the above

17. If the pressure of gas is increased by 4 times then what happens to the speed of the sound?
    a. Increases by $\sqrt{2}$ times
    b. Increases by 2 times
    c. Decreases by 2 times
    d. Remains same

18. In terms of base units, the SI units of pressure is:
    a. Kg/ms^2
    b. Kg^2/ms
    c. Kgm/s
    d. Kg/s

19. N number of identical capacitors are first connected in series and then in parallel such that the ratio of the net capacitance in series to net capacitance in parallel comes out to be ¼. What is the total number of capacitors?
    a. 1
    b. 2
    c. 3
    d. Cannot be determined

20. $\overline{A.B} = ?$

    a. $\bar{A}.\bar{B}$

    b. $\bar{A} + \bar{B}$

    c. $\overline{A + B}$

21. The length of cloud track and energy of the incident particle is
    a. Inversely proportional
    b. Directly proportional
    c. Not proportional
    d. None of these

22. If two resistors A and B are connected in series with a battery such that resistance of A is greater than B, then which of the both resister will be heated more due to current?
    a. A
    b. B
    c. Both transmit same amount of heat energy
    d. None of the above

23. For a small change in the angle, the shear modulus is written as
    a. $G = \frac{\frac{F}{A}}{\tan \theta}$
    b. $G = \frac{\frac{F}{A}}{\sin \theta}$
    c. $G = \frac{\frac{F}{A}}{\theta}$
    d. all of the above

24. During the turbulent flow, the speed:
    a. Increases
    b. Decreases
    c. Remains unchanged
    d. Changes

25. Which statement is not true about Carnot engine:

   a. It has two adiabatic and isothermal process
   b. It attains maximum possible energy
   c. Jet engine is based on them
   d. Leonard Carnot first proposed this engine

26. A load of 100g is suspended on a spring such that it causes an extension of 0.5 m in the spring, what is the work done?

   a. 0.5 J
   b. 0.25 J
   c. 0.12 J
   d. None of the above

27. What is the angular velocity of the second's hand of a clock?

   a. $\frac{\pi}{60}radsec^{-1}$
   b. $\frac{\pi}{30}radsec^{-1}$
   c. $\frac{\pi}{20}radsec^{-1}$
   d. $\frac{\pi}{40}radsec^{-1}$

28. The area of velocity time graph gives:

   a. Distance
   b. Displacement
   c. Work
   d. Both A and B

29. For a very fast moving object, drag force and velocity have the following relation:

   a. Not related in anyway
   b. Direct
   c. Inverse
   d. None of the above

30. A circuit is connected to an AC and then to a DC source. The current measured when connected to AC source of V_1 is I_1 and I_2 when it is connected to DC source of V_2. Current measured is such that $I_1=I_2$, then:

   a. $V_1=V_2$
   b. $V_1>V_2$
   c. $V_1<V_2$
   d. None of the above

31. Ray of light and wave fronts forms an angle of _____ degree:

   a. 60
   b. 120
   c. 90
   d. 360

32. If coefficient of cubic expansion of solid body is β, then its coefficient of superficial expansion γ is:

   a. $3/2\ \beta$
   b. $2/3\ \beta$
   c. 2β
   d. 3β

33. If the cross sectional area of a resistor is increased by two times and is length is decreased by two times then what happens to its resistance?

   a. Increases by four times
   b. Decreases by four times
   c. Increases by two times
   d. Remains same

34. The windings of the electromagnet in DC motor is called:

   a. Generator
   b. Field coil
   c. Magnetizer
   d. Both B and C

35. The phenomena of bending of light around it's edges is:

   a. Interference
   b. Diffraction
   c. Reflection
   d. Polarization

36. Bragg equation is written as:

   a. $dsin\theta = n\lambda$
   b. $dsin2\theta = n\lambda$
   c. $dsin\theta = 2n\lambda$
   d. $2dsin\theta = n\lambda$

37. The number of spectral lines emission spectrum of hydrogen atom, when electron is in n=3, are:

   a. 3
   b. 2
   c. 1
   d. Cannot be determined

38. Which of the following is the dimension of radian?

   a. $[MLT]$
   b. $[M^0L^0T^0]$
   c. $[M^1L^0T^0]$
   d. None of the above

39. A uniform meter rod of 30g is balanced with the help of a wedge placed at 60 cm from one end of the rod and a bob of mass 30g is attached to balance the meter rod. At what distance is it attached from the wedge?

   a.   10 cm towards left
   b.   10 cm towards right
   c.   20 cm towards left
   d.   20 cm towards right

40. a- particles have _____ penetrating power:

   a.   High
   b.   Low
   c.   Intermediate
   d.   None of them

41. Wbm^{-2} is the unit of:

   a.   Magnetic field
   b.   Magnetic field strength
   c.   Magnetic flux density
   d.   Magnetic induction

42. Which of the following source of current converts chemical energy into electrical energy?

   a.   Solar cell
   b.   Battery
   c.   Thermo- couples
   d.   None of the above

43. A 45cm long wire, carrying a current of 13 mA, is placed in a uniform magnetic field of 0.04 T parallel to the magnetic field. What is the force exerted on the wire?

   a.   2 N
   b.   Zero
   c.   0.2 mN
   d.   None of the above

44. 1 Gauss is equivalent to:

   a.   1 tesla
   b. 10^{-3} tesla
   c. 10^{4} tesla
   d. 10^{-4} tesla

45. Ammeter is connected in _____ in a circuit.

   a.   Parallel
   b.   Series
   c.   No specific
   d.   None of the above

46. In semi-conductors the forbidden energy gap is of the order of:

   a.   1 eV
   b.   5 eV
   c.   10 eV
   d.   None of the above

47. A diffraction grating of 5000 lines per cm is used, how many order of spectra are observed at maximum if the light of wave length 500nm is used?

   a.   1
   b.   2
   c.   3
   d.   4

48. Potential midway between two similar charges +q, such that they are separated by a distance 2d, is:

   a.   Zero
   b. $\frac{2q}{4\pi\varepsilon_o d}$
   c. $\frac{q}{4\pi\varepsilon_o d}$
   d.   none of the above

49. How many quarks are used to make a baryon?

   a.   1
   b.   2
   c.   3
   d.   4

50. What happens to the orbital speed of a satellite if the mass of the earth is increased by 4 times?

   a.   Increased by 2 times
   b.   Decreased by 2 times
   c.   Increased by 4 times
   d.   Decreased by 4 times

51. The resistance of three bulbs is 10 ohms, 20 ohms and 30 ohms. All the three are connected in series to each other, which of them will be brightest?

   a.   10 ohms bulb
   b.   20 ohms bulb
   c.   30 ohms bulb
   d.   All of the above

52. An AC of 50 Hz is rectified using full wave rectifier. What is the frequency of resultant wave?

a. 50 Hz
b. 100 Hz
c. 0 Hz
d. 1 Hz
e. ∞

53. According to Bernoulli's equation, where speed is high pressure is:

a. High
b. Low
c. None of the above
d. Moderate

54. Translational energy of an ideal gas is also known as:

a. Vibrational energy
b. Internal energy
c. Vonratopma iometric energy
d. Potential energy

55. If there is a hole of $1cm^2$ in a tank at a height of 5m and the total height of the tank is 10m. What is the flow rate of the fluid from the hole?

a. $0.004m^3s^{-1}$
b. $0.003m^3s^{-1}$
c. $0.002m^3s^{-1}$
d. $0.001m^3s^{-1}$

56. In hypermetropia, image is formed:

a. On retina
b. Before retina
c. Image is not formed
d. After retina

57. The range of γ-particles in air is

a. Few centimeters
b. Few millimeters
c. Few meters
d. ∞

58. For a stiff spring the value of spring constant is:

a. Higher
b. Lower
c. Intermediate
d. Zero

59. Suppose an inductor is connected with an AC source in a circuit. What happens to the current in the circuit if the frequency of the source is increased?

a. Increases
b. Decreases
c. Remains same
d. None of the above

60. Which of the following information is not given by dimension?

a. Both B and C
b. Homogeneity of the equation
c. Dimensionless constants
d. Dimensional constants

61. The time taken by a capacitor to charge depends on:

a. the resistance
b. the capacitance
c. Both A and B
d. None of the above

62. The voltage read on a multimeter is 240V. The peak value is:

a. $240\sqrt{2}$
b. $\frac{240}{\sqrt{2}}$
c. $240 + \sqrt{2}$
d. None of these

63. If a coil is attached to a battery of 10 V such that it produces a current of 10A in the coil. Then what is the induced emf in the nearby coil such that mutual inductance is 10 Henry?

a. 100 V
b. 10 V
c. 0 V
d. None of the above

64. Suppose the speed of light is c as measured when the observer is at rest. What happens to the speed of light as observed by an observer moving with a speed v?

a. $c + v$
b. $c - v$
c. c
d. None of the above

65. For a constant current in a wire, drift velocity is:

a. Increasing
b. Decreasing
c. Constant
d. None of the above

66. If a ball is thrown at an initial speed of v at an angle θ, then what is the potential energy at the highest point in the projectile?

   a. $\frac{1}{2}m(v\sin\theta)^2$

   b. $\frac{1}{2}m(v\cos\theta)^2$

   c. $\frac{1}{2}m(v)^2$

   d. None of the above

67. How is the density of a planet and its escape velocity related?

   a Directly

   b Not related in any way

   c. Inversely

   d All of the above

68. A wave travels the distance of 10 m in 3 sec. What is the possible wavelength and time period of the wave respectively?

   a. 2 m and 0.4 sec

   b. 3 m and 0.5 sec

   c. 1 m and 0.3 sec

   d. Cannot be determined

69. An electron enters in a magnetic field at an angle less than 90° with magnetic field. Which of the following path is followed by electron?

   a. Straight

   b. Circular

   c. Curve

   d. Helical

70. Diffraction is prominent when slit width d is:

   a $d > \lambda$

   b $d \sim \lambda$

   c $d < \lambda$

   d None of the above

71. Thicker the hysteresis loop, _____ is the material.

   a Harder

   b Softer

   c Brittle

   d Ductile

72. The resistance of the collector emitter becomes nearly _____ when the switch is closed in transistor when it acts like a switch.

   a Zero

   b 1

   c ∞

   d None of the above

73. The Fahrenheit and kelvin scale will have same reading at temperature:

   a. 370.6°F

   b. 414.25°F

   c. 574.25°F

   d. 120°F

74. Work done in conservative field is:

   a. Independent of the path followed

   b. Depends on the path followed

   c. Always zero

   d. Both A and C

75. The sum of highest and lowest peak value is:

   a. $2V_0$

   b. V_0

   c. Zero

   d. None of the above

76. The ratio of potential barrier of Si to Ge is:

   a. 7/3

   b. 3/7

   c. 5/3

   d. 3/5

77. If a convex lens is dipped in water, its power:

   a. Increases

   b. Remains same

   c. Decreases

   d. None of these

78. In velocity selector magnetic field is applied _____ to electric field

   a. parallel

   b. pependicular

   c. antiparallel

   d. none of these

79. A system undergoes an isothermal contraction such that the pressure increases from 100 kPa to 400 kPa and volume of the system decreases from $4cm^3$ to $1cm^3$ then change in internal energy is:

   a. 40 J

   b. Zero

   c. 4 J

   d. 400 J

80. By increasing the cross-sectional area of the resistor, it is _____:

 a. Easy for current to flow
 b. Difficult for current to flow
 c. Current is not related with the change of cross-sectional area
 d. None of the above

81. Radioactivity was discovered by

 a. Marie Curie
 b. Pierre Curie
 c. Henri Becquerel
 d. Both A and B

82. How much energy is required to produce an electron hole pair in solid state detector?

 a. 3eV to 4eV
 b. 2eV to 3eV
 c. > 4eV
 d. None of above

83. Water waves in sea are:

 a. Longitudinal
 b. Transverse
 c. Both A and B
 d. Electromagnetic

84. 1.0974×10^7 m^{-1} is:

 a. Planks constant
 b. Spring constant
 c. Rydberg's constant
 d. Wein's constant

85. Higher the wavelength of the light used, _____ is the resolution.

 a. Lower
 b. Not affected
 c. None of the above
 d. Higher

86. The fluctuation in the rectified DC can be made smooth using filter circuit which uses a:

 a. Capacitor
 b. Resistor
 c. Inductor
 d. None of the above

87. What is the launching angle of a ball such that the kinetic energy of the ball at the highest point of the projectile is half the initial kinetic energy?

 a. 30°
 b. 45°
 c. 60°
 d. 90°

88. Sensitivity of a galvanometer can be increased by:

 a. Decreasing torsional couple
 b. Increasing number of turns
 c. Increasing the magnetic field
 d. All of the above

89. Capacitance of a capacitor _____ by introducing a dielectric medium.

 a. Increases
 b. Decreases
 c. Remains same
 d. None of the above

90. Dot product is also known as:

 a. Vector product
 b. Scalar product
 c. Cross product
 d. None of the above

91. Which of the following uses Carnot engine:

 a. Automobiles
 b. Jet crafts
 c. Cars
 d. None of these

92. Diastolic pressure is the measure of _____ reading of blood pressure:

 a. Higher
 b. Lower
 c. Both
 d. None of these

93. Suppose an elevator is moving up with a constant velocity v. The apparent weight of a person standing in the elevator at the instant when the elevator stops is:

 a. Equal to real weight
 b. Feels weightlessness
 c. Less than real weight
 d. Greater than real weight

94. The net capacitance of a parallel combination is:

 a. Larger than the largest capacitance
 b. Smaller than the smallest capacitance
 c. between the largest and smallest capacitance
 d. Cannot be determined

95. If Cv is molar specific heat and ΔT is temperature change then Cv ΔT gives:

    a. Pressure

    b. Volume

    c. Density

    d. Energy

96. In a complete p-p reaction how many protons are used to run the reaction?

    a. 2

    b. 3

    c. 4

    d. 0

97. At what launching angle, escape velocity will be minimum?

    a. $0°$

    b. $45°$

    c. $90°$

    d. Does not depend on the launching angle

98. A ball is thrown from the top of a tower. The acceleration of the ball immediately after leaving the hand is:

    a. Greater than g

    b. Equal to g

    c. Less than g

    d. None of the above

99. Third law of motion gives the:

    a. Definition of force

    b. Behavior of force

    c. Formula of force

    d. All of the above

100. Speedometer in cars is used to measure:

    a. Instantaneous speed

    b. Average speed

    c. Total speed

    d. All of the above

ANSWERS & EXPLANATIONS

Question Number	1	Correct Option	a

Explanation

The critical angle of glass is 41.8°

Question Number	2	Correct Option	c

Explanation

According to law of conservation of energy,(since the sphere is rolling not slipping therefore potential energy is changed into translational as well as rotational kinetic energy)

$PE = K.E_{tran} + K.E_{rot}$

$mgh = \frac{1}{2}mv^2 + \frac{1}{2}I\omega^2$

For a hollow sphere , $I = 2/3\ mr^2$

$mgh = \frac{1}{2}mv^2 + \frac{1}{2}(\frac{2}{3}mr^2)\omega^2$

$mgh = \frac{1}{2}mv^2 + \frac{1}{3}mr^2\omega^2$

We have $v = r\omega$

$mgh = \frac{1}{2}mv^2 + \frac{1}{3}mv^2 = \frac{5}{6}mv^2 \Rightarrow v = \sqrt{\frac{6gh}{5}}$

$v = \sqrt{\frac{6\times10\times10}{5}} = \sqrt{120}ms^{-1}$

Question Number	3	Correct Option	a

Explanation

Chromatic aberration can be treated with the help of chromatic lens which is made up by the combination of concave and convex lens. This is a color deflection defect.

Question Number	4	Correct Option	a

Explanation

A black body is a black hollow object with a hole from which radiations can enter and escape. Radiations are trapped in it once they are entered hence it absorbs every radiation that enters and thus its absorption power is maximum.

Question Number	5	Correct Option	b

Explanation

Compton's effect explains the scattering of X-rays when they hit a graphite target. Hence it is explained using the particle nature of photons. The compton effect (also known as compton scattering) is the result of a high-energy photon colliding with a target, which releases loosely bound electrons from the outer shell of the atom or molecule. This proves particle nature of light.

Question Number	6	Correct Option	d

Explanation

Using

$G = 1 + \frac{R2}{R1} = 1 + \frac{100K\Omega}{10K\Omega} = 11$

Question Number	7	Correct Option	a

Explanation

Fringe width is written as:

$\Delta_i = \frac{\lambda L}{d}$

Where L is the distance between slit and screen and d is the distance between two slits. There is no dependence on the distance between the source and double slit, hence the fringe width is not affected.

Question Number	8	Correct Option	c

Explanation

Transverse waves are the electromagnetic waves. These are described as the waves that propagate perpendicular to the propagation of the waves. Light waves are the best example of transverse waves.

Question Number	9	Correct Option	b

Explanation

The location of an air craft after an hour's flight can be predicted within by NAVSTAR about 760m, when relativistic effects are not encountered

Question Number	10	Correct Option	c

Explanation

Gas is the simplest form of matter because the intermolecular interaction is minimum in gases and it is easy to predict its behavior under certain conditions unlike solid, liquid and plasma.

Question Number	11	Correct Option	a

Explanation

If the deforming force is released immediately then the kinetic energy of the particles in increased therefore temperature is increased.

Question Number	12	Correct Option	a

Explanation

Photoelectric effect was explained by Albert Einstein.

Question Number	13	Correct Option	a

Explanation

Thermodynamics scale of the temperature describes the absolute temperature as 273.1K. It is the state at which ice, water and vapour coexists in equilibrium and it uniquely occurs at one particular pressure and temperature. Therefor surface tension is not described by the thermodynamics scale of temperature.

Question Number	14	Correct Option	b

Explanation

Kinetic energy is written as,

$$K.E = \frac{1}{2}K(x_0^2 - x^2)$$

Total energy $E = \frac{1}{2}Kx_0^2$

According to given condition,

$$K.E = \frac{E}{2}$$

$$\frac{1}{2}K(x_0^2 - x^2) = \frac{1}{2}(\frac{1}{2}Kx_0^2)$$

$$x_0^2 - x^2 = \frac{1}{2}x_0^2 \Rightarrow x = \frac{x_0}{\sqrt{2}}$$

We know that, $x = x_0 \sin\theta$

$$\frac{x_0}{\sqrt{2}} = x_0 \sin\theta \Rightarrow \theta = 45^0$$

Question Number	15	Correct Option	b

Explanation

Given that,

initial angular velocity $\omega_i = \frac{\pi}{4}$ rad sec^{-1}

final angular velocity $\omega_f = \frac{\pi}{2}$ rad sec^{-1}

angular distance (along the diameter) $S = \pi$ rad

Using,

$$2aS = \omega_f^2 - \omega_i^2$$

$$a = \frac{\omega_f^2 - \omega_i^2}{2S}$$

$$a = \frac{(\pi/2)^2 - (\pi/4)^2}{2\pi} = \frac{3\pi}{32} radsec^{-2}$$

Question Number	16	Correct Option	a

Explanation

Photoelectric effect is best shown when the incoming photon is of high energy as it has to transfer its energy in electrons of metal. UV has the highest energy among the given option.

Question Number	17	Correct Option	d

Explanation

The speed of sound is not affected by the change in pressure because an increase in pressure also causes an increase in density, hence the speed of sound remains constant.

Question Number	9	Correct Option	b

Explanation

The location of an air craft after an hour's flight can be predicted within by NAVSTAR about 760m, when relativistic effects are not encountered.

Question Number	10	Correct Option	c

Explanation

Gas is the simplest form of matter because the intermolecular interaction is minimum in gases and it is easy to predict its behavior under certain conditions unlike solid, liquid and plasma.

Question Number	11	Correct Option	a

Explanation

If the deforming force is released immediately then the kinetic energy of the particles in increased therefore temperature is increased.

Question Number	12	Correct Option	a

Explanation

Photoelectric effect was explained by Albert Einstein.

Question Number	13	Correct Option	a

Explanation

Thermodynamics scale of the temperature describes the absolute temperature as 273.1K. It is the state at which ice, water and vapour coexists in equilibrium and it uniquely occurs at one particular pressure and temperature. Therefor surface tension is not described by the thermodynamics scale of temperature.

Question Number	14	Correct Option	b

Explanation

Kinetic energy is written as,

$$K.E = \frac{1}{2}K(x_0^2 - x^2)$$

Total energy $E = \frac{1}{2}Kx_0^2$

According to given condition,

$$K.E = \frac{E}{2}$$

$$\frac{1}{2}K(x_0^2 - x^2) = \frac{1}{2}(\frac{1}{2}Kx_0^2)$$

$$x_0^2 - x^2 = \frac{1}{2}x_0^2 \Rightarrow x = \frac{x_0}{\sqrt{2}}$$

We know that , $x = x_0 \sin\theta$

$$\frac{x_0}{\sqrt{2}} = x_0 \sin\theta \Rightarrow \theta = 45^0$$

Question Number	15	Correct Option	b

Explanation

Given that,

Initial angular velocity $\omega_i = \frac{\pi}{4}$ rad sec^{-1}

final angular velocity $\omega_f = \frac{\pi}{2}$ rad sec^{-1}

angular distance (along the diameter) $S = \pi$ rad

Using,

$$2aS = \omega_f^2 - \omega_i^2$$

$$a = \frac{\omega_f^2 - \omega_i^2}{2S}$$

$$a = \frac{(\pi/2)^2 - (\pi/4)^2}{2\pi} = \frac{3\pi}{32} rad sec^{-2}$$

Question Number	16	Correct Option	a

Explanation

Photoelectric effect is best shown when the incoming photon is of high energy as it has to transfer its energy in electrons of metal. U has the highest energy among the given option.

