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Physics mock test 3 2022-23

Time : 75 Min	Phy : Full Portion Paper	Marks : 200

01) If the velocity of a particle is given by
$v = (180 - 16x)^{1/2}$ m/s, then its acceleration will be
A) Zero
B) 4 m/s^2
C) - 8 m/s^2
D) 8 m/s^2

02) 1 mole of H_2 gas is contained in a box of
volume $V = 1.00$ m^3 at $T = 300\,K$. The gas is
heated to a temperature of $T = 3000K$ and the gas
gets converted to a gas of hydrogen atoms. What
would be the final pressure? (considering all gases
to be ideal)
A) 20 times the pressure initially
B) 10 times the pressure initially
C) 2 times the pressure initially
D) Same as the pressure initially

03) According to Bernoulli's equation,
$$\frac{P}{\rho g} + h + \frac{1}{2}\frac{v^2}{g} = \text{constant}$$
The terms A, B and C are generally called
respectively
A) pressure head, gravitational head and velocity
head
B) gravitational head, pressure head and velocity
head
C) gravity, gravitational head and velocity head
D) gravity, pressure and velocity head

04) The surface tension of a liquid is 70 dyne/cm.
In MKS system, its value is
A) 7×10^{-2} N/m
B) 7×10^2 N/m
C) 7×10^3 N/m
D) 70 N/m

05) The distance between the two charges $25\,\mu C$
and $36\,\mu C$ is 11 cm. At what point on the line
joining the two, the intensity will be zero?
A) At a distance of 5 cm from $36\,\mu C$
B) At a distance of 5 cm from $25\,\mu C$
C) At a distance of 10 cm from $25\,\mu C$
D) At a distance of 11 cm from $36\,\mu C$

06) At N. T. P. one mole of diatomic gas is
compressed adiabatically to half of its volume
$\gamma = 1.41$. The work done on gas will be
A) 2025 J
B) 1815 J
C) 1610 J

D) 1280 J

07) The frequencies of X-rays, γ-rays and
ultraviolet rays are respectively a, b and c, then
A) a < b, b < c
B) a > b, b < c
C) a > b, b > c
D) a < b, b > c

08) An inductor L and a capacitor C are connected
in the circuit as shown in the figure. The frequency
of the power supply is equal to the resonant
frequency of the circuit. Which ammeter will read
zero ampere?

A) A_3
B) A_2
C) A_1
D) None of these

09) If x, v and a denote the displacement, the
velocity and the acceleration of a particle executing
simple harmonic motion of time period T, then,
____ does not change with time.
A) $\dfrac{aT}{x}$
B) $a^2T^2 + 4\pi^2v^2$
C) $\dfrac{aT}{v}$
D) $at + 2\pi v$

10) A brick of mass 2 kg begins to slide down on a
plane inclined at an angle of 45° with the
horizontal. The force of friction will be
A) 9.8 sin 45°
B) 9.8 cos 45°
C) 19.6 sin 45°
D) 19.6 cos 45°

11) A 60 kg man runs up a staircase in 12 seconds
while a 50 kg man runs up the same staircase in
11, seconds, the ratio of the rate of doing their
work is
A) 12 : 11
B) 11 : 10
C) 10 : 11
D) 6 : 5

12) Statement 1: It is possible to describe the
motion of a big system, when Newton's laws of

motion are applicable to individual particles of the system.

Statement 2: To describe the motion of a system, we can write the equation of motion for centre of mass of the system.

A) Both Statement 1 and Statement 2 are true but Statement 2 is not the correct explanation of Statement 1

B) Both Statement 1 and Statement 2 are true and the Statement 2 is correct explanation of the Statement 1

C) Both Statement 1 and Statement 2 are false

D) The Statement 1 is false but the Statement 2 is true

13) Which one of the following is a non-magnetic substance?
A) Brass
B) Cobalt
C) Nickel
D) Iron

14) Statement 1: The value of current through p-n junction in the adjoining figure will be 10 mA.
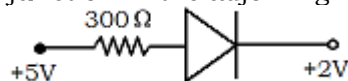
Statement 2: In the above figure, p-side is at higher potential than n-side.

A) Both Statement 1 and Statement 2 are true but Statement 2 is not the correct explanation of Statement 1

B) Both Statement 1 and Statement 2 are true and the Statement 2 is correct explanation of the Statement 1

C) Both Statement 1 and Statement 2 are false

D) The Statement 1 is false but the Statement 2 is true

15) The pressure of air in a soap bubble of 0.7 cm diameter is 8 mm of water above the pressure outside. The surface tension of the soap solution is
A) 137 dyne / cm
B) 100 dyne / cm
C) 68.66 dyne / cm
D) 150 dyne / cm

**16) Statement 1:** The mass equivalent to energy 1 MWh is 40 microgram.

Statement 2: This follows from E = mc^2, where c = 3×10^8 m/s

A) Both Statement 1 and Statement 2 are true but Statement 2 is not the correct explanation of Statement 1

B) Both Statement 1 and Statement 2 are true and the Statement 2 is correct explanation of the Statement 1

C) Both Statement 1 and Statement 2 are false

D) The Statement 1 is false but the Statement 2 is true

17) The following figure shows a glass tube (linear co-efficient of expansion is α) completely filled with a liquid of volume expansion co-efficient γ.

