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Physics mock test 6 2022-23

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

01) A child weighing 25 kg slides down a rope hanging from the branch of a tall tree. If the force of friction acting against him is 2 N, what is the acceleration of the child? (Take g = 9.8 m/s²)

A) $5\ m/s^2$

B) $8\ m/s^2$

C) $9.72\ m/s^2$

D) $22.5\ m/s^2$

02) An electron in hydrogen atom makes a transition $n_1 \rightarrow n_2$ where n_1 and n_2 are principal quantum numbers of the two states. Assuming Bohr's model to be valid, the time period of the electron in the initial state is eight times that in the final state. The possible values of n_1 and n_2 are (2013)

A) $n_1 = 6$ and $n_2 = 2$

B) $n_1 = 8$ and $n_2 = 1$

C) $n_1 = 8$ and $n_2 = 2$

D) $n_1 = 4$ and $n_2 = 2$

03) Work done in moving a positive charge on an equipotential surface is

A) zero.
B) finite, negative but not zero.
C) finite, positive but not zero.
D) infinite.

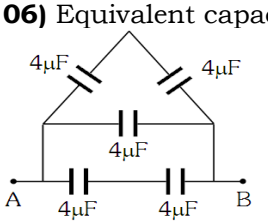
04) At nodes in stationary waves,

A) change in pressure and density are minimum.
B) change in pressure and density are maximum.
C) strain is zero.
D) energy is minimum.

05) Two wires that are made up of two different materials whose specific resistance are in the ratio 2 : 3, length 3 : 4 and area 4 : 5. The ratio of their resistances is

A) 1 : 2
B) 5 : 8
C) 6 : 8
D) 6 : 5

06) Equivalent capacitance between A and B is



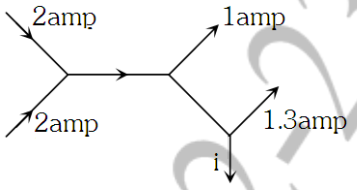
A) 6 μF

B) 8 μF

C) 26 μF

D) 10 / 3 μF

07) The figure below shows currents in a part of electric circuit. The current i is



A) 1 amp
B) 1.3 amp
C) 1.7 amp
D) 3.7 amp

08) The escape velocity for a rocket from earth is 11.2 km/s. Its value on a planet where acceleration due to gravity is double that on the earth and diameter of the planet is twice that of earth will be in km/s

A) 5.6
B) 11.2
C) 22.4
D) 43.6

09) Can a metal be used as a medium for dielectric?

A) No.
B) Depends on its shape.
C) Yes.
D) Depends on dielectric.

10) A force $\vec{F} = (5\hat{i} + 3\hat{j})N$ is applied over a particle which displaces it from its original position to the point $\vec{s} = (2\hat{i} - 1\hat{j})$ m. The work done on the particle is

A) - 7 J
B) + 7 J
C) + 11 J
D) + 13 J

11) A gas is suddenly compressed to 1/4 th of its original volume at normal temperature. The increase in its temperature is $(\gamma = 1.5)$

A) 573 K
B) 473 K
C) 373 K
D) 273 K

12) ${}_{86}A^{222} \rightarrow {}_{84}B^{210}$. In the given reaction how many α and β particles are emitted?

A) $3\alpha, 6\beta$

B) $4\alpha, 3\beta$

C) $3\alpha, 4\beta$
D) $6\alpha, 3\beta$

13) The total kinetic energy of the rolling solid sphere having translational velocity v is
A) $\frac{10}{7}mv^2$
B) $\frac{7}{10}mv^2$
C) $\frac{1}{2}mv^2$
D) $\frac{2}{5}mv^2$

14) If a coil made of conducting wires is rotated between poles pieces of the permanent magnet. The motion will generate a current and this device is called
A) an electric motor.
B) an electric generator.
C) an electromagnet.
D) all of above.

15) If I_0 is the intensity of the principal maximum in the single slit diffraction pattern, then what will be its intensity when the slit width is doubled?
A) $4\,I_0$
B) $2\,I_0$
C) I_0
D) $\frac{I_0}{2}$

16) A transistor is used as an amplifier in CB mode with a load resistance of $5\,k\Omega$ the current gain of amplifier is 0.98 and the input resistance is $70\,\Omega$, the voltage gain and power gain respectively are
A) 60, 66.6
B) 70, 68.6
C) 80, 75.6
D) 90, 96.6

17) Two cars A and B at rest at same point initially. If A starts with uniform velocity of 40 m/s and B starts in the same direction with constant acceleration of $4\,m/s^2$, then B will catch A after how much time?
A) 40 s
B) 30 s
C) 20 s
D) 10 s