Question Number	17	Correct Option	d

Explanation

The speed of sound is not affected by the change in pressure because an increase in pressure also causes an increase in densi hence the speed of sound remains constant.

Question Number	9	Correct Option	b

Explanation

The location of an air craft after an hour's flight can be predicted within by NAVSTAR about 760m, when relativistic effects are not encountered

Question Number	10	Correct Option	c

Explanation

Gas is the simplest form of matter because the intermolecular interaction is minimum in gases and it is easy to predict its behavior under certain conditions unlike solid, liquid and plasma.

Question Number	11	Correct Option	a

Explanation

If the deforming force is released immediately then the kinetic energy of the particles in increased therefore temperature is increased.

Question Number	12	Correct Option	a

Explanation

Photoelectric effect was explained by Albert Einstein.

Question Number	13	Correct Option	a

Explanation

Thermodynamics scale of the temperature describes the absolute temperature as 273.1K. It is the state at which ice, water and vapour coexists in equilibrium and it uniquely occurs at one particular pressure and temperature. Therefor surface tension is not described by the thermodynamics scale of temperature.

Question Number	14	Correct Option	b

Explanation

Kinetic energy is written as,

$$K.E = \frac{1}{2}K(x_0^2 - x^2)$$

Total energy $E = \frac{1}{2}Kx_0^2$

According to given condition ,

$$K.E = \frac{E}{2}$$

$$\frac{1}{2}K(x_0^2 - x^2) = \frac{1}{2}(\frac{1}{2}Kx_0^2)$$

$$x_0^2 - x^2 = \frac{1}{2}x_0^2 \Rightarrow x = \frac{x_0}{\sqrt{2}}$$

We know that , $x = x_0 \sin\theta$

$$\frac{x_0}{\sqrt{2}} = x_0 \sin\theta \Rightarrow \theta = 45^0$$

Question Number	15	Correct Option	b

Explanation

Given that,

Initial angular velocity $\omega_i = \frac{\pi}{4}$ rad sec^{-1}

final angular velocity $\omega_f = \frac{\pi}{2}$ rad sec^{-1}

angular distance (along the diameter) $S = \pi$ rad

Using,

$$2\alpha S = \omega_f^2 - \omega_i^2$$

$$\alpha = \frac{\omega_f^2 - \omega_i^2}{2S}$$

$$\alpha = \frac{(\pi/2)^2 - (\pi/4)^2}{2\pi} = \frac{3\pi}{32} radsec^{-2}$$

Question Number	16	Correct Option	a

Explanation

Photoelectric effect is best shown when the incoming photon is of high energy as it has to transfer its energy in electrons of metal. UV has the highest energy among the given option.

Question Number	17	Correct Option	d

Explanation

The speed of sound is not affected by the change in pressure because an increase in pressure also causes an increase in density, hence the speed of sound remains constant.

Question Number	9	Correct Option	b

Explanation

The location of an air craft after an hour's flight can be predicted within by NAVSTAR about 760m, when relativistic effects are not encountered

Question Number	10	Correct Option	c

Explanation

Gas is the simplest form of matter because the intermolecular interaction is minimum in gases and it is easy to predict its behavior under certain conditions unlike solid, liquid and plasma.

Question Number	11	Correct Option	a

Explanation

If the deforming force is released immediately then the kinetic energy of the particles in increased therefore temperature is increased

Question Number	12	Correct Option	a

Explanation

Photoelectric effect was explained by Albert Einstein.

Question Number	13	Correct Option	a

Explanation

Thermodynamics scale of the temperature describes the absolute temperature as 273.1K. It is the state at which ice, water and vapour coexists in equilibrium and it uniquely occurs at one particular pressure and temperature. Therefor surface tension is not described by the thermodynamics scale of temperature.

Question Number	14	Correct Option	b

Explanation

Kinetic energy is written as,

$$K.E = \frac{1}{2}K(x_0^2 - x^2)$$

Total energy $E = \frac{1}{2}Kx_0^2$

According to given condition ,

$$K.E = \frac{E}{2}$$

$$\frac{1}{2}K(x_0^2 - x^2) = \frac{1}{2}(\frac{1}{2}Kx_0^2)$$

$$x_0^2 - x^2 = \frac{1}{2}x_0^2 \Rightarrow x = \frac{x_0}{\sqrt{2}}$$

We know that , $x = x_0 \sin\theta$

$$\frac{x_0}{\sqrt{2}} = x_0 \sin\theta \Rightarrow \theta = 45^0$$

Question Number	15	Correct Option	b

Explanation

Given that,

initial angular velocity $\omega_i = \frac{\pi}{4}$ rad sec^{-1}

final angular velocity $\omega_f = \frac{\pi}{2}$ rad sec^{-1}

angular distance (along the diameter) $S = \pi$ rad

Using,

$$2aS = \omega_f^2 - \omega_i^2$$

$$a = \frac{\omega_f^2 - \omega_i^2}{2S}$$

$$a = \frac{(\pi/2)^2 - (\pi/4)^2}{2\pi} = \frac{3\pi}{32} radsec^{-2}$$

Question Number	16	Correct Option	a

Explanation

Photoelectric effect is best shown when the incoming photon is o high energy as it has to transfer its energy in electrons of metal. has the highest energy among the given option.

Question Number	17	Correct Option	d

Explanation

The speed of sound is not affected by the change in pressure because an increase in pressure also causes an increase in densit hence the speed of sound remains constant

Question Number	9	Correct Option	b

Explanation

The location of an air craft after an hour's flight can be predicted within by NAVSTAR about 760m, when relativistic effects are not encountered

Question Number	10	Correct Option	c

Explanation

Gas is the simplest form of matter because the intermolecular interaction is minimum in gases and it is easy to predict its behavior under certain conditions unlike solid, liquid and plasma.

Question Number	11	Correct Option	a

Explanation

If the deforming force is released immediately then the kinetic energy of the particles in increased therefore temperature is increased

Question Number	12	Correct Option	a

Explanation

Photoelectric effect was explained by Albert Einstein.

Question Number	13	Correct Option	a

Explanation

Thermodynamics scale of the temperature describes the absolute temperature as 273.1K. It is the state at which ice, water and vapour coexists in equilibrium and it uniquely occurs at one particular pressure and temperature. Therefor surface tension is not described by the thermodynamics scale of temperature.

Question Number	14	Correct Option	b

Explanation

Kinetic energy is written as,

$$K.E = \frac{1}{2}K(x_0^2 - x^2)$$

Total energy $E = \frac{1}{2}Kx_0^2$

According to given condition ,

$$K.E = \frac{E}{2}$$

$$\frac{1}{2}K(x_0^2 - x^2) = \frac{1}{2}(\frac{1}{2}Kx_0^2)$$

$$x_0^2 - x^2 = \frac{1}{2}x_0^2 \rightarrow x = \frac{x_0}{\sqrt{2}}$$

We know that , $x = x_0 \sin\theta$

$$\frac{x_0}{\sqrt{2}} = x_0 \sin\theta \rightarrow \theta = 45^0$$

Question Number	15	Correct Option	b

Explanation

Given that,

initial angular velocity $\omega_i = \frac{\pi}{4}$ rad sec⁻¹

final angular velocity $\omega_f = \frac{\pi}{2}$ rad sec⁻¹

angular distance (along the diameter) $S = \pi$ rad

Using,

$$2aS = \omega_f^2 - \omega_i^2$$

$$a = \frac{\omega_f^2 - \omega_i^2}{2S}$$

$$a = \frac{(\pi/2)^2 - (\pi/4)^2}{2\pi} = \frac{3\pi}{32} rad sec^{-2}$$

Question Number	16	Correct Option	a

Explanation

Photoelectric effect is best shown when the incoming photon is of high energy as it has to transfer its energy in electrons of metal. U has the highest energy among the given option.

Question Number	17	Correct Option	d

Explanation

The speed of sound is not affected by the change in pressure because an increase in pressure also causes an increase in density hence the speed of sound remains constant.

Question Number	9	Correct Option	b

Explanation

The location of an air craft after an hour's flight can be predicted within by NAVSTAR about 760m, when relativistic effects are not encountered

Question Number	10	Correct Option	c

Explanation

Gas is the simplest form of matter because the intermolecular interaction is minimum in gases and it is easy to predict its behavior under certain conditions unlike solid, liquid and plasma.

Question Number	11	Correct Option	a

Explanation

If the deforming force is released immediately then the kinetic energy of the particles in increased therefore temperature is increased.

Question Number	12	Correct Option	a

Explanation

Photoelectric effect was explained by Albert Einstein.

Question Number	13	Correct Option	a

Explanation

Thermodynamics scale of the temperature describes the absolute temperature as 273.1K. It is the state at which ice, water and vapour coexists in equilibrium and it uniquely occurs at one particular pressure and temperature. Therefor surface tension is not described by the thermodynamics scale of temperature.

Question Number	14	Correct Option	b

Explanation

Kinetic energy is written as,

$$K.E = \frac{1}{2}K(x_0^2 - x^2)$$

Total energy $E = \frac{1}{2}Kx_0^2$

According to given condition ,

$$K.E = \frac{E}{2}$$

$$\frac{1}{2}K(x_0^2 - x^2) = \frac{1}{2}(\frac{1}{2}Kx_0^2)$$

$$x_0^2 - x^2 = \frac{1}{2}x_0^2 \Rightarrow x = \frac{x_0}{\sqrt{2}}$$

We know that , $x = x_0 \sin\theta$

$$\frac{x_0}{\sqrt{2}} = x_0 \sin\theta \Rightarrow \theta = 45^0$$

Question Number	15	Correct Option	b

Explanation

Given that,

initial angular velocity $\omega_i = \frac{\pi}{4}$ rad sec^{-1}

final angular velocity $\omega_f = \frac{\pi}{2}$ rad sec^{-1}

angular distance (along the diameter) $S = \pi$ rad

Using,

$$2aS = \omega_f^2 - \omega_i^2$$

$$a = \frac{\omega_f^2 - \omega_i^2}{2S}$$

$$a = \frac{(\pi/2)^2 - (\pi/4)^2}{2\pi} = \frac{3\pi}{32} rad sec^{-2}$$

Question Number	16	Correct Option	a

Explanation

Photoelectric effect is best shown when the incoming photon is of high energy as it has to transfer its energy in electrons of metal. U has the highest energy among the given option.

Question Number	17	Correct Option	d

Explanation

The speed of sound is not affected by the change in pressure because an increase in pressure also causes an increase in densi hence the speed of sound remains constant.

Question Number	9	Correct Option	b

Explanation

The location of an air craft after an hour's flight can be predicted within by NAVSTAR about 760m, when relativistic effects are not encountered

Question Number	10	Correct Option	c

Explanation

Gas is the simplest form of matter because the intermolecular interaction is minimum in gases and it is easy to predict its behavior under certain conditions unlike solid, liquid and plasma.

Question Number	11	Correct Option	a

Explanation

If the deforming force is released immediately then the kinetic energy of the particles in increased therefore temperature is increased.

Question Number	12	Correct Option	a

Explanation

Photoelectric effect was explained by Albert Einstein.

Question Number	13	Correct Option	a

Explanation

Thermodynamics scale of the temperature describes the absolute temperature as 273.1K. It is the state at which ice, water and vapour coexists in equilibrium and it uniquely occurs at one particular pressure and temperature. Therefor surface tension is not described by the thermodynamics scale of temperature.

Question Number	14	Correct Option	b

Explanation

Kinetic energy is written as,

$$K.E = \frac{1}{2}K(x_0^2 - x^2)$$

Total energy $K = \frac{1}{2}Kx_0^2$

According to given condition ,

$$K.E = \frac{K}{2}$$

$$\frac{1}{2}K(x_0^2 - x^2) = \frac{1}{2}(\frac{1}{2}Kx_0^2)$$

$$x_0^2 - x^2 = \frac{1}{2}x_0^2 \Rightarrow x = \frac{x_0}{\sqrt{2}}$$

We know that , $x = x_0 \sin\theta$

$$\frac{x_0}{\sqrt{2}} = x_0 \sin\theta \Rightarrow \theta = 45^o$$

Question Number	15	Correct Option	b

Explanation

Given that,

initial angular velocity $\omega_i = \frac{\pi}{4}$ rad sec^{-1}

final angular velocity $\omega_f = \frac{\pi}{2}$ rad sec^{-1}

angular distance (along the diameter) $S = \pi$ rad

Using,

$$2aS = \omega_f^2 - \omega_i^2$$

$$a = \frac{\omega_f^2 - \omega_i^2}{2S}$$

$$a = \frac{(\pi/2)^2 - (\pi/4)^2}{2\pi} = \frac{3\pi}{32} rad sec^{-2}$$

Question Number	16	Correct Option	a

Explanation

Photoelectric effect is best shown when the incoming photon is of high energy as it has to transfer its energy in electrons of metal. U has the highest energy among the given option.

Question Number	17	Correct Option	d

Explanation

The speed of sound is not affected by the change in pressure because an increase in pressure also causes an increase in density hence the speed of sound remains constant.

Question Number	9	Correct Option	b

Explanation

The location of an air craft after an hour's flight can be predicted within by NAVSTAR about 780m. when relativistic effects are not encountered.

Question Number	10	Correct Option	c

Explanation

Gas is the simplest form of matter because the intermolecular interaction is minimum in gases and it is easy to predict its behavior under certain conditions unlike solid, liquid and plasma.

Question Number	11	Correct Option	a

Explanation

If the deforming force is released immediately then the kinetic energy of the particles in increased therefore temperature is increased.

Question Number	12	Correct Option	a

Explanation

Photoelectric effect was explained by Albert Einstein.

Question Number	13	Correct Option	a

Explanation

Thermodynamics scale of the temperature describes the absolute temperature as 273.1K. It is the state at which ice, water and vapour coexists in equilibrium and it uniquely occurs at one particular pressure and temperature. Therefor surface tension is not described by the thermodynamics scale of temperature.

Question Number	14	Correct Option	b

Explanation

Kinetic energy is written as,

$$K.E = \frac{1}{2}K(x_0^2 - x^2)$$

Total energy $E = \frac{1}{2}Kx_0^2$

According to given condition ,

$$K.E = \frac{E}{2}$$

$$\frac{1}{2}K(x_0^2 - x^2) = \frac{1}{2}(\frac{1}{2}Kx_0^2)$$

$$x_0^2 - x^2 = \frac{1}{2}x_0^2 \Rightarrow x = \frac{x_0}{\sqrt{2}}$$

We know that , $x = x_0 \sin\theta$

$$\frac{x_0}{\sqrt{2}} = x_0 \sin\theta \Rightarrow \theta = 45^0$$

Question Number	15	Correct Option	b

Explanation

Given that,

Initial angular velocity $\omega_i = \frac{\pi}{4}$ rad sec^{-1}

final angular velocity $\omega_f = \frac{\pi}{2}$ rad sec^{-1}

angular distance (along the diameter) $S = \pi$ rad

Using,

$$2aS = \omega_f^2 - \omega_i^2$$

$$a = \frac{\omega_f^2 - \omega_i^2}{2S}$$

$$a = \frac{(\pi/2)^2 - (\pi/4)^2}{2\pi} = \frac{3}{32}rad sec^{-2}$$

Question Number	16	Correct Option	a

Explanation

Photoelectric effect is best shown when the incoming photon is of high energy as it has to transfer its energy in electrons of metal. UV has the highest energy among the given option.

Question Number	17	Correct Option	d

Explanation

The speed of sound is not affected by the change in pressure because an increase in pressure also causes an increase in density hence the speed of sound remains constant.

Question Number	9	Correct Option	b

Explanation

The location of an air craft after an hour's flight can be predicted within by NAVSTAR about 760m, when relativistic effects are not encountered

Question Number	10	Correct Option	a

Explanation

Gas is the simplest form of matter because the intermolecular interaction is minimum in gases and it is easy to predict its behavior under certain conditions unlike solid, liquid and plasma.

Question Number	11	Correct Option	a

Explanation

If the deforming force is released immediately then the kinetic energy of the particles in increased therefore temperature is increased.

Question Number	12	Correct Option	a

Explanation

Photoelectric effect was explained by Albert Einstein.

Question Number	13	Correct Option	a

Explanation

Thermodynamics scale of the temperature describes the absolute temperature as 273.1K. It is the state at which ice, water and vapour coexists in equilibrium and it uniquely occurs at one particular pressure and temperature. Therefor surface tension is not described by the thermodynamics scale of temperature.

Question Number	14	Correct Option	b

Explanation

Kinetic energy is written as,

$$K.E = \frac{1}{2}K(x_0^2 - x^2)$$

Total energy $K = \frac{1}{2}Kx_0^2$

According to given condition ,

$$K.E = \frac{E}{2}$$

$$\frac{1}{2}K(x_0^2 - x^2) = \frac{1}{2}(\frac{1}{2}Kx_0^2)$$

$$x_0^2 - x^2 = \frac{1}{2}x_0^2 \Rightarrow x = \frac{x_0}{\sqrt{2}}$$

We know that , $x = x_0 \sin\theta$

$$\frac{x_0}{\sqrt{2}} = x_0 \sin\theta \Rightarrow \theta = 45^0$$

Question Number	15	Correct Option	b

Explanation

Given that,

initial angular velocity $\omega_i = \frac{\pi}{4}$ rad sec^{-1}

final angular velocity $\omega_f = \frac{\pi}{2}$ rad sec^{-1}

angular distance (along the diameter) $S = \pi$ rad

Using,

$$2aS = \omega_f^2 = \omega_i^2$$

$$a = \frac{\omega_f^2 - \omega_i^2}{2S}$$

$$a = \frac{(\pi/2)^2 - (\pi/4)^2}{2\pi} = \frac{3\pi}{32} radsec^{-2}$$

Question Number	16	Correct Option	a

Explanation

Photoelectric effect is best shown when the incoming photon is of high energy as it has to transfer its energy in electrons of metal. UV has the highest energy among the given option.

Question Number	17	Correct Option	d

Explanation

The speed of sound is not affected by the change in pressure because an increase in pressure also causes an increase in density, hence the speed of sound remains constant.

86

Question Number	9	Correct Option	b

Explanation

The location of an air craft after an hour's flight can be predicted within by NAVSTAR about 760m, when relativistic effects are not encountered.

Question Number	10	Correct Option	c

Explanation

Gas is the simplest form of matter because the intermolecular interaction is minimum in gases and it is easy to predict its behavior under certain conditions unlike solid, liquid and plasma.

Question Number	11	Correct Option	a

Explanation

If the deforming force is released immediately then the kinetic energy of the particles in increased therefore temperature is increased.

Question Number	12	Correct Option	a

Explanation

Photoelectric effect was explained by Albert Einstein.

Question Number	13	Correct Option	a

Explanation

Thermodynamics scale of the temperature describes the absolute temperature as 273.1K. It is the state at which ice, water and vapour coexists in equilibrium and it uniquely occurs at one particular pressure and temperature. Therefor surface tension is not described by the thermodynamics scale of temperature.

Question Number	14	Correct Option	b

Explanation

Kinetic energy is written as,

$$K.E = \frac{1}{2}K(x_0^2 - x^2)$$

Total energy $E = \frac{1}{2}Kx_0^2$

According to given condition,

$$K.E = \frac{E}{2}$$

$$\frac{1}{2}K(x_0^2 - x^2) = \frac{1}{2}(\frac{1}{2}Kx_0^2)$$

$$x_0^2 - x^2 = \frac{1}{2}x_0^2 \Rightarrow x = \frac{x_0}{\sqrt{2}}$$

We know that, $x = x_0 \sin\theta$

$$\frac{x_0}{\sqrt{2}} = x_0 \sin\theta \Rightarrow \theta = 45^0$$

Question Number	15	Correct Option	b

Explanation

Given that,

initial angular velocity $\omega_i = \frac{\pi}{4}$ rad sec^{-1}

final angular velocity $\omega_f = \frac{\pi}{2}$ rad sec^{-1}

angular distance (along the diameter) $S = \pi$ rad

Using,

$$2aS = \omega_f^2 - \omega_i^2$$

$$a = \frac{\omega_f^2 - \omega_i^2}{2S}$$

$$a = \frac{(\pi/2)^2 - (\pi/4)^2}{2\pi} = \frac{3\pi}{32} radsec^{-2}$$

Question Number	16	Correct Option	a

Explanation

Photoelectric effect is best shown when the incoming photon is of high energy as it has to transfer its energy in electrons of metal. UV has the highest energy among the given option.

Question Number	17	Correct Option	d

Explanation

The speed of sound is not affected by the change in pressure because an increase in pressure also causes an increase in density. hence the speed of sound remains constant.