On heating length of the liquid column does not change. Which of the following represents the correct relation between γ and α?
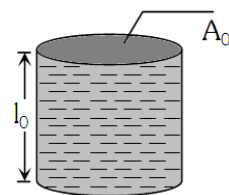
A) $\gamma = 3\alpha$
B) $\gamma = 2\alpha$
C) $\gamma = \alpha$
D) $\gamma = \dfrac{\alpha}{3}$

18) A particle of mass m is thrown upwards from the surface of the earth, with a velocity u. The mass and the radius of the earth are, respectively, M and R. G is gravitational constant and g is acceleration due to gravity on the surface of the earth. Estimate the minimum value of u so that the particle does not return back to earth.

A) $\sqrt{2gR^2}$

B) $\sqrt{\dfrac{2GM}{R}}$

C) $\sqrt{\dfrac{2gM}{R^2}}$

D) $\sqrt{\dfrac{2GM}{R^2}}$

19) A gas expands adiabatically at constant pressure such that its temperature $T \propto \dfrac{1}{\sqrt{V}}$, the value of C_P / C_V of gas is
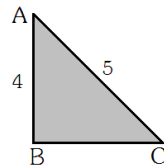A) 2.00
B) 1.67
C) 1.50
D) 1.30

20) In MKS system, Stefan's constant is denoted by σ. In CGS system, multiplying factor of σ will be
A) 10^5
B) 10^3
C) 10^2
D) 1

21) ABC is a triangular plate of uniform thickness. The sides are in the ratio shown in the figure. I_{AB}, I_{BC}, I_{CA} are the moments of inertia of the plate about AB, BC, CA respectively. Which one of the following relations is correct?

A) $I_{AB} > I_{BC}$
B) $I_{BC} > I_{AB}$
C) $I_{AB} + I_{BC} = I_{CA}$

D) I_{CA} is maximum.

22) If the magnitude of sum of two vectors is equal to the magnitude of difference of the two vectors, the angle between these vectors is   (NEET-I 2016)

A) 45°

B) 180°

C) 0°

D) 90°

23) The frequency of vibration of string is given by $v = \dfrac{p}{2l}\left[\dfrac{F}{m}\right]^{1/2}$. Here p is number of segments in the string, F is force and l is the length. The dimensional formula for m will be

A) $[M^0L^0T^0]$

B) $[M^0LT^{-1}]$

C) $[ML^{-1}T^0]$

D) $[ML^0T^{-1}]$

24) A coil in the shape of an equilateral triangle of side *l* is suspended between the pole pieces of a permanent magnet such that $\vec{B}$ is in plane of the coil. If due to a current i in the triangle a torque τ acts on it, the side *l* of the triangle is   (2005)

A) $\dfrac{2}{\sqrt{3}}\left(\dfrac{\tau}{Bi}\right)$

B) $2\left(\dfrac{\tau}{\sqrt{3}Bi}\right)^{\frac{1}{2}}$

C) $\dfrac{2}{\sqrt{3}}\left(\dfrac{\tau}{Bi}\right)^{\frac{1}{2}}$

D) $\dfrac{1}{\sqrt{3}}\dfrac{\tau}{Bi}$

25) The combination of 'NAND' gates shown here under (figure) are equivalent to
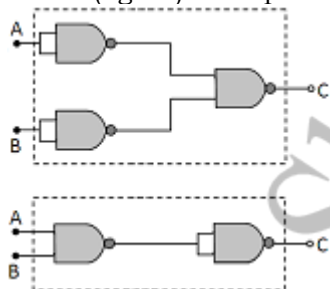
A) an AND gate and a NOT gate respectively.
B) an OR gate and an AND gate respectively.
C) an OR gate and a NOT gate respectively.
D) an AND gate and an OR gate respectively.

26) The ionization potential of H-atom is $13.6\,V$. When it is excited from ground state by monochromatic radiations of $970.6\,\text{Å}$, the number of emission lines will be (according to Bohr's theory)

A) 4

B) 6

C) 8

D) 10

27) Statement 1 : To use satellites for long distance T.V. transmission is necessary.
Statement 2 : The television signals are low frequency signals.
A) Both statement 1 and statement 2 are true and the statement 2 is the correct explanation of the statement 1.
B) Both statement 1 and statement 2 are true but statement 2 is not the correct explanation of the statement 1.
C) Statement 1 is true but statement 2 is false.
D) The statement 1 and statement 2 both are false.