18) Which of the prism is used to see infra-red spectrum of light?
A) Flint
B) Rock-salt
C) Nicol
D) Crown

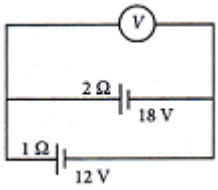
19) A prism $(\mu = 1.5)$ has the refracting angle of 30°. The deviation of a monochromatic ray incident normally on its one surface will be $\left(\sin 48^\circ\ 36' = 0.75\right)$
A) 18°
B) 18° 36'
C) 20° 30'
D) 22°1'

20) A body of mass 5 kg falls from a height of 30 metre. If its all mechanical energy is changed into heat, then heat produced will be
A) 6 cal
B) 60 cal
C) 150 cal
D) 350 cal

21) If there is a positive error of 50% in the measurement of velocity of a body, then the error in the measurement of kinetic energy is
A) 50%
B) 75%
C) 100%
D) 125%

22) In simple harmonic motion, the ratio of acceleration of the particle to its displacement at any time is a measure of
A) restoring force.
B) (angular frequency)^2.
C) angular frequency.
D) spring constant.

23) Two batteries, one of emf 18 volts and internal resistance 2Ω and the other of emf 12 volts and internal resistance 1Ω, are connected as shown. The voltmeter V will record a reading of (2005)



A) 30 volt
B) 18 volt
C) 15 volt
D) 14 volt

24) When a PN junction diode is reverse biased,
A) no change in the current takes place
B) height of the potential barrier decreases
C) electrons and holes move away from the junction depletion region
D) electrons and holes are attracted towards each other and move towards the depletion region

25) The dimension of $\frac{1}{2}\varepsilon_0 E^2$, where ε_0 is permittivity of free space and E is electric field, is (2010)
A) ML^2T^{-2}
B) $ML^{-1}T^{-2}$
C) ML^2T^{-1}
D) MLT^{-1}

26) If orbital velocity of planet is given by $v = G^a M^b R^c$, then
A) $a = 1/2, b = -1/2, c = -1/2$
B) $a = 1/2, b = -1/2, c = 1/2$
C) $a = 1/2, b = 1/2, c = -1/2$
D) $a = 1/3, b = 1/3, c = -1/3$

27) In an A.C. circuit, the current flowing is $I = 5\sin\left(100t - \frac{\pi}{2}\right)$ ampere and the potential difference is $V = 200\sin(100t)$ volts. The power consumption is equal to (1995)
A) 20 W
B) 0 W
C) 1000 W
D) 40 W

28) When you are on a frictionless horizontal plane, then how can you get off, if no horizontal force is exerted by pushing against the surface?
A) By jumping.
B) By running on the plane.
C) By spitting or sneezing.
D) By rolling your body on the surface.

29) There is no couple acting when two bar magnets are placed coaxially separated by a distance because
A) the forces act along the same line.
B) the forces are perpendicular to each other.
C) the forces are parallel and their lines of action do not coincide.
D) there are no forces on the poles.

30) According to the kinetic theory of gases the r. m. s. velocity of gas molecules is directly proportional to
A) $1/\sqrt{T}$
B) $\sqrt{T}$
C) T
D) T^2

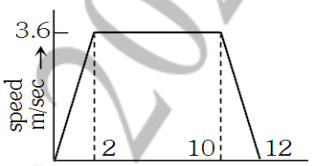
31) In Thomson experiment of finding e/m for electrons, beam of electron is replaced by that of muons (particle with same charge as of electrons but mass 208 times that of electrons). No deflection condition in this case satisfied if
A) B is increased 14.4 times.
B) B is increased 208 times.
C) E is increased 208 times.
D) None of these.

32) Point charge $q_1 = 2\mu C$ and $q_2 = -1\mu C$ are kept at points x = 0 and x = 6 respectively. Electrical potential will be zero at points
A) x = - 2 and x = 2
B) x = 1 and x = 5
C) x = 2 and x = 9
D) x = 4 and x = 12

33) The half life period of a radioactive element X is same as the mean life time of another radioactive element Y. Initially both of them have the same number of atoms, then
A) X will decay at a faster rate than Y.
B) Y will decay at a faster rate than X.
C) X and Y decay at the same rate always.
D) X and Y have the same decay rate initially.