86

| Question Number | 9 | Correct Option | b |

Explanation
The location of an air craft after an hour's flight can be predicted within by NAVSTAR about 760m. when relativistic effects are not encountered

| Question Number | 10 | Correct Option | c |

Explanation
Gas is the simplest form of matter because the intermolecular interaction is minimum in gases and it is easy to predict its behavior under certain conditions unlike solid, liquid and plasma.

| Question Number | 11 | Correct Option | a |

Explanation
If the deforming force is released immediately then the kinetic energy of the particles in increased therefore temperature is increased

| Question Number | 12 | Correct Option | a |

Explanation
Photoelectric effect was explained by Albert Einstein.

| Question Number | 13 | Correct Option | a |

Explanation
Thermodynamics scale of the temperature describes the absolute temperature as 273.1K. It is the state at which ice, water and vapour coexists in equilibrium and it uniquely occurs at one particular pressure and temperature. Therefor surface tension is not described by the thermodynamics scale of temperature.

| Question Number | 14 | Correct Option | b |

Explanation
Kinetic energy is written as,

$$K.E = \frac{1}{2}K(x_0^2 - x^2)$$

Total energy $E = \frac{1}{2}Kx_0^2$

According to given condition ,

$$K.E = \frac{E}{2}$$

$$\frac{1}{2}K(x_0^2 - x^2) = \frac{1}{2}(\frac{1}{2}Kx_0^2)$$

$$x_0^2 - x^2 = \frac{1}{2}x_0^2 \Rightarrow x = \frac{x_0}{\sqrt{2}}$$

We know that , $x = x_0 \sin\theta$

$$\frac{x_0}{\sqrt{2}} = x_0\sin\theta \Rightarrow \theta = 45^0$$

| Question Number | 15 | Correct Option | b |

Explanation
Given that,

Initial angular velocity $\omega_i = \frac{\pi}{4}$ rad sec^{-1}

final angular velocity $\omega_f = \frac{\pi}{2}$ rad sec^{-1}

angular distance (along the diameter) $S = \pi$ rad

Using,

$$2aS = \omega_f^2 - \omega_i^2$$

$$a = \frac{\omega_f^2 - \omega_i^2}{2S}$$

$$a = \frac{(\pi/2)^2 - (\pi/4)^2}{2\pi} = \frac{3\pi}{32}radsec^{-2}$$

| Question Number | 16 | Correct Option | a |

Explanation
Photoelectric effect is best shown when the incoming photon is of high energy as it has to transfer its energy in electrons of metal. UV has the highest energy among the given option.

| Question Number | 17 | Correct Option | d |

Explanation
The speed of sound is not affected by the change in pressure because an increase in pressure also causes an increase in density, hence the speed of sound remains constant.

Question Number	9	Correct Option	b

Explanation

The location of an air craft after an hour's flight can be predicted within by NAVSTAR about 760m, when relativistic effects are not encountered

Question Number	10	Correct Option	c

Explanation

Gas is the simplest form of matter because the intermolecular interaction is minimum in gases and it is easy to predict its behavior under certain conditions unlike solid, liquid and plasma.

Question Number	11	Correct Option	a

Explanation

If the deforming force is released immediately then the kinetic energy of the particles in increased therefore temperature is increased.

Question Number	12	Correct Option	a

Explanation

Photoelectric effect was explained by Albert Einstein.

Question Number	13	Correct Option	a

Explanation

Thermodynamics scale of the temperature describes the absolute temperature as 273.1K. It is the state at which ice, water and vapour coexists in equilibrium and it uniquely occurs at one particular pressure and temperature. Therefor surface tension is not described by the thermodynamics scale of temperature.

Question Number	14	Correct Option	b

Explanation

Kinetic energy is written as,

$$K.E = \frac{1}{2}K(x_0^2 - x^2)$$

Total energy $E = \frac{1}{2}Kx_0^2$

According to given condition,

$$K.E = \frac{E}{2}$$

$$\frac{1}{2}K(x_0^2 - x^2) = \frac{1}{2}(\frac{1}{2}Kx_0^2)$$

$$x_0^2 - x^2 = \frac{1}{2}x_0^2 \Rightarrow x = \frac{x_0}{\sqrt{2}}$$

We know that, $x = x_0 \sin\theta$

$$\frac{x_0}{\sqrt{2}} = x_0\sin\theta \Rightarrow \theta = 45^0$$

Question Number	15	Correct Option	b

Explanation

Given that,

Initial angular velocity $\omega_i = \frac{\pi}{4}$ rad sec^{-1}

final angular velocity $\omega_f = \frac{\pi}{2}$ rad sec^{-1}

angular distance (along the diameter) $S = \pi$ rad

Using,

$$2aS = \omega_f^2 - \omega_i^2$$

$$a = \frac{\omega_f^2 - \omega_i^2}{2S}$$

$$a = \frac{(\pi/2)^2 - (\pi/4)^2}{2\pi} = \frac{3\pi}{32} radsec^{-2}$$

Question Number	16	Correct Option	a

Explanation

Photoelectric effect is best shown when the incoming photon is of high energy as it has to transfer its energy in electrons of metal. UV has the highest energy among the given option.

Question Number	17	Correct Option	d

Explanation

The speed of sound is not affected by the change in pressure because an increase in pressure also causes an increase in density, hence the speed of sound remains constant.

Question Number	9	Correct Option	b

Explanation

The location of an air craft after an hour's flight can be predicted within by NAVSTAR about 760m, when relativistic effects are not encountered

Question Number	10	Correct Option	c

Explanation

Gas is the simplest form of matter because the intermolecular interaction is minimum in gases and it is easy to predict its behavior under certain conditions unlike solid, liquid and plasma.

Question Number	11	Correct Option	a

Explanation

If the deforming force is released immediately then the kinetic energy of the particles in increased therefore temperature is increased.

Question Number	12	Correct Option	a

Explanation

Photoelectric effect was explained by Albert Einstein.

Question Number	13	Correct Option	a

Explanation

Thermodynamics scale of the temperature describes the absolute temperature as 273.1K. It is the state at which ice, water and vapour coexists in equilibrium and it uniquely occurs at one particular pressure and temperature. Therefor surface tension is not described by the thermodynamics scale of temperature.

Question Number	14	Correct Option	b

Explanation

Kinetic energy is written as,

$$K.E = \tfrac{1}{2}K(x_0^2 - x^2)$$

Total energy $K = \tfrac{1}{2}Kx_0^2$

According to given condition ,

$$K.E = \tfrac{\Phi}{2}$$

$$\tfrac{1}{2}K(x_0^2 - x^2) = \tfrac{1}{2}(\tfrac{1}{2}Kx_0^2)$$

$$x_0^2 - x^2 = \tfrac{1}{2}x_0^2 \Rightarrow x = \tfrac{x_0}{\sqrt{2}}$$

We know that , $x = x_0 \sin\theta$

$$\tfrac{x_0}{\sqrt{2}} = x_0 \sin\theta \Rightarrow \theta = 45^0$$

Question Number	15	Correct Option	b

Explanation

Given that,

Initial angular velocity $\omega_i = \tfrac{\pi}{4}$ rad sec^{-1}

final angular velocity $\omega_f = \tfrac{\pi}{2}$ rad sec^{-1}

angular distance (along the diameter) $S = \pi$ rad

Using,

$$2aS = \omega_f^2 - \omega_i^2$$

$$a = \frac{\omega_f^2 - \omega_i^2}{2S}$$

$$a = \frac{(\pi/2)^2 - (\pi/4)^2}{2\pi} = \tfrac{3\pi}{32} radsec^{-2}$$

Question Number	16	Correct Option	a

Explanation

Photoelectric effect is best shown when the incoming photon is o high energy as it has to transfer its energy in electrons of metal. has the highest energy among the given option.

Question Number	17	Correct Option	d

Explanation

The speed of sound is not affected by the change in pressure because an increase in pressure also causes an increase in densi hence the speed of sound remains constant.

Question Number	9	Correct Option	b

Explanation

The location of an air craft after an hour's flight can be predicted within by NAVSTAR about 760m, when relativistic effects are not encountered

Question Number	10	Correct Option	c

Explanation

Gas is the simplest form of matter because the intermolecular interaction is minimum in gases and it is easy to predict its behavior under certain conditions unlike solid, liquid and plasma.

Question Number	11	Correct Option	a

Explanation

If the deforming force is released immediately then the kinetic energy of the particles in increased therefore temperature is increased.

Question Number	12	Correct Option	a

Explanation

Photoelectric effect was explained by Albert Einstein.

Question Number	13	Correct Option	a

Explanation

Thermodynamics scale of the temperature describes the absolute temperature as 273.1K. It is the state at which ice, water and vapour coexists in equilibrium and it uniquely occurs at one particular pressure and temperature. Therefor surface tension is not described by the thermodynamics scale of temperature.

Question Number	14	Correct Option	b

Explanation

Kinetic energy is written as,

$$K.E = \frac{1}{2}K(x_0^2 - x^2)$$

Total energy $K = \frac{1}{2}Kx_0^2$

According to given condition,

$$K.E = \frac{K}{2}$$

$$\frac{1}{2}K(x_0^2 - x^2) = \frac{1}{2}(\frac{1}{2}Kx_0^2)$$

$$x_0^2 - x^2 = \frac{1}{2}x_0^2 \Rightarrow x = \frac{x_0}{\sqrt{2}}$$

We know that, $x = x_0 \sin\theta$

$$\frac{x_0}{\sqrt{2}} = x_0 \sin\theta \Rightarrow \theta = 45^0$$

Question Number	15	Correct Option	b

Explanation

Given that,

Initial angular velocity $\omega_i = \frac{\pi}{4}$ rad sec^{-1}

final angular velocity $\omega_f = \frac{\pi}{2}$ rad sec^{-1}

angular distance (along the diameter) $S = \pi$ rad

Using,

$$2aS = \omega_f^2 - \omega_i^2$$

$$a = \frac{\omega_f^2 - \omega_i^2}{2S}$$

$$a = \frac{(\pi/2)^2 - (\pi/4)^2}{2\pi} = \frac{3\pi}{32} rad sec^{-2}$$

Question Number	16	Correct Option	a

Explanation

Photoelectric effect is best shown when the incoming photon is o high energy as it has to transfer its energy in electrons of metal. has the highest energy among the given option.

Question Number	17	Correct Option	d

Explanation

The speed of sound is not affected by the change in pressure because an increase in pressure also causes an increase in densi hence the speed of sound remains constant.

Question Number	9	Correct Option	b

Explanation

The location of an air craft after an hour's flight can be predicted within by NAVSTAR about 760m, when relativistic effects are not encountered

Question Number	10	Correct Option	c

Explanation

Gas is the simplest form of matter because the intermolecular interaction is minimum in gases and it is easy to predict its behavior under certain conditions unlike solid, liquid and plasma.

Question Number	11	Correct Option	a

Explanation

If the deforming force is released immediately then the kinetic energy of the particles in increased therefore temperature is increased

Question Number	12	Correct Option	a

Explanation

Photoelectric effect was explained by Albert Einstein.

Question Number	13	Correct Option	a

Explanation

Thermodynamics scale of the temperature describes the absolute temperature as 273.1K. It is the state at which ice, water and vapour coexists in equilibrium and it uniquely occurs at one particular pressure and temperature. Therefor surface tension is not described by the thermodynamics scale of temperature.

Question Number	14	Correct Option	b

Explanation

Kinetic energy is written as,

$$K.E = \frac{1}{2}K(x_0^2 - x^2)$$

Total energy $K = \frac{1}{2}Kx_0^2$

According to given condition ,

$$K.E = \frac{K}{2}$$

$$\frac{1}{2}K(x_0^2 - x^2) = \frac{1}{2}(\frac{1}{2}Kx_0^2)$$

$$x_0^2 - x^2 = \frac{1}{2}x_0^2 \Rightarrow x = \frac{x_0}{\sqrt{2}}$$

We know that , $x = x_0 \sin\theta$

$$\frac{x_0}{\sqrt{2}} = x_0 \sin\theta \Rightarrow \theta = 45^0$$

Question Number	15	Correct Option	b

Explanation

Given that,

initial angular velocity $\omega_i = \frac{\pi}{4}$ rad sec^{-1}

final angular velocity $\omega_f = \frac{\pi}{2}$ rad sec^{-1}

angular distance (along the diameter) $S = \pi$ rad

Using,

$$2aS = \omega_f^2 - \omega_i^2$$

$$a = \frac{\omega_f^2 - \omega_i^2}{2S}$$

$$a = \frac{(\pi/2)^2 - (\pi/4)^2}{2\pi} = \frac{3\pi}{32} radsec^{-2}$$

Question Number	16	Correct Option	a

Explanation

Photoelectric effect is best shown when the incoming photon is of high energy as it has to transfer its energy in electrons of metal. UV has the highest energy among the given option.

Question Number	17	Correct Option	d

Explanation

The speed of sound is not affected by the change in pressure because an increase in pressure also causes an increase in density. hence the speed of sound remains constant.

Question Number	9	Correct Option	b

Explanation

The location of an air craft after an hour's flight can be predicted within by NAVSTAR about 760m, when relativistic effects are not encountered

Question Number	10	Correct Option	c

Explanation

Gas is the simplest form of matter because the intermolecular interaction is minimum in gases and it is easy to predict its behavior under certain conditions unlike solid, liquid and plasma.

Question Number	11	Correct Option	a

Explanation

If the deforming force is released immediately then the kinetic energy of the particles in increased therefore temperature is increased.

Question Number	12	Correct Option	a

Explanation

Photoelectric effect was explained by Albert Einstein.

Question Number	13	Correct Option	a

Explanation

Thermodynamics scale of the temperature describes the absolute temperature as 273.1K. It is the state at which ice, water and vapour coexists in equilibrium and it uniquely occurs at one particular pressure and temperature. Therefor surface tension is not described by the thermodynamics scale of temperature.

Question Number	14	Correct Option	b

Explanation

Kinetic energy is written as,

$$K.E = \frac{1}{2}K(x_0^2 - x^2)$$

Total energy $E = \frac{1}{2}Kx_0^2$

According to given condition ,

$$K.E = \frac{E}{2}$$

$$\frac{1}{2}K(x_0^2 - x^2) = \frac{1}{2}(\frac{1}{2}Kx_0^2)$$

$$x_0^2 - x^2 = \frac{1}{2}x_0^2 \Rightarrow x = \frac{x_0}{\sqrt{2}}$$

We know that , $x = x_0 \sin\theta$

$$\frac{x_0}{\sqrt{2}} = x_0 \sin\theta \Rightarrow \theta = 45^0$$

Question Number	15	Correct Option	b

Explanation

Given that,

initial angular velocity $\omega_i = \frac{\pi}{4}$ rad sec^{-1}

final angular velocity $\omega_f = \frac{\pi}{2}$ rad sec^{-1}

angular distance (along the diameter) $S = \pi$ rad

Using,

$$2aS = \omega_f^2 - \omega_i^2$$

$$a = \frac{\omega_f^2 - \omega_i^2}{2S}$$

$$a = \frac{(\pi/2)^2 - (\pi/4)^2}{2\pi} = \frac{3\pi}{32} radsec^{-2}$$

Question Number	16	Correct Option	a

Explanation

Photoelectric effect is best shown when the incoming photon is of high energy as it has to transfer its energy in electrons of metal. U has the highest energy among the given option.

Question Number	17	Correct Option	d

Explanation

The speed of sound is not affected by the change in pressure because an increase in pressure also causes an increase in density hence the speed of sound remains constant.

Question Number	18	Correct Option	a

Explanation

The SI unit of pressure is <u>Pascal</u>. The formula of Pressure is given by

$$P = F/A \text{ where F is the force and A is the area}$$

Since: Force = ma where m is the mass and a is the acceleration of the body

Now we need the base units of the pressure. Base units are the units of the seven base quantities as defined by the SI system.

The base unit of force is $Kg \times ms^{-2}$

The base unit of area is m^2.

Thus the base unit of pressure is $Kgm^{-1}s^{-2}$.

Question Number	19	Correct Option	b

Explanation

Suppose n capacitors are connected in series then net capacitance is written as:

$$\frac{1}{C_s} = \frac{1}{C} + \frac{1}{C} + \ldots + \frac{1}{C} = \frac{n}{C}$$

$$C_s = \frac{C}{n}$$

Suppose n capacitors are connected in parallel then net capacitance is written as:

$$C_p = C + C + \ldots + C = nC$$

Using above results:

$$\frac{C_s}{C_p} = \frac{C}{nC} = \frac{1}{n^2}$$

Given that:

$$\frac{C_s}{C_p} = \frac{1}{4}$$

$$\frac{1}{4} = \frac{1}{n^2} \Rightarrow n = 2$$

Question Number	20	Correct Option	

Explanation

By de morgan's law:

$$\overline{A.B} = \bar{A} + \bar{B}$$

This can also be proved using truth table.

Question Number	21	Correct Option	b

Explanation

In Wilson Cloud chamber, the length of the cloud track is proportio to the energy of the incident particle. Higher the energy more the particle will travel.

Question Number	22	Correct Option	a

Explanation

Heat energy transmitted, when connected in series is written a

$$H = I^2 R t \Rightarrow H \propto R$$

Since resistance of A is more than B therefore the heat transm by A is more than B.

Question Number	23	Correct Option	d

Explanation

For a small change in angle,

$$\tan\theta = \sin\theta = \theta$$

Hence, shear modulus can be written as,

$$G = \frac{F}{\tan\theta} = \frac{F}{\sin\theta} = \frac{F}{\theta}$$

Question Number	24	Correct Option	d

Explanation

Turbulent flow is an irregular flow in which the speed does not re constant nor it changes in a certain fashion, there are abrupt cha in it.

Question Number	25	Correct Option	d

Explanation

Carnot engine was first proposed by Sadi Carnot in 1840. He described this only by using isothermal and adiabatic process

Question Number	26	Correct Option	b

Explanation

We have, mass=100g=0.1kg

W=mg=1N

Extension x=0.5m

Using,

$W = \frac{1}{2}Fx = \frac{1}{2} \times 1 \times 0.5 = 0.25J$

Question Number	27	Correct Option	b

Explanation

The complete angle covered=2π

The total time taken to cover the angle= 60 sec

Angular velocity= $\frac{2\pi}{60} = \frac{\pi}{30} radsec^{-1}$

Angular Velocity is defined as the rate of change of angular position of a rotating body.

Question Number	28	Correct Option	b

Explanation

The area of the velocity time graph gives displacementnot distance.Whereas, work is given by the area of force and distance graph.

Question Number	29	Correct Option	c

Explanation

Drag force is written as,

$F = 6\pi\eta rv$

But for a very fast moving object this relation does not hold true, rather the force and velocity become inversely related.

Question Number	30	Correct Option	b

Explanation

I_1 measured from AC source is the rms value which is 0.707 times less than the actual current. Hence an AC source of higher voltage is used to get equal effect as that DC source.

Question Number	31	Correct Option	

Explanation

The wave front is defined as the surface containing a s effects within the same wave as at a given time.

The circular path shows the wave fronts and the arrows ejected rays. Therefore, the rays of light that are being I are perpendicular to its wave fronts. In short, the rays of normal to its wave fronts.

Question Number	32	Correct Option	b

Explanation

The relation in cubic and superficial expansion in terms of coefficient of linear thermal expansion is

$\beta = \frac{3}{2}\gamma$

then

$\gamma = \frac{2}{3}\beta$

The coefficient of cubical expansion is generally defined as increment in volume of a unit volume of solid, liquid, or gas rise of temperature of 1° at constant pressure.

Question Number	33	Correct Option	b

Explanation

As

$R = \rho\frac{l}{A}$

Ten according to condition

$R' = \rho\frac{l}{2A}$

$R' = \frac{1}{4}(\rho\frac{l}{A})$

$R' = \frac{1}{4}R$

Question Number	34	Correct Option	b

Explanation

The windings of the electromagnet in DC motor are called field co

| Question Number | 35 | Correct Option | b |

Explanation

The phenomenon in which light bend around obstacles and spread the light wave inn such a way that they form a shadow of that obstacle then such a process is known as diffraction The phenomenon was prominent when a certain wavelength of light grater then obstacle dropped on the obstacle, the diffraction was occurred due to the interference between rays coming from different parts of same wave fronts

| Question Number | 36 | Correct Option | d |

Explanation

Bragg equation is written as:

$2d\sin\theta = n\lambda$

It is used to find out the interplanar spacing in a crystal.