28) Which of the following graphs correctly represents the variation of $\beta = -(dV/dP)/V$ with P for an ideal gas at constant temperature?
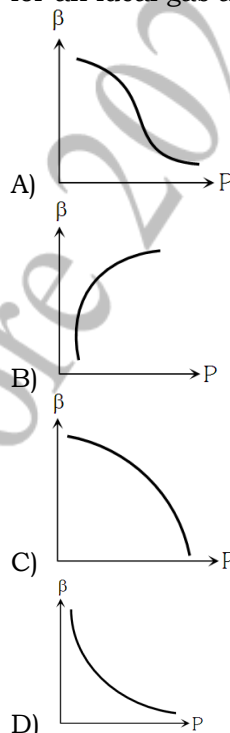
29) In Thomson's method of determining e/m of electrons
A) electric field is parallel to the electrons beam.
B) magnetic field is parallel to the electrons beam.
C) electric and magnetic fields are perpendicular to each other and perpendicular to electrons beam.
D) electric and magnetic fields are parallel to electrons beam.

30) If E_a be the electric field strength of a short dipole at a point on its axial line and E_e that on the equatorial line at the same distance, then
A) $E_a = 2E_e$
B) $E_e = 2E_a$
C) $E_a = E_e$
D) None of these

31) Statement 1 : The positively charged nucleus of an atom is having a radius of almost 10^{-15} m.

Statement 2 : In α-particle scattering experiment, the distance of closest approach for α-particles is $\simeq 10^{-15}$ m.

A) Both statement 1 and statement 2 are true and the statement 2 is the correct explanation of the statement 1.
B) Both statement 1 and statement 2 are true but statement 2 is not the correct explanation of the statement 1.
C) Statement 1 is true but statement 2 is false.
D) The statement 1 and statement 2 both are false.

32) Choose the correct statement from the following : The radius of the orbit of a geostationary satellite depends upon
A) mass of the earth, mass of the satellite, time period of the satellite and the gravitational constant.
B) mass of the earth, time period of the satellite and the gravitational constant.
C) mass of the satellite, its time period and the gravitational constant.
D) mass of the satellite, mass of the earth and the gravitational constant.

33) The quantity of heat required to raise one mole through one degree Kelvin for a mono-atomic gas at constant volume is

A) $\dfrac{7}{2}R$

B) $\dfrac{5}{2}R$

C) $\dfrac{3}{2}R$

D) $4R$

34) An object of height 1.5 cm is placed on the axis of a convex lens of focal length 25 cm. A real image is formed at a distance of 75 cm from the lens. The size of the image will be
A) 0.5 cm
B) 0.75 cm
C) 3.0 cm
D) 4.5 cm

35) In Young's double slit experiment, the central bright fringe can be identified
A) as it has a greater intensity than the other bright fringes.
B) as it is wider than other bright fringes.
C) as it is narrower than other bright fringes.
D) by using white light instead of monochromatic light.

36) Carbon -14 decays with half-life of about 5,800 years. In a sample of bone, the ratio of carbon -14 to carbon -12 is found to be $\dfrac{1}{4}$ of what it is in free air. This bone may belong to a period about x centuries ago, where x is nearest to
A) 58
B) 58 / 2

C) 2×58
D) 3×58

37) A luminous object is placed at a distance of 30 cm from the convex lens of focal length 20 cm. On the other side of the lens, at what distance from the lens a convex mirror of radius of curvature 10 cm be placed in order to have an upright image of the object coincident with it?
A) 60 cm
B) 50 cm
C) 30 cm
D) 12 cm

38) If a particle of mass m is moving with constant velocity v parallel to x-axis in x-y plane as shown in fig., its angular momentum with respect to origin at any time t will be
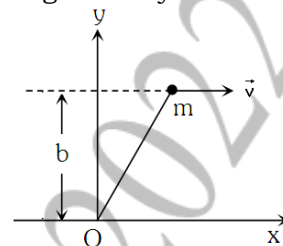
A) $mvbk$
B) $mvb\hat{i}$
C) $-mvbk$
D) $mv\hat{i}$

39) Two identical thin rings each of radius R meters are co-axially placed at a distance R meters apart. If Q_1 coulomb and Q_2 coulomb are respectively the charges uniformly spread on the two rings, the work done in moving a charge q from the center of one ring to that of other is