34) A signal emitted by an antenna from a certain point can be received at another point of the surface in the form of (1993)
A) sky wave
B) ground wave
C) sea wave
D) both (a) and (b)

35) A lift is going up. The total mass of the lift and the passenger is 1500 kg. The variation in the speed of the lift is as given in the graph. The tension in the rope pulling the lift at t = 11th s will be



A) Zero
B) 12000 N
C) 14700 N
D) 16400 N

36) 110 joule of heat is added to a gaseous system whose internal energy is 40 J, then the amount of external work done is (1993)

A) 150 J
B) 70 J
C) 110 J
D) 40 J

37) The decrease in the potential energy of a ball of mass 20 kg which falls from a height of 50 cm is
A) 1980 J
B) 968 J
C) 98 J
D) None of these.

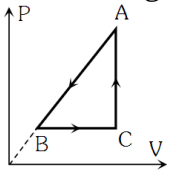
38) An ice berg of density 900 Kg/m^3 is floating in water of density 1000 Kg/m^3. The percentage of volume of ice-cube outside the water is
A) 10%
B) 20%
C) 25%
D) 35%

39) At which of the following temperature would the molecules of a gas have twice the average kinetic energy they have at 20°C?
A) 586°C
B) 313°C
C) 80°C

D) 40°C

40) Two open organ pipes give 4 beats/s are sounded together in their fundamental nodes. If the length of the pipe are 100 cm and 102.5 cm respectively, then the velocity of sound is
A) 160 m/s
B) 240 m/s
C) 328 m/s
D) 496 m/s

41) P-V diagram of a cyclic process ABCA is as shown in figure. Choose the correct statement.



A) ΔW_{CAB} = negative
B) $\Delta Q_{A\to B}$ = negative
C) $\Delta U_{B\to C}$ = positive
D) All of these

42) A thin uniform circular ring is rolling down an inclined plane of inclination 30° without slipping. Its linear acceleration along the inclined plane will be
A) g/2
B) g/3
C) 2g/3
D) g/4

43) The Young's modulus of the material of a wire is 6 x 10^{12} N/m^2 and there is no transverse strain in it, then its modulus of rigidity will be
A) 10^{12} N/m^2
B) 2 x 10^{12} N/m^2
C) 3 x 10^{12} N/m^2
D) None of the above.

44) A car runs at a constant speed on a circular track of radius 100 m, taking 62.8 seconds for every circular lap. What are the average velocity and average speed for each circular lap respectively?
A) $10\,ms^{-1}, 0$
B) $10\,ms^{-1}, 10\,ms^{-1}$
C) $0, 10\,ms^{-1}$
D) $0, 0$

45) A mercury drop of radius 1cm is sprayed into 10^6 drops of equal size. The energy expended in joules is (surface tension of Mercury is $460\times10^{-3}\ N/m$)
A) 5.7×10^{-6}
B) 5.7×10^{-4}
C) 0.057
D) 5.7

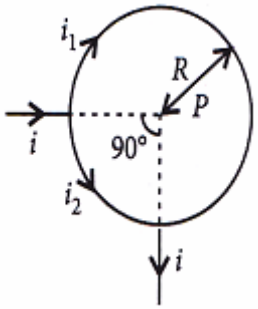
46) In a thin prism of glass (refractive index 1.5), which of the following relations between the angle of minimum deviations δ_m and angle of refraction r will be correct?
A) $\delta_m = \frac{r}{2}$
B) $\delta_m = 2r$
C) $\delta_m = 1.5\,r$
D) $\delta_m = r$

47) An electron (charge $=1.6\times10^{-19}C$) is accelerated through a potential of 100,000 V. The energy acquired by the electron is
A) 1.6×10^{-24} J
B) 0.53×10^{-17} J
C) 1.6×10^{-14} J
D) 1.6×10^{-14} erg

48) If a man increases his speed by 2 m/s, his K.E. is doubled, the original speed of the man is
A) $(2+\sqrt{2})\,m/s$
B) $(2+2\sqrt{2})\,m/s$
C) $(1+2\sqrt{2})\,m/s$
D) 4 m/s

49) A radiation of energy 'E' falls normally on a perfectly reflecting surface. Give the momentum transferred to the surface?(C=Velocity of light)
A) $\frac{2E}{C^2}$
B) $\frac{2E}{C}$
C) $\frac{E}{C}$
D) $\frac{E}{C^2}$

50) A straight conductor carrying current i splits into two parts as shown in the figure. The radius of the circular loop is R. The total magnetic field at the centre P at the loop is (2019)



A) Zero
B) $\frac{3\mu_0 i}{32R}$, outward
C) $\frac{3\mu_0 i}{32R}$, inward
D) $\frac{\mu_0 i}{2R}$, inward