In physics, Bragg's law, or Wulff–Bragg's condition, a special case of Laue diffraction, gives the angles for coherent and incoherent scattering from a crystal lattice.

| Question Number | 37 | Correct Option | a |

Explanation

For n=3 possible spectral lines will be:

N=3

N=2

N=1

Or using formula:
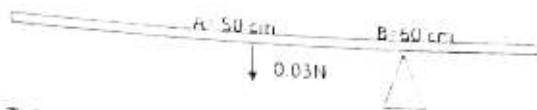
$\frac{n(n-1)}{2} = \frac{3(3-1)}{2} = 3$

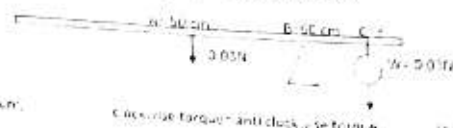| Question Number | 38 | Correct Option | b |

Explanation

Radian is a dimensionless quantity; thus, the dimension of a dimensionless quantity is written as $[M^0 L^0 T^0]$.

| Question Number | 39 | Correct Option | b |

Explanation

To balance the system, the bob should be attached at that side of the wedge that is opposite to the center of gravity of the meter rod (i.e. towards right of the wedge), as shown below

for equilibrium:

$|BC| \times W = |AB| \times 0.02$

$|BC| \times 0.03 = 0.1 \times 0.01$

$|BC| = 0.1m = 10cm$

| Question Number | 40 | Correct Option | b |

Explanation

α- particles have low penetrating power then β and γ particles because of their strong ionization or interacting power with the ma

| Question Number | 41 | Correct Option | c |

Explanation

Magnetic flux density have a unit of Tesla

$1 T = Wbm^{-2}$

| Question Number | 42 | Correct Option | b |

Explanation

Batteries convert chemical energy into electrical energy by the process of electrolysis. Batteries are basically electrolytic cells

| Question Number | 43 | Correct Option | b |

Explanation

Force on a current carrying wire placed in a uniform magnetic at an angle is written as :

$F = ILB \sin\theta$

Here angle zero degrees,

$F = 0.013 \times 0.45 \times 0.04 \times \sin 0 = 0$

Question Number	44	Correct Option	d

Explanation

We know that :

1 telsa = 10^4 gauss

⇒ 1 gauss = 10^{-4} tesla

Both Tesla and Guass are units of magnetic induction.

Electromagnetic or *magnetic induction* is the production of an electromotive force (i.e., voltage) across an electrical conductor in a changing *magnetic field*.

Question Number	45	Correct Option	b

Explanation

Ammeter is used to measure the current in a circuit and it is connected in series for this purpose in the circuit.

Question Number	46	Correct Option	a

Explanation

In semi-conductors the forbidden energy gap is of the order of 1 eV.

Question Number	47	Correct Option	d

Explanation

Using

$d = \frac{1}{N} = \frac{1}{5000} cm = \frac{1}{500000} m$

We know that,

$d\sin\theta = n\lambda$

For maximum order, $\sin\theta = 1$

$d = n\lambda \Rightarrow n = \frac{d}{\lambda} = \frac{1}{500000 \times 500 \times 10^{-9}} = \frac{100}{25} = 4$

Question Number	48	Correct Option	b

Explanation

Potential at point P due to first charge is written as:

$V1 = \frac{q}{4\pi\epsilon_0 d}$

And potential at point P due to second charge is written as:

$V2 = \frac{q}{4\pi\epsilon_0 d}$

Net potential is written as:

$V = V1 + V2 = \frac{q}{4\pi\epsilon_0 d} + \frac{q}{4\pi\epsilon_0 d} = \frac{2q}{4\pi\epsilon_0 d}$

Question Number	49	Correct Option	c

Explanation

3 quarks are used to make baryon.

Question Number	50	Correct Option	a

Explanation

Orbital velocity of a satellite is written as,

$v = \sqrt{\frac{GM}{r}}$

Increase M to 4M,

$v' = \sqrt{\frac{G4M}{r}} = 2\sqrt{\frac{GM}{r}} = 2v$

Question Number	51	Correct Option	a

Explanation

The power dissipated when connected in series is written as:

$P = I^2 R \Rightarrow P \propto R$

This implies that higher the resistance more is the power dissipated and hence more is the brightness and vice versa.

Question Number	52	Correct Option	b

Explanation

In full wave rectification the negative part of AC wave is also rectified into positive wave. Hence a wave of x Hz is changed to DC wave of 2x Hz.

Question Number	53	Correct Option	b

Explanation

According to Bernoulli's equation (for same height):

$$P_a + \frac{1}{2}\rho v_a^2 = P_B + \frac{1}{2}\rho v_b^2$$

This implies that two make both the sides equal, if the speed is high the pressure is low and where the pressure is high the speed is low.

Question Number	54	Correct Option	b

Explanation

Internal energy is defined as sum of all the molecular energies of a substance. In thermodynamics usually ideal gas is considered as working substance. The molecules of the ideal gas are mere mass points which exerts no force on other. Hence, internal energy of ideal gas is generally the translational energy.

Question Number	55	Correct Option	d

Explanation

The speed of the fluid coming out of the tank from the whole can be found using torricelli's theorem:

$$v = \sqrt{2g(h1 - h2)} = \sqrt{2 \times 10 \times (10 - 5)} = 10ms^{-1}$$

Now using'

flow rate $= \frac{V}{T} = Av = 1 \times 10^{-4} \times 10 = 0.001 m^3 s^{-1}$

Question Number	56	Correct Option	d

Explanation

In hypermetropia or the long sightedness, it is difficult to see things at a shorter distance and the image in this case is formed after retina. This defect can be treated with convex lens. Given below is an example of how an image is formed if one has Hypermetropia.

Hypermetropia

(Z1A)

Question Number	57	Correct Option	d

Explanation

The range of γ-particles in air is infinite because it obeys inverse square law

Question Number	58	Correct Option	a

Explanation

For stiffer springs, the spring constant has a larger value. Because for a stiffer spring more force will be required to produce an acceleration. Mathematically shown below:

$F = Kx \Rightarrow K = Fx$

Spring constant is just the measure of the stiffness of a spring.

Question Number	59	Correct Option	b

Explanation

Reactance of capacitance and current are written as:

$$X_L = \omega L, I = \frac{V}{X_L}$$

As frequency increases, reactance of capacitor increases and the current through the circuit decreases.

Question Number	60	Correct Option	a

Explanation

The information of the dimensionless constants is not given by dimensions, they are calculated experimentally.

For example the formula of kinetic energy is $KE = 0.5mv^2$ and ts dimensions $[KgL^2T^{-2}]$. Thus the dimension does not give any information about 0.5 in the formula.

Question Number	61	Correct Option	a

Explanation

The time taken by a capacitor to charge is written as:

$t = RC$

Where C is the capacitance of the capacitor and R is the resistance of the resistor in the circuit.

Question Number 62   **Correct Option** a

Explanation

The measured value is the rms value, hence

$V_o = \sqrt{2}V_{rms} = \sqrt{2} \times 240 = 240\sqrt{2}V$

Question Number 63   **Correct Option** c

Explanation

Emf induced due to mutual inductance is written as.

$\varepsilon = -M\frac{\Delta I}{\Delta t}$

Since the primary coil is attached to a battery hence the current is constant and ΔI is zero and so is the induced emf.

Mutual inductance :-

The emf induced in a coil due to the change of flux produced by a neighbouring coil linked to it, is called Mutually Induced emf. The phenomenon is called mutual inductance.

Question Number 64   **Correct Option** c

Explanation

According to specific theory of relativity the speed of light is a universal constant which is same for every observer regardless of the motion of the observer

---

Question Number 65   **Correct Option** c

Explanation

Drift velocity is written as.

$v_d = \frac{I}{Ane} \Rightarrow v_d \propto I$

Hence, for a constant current, drift velocity is also constant.

Question Number 66   **Correct Option** a

Explanation

According to law of conservation of energy,

Total energy at the begining of the projectile = total energy highest point

$K.E_i = K.E + P.E$

$\frac{1}{2}m(v)^2 = \frac{1}{2}m(v\cos\theta)^2 + P.E$

$\frac{1}{2}m(v\sin\theta)^2 + (v\cos\theta)^2 = \frac{1}{2}m(v\cos\theta)^2 + P.E$

$\Rightarrow P.E = \frac{1}{2}m(v\sin\theta)^2$

Question Number 67   **Correct Option** a

Explanation

The escape velocity is also written as:

$v_{esc} = \sqrt{\frac{2GM}{R}} = \sqrt{\frac{2GMV}{RV}} = \sqrt{\frac{2GV\rho}{R}} = \sqrt{\frac{2G(\frac{4\pi R^3}{3})\rho}{R}}$

$\Rightarrow v_{esc} = R\sqrt{\frac{8\pi G\rho}{3}}$

This shows that both quantities are directly related.

Question Number 68   **Correct Option** c

Explanation

The speed of the wave can be calculated as follows,

$v = 10/3 = 3.3ms^{-1}$

Now we will check that which of the above pairs also correspond to the same speed, then that would be one of the possible solutions to the problem.

A. $1/0.3 = 3.3ms^{-1}$

B. $2/0.4 = 5ms^{-1}$

C. $3/0.5 = 6ms^{-1}$

So, the answer is A.

Question Number 69   **Correct Option** d

Explanation

If a charged particle enters at an angle, then its motion is a combination of vertical and horizontal component of velocity Hence when it enters a magnetic field it moves in a circular path due to vertical component and straight path due to horizontal component of velocity and the resultant path is a helical path.

Question Number	70	Correct Option	c

Explanation

The phenomenon of diffraction is prominent when the wavelength of light is large as compared to the slit width

Question Number	71	Correct Option	a

Explanation

Thicker the hysteresis loop is the harder is the material and vice versa. The hysterisis loop of a hard material is given below

Question Number	72	Correct Option	a

Explanation

When the switch is closed, the base current is maximum hence the collector current is also maximum, and the resistance becomes nearly zero i.e. 0.1 ohm.

Question Number	73	Correct Option	c

Explanation

We know that,

$K = (F - 32) \times 5/9 + 273.15$

Let K and f = x, then

$x = (x - 32) \times \frac{5}{9} + 273.15 \Rightarrow x = 574.59$

Question Number	74	Correct Option	d

Explanation

The conservative field is the one in which the work done is independent of the path followed and work done in closed path is always zero.

Question Number	75	Correct Option	c

Explanation

The sum of highest and lowest peak value is given as follows:

$V_0 + (-V_0) = 0$

The peak to peak value is the sum of magnitude of highest and lowest peak values and it is $2V_0$.

Question Number	76	Correct Option	a

Explanation

The potential barrier of Si is 0.7 V and that of Ge is 0.3 V. Hence the ratio is 7/3.

A region within a force field in which the potential is significantly higher than at points either side of it so that a particle requires energy to pass through it is known as a potential barrier

Question Number	77	Correct Option	c

Explanation

If a convex lens is dipped in water then its focal length increases and hence its power decreases, as shown below:

$p = \frac{1}{f}$

Question Number	78	Correct Option	c

Explanation

In a velocity selector magnetic field is applied antiparallel to the electric field and their magnitude is adjusted so that a charged particle moves through it undeviated.

Question Number	79	Correct Option	b

Explanation

For isothermal process temperature remains constant, therefore internal energy is also constant

Question Number	80	Correct Option	a

Explanation

By increasing the cross-sectional area of the resistor, resistance decreases as evident from the following relation.

$R = \rho \frac{l}{A}$

And hence it is easy for current to flow due to less resistance, this is given by ohm's law:

$R = \frac{V}{I}$

Question Number	81	Correct Option	c

Explanation

Radioactivity was discovered by Henri Becquerel.

Question Number	82	Correct Option	a

Explanation

The energy required is 3eV to 4eV to produce an electron hole pair in solid state detector. It makes the device useful for detecting low energy particles.

Question Number	83	Correct Option	c

Explanation

The sea waves are both transverse and longitudinal in nature. On the surface they are transverse but deep in the sea they are longitudinal.

Question Number	84	Correct Option	c

Explanation

Rydberg's constant can be calculated by a formula,

$R_H = \frac{E_o}{hc}$

Where,

E_o = quantized energy in Bohrs model

h= planks constant

c = speed of light

By putting their values we get the Rydberg's constant as $1.097 \times 10^7 m^{-1}$

Question Number	85	Correct Option	a

Explanation

Limiting angle is written as:

$a_{min} = \frac{1.22\lambda}{D}$

And the resolution is written as:

$R = \frac{1}{a_{min}}$

Higher the wavelength, higher the limiting angle ang lower is the resolution.

Question Number	86	Correct Option	a

Explanation

The fluctuation in the rectified DC can be made smooth using filt circuit which uses a capacitor as shown below:

Input   Output

Question Number	87	Correct Option	b

Explanation

The velocity at the highest point of the projectile is only horizontal velocity i.e. $v = v_i \cos\theta$

Kinetic energy at the highest point= $K.E = 1/2 \, mv^2 = 1/2 \, m(v_i \cos\theta)$

Initial Kinetic energy= $K.E_i = \frac{1}{2}mv_i^2$

According to the given condition in the question

$K.E = \frac{K.E_i}{2}$

$\frac{1}{2}m(v_i\cos\theta)^2 = \frac{1}{2}(\frac{1}{2}mv_i^2) \Rightarrow \cos\theta \frac{1}{\sqrt{2}} \Rightarrow \theta = 45^0$

Question Number	88	Correct Option	d

Explanation

Sensitivity of a galvanometer is written as:

$S = \frac{Ban}{C}$

94

Question Number	89	Correct Option	a

Explanation

Capacitance of a capacitor with dielectric is written as:

$$C_{med} = \frac{A\varepsilon_0\varepsilon_r}{d} = \varepsilon_r C$$

Where C is the capacitance of same capacitance without a dielectric. For a dielectric ε_r is always greater than 1. Hence capacitance increases.

Question Number	90	Correct Option	b

Explanation

Dot product is also said to be scalar product because it gives a scalar as the output.

Question Number	91	Correct Option	d

Explanation

Carnot engine is the engine that converts heat energy to mechanical energy. It consists of four parts of cycle. Two are adiabatic ones and the other two are combustion ones. They produce excess of heat which is uncontrollable. Therefore, machines don't use Carnot engines normally.

Question Number	92	Correct Option	b

Explanation

Diastolic pressure is defined as the measure of minimum arteries pressure that occurs during the relaxation and dilatation of ventricles of heart when they are filled with blood. Generally, it is the second number (lower readings) recorded.

Question Number	93	Correct Option	c

Explanation

When the elevator is moving with a constant speed then there is no acceleration, therefore the apparent weight appears to be the same as the real weight. But when the elevator stops, there is a deceleration in the system and the apparent weight appears to be less than the original weight. It is also shown below:

$$T = W + ma$$

Here a is negative therefore,

$$T < W$$

Question Number	94	Correct Option	a

Explanation

The net capacitance in parallel combination is the simple algebraic sum of the capacitances of the capacitors. Hence in net capacitance is larger than the largest capacitance.

$$C = C_1 + C_2 + \dots + C_n$$

Question Number	95	Correct Option	d

Explanation

According to molar specifc heat

$$C_v = \frac{Q}{n\Delta T}$$

$$C_v \Delta T = \frac{Q}{n}(\text{heat energy})$$

Question Number	96	Correct Option	c

Explanation

Proton-proton reaction is an example of nuclear fusion, 4 hydrogen nuclei combine to form 1 helium nuclei.

$$^1_1H + ^1_1H + ^1_1H + ^1_1H \rightarrow ^4_2He + 2^0_1e$$
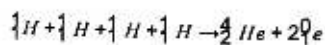
0.7 % of the mass of the original protons is lost and is converted into energy. The total energy yield of one whole chain is 26.7MeV.

Question Number	97	Correct Option	d

Explanation

Escape velocity is written as;

$$v_{esc} = \sqrt{\frac{2GM}{R}}$$

This is clear from the formula that the escape velocity does not depend on the launching angle.

Question Number	98	Correct Option	b

Explanation

When the ball leaves the hand of the person then the only force that acts on the ball is the gravitational force and it causes gravitational acceleration in the ball i.e. g.

Question Number	99	Correct Option	b

Explanation

Third law of motion gives the behavior of the force i.e. to every action there is an equal but opposite reaction.

The first law gives the definition of force, A force is an interaction that can cause an object to accelerate.

The second law gives the formula for force, i.e $F=ma$

Question Number	100	Correct Option	a

Explanation

Speedometer in car tells the instantaneous speed of the vehicle.

PHYSICS PRACTICE SOLVED PAPER 2

1. If θ is the angle between the magnetic field and the vector area of the coil, then torque on the coil is written as:

   a. $IBA\cos\theta$

   b. $IBA\sin\theta$

   c. $IBA\tan\theta$

   d. None of the above

2. Absolute zero is equivalent to:

   a. 0 K

   b. -273°C

   c. -459.4°F

   d. All of the above

3. If a mass of 1kg is burnt completely, then the energy gained will be:

   a. 9×10^{16} J

   b. 9×10^{64} J

   c. 9×10^{8} J

   d. None of the above

4. Strictly speaking, the earth is:

   a. Inertial frame of reference

   b. non-inertial frame of reference

   c. both a and b

   d. none of the above

5. The equation used for calculating the speed of nth orbit of electron is:

   a. $2\pi (ke)^2/ nh^2$

   b. $\pi ke/ nh$

   c. $2\pi ke^2/nh$

   d. $2\pi ke^2/n^2 b$

6. Conductivity of semi-conductors is of the order of:

   a. $10^{-8} to 10^{-4}(\Omega m)^{-1}$

   b. $10^{-1} to 10^{1}(\Omega m)^{-1}$

   c. $10^{1} to 10^{2}(\Omega m)^{-1}$

   d. None of the above

7. The negative sign in the faraday's law is explained by using:

   a. Oersted law

   b. Lenz law

   c. Hertz's law

   d. None of the above

8. If two mirrors are placed at an angle of 90° with each other, then the number of images formed are:

   a. 1   c. 2

   b. 3   d. 4

9. For open circuit:

   a. EMF>V

   b. EMF

   c. EMF=V

   d. None of the above

10. Moment of inertia is:

    a. Vector quantity

    b. Tensor quantity

    c. None of the above

    d. Scalar quantity

11. Which of the following is not a source of current?

    a. Cell

    b. Capacitor

    c. Solar cell

    d. None of the above

12. If two resistors A and B are connected in parallel with a battery such that resistance of A is greater than B, then which of the both resistors will be heated more due to current?

    a. A

    b. B

    c. Both transmit same amount of heat energy

    d. None of the above

13. A train is approaching the station at a speed of $90 kmh^{-1}$ sounding a whistle of frequency 1000Hz. What will be apparent frequency of the whistle as heard by a passenger sitting in the train?

    a. 1079.4 Hz

    b. 1000 Hz

    c. 931.5 Hz

    d. none of the above

14. Which of the following is not conserved in pair production?

    a. Momentum

    b. Energy

    c. Both A and B

    d. None of the above

15. A cyclist covers ¾ of circular path of unit meter radius in 1 min. What is the displacement covered by the cyclist?

    a. π m   c. 1m

    b. √2 m   d. 2 m

16 Which of the following types of thermistor is accurate for measuring low temperature?

    a High positive temperature coefficient thermistor

    b Low positive temperature coefficient thermistor

    c High negative temperature coefficient thermistor

    d Low negative temperature coefficient thermistor

17 The slope of the following graph gives:

    a Young's modulus
    b Stress
    c Specific gravity
    d None of the above

18 Evaluate

$$\overline{A \cdot B}$$

    a $\overline{A} \cdot \overline{B}$
    b $\overline{A} + \overline{B}$
    c $\overline{A + b}$
    d none of the above

19 Y - particles have

    a +ve charge
    b -ve charge
    c No charge
    d None of these

20 The specific gravity of the polymeric solids is _____ the lightest metal.

    a Equal to
    b Greater than
    c Less than
    d None of the above

21 By putting an iron piece inside a solenoid, the magnetic field

    a Increases
    b Decreases
    c Remains same
    d None of the above

22 Capacitance of a metallic sphere of radius r is written as:

    a $C = 4\pi \epsilon_o r$
    b $C = 2\pi \epsilon_o r$
    c $C = 3\pi \epsilon_o r$
    d None of the above

23 Voltmeter is also said to be:

    a Ammeter
    b Galvanometer
    c High resistance galvanometer
    d Low resistance galvanometer

24 In the production of X-rays _____ source is used.

    a AC
    b DC
    c Both A and B
    d None of the above

25. A ball is thrown horizontally from a height of 20m with initial speed of 5ms^{-1}. What is the horizontal distance covered by the ball when it strikes the ground?

    a 30m
    b 10m
    c 20m
    d Insufficient information

26. A copper wire has resistances 10Ω and 20Ω at temperatures 0°C and 10°C respectively. What is the temperature coefficient of the copper wire?

    a 0.1 K^{-1}
    b 0.02 K^{-1}
    c 0.01 K^{-1}
    d 0.2 K^{-1}

27 Huygens principle can determine _____ of the waves:

    a Size and location
    b Shape and diffraction
    c Shape and location
    d None of them

28. Two charged particles, of 1C each and 1m distance between them, are moving in same direction with same speed. What is the magnitude of coulomb's force between them?

    a 9 x 10^9 N
    b 1 N
    c Zero
    d None of the above

29. Which of the following is not an application of a diode?
   a. LED
   b. Photodiode
   c. Transistor
   d. None of the above

30. For a mass spring system, the graph of speed and displacement is:
   a. Straight line
   b. Ellipse
   c. Sinusoidal wave
   d. None of the above

31. Rainbows are formed due to:
   a. Total internal reflection
   b. Dispersion
   c. Polarization
   d. both a & b

32. Flow rate=?
   a. Av
   b. V/t
   c. m/t
   d. both a & b

33. The energy stored in the capacitor is written as:
   a. $\frac{1}{2}CV^2$
   b. $\frac{1}{3}CV^2$
   c. CV^2
   d. None of the above