A) $\dfrac{q\sqrt{2}(Q_1 + Q_2)}{4\pi\varepsilon_0 R}$

B) $\dfrac{q(Q_1 + Q_2)(\sqrt{2} + 1)}{\sqrt{2}.4\pi\varepsilon_0 R}$

C) $\dfrac{q(Q_1 - Q_2)(\sqrt{2} - 1)}{\sqrt{2}.4\pi\varepsilon_0 R}$

D) Zero

40) A wire of length 100 cm is connected to a cell of emf 2 V and negligible internal resistance. The resistance of the wire is $3\,\Omega$. The additional resistance required to produce a potential drop of 1 milli volt per cm is
A) $6\,\Omega$
B) $57\,\Omega$
C) $47\,\Omega$
D) $35\,\Omega$

41) The dielectric strength of air at NTP is 3×10^6 V/m, then the maximum charge that can be given to a spherical conductor of radius 3 m is
A) 3×10^{-1} C

B) 3×10^{-2} C

C) 3×10^{-3} C

D) 3×10^{-4} C

42) A hospital uses an ultrasonic scanner to locate tumours in a tissue. The operating frequency of the scanner is 4.2 MHz. The speed of sound in a tissue is 1.7 km/s. The wavelength of sound in the tissue is close to (1995)

A) 4×10^{-3} m

B) 8×10^{-3} m

C) 4×10^{-4} m

D) 8×10^{-4} m

43) If three resistors of resistance $2\,\Omega$, $4\,\Omega$ and $5\,\Omega$ are connected in parallel, then the total resistance of the combination will be

A) $\dfrac{19}{20}\Omega$

B) $\dfrac{20}{19}\Omega$

C) $\dfrac{10}{19}\Omega$

D) $\dfrac{19}{10}\Omega$

44) A lift of mass 1000 kg which is moving with acceleration of $1\,\text{m}/\text{s}^2$ in upward direction, then the tension developed in string which is connected to lift is (2002)

A) 9800 N

B) 10,800 N

C) 11,000 N

D) 10,000 N

45) When a resistor of $11\,\Omega$ is connected in series with an electric cell, the current flowing in it is 0.5 A. Instead, when a resistor of $5\,\Omega$ is connected to the same electric cell in series, the current increases by 0.4 A. The internal resistance of the cell is

A) $3.5\,\Omega$

B) $2.5\,\Omega$

C) $2\,\Omega$

D) $1.5\,\Omega$

46) A machine gun is mounted on a 2000 kg car on a horizontal frictionless surface. At some instant the gun fires bullets of mass 10 gm with a velocity of 500 m/s with respect to the car. The number of bullets fired per second is ten. The average thrust on the system is

A) 250 dyne

B) 50 N

C) 250 N

D) 550 N

**47)** The possible value of Poisson's ratio is

A) 0.4

B) 0.8

C) 0.9

D) 1

48) The amplitude of a wave represented by displacement equation $y = \dfrac{1}{\sqrt{a}}\sin\omega t \pm \dfrac{1}{\sqrt{b}}\cos\omega t$ will be

A) $\sqrt{\dfrac{a+b}{ab}}$

B) $\dfrac{\sqrt{a} \pm \sqrt{b}}{ab}$

C) $\dfrac{\sqrt{a} + \sqrt{b}}{ab}$

D) $\dfrac{a+b}{ab}$

49) A flexible wire bent in the form of a circle is placed in an uniform magnetic field perpendicular to the plane of the coil. The radius of the coil changes as shown in figure below. The graph of induced e. m. f. in the coil is represented by
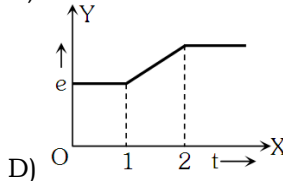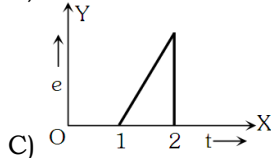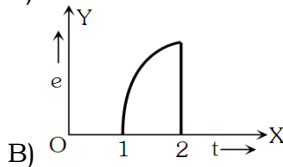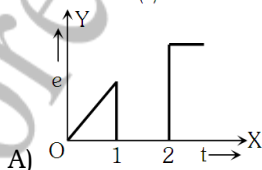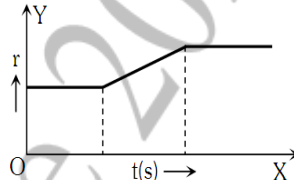
50) Statement 1: The de-Broglie wavelength of an electron accelerated through 941V is 0.4 Å.

Statement 2: Higher the accelerating potential smaller is the de-Broglie wavelength.

A) Both Statement 1 and Statement 2 are true but Statement 2 is not the correct explanation of Statement 1

B) Both Statement 1 and Statement 2 are true and the Statement 2 is correct explanation of the Statement 1

C) Both Statement 1 and Statement 2 are false

D) The Statement 1 is false but the Statement 2 is true