34. What happens to the back generator effect in the motor if it is overloaded?
   a. Increases
   b. Decreases
   c. Remains same
   d. None of the above

35. A hose pipe ejects water at a rate of 0.5 ms^{-1}. The cross-sectional area of the pipe is $30cm^2$. What is the momentum change per second?
   a. 0.5 N
   b. 0.45 N
   c. 5 N
   d. Insufficient information

36. Entropy change of adiabatic process:
   a. Constant
   b. Maximum
   c. Minimum
   d. Zero

37. Which element has maximum binding energy per nucleon?
   a. Lithium
   b. Iron
   c. Uranium
   d. Krypton

38. If the radius of Earth is doubled then the escape velocity becomes:
   a. $\sqrt{2} times$
   b. 2 times
   c. 1/2 times
   d. $\frac{1}{\sqrt{2}} times$

39. Time period of a simple pendulum is maximum at:
   a. Center of earth
   b. At mount Everest
   c. Surface of moon
   d. Surface of earth

40. Transformers work on which of the following principles:
   a. Mutual induction
   b. Self induction
   c. Both A and B
   d. None of the above

41. SQUID is used to detect:
   a. Strong electric field
   b. Weak electric field
   c. Strong magnetic field
   d. Weak magnetic field

42. Which of the following scientists discovered that current produces magnetic field?
   a. Oersted
   b. Faraday
   c. Fleming
   d. None of the above

43. If the mass of the resistor remains same and its length increases by n times than its resistance:
   a. Increases by n times
   b. Decreases by n times
   c. Increases by n^2 times
   d. Decreases by n^2 times

44. The angular speed of the tyres of a car is $\frac{5}{3}\,radsec^{-1}$, what is the distance covered by the car in 60 sec if the radius of the tyres is 40cm?

   a. $8\pi m$

   b. $4\pi m$

   c. $2\pi m$

   d. πm

45. A uniform wire of resistance 3 ohm is folded in such a way that it forms an equilateral triangle, then what is its resistance across the ends of any two vertices?

   a. 2 ohm

   b. 3 ohm

   c. 2/3 ohm

   d. 3/2 ohm

46. If there is a hole in a tank at a height of 5m and the total height of the tank is 10m. at what distance the fluid coming out of the hole falls?

   a. 10 m

   b. 20 m

   c. 15 m

   d. 5 m

47. An electron can stay in metastable state for:

   a. $10^{-8}s$

   b. $10^{-5}s$

   c. $10^{-3}s$

   d. None of the above

48. A particle of mass 5 kg moved with a speed of 200 ms^{-1}. What is the associated de Broglie wavelength?

   a. 6.63×10^{-31} m

   b. 6.63×10^{-32} m

   c. 6.63×10^{-33} m

   d. none of the above

49. If an object of 0.1 kg is thrown up with an initial velocity of 10 ms^{-1} then what is its potential energy at the highest point?

   a. 15 J

   b. 5 J

   c. 10 J

   d. Insufficient information

50. The dot product between two vectors is 15 while the product of their magnitudes is 30. What is the angle between the two vectors?

   a. 45°

   b. 60°

   c. 90°

   d. 120°

51. Current is not a vector quantity because:

   a. It does not have a direction

   b. It does not follow head to tail rule

   c. Both A and B

   d. Current is a vector

52. A car travels at a speed of 10 ms^{-1} in first quarter time of its journey and at 20 ms^{-1} in the rest of the time of the journey. What is the average speed of the car?

   a. 15 ms^{-1}

   b. 20 ms^{-1}

   c. 10 ms^{-1}

   d. 17.5 ms^{-1}

53. The unit of permeability of free space is equal to:

   a. $WbA^{-1}m^{-1}$

   b. NA^{-2}

   c. $N(Cs^{-1})^{-2}$

   d. All of the above

54. A student measured the mass of box to be 800g with the help of a balance which had a least count of 10g. what is the total number of significant figures in the measurement?

   a. 1

   b. 2

   c. 3

   d. 4

55. The absolute P.E at infinite distance from Earth is:

   a. -1

   b. 0

   c. Infinite

   d. None of these

56. Suppose a loop is moving in a region where there is constant magnetic field and the loop does not get out of the region at any time. Then what is the induced emf in the loop?

   a. Higher in magnitude

   b. Smaller in magnitude

   c. Zero

   d. None of the above

57. If a ball is thrown with a speed of 2c then what happens to the time?

a. $t/\sqrt{-3}$
b. $-t/\sqrt{3}$
c. $t/\sqrt{3}$
d. None of the above

58. Conversion of AC to DC is called:

a. Rectification
b. Alteration
c. Amplification
d. None of the above

59. α particle are those which have _____ charge:

a. Negative
b. Positive
c. Neutral
d. Both a and b

60. A device that is used to emit light only when it is in forward biased:

a. LCD
b. LED
c. Rectifiers
d. Transistors

61. Pair production does not take place in:

a. Air
b. Vacuum
c. Both A and B
d. None of the above

62. Isobaric processes occur at

a. constant temperature
b. constant pressure
c. constatnt volume
d. both a & b

63. In a _____ monitor, strong magnets are used to change the direction of beam:

a. CRO
b. CRT
c. Oscilloscope
d. None of them

64. For diatomic gas C_v= 5/2R therefore y for the gas is:

a. 35/4
b. 4/35
c. 7/5
d. 5/7

65. Suppose g_{eq} and g_{pol} is the value of gravitational acceleration at equator and pole respectively. Then:

a. $g_{eq} > g_{pol}$
b. $g_{eq} < g_{pol}$
c. $g_{eq} = g_{pol}$
d. None of the above

66. At resonance frequency the current in LC parallel circuit is:

a. Minimum
b. Maximum
c. Zero
d. None of the above

67. Electric flux is maximum when the electric field is parallel to _____:

a. Vector area
b. Area
c. Both A and B
d. None of these

68. What is the displacement covered by a ball in 2nd second when it is dropped from a height of 10m?

a. 15m
b. 5m
c. 20m
d. None of the above

69. How many radians are present in one complete circle?

a. 2π
b. 3π
c. 4π
d. None of these

70. In 1905, Einstein proposed:

a. Einstein equation
b. De-Broglie's wavelength
c. Special theory of relativity
d. Frame of references

71. In modulation, carrier waves are of:

a. High frequency
b. Low frequency
c. Moderate frequency
d. None of the above

72. What is the minimum number of unequal vectors whose resultant is zero?

a. 2
b. 3
c. 4
d. 5

73 The longest wavelength in Balmer series is:

a. $36/5R_H$
b. $6/5R_H$
c. $16/5R_H$
d. None of the above

74. Suppose we have three closed surfaces A, B and C as shown below. Which of the following would have more electric flux coming out of it such that a charge q is placed at the center of each closed surface?

a. A
b. B
c. C
d. All of the above

75. If two convex lens of focal length 5 cm each are joined then what is the wavelength of the resulting lens?

a. 5 cm
b. 10 cm
c. 2.5 cm
d. none of the above

76 In CGS unit system, angle has ____ unit:

a. Degree
b. Radian
c. Steradian
d. Both B and C

77. Refractive index is written as:

a. $n=c/v$
b. n=real depth/ apparent depth
c. n=sin i/sin r
d. All of the above

78 Time period of a vertical mass spring system is written as,

$$T = 2\pi\sqrt{\frac{x}{g}}$$

If g is increased, time period:

a. Decreases
b. Remains same
c. Increases
d. Cannot be determined

79 Which of the following pairs have same dimensions?

a. Spring constant and surface tension
b. Rydberg's constant and propagation constant
c. Velocity gradient and angular velocity
d. All of the above

80. Induced current can be increased by:

a. Using a stronger magnet
b. Moving the loop faster
c. Increasing the number of loops
d. All of the above

81. Magnetic field in a certain region in space is given by $(5i+5j)$T. How much magnetic flux will pass through a loop of are 1m2 if it is placed flat in XZ plane?

a. 5 Wb
b. 10 Wb
c. 25 Wb
d. None of the above

82. If a coil is attached to a DC source with a switch then when does the phenomenon of self induction takes place?

a. When the switch is turned on
b. When the switch is turned off
c. Self induction not at all takes place
d. Both A and B

83. The rate of change of magnetic field in a loop is 10 Ts^{-1}. What is the magnitude of induced emf?

a. 10 V
b. 5 V
c. 2 V
d. 0 V

84. Which radio active isotope is used to study the circulation of blood?

a. Iron-59
b. Carbon-14
c. Sodium-24
d. Iodine-131

85 Which of the following algebraic operations cannot be performed on the dimensions?

a. Addition
b. Multiplication
c. Division
d. Power

86. If source is moving with a constant speed in a circular path with the observer is at rest at the center of the circle. The apparent frequency is:

a. More than actual frequency
b. Less than the actual frequency
c. Same as the actual frequency
d. Zero

87. If a pipe is of length 1 m and open from one end, then find out the frequency of fundamental harmonic.

a. 100 Hz
b. 130 Hz
c. 170 Hz
d. 150 Hz

88. The emf produced in a conductor is called:

a. Potential difference
b. Voltage
c. Induced emf
d. None of the above

89. Twinkling of stars is due to:

a. Non-uniform density of atmosphere
b. Scattering of light
c. Interference
d. Dispersion

90. A drug has 50 gm of iodine-131 in it. It was received from the laboratory 56 days ago. What will be the quantity of iodine in medical store after this time if the half life of iodine is 8 days?

a. 0.3125mg
b. 2.5mg
c. 12.5mg
d. 0.39mg

91. Consider a volume of a cylinder is 4 c.c. if piston is held stationary and gas is heated from 10°C to 15°C then the work done is:

a. 30 J
b. 4.3 J
c. 15 J
d. zero

92. The Heisenberg's calculation for energy and time is

a. $\nabla E \geq \hbar t$

b. $\nabla E . \nabla t = \hbar$

c. $\nabla E . \hbar = \nabla t$

d. None of these

93. The ratio of impurities in doping is:

a. 1.10^6
b. 1.10^3
c. 1.10^{12}
d. None of the above

94. The slowing down of the energetic photons by the creation of positron and electron is:

a. Compton effect
b. Photoelectric effect
c. Quantum theory
d. Pair production

95. A stone is attached to a string and it is moving in a vertical circle with uniform speed. The tension in the string is maximum at the:
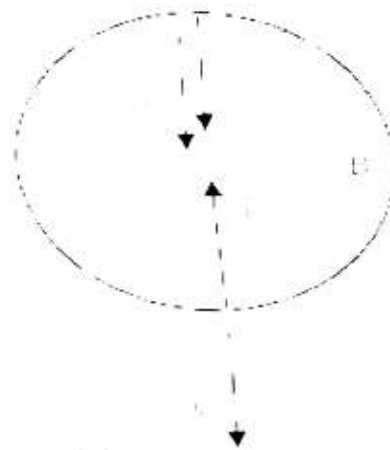
a. Left
b. Bottom
c. Right A
d. Top

96. Which of the gas is quenching gas?

   a. Br
   b. Ne
   c. He
   d. All of the above

97. If a convex and a concave lens of focal length 5 cm each are joined then what is the wavelength of the resulting lens?

   a. infinite
   b. Zero
   c. 2.5 cm
   d. 5 cm

98. Which of the following rings is used in DC generator?

   a. Slip rings
   b. Split rings
   c. Armature
   d. None of the above

99. Oersted discovered that current produces1:

   a. Polarized field
   b. EMF
   c. Magnetic field
   d. None of these

100. Current density in wire of radius 0.01 m of a circuit is found to be 0.02 Am^{-1}. What is the current in the wire?

   a. 0.0006 A
   b. 0.0005 A
   c. 0.0003 A
   d. 0.0002 A

ANSWERS & EXPLANATIONS

Question Number	1	Correct Option	b

Explanation

Torque on a current carrying coil is written as:

$$\tau = IBA\cos\alpha$$

Where a is the angle between the area of the loop and magnetic field Hence, $a = 90° + \theta$ Put in above equation:

$$= IBA\cos(90° + \theta) = IBA\sin\theta$$

Question Number	2	Correct Option	d

Explanation

All the three temperatures mentioned above are equivalent.

Question Number	3	Correct Option	a

Explanation

Using

$$E = mc^2 = 1(3 \times 10^8)^2 = 9 \times 10^{16} j$$

Question Number	4	Correct Option	b

Explanation

Earth accelerates (centripetal acceleration) around sun hence it is a non-inertial frame of reference.

Question Number	5	Correct Option	c

Explanation

By using the value of quantized radii in Bohr's atomic model we have,

$$v_n = nh/2\pi m r_n$$

The radii of different stationary orbits is different ($r_n = r_1, 4r_1, 6r_1, ...$) therefore,

$$V_n = 2\pi ke^2/nh$$

Question Number	6	Correct Option	a

Explanation

Conductivity of semi-conductors is

$$10^{-6} \text{ to } 10^{-4} (\Omega m)^{-1}$$

Question Number	7	Correct Option	b

Explanation

Negative sign in Faraday's law signifies the direction of induced current which is explained using Lenz's law.

Question Number	8	Correct Option	b

Explanation

We use the following formula (if 360°/θ is even):

$$n = \frac{360°}{\theta} - 1$$

Or (if 360°/θ is odd)

$$n = \frac{360°}{\theta}$$

Since 360°/θ is even, we use first formula:

$$\Rightarrow n = \frac{360}{90} - 1 = 3$$

Question Number	9	Correct Option	c

Explanation

EMF and voltage relation is given below :

$$EMF = V + Ir$$

For open circuits $I = 0$, hence

$$EMF = V$$

Question Number	10	Correct Option	b

Explanation

Moment of inertia is a tensor quantity because it depends on the of rotation. Changing the axis also changes the moment of inertia. It does not have a direction. Tensor quantities are the one which not have a direction but their values change with changing the direction.

Question Number	11	Correct Option	b

Explanation

Source of current is anything that can convert any other type of energy into current. Since capacitor does not follow this definition hence it is not a source of current although it can be used to store and use electrical energy by means of charging and discharging of electricity

Question Number	12	Correct Option	b

Explanation

Heat energy transmitted, when connected in parallel is written as

$$H = \frac{I^2}{R}t \Rightarrow H \propto \frac{1}{R}$$

Since resistance of A is more than B therefore the heat transmitted by B will be more than A

Question Number	13	Correct Option	b

Explanation

For a passenger sitting in the train the frequency of the whistle appears to be the same as the actual frequency because there is no relative motion between them

Question Number	14	Correct Option	d

Explanation

Both momentum and energy are conserved in pair production

Question Number	15	Correct Option	b

Explanation

The cyclist covers ¾ of the circumference of the circular path as shown below

The cyclist starts from point A and ends at point D through point B and C. The shortest distance AD can be found by using right angled triangle AOD

$$AO^2 + OD^2 = AD^2$$

$$1 + 1 = AD^2 \Rightarrow AD = \sqrt{2}m$$

Question Number	16	Correct Option	c

Explanation

High negative temperature coefficient thermistors are used to accurately measure low temperatures near 10K. Higher resis at low temperature helps in accurately measuring temperatur

Question Number	17	Correct Option	a

Explanation

The slope of the above graph is the ratio of stress to strain wh is young's modulus

Question Number	18	Correct Option	b

Explanation

By de morgan's law

$$\overline{AB} = \overline{A} + \overline{B}$$

This can also be proved using truth table

Question Number	19	Correct Option	c

Explanation

γ - Particles have no charge because they have very low ionization power. When a radioactive material is placed inside the chamber, γ - particles are not affected by the photographic plate and pass straight through them

Question Number	20	Correct Option	c

Explanation

The specific gravity (ratio of density of a substance to the density of a reference substance) of the polymeric solids is less than that o the lightest metal. Plymeric solids consists of light weight monomer chains like C, H, O, N etc hence their density is low as compared to metals

Question Number	21	Correct Option	a

Explanation

By putting an iron piece inside a solenoid, it also magnetizes due to external magnetic field and hence the net magnetic field increases

Question Number	22	Correct Option	a

Explanation

Capacitance of a metallic sphere of radius r is written as,

$C = 4\pi G_0 r$

Question Number	23	Correct Option	c

Explanation

A voltmeter is constructed by connecting a high resistance with galvanometer in series and hence it is also called a high resistance galvanometer

Question Number	24	Correct Option	b

Explanation

Ac source is used to produce X-rays to minimize heating effect because DC can melt the target

Question Number	25	Correct Option	b

Explanation

The idea of prjectile motion is that when an object is thrown horizontally with some velocity, the time it takes to reach the ground is the same as the time it takes for the object being dropped vertically from the same force with 0 initial vertical velocity

The onlyforce on a projectile thrown horizontally is the gravitational force hence it is assumed that the vertical component continuously changes whereas the horizontal component of the motion remains the same

Using these ideas we can write the equations of motion for a projectile

The horizontal distance $x = v_x \times t$ ..... (i)

Vertical distance $y = \frac{1}{2}gt^2 \Rightarrow t = \sqrt{\frac{2y}{g}}$

assuming that the object is dropped verticaclly with 0 initial vertical velocuty

this time is the same for the horizontal motion of the projectile

Put the value of t in (i)

$x = v_x \times \sqrt{\frac{2y}{g}} = 5 \times \sqrt{\frac{2 \times 20}{10}} = 10m$

Question Number	26	Correct Option	a

Explanation

Using

$a = \frac{R_1 R_0}{R_0 t}$

$a = \frac{20\Omega - 10\Omega}{10\Omega \times 10K}$

$a = 0.1 K^{-1}$

Question Number	27	Correct Option	c

Explanation

Huygens principle describes how a wave front travels in space So according to this principle, we can assume that each point on a wave front acts as point source that emits in a spherical shape These emitted wavelets then travel with velocity of light in any medium After a couple of time these tinny wavelets can be enclosed as a total wave front The tangent line is drawn to find its location

Question Number	28	Correct Option	c

Explanation

Coulomb force acts on stationary charges, for moving charges no coulomb's force acts therefore the answer is zero.

Question Number	29	Correct Option	c

Explanation

A transistor is not a diode it is a triode

Question Number	30	Correct Option	b

Explanation
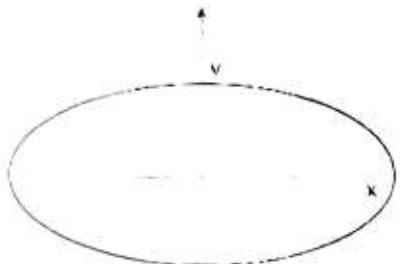
V and x are related as follows:

$$v = \omega \sqrt{x_0^2 + x^2}$$

$$\Rightarrow v^2 - \omega^2 x^2 = \omega^2 x_0^2$$

Which is similar to the general ellipse equation,

$$Ax^2 - By^2 = C$$

This equation gives an ellipse.

Question Number	31	Correct Option	d

Explanation

The complete reflection of a light ray reaching a surface with a less dense medium when the angle of incidence exceeds the critical angle is called total internal reflection.

Dispersion is the separation of white light into colors or of any radiation according to wavelength.

Polarization is the process of making light unidirectional.

A rainbow is a combination of reflection, refraction, and dispersion. So both A & B are correct.

Question Number	32	Correct Option	d

Explanation

Flow rate is defined as the volume of the fluid passed a point in unit second therefore flow rate equals Av and V/t with units m^3s^{-1} not mvt.

Question Number	33	Correct Option	a

Explanation

Energy stored in a capacitor is written as

$$E = \tfrac{1}{2}CV^2$$

Question Number	34	Correct Option	b

Explanation

As the motor is loaded it requires more current to rotate and hence the back generator effect increases but if the motor is overloaded the current required is so high that the motor stops to rotate and hence due to this decrease in rotation the back generator effect decreases

Question Number	35	Correct Option	b

Explanation

Volume of water ejected per second= v × A= 0.5 × 0.003 = 0.0015 m^3s^{-1}

Mass of water ejected per second= V/t × ρ = 0.0015 × 1000= 1.5 kgs^{-1}

Force= momentum change per second= mv/t 1.5×0.3=0.45N

Question Number	36	Correct Option	d

Explanation

In adiabatic process no heat enters or leave the system,

$$\Delta S = \Delta Q/T$$

$$\Delta S = 0$$

Question Number	37	Correct Option	b

Explanation

Iron ($_{26}^{58}$Fe) because the binding energy increases as mass number increases till it reaches a maximum value of 8.8MeV at mass number 58 then it starts gradually decreasing to the value of 7.6 MeV at mass number 238.

Question Number	38	Correct Option	d

Explanation

Escape velocity is written as:

$$v_{esc} = \sqrt{\frac{2GM}{R}}$$

Replace R by 2R;

$$v'_{esc} = \sqrt{\frac{2GM}{2R}} = \frac{1}{\sqrt{2}}\sqrt{\frac{2GM}{R}} = \frac{v_{esc}}{\sqrt{2}}$$

Question Number	39	Correct Option	a

Explanation

At the center of earth the value of g is lowest hence the time period is highest. the formula for time period is given by

$$T = 2\pi\sqrt{\frac{l}{g}}$$

Question Number	40	Correct Option	a

Explanation

Transformer in an electrical device that is used to change the given alternating emf in a larger or smaller emf. It is based on the principle of mutual induction which is defined as the phenomenon in which a changing current in one coil induces an emf on the other coil.

Question Number	41	Correct Option	d

Explanation

SQUID (super conducting quantum interference device) is used to detect weak magnetic field such as produced by the brain.

Question Number	42	Correct Option	a

Explanation

Oersted discovered that current produces magnetic field.

Question Number	43	Correct Option	c

Explanation

Since the length of the material is changed by keeping the mass constant therefore the ordinary relation of resistance with length i.e. the direct relation is not used instead the following relation is used:

$R = \rho d l^2 m$ p, d and m are constants. $R' = \rho d m \, (nl)2$

$R' = n^2 R$

Resistance of a resistor increases with its length because electrons have a larger distance to travel, and hence suffer greater collisions.

Question Number	44	Correct Option	a

Explanation

Given that

$\omega = \frac{\pi}{3} rad sec^{-1}$

$t = 60 sec$

$r = 0.4m$

Using,

$\theta = \omega t = \frac{\pi}{3} \times 60 = 20\pi rad$

$S = r\theta = 0.4 \times 20\pi = 8\pi m$

Angular Velocity is the rate of change of angular position of a rotating body.

Question Number	45	Correct Option	c

Explanation

Since we have a uniform wire therefore the resistance of each side of the triangle will be equal as the length of each is also equal. Three sides mean that each side will have resistance 3ohm/3 = 1 ohm, as shown below:

1 ohm   1 ohm

A   B

1 ohm
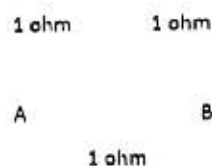
If the resistance is to be measured across A and B, then it is clea that two of the three sides are connected in series

$R' = 1 + 1 = 2ohm$

and there combination is connected in parallel with the third side

$\frac{1}{R} = \frac{1}{1} + \frac{1}{2} = \frac{3}{2} \Rightarrow R = \frac{2}{3}ohm$

Question Number	46	Correct Option	a

Explanation

The speed of the fluid coming out of the tank from the whole ca be found using torricelli's theorem:

$v = 2g(h_1 - h_2) = 2 \times 10 \times (10 - 5) = 10ms^{-1}$

Using the projectile motion formulas:

$t = \frac{2h}{g} = \frac{2 \times 5}{10} 1sec$

$x = v \times t = 10 \times 1 = 10m$

Question Number	47	Correct Option	c

Explanation

An electron can stay in a metastable state for 10^{-3}s

Metastable state :

The metastable state is a particular excited state of an atom, nucleus or other systems that have a longer lifetime than the ordinary excited *states* but a shorter lifetime than the ground *state*

Question Number	48	Correct Option	a

Explanation

using

$$\lambda = \frac{h}{mv} = \frac{6.63 \times 10^{-34}}{5 \times 200} = 6.63 \times 10^{-31} m$$

Question Number	49	Correct Option	b

Explanation

According to the law of conservation of energy,

Initial energy (at the starting point) = final energy (at the highest point)

$K E_i + P E_i = K E_f + P E_f$

$\frac{1}{2}mv^2 + 0 = 0 + P E_f$

$P E_f = \frac{1}{2}(0.1)(10)^2 = 5J$

Question Number	50	Correct Option	b

Explanation

Given that two vectors A and B such that

$A . B = 15$

$A B = 30$

$A . B = A B \cos\theta$

$\cos\theta = \frac{A.B}{AB} = \frac{15}{30} = 0.5 \Rightarrow \theta = 60^\circ$

Question Number	51	Correct Option	b

Explanation

Current is not a vector quantity because it cannot be added by vector addition i.e. by head to tail rule. It is algebraically added as scalars do. Although current has a direction.

Question Number	52	Correct Option	d

Explanation

The average speed can be calculated as follows

Time of the first quarter of the journey= t

Time of the other 3 quarters of the journey= 3t

Total time of the journey= 4t

The speed in the first quarter w.r.t time=

The speed in the first quarter w.r.t time=v1 $= \frac{S1}{t}$

The speed in the rest of the three quarters of the journey w.r.t time=v2$= \frac{S2}{3t}$

$V_{avg} = \frac{TotalDistance}{Totaltime} = \frac{S1+S2}{4t} = \frac{S1}{4t} + \frac{S2}{4t} = \frac{v1}{4} + \frac{3v2}{4} = \frac{10}{4} + \frac{3 \times 20}{4} = 17.5 ms^{-1}$

Question Number	53	Correct Option	d

Explanation

The unit of permeability of free space is written as:

$$Wb A^{-1} = V.s = N.C^{-1} ...$$

Its value in SI units is 4π x 10-7 NA-2

It is a measure of the amount of resistance encountered when forming a magnetic field in a vacuum.

Question Number	54	Correct Option	b

Explanation

The number of significant figures in a measurement can be found out with the help of the least count of the measuring instrument. In this case the accurately known digit is 8 while the doubtful digit is the first zero from the left. This is because the measurement is rounded off to the tens due to the least count which is 10g. If the least count were to be 100g then the significant figures in 800g will be 1 as the measurement is rounded off to hundreds in that case

Question Number	55	Correct Option	b

Explanation

Absolute P E is written as

$$U = -\frac{GMm}{R}$$

As R goes to infinity, U goes to zero

Potential energy or absolute potential energy is defined as the amount of work done by an external source in moving an object from a reference point (point of zero potential energy) to a particular position such that the object or charge is never accelerated.

Question Number	56	Correct Option	c

Explanation

Emf is induced due to changing magnetic flux. If the magnetic field is constant throughout the region and the loop is moving within that region then there will be no change in the magnetic flux hence no emf will be induced.

Question Number	57	Correct Option	d

Explanation

Specific theory of relativity is only applicable if the object is moving with a speed approaching the speed of sound. If it is equal or greater than the speed of light, then the theory collapse.

" The speed of light is the speed maximum speed at which an object can travel" Anything travelling faster than that defies the laws of physics

Question Number	58	Correct Option	a

Explanation

The conversion of alternating current into direct current is called rectification This is done using diodes

Question Number	59	Correct Option	b

Explanation

σ particles are the particles that have a positive charge on them To detect an σ particle, the particles fall on a photographic plate, these particles bend lowards the negative plate of the detector These particles continue to produce the intense ionization along a straight path till it comes to rest

Question Number	60	Correct Option	b

Explanation

LED (Light Emitting Diode) is a semiconductor device that is used to transmit the light when it is in forward biased It is mostly made gallium arsenide and gallium arsenide phosphide which have a potential barrier of p and n sides in such a way that when an electron combines hole during forward biased conduction, a photon of visible light is emitted

Question Number	61	Correct Option	b

Explanation

Pair production does not take place in vacuum because in vacuum momentum does not remain conserve. Pair production also requires the use of photons which also do not exist in a vaccum

Question Number	62	Correct Option	b

Explanation

Isobaric process is a process in which the change in pressure is 0 i e pressure remains constant.

Question Number	63	Correct Option	b

Explanation

In the CRO, when the electron beam is injected inside the tube, strong magnets are place inside the tube that are also the deflecting plates which helps to deflect the electron beam These deflected beam gives the different wave forms of different voltages applied on the screen

Question Number	64	Correct Option	c

Explanation

As we know that.

$$C_p - C_v = R$$

$$C_p / C_v = R$$

By solving both equations simultaneously then

$$C_v(\gamma - 1) = R$$

$$\gamma = \frac{R}{C_v} + 1$$

$$\gamma = \frac{5R+1}{2} \quad \gamma = \frac{7}{5}$$

Question Number	65	Correct Option	b

Explanation

The value of g is written as,

Earth is not a perfect sphere. Its radius measured from the equator is greater than as measured from poles by 21 km

$R_{eq} > R_{pol}$

Since g and R are inversely related, therefore,

$R_{eq} < R_{pol}$

Question Number	66	Correct Option	a

Explanation

At resonance frequency the current in LC parallel circuit is minimum because the impedance becomes maximum.

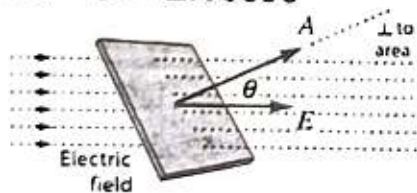| Question Number	67	Correct Option	a

Explanation

Where θ is angle between vector area and electric field. Electric flux is maximum when this angle is zero degree, or the vector area and electric field are parallel.

Given below is a figure which demonstates this fact.

$$\text{flux} = \Phi = EA\cos\theta$$

Question Number	68	Correct Option	a

Explanation

The main idea behind this question is to use the equations of motion. We calculate the distance travelled during for the first second and for the two seconds of the journey and then we can calculate the distance moved in the 2nd second.

According to second equation of motion:

$$S = ut + 0.5at^2$$

Here u=0, which is the initail velocity a is the acceleration and t is the time

$S = \frac{a}{2}r^2$, Putting a=g=10

In 1 sec the distance covered is;

$$S = \frac{10}{2}(1)^2 = 5m$$

Similarly, in 2 sec the distance covered is,

$$S = \frac{10}{2}(2)^2 = 20m$$

So, the distance covered during 2nd second is,

20-5=15.

Equations of motion :-

vf = vi + atS = vit + 12at22aS = vf2 - vi2

When a body is in free fall, 'a' is replaced by gravitational acceleration 'g'.

Question Number	69	Correct Option	a

Explanation

By definition, 1 radian is subtended at the center of a circle by an arc equal to the radius.

angle: length of the arc

1: r

Circumference of circle = 2 r

$X: 2\pi r$

$\Rightarrow X = 2\pi$ rad

Question Number	70	Correct Option	c

Explanation

Albert Einstein in 1905, observed that the laws of physics were not same for accelerating and nonaccelerating bodies. The speed of light was independent in vacuum also. This was the initial postulate of special theory of relativity which produces new frame work for the scientists and new postulates for space and time.

Question Number	71	Correct Option	a

Explanation

In modulation low frequency signals are modulated with high frequency carrier waves.

In electronics and telecommunications, modulation is the process of varying one or more properties of a periodic waveform, called the carrier signal, with a modulating signal that typically contains information to be transmitted.

Question Number	72	Correct Option	a

Explanation

The minimum number of unequal vectors whose resultant is zero is 2. Two vectors with same magnitude but opposite in direction are also unequal vector and their resultant is zero.

Question Number	73	Correct Option	a

Explanation

Mathematical formula for Balmer series is:

$$\frac{1}{\lambda} = R_H\left(\frac{1}{2^2} - \frac{1}{n^2}\right)$$

For longest wavelength n=3

$$\frac{1}{\lambda} = R_H\left(\frac{1}{2^2} - \frac{1}{3^2}\right) = \frac{5R_H}{36} \Rightarrow \lambda = \frac{36}{5R_H}$$

Question Number	74	Correct Option	d

Explanation

According to Gauss's law, electric flux through a closed surface enclosing a charge is written as:

$$\Phi = \frac{q}{\varepsilon_0}$$

This shows that electric flux is independent of the shape of the closed surface and it only depends on the amount of charge which is constant in all of the above cases. Hence all the surfaces have the same electric flux.

Question Number	75	Correct Option	c

Explanation

The focal length of a lens formed by two convex lens is written as:

$$\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2}$$

Using this formula:

$$\frac{1}{f} = \frac{1}{5} + \frac{1}{5} = \frac{2}{5} \Rightarrow f = 2.5cm$$

Question Number	76	Correct Option	a

Explanation

CGS is another system of units which measures lengths in centi metres mass in grams and time in seconds

In CGS unit system the unit of angle is degrees.

Question Number	77	Correct Option	d

Explanation

Refractive index can be calculated with the help of all the above mentioned formulas. The ratio of the velocity of light in a vacuum to its velocity in a specified medium is called refractive index.

Question Number	78	Correct Option	b

Explanation

The increase in the gravitational constant also causes the extension in the vertical spring system to increase. And hence the time period remains constant

Question Number	79	Correct Option	d

Explanation

Rydberg's constant and propagation constant have same unit i.e. /m and same dimension i.e. $[L^{-1}]$

Similarly, velocity gradient and and angular velocity have same unit i.e. /s and same dimension i.e. $[T^{-1}]$

Spring constant and surface tension have same unit i.e. N/m and same dimension i.e. $[MT^{-2}]$

Question Number	80	Correct Option	d

Explanation

Emf is induced due to changing magnetic flux. All of the above options increase the rate of change of magnetic field.

Question Number	81	Correct Option	a

Explanation

Magntice flux is written as :

$$\Phi = B.A = (5\hat{i} + 5\hat{j}).(1\hat{j}) = 5Wb$$

Question Number	82	Correct Option	d

Explanation

The instant at which the switch is turned on the current changes from zero to a maximum value and remains constant and when it is turned off the value of current decreases to zero, hence, when the switch is turned on or off self induction takes place for that instant even if it is connected to a DC source.

Question Number	83	Correct Option	a

Explanation

Using

$$\epsilon = -N\frac{\Delta\varphi}{\Delta t}$$

Since there is a loop hence N=1:

$$\epsilon = 1 \times 10 = 10 V$$

Question Number	84	Correct Option	c

Explanation

Sodium-24 is used to study the circulation of blood.

Question Number	85	Correct Option	a

Explanation

Dimensions can be multiplied, divided and powered but they cannot be added or subtracted algebraically.

Question Number	86	Correct Option	c

Explanation

Since the source is moving in a circular path with observer center, the distance between them does not change althou a relative motion between them. Therefore, the frequency appear to change.

Question Number	87	Correct Option	c

Explanation

Using the following formula,

$$f_n = \frac{nv}{2l}$$

$$f_1 = \frac{1 \times 340}{2 \times 1} = 170 Hz$$

Question Number	88	Correct Option	c

Explanation

The emf induced in a conductor is called induced emf.

Question Number	89	Correct Option	a

Explanation

The twinkling of light is due to the non-uniform density of the atmosphere.

Question Number	90	Correct Option	d

Explanation

The amount of iodine-131 left behind will be 0.39mg because half life of iodine-131 is 8 days and after every 8 days half of th iodine is decayed. 56 days means 7 half-lives.

$$N = \frac{N_0}{2^n} = \frac{50}{2^7} = 0.39mg$$

Question Number	91	Correct Option	d

Explanation

If piston is fixed then volume change is zero so as work done is als zero.

Question Number	92	Correct Option	d

Explanation

According to the uncertainty principle,

$$\Delta x \, \Delta p \geq \frac{h}{2}$$

Therefore in terms of energy and time it can be represented as

$$\Delta E \Delta t = \frac{h}{2}$$

Which shows that the uncertainty in the energy for a system changing significantly requires a time which is always greater then h/2

Question Number	93	Correct Option	a

Explanation

The introduction of impurities into a semi-conductor is called doping. Doping is done in the ratio 1 to 10^5.

Question Number	94	Correct Option	d

Explanation

Materialization of energy is a phenomenon which includes a pair production. Pair production is a process in which there is a conversion of direct energy into a matter. Since the photon is energetic therefore it is converted into the electron positron pair that can be detected by the cloud chamber under the presence of magnetic field. The positron formed undergoes with annihilation process with another electron present in matter to stable itself.

Question Number	95	Correct Option	b

Explanation

At the right and left (point B and D) of the circle the centripetal force is provided entirely by the tension in the string.

$$T_{B,D} = \frac{mv^2}{r}$$

At the top (point A) the centripetal force is the resultant of weight and tension in the string

$$T_A + mg = \frac{mv^2}{r}$$

$$T_A = \frac{mv^2}{r} - mg$$

Similarly, at the bottom (point C)

$$T_C - mg = \frac{mv^2}{r}$$

$$T_C = \frac{mv^2}{r} + mg$$

Hence,

$$T_A < T_B = T_D < T_C$$

Centripetal force is a force that acts on a body moving in a circular path and is directed towards the centre around which the body is moving.

Tension is defined as the force acting along a string.

Question Number	96	Correct Option	a

Explanation

Boron is the quenching gas because it has low ionization potential than inert gas.

Question Number	97	Correct Option	a

Explanation

The focal length of a lens formed by two lens is written as:

$$\frac{1}{f} = \frac{1}{f1} - \frac{1}{f2}$$

Using this formula:

$$\frac{1}{f} = \frac{1}{5} - \frac{1}{5}$$

f = infinite

Question Number	98	Correct Option	b

Explanation

The rings used in DC generators is split ring. Split rings allow for the smooth turing of mortor and generation of DC current. Given below is a diagram of a DC generator.
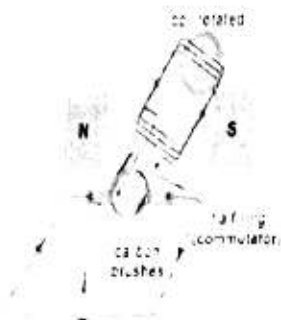
Question Number	99	Correct Option	c

Explanation

Oersted discovered that the electric current produces magnetic field, many scientist started to look for the reverse effect i.e. electric field to be caused by means of magnetic field.

Question Number	100	Correct Option	a

Explanation

Using

$$J = \frac{I}{A} = \frac{I}{\pi r^2} \Rightarrow I = J\pi r^2 = 0.02 \times 3.14 \times 0.01^2 = 0.0006 A$$

PHYSICS PRACTICE SOLVED PAPER 3

1. In CGS unit system, the unit for magnetic field is:
   a. Tesla
   b. Milli tesla
   c. Gauss
   d. None of the above

2. Bernoulli's equation gives:
   a. Law of conservation of energy
   b. Law of mass action
   c. Law of conservation of mass
   d. Both A and C

3. What is the instantaneous power dissipated through a resistor of resistance 10 ohm if it is connected to an AC source of frequency 15 Hz at 1/180 sec if peak value s 20 V?
   a. 10 W
   b. 100 W
   c. 40 W
   d. Cannot be determined

4. What happens to the fringe width if the young's double slit apparatus is placed in water tank?
   a. Increases
   b. Decreases
   c. Remains same
   d. None of the above

5. Supplementary units are:
   a. Baseless
   b. Dimensionless
   c. Dimensional
   d. None of the above

6. If a lens of refractive index n is placed in liquid of same refractive index, then focal length becomes
   a. half   c. Infinite
   b. zero   d. double

7. The second isotope of hydrogen is known as:
   a. Protium
   b. Deuterium
   c. Tritium
   d. None of these

8. At which energy level the dominant process is photoelectric effect which removes photons from a beam.
   a. <0.5 MeV
   b. >0.5 MeV
   c. 0.5 MeV
   d. None of these

9. What is the wavelength of the following stationary wave?

   a. 2L/3
   b. 3L/2
   c. L/2
   d. none of the above

10. Deflection θ of needle of a Galvanometer is
    a. directly proportional to voltage
    b. inversely proportional to voltage
    c. directly proportional to current
    d. inversely proportional to current

11. The mathematical relationship of Torricelli's equation of continuity is represented by:
    a. $V_2 = 2g(h_1 - h_2)$
    b. $V_2 = 2g(h_2 - h_1)$
    c. $V_2 = 2g(h_2 + h_1)$
    d. $V_2 = 2g(h_1 + h_2)$

12. If two identical springs, of spring constant K, are attached end to end, then the spring constant of the resulting spring is:
    a. 2K   c. K/2
    b. K   d. None of the above

13. EEG is used to measure the potential difference created by the electrical activity of:
    a. Heart
    b. Brain
    c. Lungs
    d. None of the above

14. Oxygen is sixteen times that of hydrogen. What is the ratio of speed of hydrogen with respect to oxygen?

    a. Five
    b. Eight
    c. Four
    d. Sixteen

15. X-rays cannot be used in:

    a. Radars
    b. CAT scans
    c. Finding out defects in structural steels
    d. None of the above

16. If the mass of the object is doubled then what happens to the escape velocity?

    a. One half
    b. Doubled
    c. $\sqrt{2} times$
    d. Does not depend on the mass

17. Which one of these is the reverse of heat engine?

    a. Steam engine
    b. Refrigerator
    c. Waterfall
    d. None of these

18. What is the angle between two forces of equal magnitude such that the resultant is of same magnitude?

    a. $60°$
    b. $45°$
    c. $90°$
    d. $120°$.

19. The width of dark and bright fringe is:

    a. Greater
    b. Lesser
    c. Equal
    d. None of the above

20. Potential energy is maximum at the highest point of the projectile motion if the angle is:

    a. $90°$
    b. $60°$
    c. $45°$
    d. $30°$

21. The shortest wavelength in Pfund series is:

    a. $2^2/R_H$
    b. $3^2/R_H$
    c. $4^2/R_H$
    d. $5^2/R_H$

22. Linear velocity is equal to:

    a. $\vec{\omega} \times \vec{r}$
    b. $\vec{r} \times \vec{\omega}$
    c. $\vec{\omega}.\vec{r}$
    d. None of the above

23. At resonance, the _____ of the period oscillators matches that of the driven harmonic oscillator.

    a. Amplitude
    b. Both A and B
    c. Frequency
    d. Energy

24. When the antinodes, in stationary wave are passing through their equilibrium position, the energy is:

    a. Potential only
    b. Kinetic only
    c. A combination of both forms of energ
    d. There is no energy in stationary wave

25. The phenomenon in which the changing of the current in one coil induces current in a nearby coil is called:

    a. Motional emf
    b. Mutual induction
    c. Self induction
    d. None of the above

26. What happens to the width of potential barrier if the ratio of impurity increases?

    a. Decreases
    b. Increases
    c. Remains same
    d. None of the above

27. If a molecule moves with initial momentum towards right and then towards left with momentum $-mv_x$, then what is the change in the momentum equal to?

    a. 0
    b. mv_x
    c. $2mv_x$
    d. $-2mv_x$

28. If the light is horizontally polarized, what will be the intensity I of the light passing through a polarizer if it is placed at an angle of 45o from horizontal?

    a. I
    b. I/2
    c. Zero
    d. None of the above

29. The time period of free falling pendulum is:
   a. Infinity
   b. Zero
   c. Unchanged
   d. None of the above

30. Which of the following is not laser property:
   a. Uni-directional
   b. Coherent
   c. Radioactive
   d. Monochromatic

31. When an unmagnetized iron bar is kept in a magnetic field, the hysteresis loop completes in _____ quarter cycles.

   a. 2
   b. 3
   c. 4
   d. 5

32. In RL series circuit voltage leads current by angle:
   a. $sin^{-1}\frac{X_L}{R}$
   b. $cos^{-1}\frac{R}{Z}$
   c. $tan^{-1}\frac{X_L}{Z}$
   d. None of the above

33. In the reverse biased p-n junction the leakage current is due to:
   a. majority charge carriers
   b. minority charge carriers
   c. Both A and B
   d. None of the above

34. Photoelectrons attain a maximum energy of:
   a. $V_o e = mv^2_{max}$
   b. $2V_o e = mv^2_{max}$
   c. $V_o e = \frac{1}{2} mv^2_{max}$
   d. $2V_o e = v^2_{max}$

35. The units of pgh is equal to:
   a. $1/2\ \rho v^2$
   b. Pressure
   c. Work
   d. Both A and B

36. The process of radioactivity is affected by
   a. Chemical or physical change
   b. Pressure
   c. Temperature
   d. None of these

37. Induced emf is produced due to:
   a. Magnetic field
   b. Magnetic flux
   c. Changing magnetic flux
   d. All of the above

38. The maximum velocity that a drop of radius 1 cm and density 1000 kgm^{-3} can attain in a medium of viscosity 10^{-3} $kgm^{-1}s^{-1}$ is:
   a. $3000ms^{-1}s$
   b. $2000ms^{-1}s$
   c. $1000ms^{-1}s$
   d. $9000ms^{-1}s$

39. What is the reaction force due to wedge A and B if they are placed at 10 cm and 70 cm from one end of a uniform meter rod of 0.02 N such that a ball of 10 g is placed at 50 cm from the same end?
   a. 0.01 N and 0.03 N respectively
   b. 0.04 N and 0.08 N respectively
   c. 0.005 N and 0.025 N respectively
   d. 0.03N and 0.01N respectively

40. We know that for the dark fringes in young's double slit experiment:
$$y = (m + \tfrac{1}{2})\frac{\lambda L}{d}$$
   For first dark fringe m=?
   a. 1
   b. 2
   c. -1/2
   d. 0

41. Photoelectrons having maximum kinetic energy depends upon the _____ of incident light:
   a. Intensity
   b. Power
   c. Brightness
   d. Frequency

42. The angular speed of the earth about its own axis is:

  a. $\frac{\pi}{43200} radsec^{-1}$

  b. $\frac{\pi}{12} radsec^{-1}$

  c. $\frac{\pi}{3600} radsec^{-1}$

  d. Cannot be determined

43. Equation of continuity gives:

  a. Law of conservation of energy

  b. Law of conservation of mass

  c. Law of mass action

  d. both b & c

44. Suppose we have two metallic spheres. Two charged particles of equal charges are placed inside the spheres one in each sphere. In one of these spheres charged particle is placed at the center and in the other it is placed half way on the radius from the center, as shown below:

A   B

The electric flux in Sphere A and Sphere B is:

  a. A>B

  b. B>A

  c. B=A

  d. Cannot be determined

45. Which of the following wave needs medium for their propagation:

  a. X- rays

  b. Sound waves

  c. Heat waves

  d. Infrared radiation

46. If a longitudinal wave is moving from a low potential area to a high potential area, then its phase angle changes by:

  a. 180°

  b. 90°

  c. 45°

  d. 0°

47. Suppose a solenoid of self inductance 10 H has a current 1 A in it. What is the energy stored in the solenoid?

  a. 10 J

  b. 100 J

  c. 1000 J

  d. None of the above

48. Photocell is based on:

  a. Compton's effect

  b. Photoelectric effect

  c. both a & b

  d. none of the above

49. For a compressible fluids equation of continuity becomes:

  a. V/t=costant

  b. Av= constant

  c. pAv=constant

  d. It is not applicable for compressible flu

50. A device that converts mechanical energy to electrical energy is:

  a. DC generator

  b. AC generator

  c. Transistor

  d. Transformer

51. Power in an AC circuit is written as:

  a. $VI\cos\theta$

  b. $VI\sin\theta$

  c. $VI\tan\theta$

  d. All of the above

52. Solve the following

$$\hat{i}.\hat{j} \times \hat{k}$$

  a. 0

  b. 1

  c. Cannot be simplified

  d. $\sqrt{2}$

53. Blood is _____ times more viscous than water.

  a. 1-3

  b. 5-7

  c. 3-5

  d. none of the above

54. The elementary particles are:

  a. hadrons

  b. leptons

  c. photons

  d. both b and c

55. A negative charge moves _____ to the electric field.

  a. Parallel

  b. Antiparallel

  c. Perpendicular

  d. None of the above

56. The angle between eye and an object placed at any distance from eye is known as:
   a. Objective angle
   b. Subjective angle
   c. Visual angle
   d. None of the above

57. Power factor at resonance in RLC series circuit is:
   a. 1
   b. 0
   c. ∞
   d. None of the above

58. Average kinetic energy per molecule is:
   a. KT
   b. 3/2 KT
   c. ½ KT
   d. K/T

59. AC current leads AC voltage in resistors by:
   a. $\pi/2$
   b. π
   c. Zero
   d. None of the above

60. Which of the following x-rays have highest energy?
   a. K_α
   b. K_β
   c. Both A and B
   d. None of the abdve

61. Molecular kinetic gas theory is not based on:
   a. Collision between the molecules are inelastic
   b. Gases possess no intermolecular attraction or repulsion
   c. Gases have continuous motion
   d. Gases have no definite volume but have definite mass

62. The converse of pair production is:
   a. Compton's effect
   b. Photoelectric effect
   c. Annihilation of matter
   d. None of the above

63. The central point in the newton's rings is:
   a. Dark
   b. Depends on the type of light used
   c. None of the above
   d. Bright

64. In cathode ray oscilloscope, the voltage applied at x axis is called:
   a. Sweep voltage
   b. Time base voltage
   c. Saw tooth voltage
   d. All of the above

65. Unit vector does not have:
   a. Units
   b. Direction
   c. Magnitude
   d. All the above

66. Pitch of sound is affected by :
   a. Frequency
   b. Loudness
   c. Shielding effect
   d. Harmonics

67. If the starting position in simple harmonic motion is the extreme position, then extension X is written as:
   a. $x = x_o sin\theta$
   b. $x = x_u cos\theta$
   c. $x = x_u sec\theta$
   d. None of the above

68. By increasing the temperature, the viscosity of gases:
   a. Increases
   b. Remains constant
   c. Decreases
   d. None of the above

69. For short circuit:
   a. EMF>V
   b. EMF
   c. EMF=V
   d. None of the above

70. The electric flux due to two similarly charged infinite sheets is:
   a. σ/ϵ_o
   b. $\sigma/2\epsilon_o$
   c. Zero
   d. None of the above

71. A neutron is made up of:
   a. 1 up and 1 down quarks
   b. 2 strange and 2 down quarks
   c. 1 up and 2 down quarks
   d. 1 strange and 3 charm quarks

72. If an object is moving with the speed approaching the speed of light, then length:

    a. Increases
    b. Decreases
    c. Remains same
    d. None of the above

73. Elastic deformation deforms:

    a. Metals
    b. Materials
    c. Metal oxides
    d. Halogens

74. In velocity selector magnetic field is applied _____ to electric field:

    a. Parallel
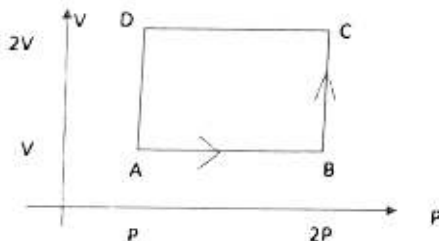   b. Perpendicular
    c. Antiparallel
    d. None of the above

75. How many kinds of units are there?

    a. 1
    b. 7
    c. 3
    d. Infinite

76. In a black body, energy distribution curve can be calculated by

    a. Quantum theory of radiation
    b. Compton effect
    c. Photoelectric effect
    d. Black body radiation theory

77. What is the net work done in the following graph:

    a. PV
    b. Zero
    c. 2PV
    d. 4PV

78. The orbital radius of a geostationary orbit is equal to:

    a. $\left(\frac{GMT^2}{4\pi^2}\right)^{\frac{1}{3}}$
    b. $\left(\frac{GMT^2}{4\pi^2 r^2}\right)^{\frac{1}{3}}$
    c. $\left(\frac{GM}{\omega^2}\right)^{\frac{1}{3}}$
    d. All of the above

79. Force on a moving negative charge in magnetic field is written as:

    a. $F=q(v\times B)$
    b. $F=v(q\times B)$
    c. $F=q(B\times v)$
    d. None of the above

80. X-rays were first discovered by:

    a. Rydberg
    b. Rontgen
    c. Planck
    d. None of the above

81. Which of the following is not an example of geothermal energy?

    a. Radioactive decay
    b. Geysers
    c. Residual heat of the earth
    d. None of the above

82. When a beam of light is confined to vibrate in one medium then such a process is:

    a. Total internal reflection
    b. Diffraction
    c. Polarization
    d. Transmission

83. Hard x-rays mostly consist of:

    a. Characteristic x-ray
    b. Continuous x-ray
    c. Both A and B
    d. None of the above

84. How many steradians are present in one half sphere?

    a. None of these
    b. 2π
    c. 3π
    d. 4π

85. In an Einstein equation, rest mass energy can be represented as:

    a. m_0
    b. m
    c. m^0
    d. None of these

86. The timing element in the circuit of a charging capacitor is:

    a. Battery
    b. Resistor
    c. Capacitor
    d. None of the above

87. If the young's double slit apparatus is placed in a denser medium of refractive index n, then the fringe width:

   a. Decreases by n times.
   b. Increases by 2n times
   c. Decreases by 2n times
   d. Increases by n times

88. The branch of physics that deals with the investigation of intensities and wavelengths of electromagnetic radiations emitted or absorbed by atoms is called:

   a. Optical physics
   b. Spectroscopy
   c. Atomic physics
   d. None of the above

89. Wave particle duality was introduced by:

   a. De Broglie
   b. Einstein
   c. Plank
   d. None of the above

90. Alpha particles enter a velocity selector where electric intensity is 200Vm^(-1) and magnetic induction 0.10T. what is the speed of the particle which passes undeviated?

   a. $200ms^{-1}$
   b. $100ms^{-1}$
   c. $2000ms^{-1}$
   d. none of these

91. Electromagnetic waves were discovered by:

   a. Maxwell
   b. Hurtz
   c. Fleming
   d. None of the above

92. In winters the time sound takes to travel:

   a. Increases
   b. Decreases
   c. Remains same
   d. Cannot be determined

93. Torque on a current carrying coil is written as:

   a. ILBacosα
   b. IBAcosα
   c. IBcosα
   d. Both A and B

94. Neutron possess _____ quarks:

   a. Two up one down
   b. Three up
   c. Three down
   d. One up two down

95. A solenoid 10 cm long has 100 turns of wire in it. A current of 1 ampere flows through it. What is the magnitude of the magnetic field inside the solenoid?

   a. $4\pi \times 10^{-3}T$
   b. $4\pi \times 10^{-4}T$
   c. $4\pi \times 10^{-5}T$
   d. None of the above

96. Liquid lasers use dye to dissolve in _____ which is used as light amplifying agent:

   a. Ethanol
   b. Methanol
   c. Glycol
   d. All of above

97. For any two vectors

$$\vec{A} and \vec{B}, \vec{A}.\vec{B} \times \vec{A} =?$$

   a. 0
   b. $\vec{A}$
   c. $\vec{B}$
   d. Cannot be determined

98. Curie temperature of _____ is about 1043 k.

   a. Helium
   b. Nickel
   c. Iron
   d. Sodium

99. A boy climbs up 10 stairs of width 30 cm and height 15 cm each, while carrying a bucket of weight 3N. what is the work done by the boy?

   a. 4 J
   b. 4.5 J
   c. 5 J
   d. 5.5 J

100. Speed of sound is not effected by:

   a. Pressure
   b. Density
   c. Temperature
   d. Humidity

ANSWERS & EXPLANATIONS

Question Number 1   **Correct Option** c

Explanation

In CGS unit system the unit for magnetic field is Gauss.

Question Number 2   **Correct Option** a

Explanation

Bernoulli's equation gives law of conservation of energy.

Question Number 3   **Correct Option** a

Explanation

Using

$$V_0 = V sin(2\pi f t) = 20 \times sin(2\pi \times 15 \times \tfrac{1}{180}) = 10V$$

Using

$$P = \frac{V^2}{R} = \frac{10^2}{10} = 10W$$

Question Number 4   **Correct Option** b

Explanation

In denser medium wavelength and hence the speed of light decreases. Due to this the fringe width also decreases as shown below:

$$\Delta y = \frac{\lambda}{d}$$

Question Number 5   **Correct Option** b

Explanation

Supplementary units are the only units which are dimensionless, that is why they are categorized as a separate type of units for example steradian or radian.

Question Number 6   **Correct Option** c

Explanation

If the lens is immersed in a liquid of same refractive index then it is similar to covering the lens with the same medium and hence the focal length becomes infinite as it acts like a slab.

Question Number 7   **Correct Option** b

Explanation

Hydrogen possess three isotopes. The second isotope of hydrogen is known as the deuterium as it possess only o and one neutron in its nucleus.

The other isotopes of hydrogen are

- protium H^1
- tritium H^3

Question Number 8   **Correct Option** a

Explanation

Photoelectric effect is dominant at low energies less than 0.5 MeV.

Photoelectric effect, phenomenon in which electrically cha particles are released from or within a material when it abs electromagnetic radiation.

Question Number 9   **Correct Option** a

Explanation

Total number of wavelengths in length L is $3\lambda/2$

$$L = \frac{3\lambda}{2} \Rightarrow \lambda = \frac{2L}{3}$$

Question Number 10   **Correct Option** c

Explanation

In a galvanometer

$$\text{Deflection torque} = \text{Restoring torque}$$

$$NIBA = c\theta$$

As c/NBA is constant, so

$$I \propto \theta$$

A galvanometer is an electromechanical instrument used fo detecting and indicating an electric current.

Question Number	11	Correct Option	b

Explanation

Torricelli's equation is derived from the Bernoulli's equation which describes that the efflux of the speed is equal to the velocity gained by the fluid which is falling through a distance h_2-h_1 under the influence of gravity. It is represented as:

$$V_2 = \sqrt{2g(h_2 - h_1)}$$

Question Number	12	Correct Option	c

Explanation

For two springs attached in series, the resultant spring constant is written as:

$$\frac{1}{K} = \frac{1}{K_1} + \frac{1}{K_2}$$

$$\frac{1}{K'} = \frac{1}{K} + \frac{1}{K} = \frac{2}{K} \Rightarrow K' = \frac{K}{2}$$

Question Number	13	Correct Option	b

Explanation

EEG (electroencephalography) is used to measure the potential difference created by the electrical activity of brain. Which is used for diagnosing abnormal behavior.

Question Number	14	Correct Option	c

Explanation

According to the formula,

$$\frac{V_{H_2}}{V_{O_2}} = \frac{\frac{3KT}{m_{H_2}}}{\frac{3KT}{m_{H_2}}}$$

$$\frac{V_{H_2}}{V_{O_2}} = \frac{m_{O_2}}{m_{H_2}}$$

Since mass of oxygen is 16 μ, so mass of O_2 would be 32 μ. Similarly the mass of hydrogen is 1μ, therefore the mass of H_2 would be 2 μ. By putting the values in above equation we have,

$$\frac{V_{H_2}}{V_{O_2}} = \frac{32\mu}{2\mu}$$

$$\frac{V_{H_2}}{V_{O_2}} = 4$$

Question Number	15	Correct Option	a

Explanation

X rays cannot be used in radars because x rays have high penetration power and are not reflected by targets.

Question Number	16	Correct Option	d

Explanation

Escape velocity is written as

$$v_{esc} = \sqrt{\frac{2GM}{R}}$$

here M is the mass of earth

This shows that escape velocity is independent of the mass of the object.

Question Number	17	Correct Option	b

Explanation

In refrigerator heat is transferred from a low temperature compartment to high temperature surrounding which is opposite to the heat engine.

Question Number	18	Correct Option	d

Explanation

The magnitude of resultant is written as (using the law of cosine):

$$R = \sqrt{F_1^2 + F_2^2 + 2F_1F_2\cos\theta}$$

$$R^2 = F_1^2 + F_2^2 + 2F_1F_2\cos\theta$$

Given conotiion ;$R=F_1=F_2=F$

$$F^2 = F^2 + F^2 + 2F^2\cos\theta$$

$$\cos\theta = -\frac{1}{2} \Rightarrow \theta = 120^\circ$$

Question Number	19	Correct Option	c

Explanation

Width of a bright is written as ;

$$\Delta y_b = y_{m+1} - y_m(m + 1)\frac{\lambda L}{d} - \frac{m\lambda L}{d} = \frac{\lambda L}{d}$$

Similarly , for dark fringe;

$$\Delta y_b = y_{m+1} - y_m(m + 1 + \frac{1}{2})\frac{\lambda L}{d} - \frac{(m+\frac{1}{2}\lambda L)}{d} = \frac{\lambda L}{d}$$

Hence both are equal

Question Number	20	Correct Option	a

Explanation

To find the angle for maximum potential energy, maximum height function must be maximized as follows

$$h = \frac{v_i^2 \sin^2\theta}{2g}$$

the maximum value of $\sin\theta$ is $1 \Rightarrow \theta = 90°$

This makes sense intuitively that when an object is thrown straight up in the air without any angle it travels the farthest distance and thus will have the maximum potential energy.

Question Number	21	Correct Option	d

Explanation

Mathematical formula for Pfund series is:

$$\frac{1}{\lambda} = R_H\left(\frac{1}{5^2} - \frac{1}{n^2}\right)$$

For shortest wavelength $n = \infty$

$$\frac{1}{\lambda} = R_H\left(\frac{1}{5^2} - \frac{1}{\infty^2}\right) = \frac{R_H}{5^2} \Rightarrow \lambda = \frac{5^2}{R_H}$$

Question Number	22	Correct Option	a

Explanation

Linearly velocity is equal to the cross product of ω and r . The right direction of the velocity is given by $\vec\omega \times \vec r$ as supported by the right hand rule, not by $\vec r \times \vec\omega$.

Linear veocity ($v-$) is the speed and direction of an object moving in a straight line.

Angularvelocity ($\omega-$) is a measure of how fast the object is rotating. Its direction can be determined by the right hand rule, i.e if you hold the axis with your right hand and rotate the fingers in the direction of motion of the rotating body then your thumb will point in the direction of the angular velocity.

Question Number	23	Correct Option	c

Explanation

Resonance occurs when the frequency of the applied periodic oscillator resonates with one of the natural frequencies of the driven oscillator

Question Number	24	Correct Option	b

Explanation

There is no energy transfer in stationary waves, but the energy of antinodes keeps on changing from potential to kinetic energy. At complete stretched position, the energy is wholly potential but as it passes through the equilibrium position it is kinetic only.

Question Number	25	Correct Option	b

Explanation

The phenomenon in which the changing of the current in one coil induces current in a nearby coil is called mutual induction.

Question Number	26	Correct Option	a

Explanation

By increasing the ratio of impurities, the number of charged particles increases and they are able to surmount the barrier hence the width of barrier decreases.

Question Number	27	Correct Option	d

Explanation

Change in the momentum = final momentum − initial momentum

$$\Delta P = -mv_x - mv_x = -2mv_x$$

Question Number	28	Correct Option	b

Explanation

Intensity for such a situations is directly proportional to the square of the cos of the angle, as shown below:

$$I \propto (A\cos\theta)^2$$
$$\Rightarrow I' = I(\cos\theta)^2 = \frac{I}{2}$$

Question Number	29	Correct Option	a

Explanation

Free falling body is in a state of weightlessness and the effective g becomes zero, hence the time period becomes infinite.

Question Number	30	Correct Option	c

Explanation

Lasers do not use radioactive materials to generate the intense beam for the treatments. They usually use the emission of photons or electrons producing from the electromagnetic radiations. With the help of these, they can generate high intensity beam which can be used further

Question Number	31	Correct Option	d

Explanation

It is clear from the hysteresis loop that it takes 4 quarter cycles to complete but when an unmagnetized bar of iron is used then for the first cycle it is magnetized and follows point O to A which is an additional quarter in the 4 quarters. Hence for a demagnetized material hysteresis loop takes 5 cycles to complete, but once it is magnetized the hysteresis loop will complete in 4 cycles.

Question Number	32	Correct Option	b

Explanation

The angle by which voltage lead voltage by is:

$$\theta = \tan^{-1}\frac{X_L}{R} = \cos^{-1}\frac{R}{\sqrt{R^2+X_L^2}} = \cos^{-1}\frac{R}{Z}$$

Question Number	33	Correct Option	b

Explanation

The reverse current or the leakage current in reverse biased p-n junction is due to minority charge carriers in the semi-conductor.

Question Number	34	Correct Option	c

Explanation

According to the photoelectric effect,

$K_{max} = E - \Phi$

Where,

E = absorbed energy

Φ = work done

Since $E = hf = hc/y_0$

According to the Plank-Einstein Equation;

The maximum kinetic energy (Kmax) of the photoelectrons (with charge e) can be determined by the stopping potential (V0).

$$V_0 = \frac{W}{q} = \frac{K_{max}}{e}$$

Therefore,

$V_0 e = K_{max}$

$K_{max} = \frac{1}{2}mv^2_{max}$ so,

$V_0 e = \frac{1}{2}mv^2_{max}$

Question Number	35	Correct Option	d

Explanation

We know that according to bernoulli's equation:

$P + 1/2\,\rho v^2 + \rho gh = \text{constant}$

These three quantities can only be added if they have same units and dimensions.

Question Number	36	Correct Option	d

Explanation

The process of radioactivity is purely a nuclear phenomenon which is not affected by any of these.

Question Number	37	Correct Option	c

Explanation

Emf is induced due to changing magnetic flux. Constant magnetic field or magnetic flux does not induce emf in a conductor

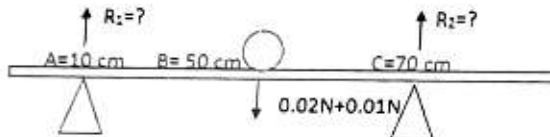| Question Number	38	Correct Option	b

Explanation

Terminal velocity is the maximum velocity that can be obtained. Using:

$$v_T = \frac{2gr^2\rho}{9\eta} = \frac{2(10)(10^{-4})(9000)}{9(10^{-3})} 2000ms^{-1}$$

Question Number	39	Correct Option	b

Explanation

For equilibrium, (pivot at A) clockwise torque= anti clockwise torque

$$|AB| \times W = |AC| \times R2$$

$$0.2 \times (0.03) = 0.6 \times R2$$

$$R2 = 0.01N$$

At equilibrium,

$$\Sigma F_y = 0$$

$$0.01 + R1 - 0.03 = 0 \Rightarrow R1 = 0.02N$$

Question Number	40	Correct Option	d

Explanation

The first dark fringe appears at m=0, because at the center there is a maxima and the first dark fringe appears at $\frac{\lambda L}{2d}$.

Question Number	41	Correct Option	d

Explanation

Since the electrons are emitted by the different energies. Therefore, maximum emission of electrons depends upon the frequency of the incident light and particular metal surface. The energy of a photon is given by $v = f \lambda$. The more frequency of the light wave the more energy is absorbed by electron.

Question Number	42	Correct Option	a

Explanation

Angular speed refers to how fast an object rotates.

In the case of earth it completes a circle which corresponds to

The total time taken to cover the angle=24 hours= 24×60× 60

Angular velocity= $\frac{2\pi}{24\times60\times60}$ = $\frac{\pi}{43200}radsec^{-1}$

Question Number	43	Correct Option	b

Explanation

Equation of continuity gives law of conservation of mass.

Question Number	44	Correct Option	c

Explanation

The electric flux through a closed surface enclosing a charge is written as:

$$\Phi = \frac{q}{\varepsilon_0}$$

This shows that the electric flux only depends on the amount of charge, which is same in both the spheres. Hence the electric flux is same.

Question Number	45	Correct Option	b

Explanation

The entire above options except sound waves are the electromagnetic waves which don't requires medium for their propagation.

Question Number	46	Correct Option	d

Explanation

For a longitudinal wave the phase change is zero degrees when it moves from a rare to denser medium while moving from a denser to rare medium the phase change is 180°. For the transverse waves, it is opposite. In transverse waves the phase changes by 180 degrees if it moves from rarer to denser medium and there is no phase change if it moves from denser to rare medium.

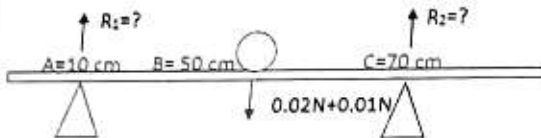| Question Number | 38 | Correct Option | b |

Explanation

Terminal velocity is the maximum velocity that can be obtained. Using:

$$v_T = \frac{2gr^2\rho}{9\eta} = \frac{2(10)(10^{-4})(9000)}{9(10^{-3})} = 2000 ms^{-1}$$

| Question Number | 39 | Correct Option | b |

Explanation

For equilibrium, (pivot at A) clockwise torque= anti clockwise torque

$|AB| \times W = |AC| \times R2$

$0.2 \times (0.03) = 0.6 \times R2$

$R2 = 0.01N$

At equilibrium,

$\Sigma F_y = 0$

$0.01 + R1 - 0.03 = 0 \Rightarrow R1 = 0.02N$

| Question Number | 40 | Correct Option | d |

Explanation

The first dark fringe appears at m=0, because at the center there is a maxima and the first dark fringe appears at $\frac{\lambda L}{2d}$.

| Question Number | 41 | Correct Option | d |

Explanation

Since the electrons are emitted by the different energies. Therefore, maximum emission of electrons depends upon the frequency of the incident light and particular metal surface. The energy of a photon is given by $v=f\lambda$. The more frequency of the light wave the more energy is absorbed by electron.

| Question Number | 42 | Correct Option | a |

Explanation

Angular speed refers to how fast an object rotates.

In the case of earth it completes a circle which corresponds to

The total time taken to cover the angle=24 hours= 24×60× 60

Angular velocity= $\frac{2\pi}{24\times60\times60} = \frac{\pi}{43200} rad sec^{-1}$

| Question Number | 43 | Correct Option | b |

Explanation

Equation of continuity gives law of conservation of mass.

| Question Number | 44 | Correct Option | c |

Explanation

The electric flux through a closed surface enclosing a charge is written as:

$\Phi = \frac{q}{\epsilon_0}$

This shows that the electric flux only depends on the amount of charge, which is same in both the spheres. Hence the electric flux is same.

| Question Number | 45 | Correct Option | b |

Explanation

The entire above options except sound waves are the electromagnetic waves which don't requires medium for their propagation.

| Question Number | 46 | Correct Option | d |

Explanation

For a longitudinal wave the phase change is zero degrees when it moves from a rare to denser medium while moving from a denser to rare medium the phase change is 180°. For the transverse waves, it is opposite. In transverse waves the phase changes by 180 degrees if it moves from rarer to denser medium and there is no phase change if it moves from denser to rare medium.

Question Number	47	Correct Option	d

Explanation

Using

$$I = \frac{1}{2}LI^2 = \frac{1}{2} 10 \times 1^2 = 5J$$

A solenoid is a long coil of wire wrapped in many turns. When a current passes through it, it creates a nearly uniform magnetic field inside.

Question Number	48	Correct Option	b

Explanation

In photocell photons are used to flow current and is based on photoelectric effect.

Question Number	49	Correct Option	c

Explanation

Equation of continuity is derived using the law of conservation of mass, which implies that mass transferred in unit time is constant for two different points in pipe but at same time,

ρAv=constant

Further condition that the fluid is incompressible reduces it to,

Av = constant

So, for a compressible fluid the equation of continuity retains its previous form and not reduced further.

Question Number	50	Correct Option	c

Explanation

Equation of continuity is derived using the law of conservation of mass, which implies that mass transferred in unit time is constant for two different points in pipe but at same time,

ρAv=constant

Further condition that the fluid is incompressible reduces it to,

Av = constant

So, for a compressible fluid the equation of continuity retains its previous form and not reduced further.

Question Number	51	Correct Option	b

Explanation

Alternating current generator is a devices that allows to convert mechanical energy to the electrical energy.

Question Number	52	Correct Option	a

Explanation

By definition, the power dissipated in AC circuit with a phase difference is written as.

$$P = VI \cos \theta$$

The path for the flow of alternating current is called an AC Circuit.

Question Number	53	Correct Option	b

Explanation

In the case of dot and cross products, cross product is simplified first followed by dot product. Simplifying cross product first gives a vector with which dot product can easily be evaluated but if we try to solve dot product first then we will end up with a cross product of a vector and scalar, because dot product gives a scalar quantity, which is not possible.

$$\hat{i}.\hat{j} \times \hat{k} = \hat{i}.\hat{i} = 1$$

Question Number	54	Correct Option	c

Explanation

Blood is 3-5 times more viscous than water, but their densities are nearly equal.

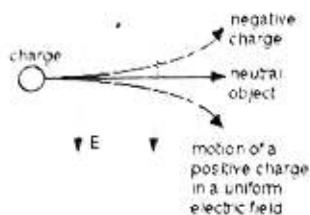| Question Number	55	Correct Option	d

Explanation

Leptons and Photons are the elementary particles.

In physics an elementary particle or fundamental particle is a sub-atomic particle with no substructure, thus not composed of other particles. These include leptons and photons.

Question Number	56	Correct Option	b

Explanation

A negative charge moves from a lower potential to higher potential that is against the direction of electric field or antiparallel to the electric field. The movement of all such particles is shown below

Question Number	57	Correct Option	c

Explanation

The angle between eye and an object placed at any distance from eye is known as visual angle. If the distance is 25 cm i.e. the near distance of the eye then it is called the objective angle.

Question Number	58	Correct Option	a

Explanation

At resonance the impedance is only resistive and hence both voltage and current are in phase i.e. angle is zero radians. Hence, the power factor i.e. $\cos\theta$ is 1.

Electrical resonance occurs in an electrical circuit at a particular *resonant frequency* when the impedances of circuit elements cancel each other

Electrical impedance is the measure of the opposition that a circuit presents to a current when a voltage is applied.

Question Number	59	Correct Option	b

Explanation

In an ideal gas, there exist no attractive forces between the gas molecules, and there is neither rotation nor vibration within the molecules. The kinetic energy of the translational motion of an ideal gas depends upon its temperature. Therefore, the formula the kinetic energy of a gas defines the average kinetic energy molecule. The kinetic energy is measured in Joules (J), and the temperature is measured in Kelvin (K).

(average kinetic energy per molecule)=$\frac{3}{2}$(Boltzmann's constant) (temperature)

$$K = \frac{3}{2}K_B T$$

Where,

K = average kinetic energy per molecule of gas

k_B= Boltzmann's constant

T = temperature

Question Number	60	Correct Option	c

Explanation

The AC current through a resistor is written as:

$$I = I_0 sin\theta$$

The AC voltage through resistor is written as:

$$V = V_0 sin\theta$$

It is evident from above two equations that there is no phase difference between current and voltage.

Resistors are elctrical devices that oppose the flow of current.

Question Number	61	Correct Option	b

Explanation

The energy of K_α is given by:

$$E(K_a) = E_L - E_K$$

The energy of K_β is given by:

$$E(K_\beta) = E_M - E_K$$

Tis is clear that:

$$E(K_\alpha) < E(K_\beta)$$

Question Number	62	Correct Option	a

Explanation

Molecular kinetic theory of gas have the postulates which explains all the above options except a because molecules exhibits elastic collision which tells that they do not gain or loss theirenergy during collisions

Question Number	63	Correct Option	c

Explanation

The converse of pair production is annihilation in which a particle and anti-particle combines to form photons.

Question Number	64	Correct Option	a

Explanation

The central ring is dark due to destructive interference because due to the reflection from the denser medium an additional path difference of $\gamma/2$ is created.

Question Number	65	Correct Option	d

Explanation

In cathode ray oscilloscope, the voltage applied at x axis is called sweep voltage, time base generator and saw tooth voltage.

A Cathode Ray Oscilloscope (CRO) is an instrument generally used in a laboratory to display, measure and analyze various waveforms of electrical circuits.

Question Number	66	Correct Option	a

Explanation

A unit vector does not have a unit. It is called a unit vector because its magnitude is equal to 1.

Question Number	67	Correct Option	a

Explanation

Pitch is the characteristic of sound that can distinguish between the shrill and grave sound. It also depends upon the frequency. Higher the frequency higher would be the pitch and lower the frequency lower would be the pitch.

Question Number	68	Correct Option	b

Explanation

Extension x in SHM is written as ;

$x = x0 sin(\varphi + \theta)$

Where φ is the initial phase angle , which is 90° in this case .

Hence above equation becomes,

$x = x_0 sin(90° + \theta)$

$x = x_0 \cos\theta$

simple harmonic motion is a special type of oscillation where the restoring force is directly propotional to the displacement and acts in the direction opposite to that of displacement.

Question Number	69	Correct Option	a

Explanation

By increasing the temperature, the viscosity of liquids decreases but that of gases increases. In other words, increasing gas temperature causes the gas molecules to collide more often. This increases the gas viscosity because the transfer of momentum between stationary and moving molecules is what causes gas viscosity.

Question Number	70	Correct Option	a

Explanation

EMF and voltage relation is given below ;

$EMF = V + Ir$

For open circuits $I > 0$, hence

$EMF > V$

Question Number	71	Correct Option	c

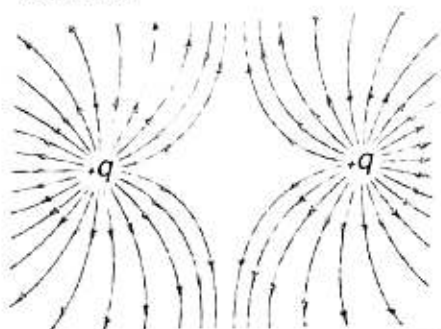**Explanation**

For two similarly charged infinite sheets, there is no electric field lines between them. Hence, electric flux is zero. As shown below

Question Number	72	Correct Option	c

Explanation

A neutron is assumed to made up of 1 up and 2 down quarks.

Question Number	73	Correct Option	b

Explanation

According to special theory of relativity:

$$l = l_o \sqrt{1 - \frac{v^2}{c^2}}$$

$\sqrt{1 - \frac{v^2}{c^2}} < 1$, Hence length decreases

Length contraction is the phenomenon that a moving object's length is measured to be shorter than its proper length which is the length as measured in the object's own rest frame. It is also known as Lorentz contraction or Lorentz–Fitz Gerald contraction

Question Number	74	Correct Option	b

Explanation

Elastic deformation is the deformation in which the materials are deformed i.e they change their shapes. These shapes are also reversible and after some time they can attain their original shapes.

Question Number	75	Correct Option	b

Explanation

In a velocity selector magnetic field is applied perpendicular to the electric field and their magnitude is adjusted so that a charged particle moves through it undeviated.

Question Number	76	Correct Option	c

Explanation

There are 3 kinds of SI units, Base units, Supplementary units and derived units

Question Number	77	Correct Option	d

Explanation

Since the energy distribution is related to black body therefore black body radiations are used to calculate the distribution curve. This also tells that how much amount of radiations are emitted through a black body after a specific duration

Question Number	78	Correct Option	a

Explanation

The net work done is calculated by,

$$W=W_{AB}+W_{BC}+W_{CD}+W_{DA}=PV+0+2PV+0=PV$$

Question Number	79	Correct Option	d

Explanation

All the options are equal as shown below, $(T=1/f)$

$$R =(\frac{GMT^2}{4\pi^2})^{\frac{1}{3}} = (\frac{GM}{4\pi^2 f^2})^{\frac{1}{3}}$$

We know that , $\omega = \frac{2\pi}{T} = 2\pi f$

$$\Rightarrow (\frac{GMT^2}{4\pi^2})^{\frac{1}{3}} = (\frac{GM}{4\pi^2 f^2})^{\frac{1}{3}} = (\frac{GM}{\omega^2})^{\frac{1}{3}}$$

Question Number	80	Correct Option	c

Explanation

Force on a moving charge placed in a magnetic field is written as.

$F=q(v \times B)$

For negative charge i.e -q

$F=-q (v \times B) = q (-v \times B) = q (B \times v)$

Question Number	81	Correct Option	b

Explanation

X-rays were first discovered in 1895 accidently by Rontgan

| Question Number | 82 | Correct Option | d |

Explanation

All the above mentioned are the examples of geothermal energy

| Question Number | 83 | Correct Option | c |

Explanation

Polarization is defined as the orientation along a particular direction. In transverse mechanical waves, the vibration of particle is perpendicular along the direction of the propagation of the waves. Light waves are produced by the oscillating charge which possess the periodic vibration of the electric field. The light is when confined in one plane direction, then they are to be polarized therefore it is said that light waves has a transverse nature.

| Question Number | 84 | Correct Option | b |

Explanation

Hard x-ray is the one with higher energy hence, it consists mostly of continuous x-ray

| Question Number | 85 | Correct Option | b |

Explanation

By definition, 1 steradian is subtended at the center of a sphere by an area equal to one square of radius r.

Solid angle: area

1. r^2

Surface area of a complete sphere = $4\pi r^2$

Surface area of one half of sphere = $2\pi r^2$

X. 2π

$\Rightarrow X = 2\pi str$

| Question Number | 86 | Correct Option | a |

Explanation

The mass of a body when at rest is called rest mass.

| Question Number | 87 | Correct Option | b |

Explanation

The resistor in the circuit of a charging capacitor is the timing element because it dictates the time required for charging a capacitor. By changing the value of resistance for same capacitor, time taken to charge a capacitor changes as shown below by the equation

$t = rc$

| Question Number | 88 | Correct Option | a |

Explanation

In a denser medium, velocity and wavelength decreases by n as shown below:

$v = \frac{c}{n} \Rightarrow \lambda' = \frac{c}{nf} = \lambda/n$

And hence the fringe width also changes as follows:

$\Delta y' = \frac{\lambda' L}{d} = \frac{\lambda L}{nd} = \frac{\Delta y}{n}$

| Question Number | 89 | Correct Option | b |

Explanation

The branch of physics that deals with the investigation of intensities and wavelengths of electromagnetic radiations emitted or absorbed by atoms is called spectroscopy

| Question Number | 90 | Correct Option | a |

Explanation

Wave particle duality was introduced by de Broglie

| Question Number | 91 | Correct Option | c |

Explanation

$v = \frac{F}{B} = \frac{200NC^{-1}}{0.10NA^{-1}m^{-1}} = 2000ms^{-1}$

| Question Number | 92 | Correct Option | b |

Explanation

Electromagnetic waves were predicted by Maxwell but discovered by Hurtz

Question Number	93	Correct Option	a

Explanation

In winters, the temperature decreases which results in the decrease in the speed of the sound and hence sound takes more time to travel.

As the relation between the sound and temperature is:

$v_T \propto \sqrt{T}$

Question Number	94	Correct Option	d

Explanation

Torque on a current carrying coil is written as:

$\tau = ILBa\cos\alpha = IBA\cos\alpha$

Question Number	95	Correct Option	d

Explanation

Neutrons belongs to a family of quarks. It is composed of one up and two down quarks. The single existence of quark is still not verified.

Question Number	96	Correct Option	b

Explanation

Using;

$B = \mu_0 n I = \mu_0 \frac{N}{L} I = 4 \times 10^{-7} \times \frac{100}{0.1} \times 1 = 4\pi \times 10^{-4} T$

Question Number	97	Correct Option	d

Explanation

Liquid lasers uses a liquid as an active medium. Dyes are also liquids therefore they are refered as a liquid laser. These dyes are dissolved in the solvents to produce longer wavelength of light that is amplified. These wavelengths are in the mostly in UV, IR regions.

Question Number	98	Correct Option	a

Explanation

For any two vectors $\vec{A}$ and $\vec{B}$, their cross product is perpendicular both the vectors. that is $\vec{B} \times \vec{A} = \vec{C}$, Where $\vec{C}$ is surely perpendic to $\vec{A}$ and $\vec{B}$.

$\vec{A}.\vec{B} \times \vec{A} = \vec{A}.\vec{C} = 0$ this is because the dot product of two perpendicular vectors is always zero.

Question Number	99	Correct Option	c

Explanation

The Curie temperature of iron is 1043K. When the temperature of is at the Curie temperature or higher, then the iron behaves as paramagnetic and when the temperature of iron is below the Curie temperature, then it behaves as ferromagnetic. Curie temperature different for every element.

Question Number	100	Correct Option	b

Explanation

Total height of 10 stairs= 150 cm =1.5 m

mg= 3 N

P.E= mgh = 3 × 1.5 = 4.5 J

Potential Energy is defined as the potential energy a physical object with mass has in relation to another massive object due to gravity.

Question Number	101	Correct Option	a

Explanation

The speed of sound depends upon the compressibility and inertia of the medium through which it is travelling there are certain factors that affects the speed of sound i.e. density, temperature. Since density is proportional to pressure therefore there is no effect of pressure on the speed of sound.