Subject :: Physics

Q. No. 1 0011001	**Dimensions of resistance in an electric circuit, in terms of dimensions of mass M, of length L, of time T and of current I would be**
Option A	ML^2T^{-2}
Option B	$ML^2T^{-1}I^{-1}$
Option C	$ML^2T^{-3}I^{-2}$
Option D	$ML^2T^{-3}I^{-1}$
Correct Option	**C**

Q. No. 2 0011002	**The density of a solid ball is to be determined in an experiment. The diameter of the ball is measured with a screw gauge, whose pitch is 0.5 mm and there are 50 divisions on the circular scale. The reading on the main scale is 2.5 mm and that on the circular scale is 20 divisions. If the measured mass of the ball has a relative error of 2%, the relative percentage error in the density is**
Option A	0.9%
Option B	2.4%
Option C	3.1%
Option D	4.2%
Correct Option	**C**

Q. No. 3 0011003	**Two particles, one with constant velocity 50 m/s and the other with uniform acceleration $10 ms^{-2}$, start moving simultaneously from the same place in the same direction. They will be at a distance of 125 m from each other after**
Option A	5 sec
Option B	$5(1+\sqrt{2})$ sec
Option C	10 sec
Option D	$10(\sqrt{2}+1)$ sec
Correct Option	**B**

Q. No. 4 0011004	**The acceleration of a particle (a) is related to its velocity (v) by a = -2 v. What is the nature of velocity- time curve?**
Option A	Linearly increasing
Option B	Exponentially decreasing
Option C	Exponentially increasing
Option D	Linearly decreasing
Correct Option	**B**

Q. No. 5 0011005	**A block B is pushed momentarily along a horizontal surface with an initial velocity V. If μ is the coefficient of sliding friction between B and the surface, block B will come to rest after a time**

Option A	$g\mu/V$
Option B	g / V
Option C	V / g
Option D	$V/g\mu$
Correct Option	**D**

Q. No. 6 0011006	**A conveyor belt is moving at a constant speed of 2 m/s. A box is gently dropped on it. The coefficient of friction between them is $\mu = 0.5$. The distance that the box will move relative to belt before coming to rest on it, taking g = 10 ms^{-2}, is**
Option A	1.2 m
Option B	0.6 m
Option C	zero
Option D	0.4 m
Correct Option	**D**

Q. No. 7 0011007	**A point mass of 1 kg collides elastically with a stationary point mass of 5 kg. After their collision, the 1 kg mass reverses its direction and moves with a speed of 2 ms^{-1}. Which of the following statement(s) is (are) correct for the system of these two masses?**
Option A	Total momentum of the system is 30 kg ms^{-1}.
Option B	Momentum of 5 kg mass after collision is 4 kg ms^{-1}.
Option C	Kinetic energy of the centre of mass is 0.75 J.
Option D	Total kinetic energy of the system is 4 J.
Correct Option	**C**

Q. No. 8 0011008	**An engine pumps water through a hose pipe. Water passes through the pipe and leaves it with a velocity of 2 m/s. The mass per unit length of water in the pipe is 100 kg/m. What is the power of the engine?**
Option A	400 W
Option B	200 W
Option C	100 W
Option D	800 W
Correct Option	**A**

Q. No. 9 0011009	**A circular disc of radius R is removed from a bigger circular disc of radius 2 R, such that the circumferences of the discs coincide. The centre of mass of the new disc is α R from the centre of the bigger disc. The value of α is**
Option A	1/4
Option B	1/3
Option C	1/2
Option D	1/6
Correct	**B**

Option	[redacted]

Q. No. 10 0011010	**A flywheel of moment of inertia 3 x 10^2 kg m^2 is rotating with uniform angular speed of 4.6 rad s^{-1}. If a torque of 6.9 x 10^2 Nm retards the wheel, then the time in which the wheel comes to rest is**
Option A	1.5 s
Option B	2 s
Option C	0.5 s
Option D	2.5 s
Correct Option	**B**

Q. No. 11 0011011	**Infinite numbers of masses, each of 1 Kg, are placed along the x-axis at x= $\pm$1 m, $\pm$2 m, $\pm$4 m, $\pm$8 m, $\pm$16 m...... . The magnitude of the resultant gravitational potential in terms of gravitational constant G at the origin (x = 0) is**
Option A	G/2
Option B	G
Option C	2 G
Option D	4 G
Correct Option	**D**

Q. No. 12 0011012	**The radii of circular orbits of two satellites A and B of the earth are 4 R and R respectively. If the speed of satellite A is 3 V, then the speed of satellite B will be**
Option A	3 V/4
Option B	6 V
Option C	12 V
Option D	3 V/2
Correct Option	**B**

Q. No. 13 0011013	**Copper of fixed volume V is drawn into wire of length *l*. When this wire is subjected to a constant force F, the extension produced in the wire is Δl. Which of the following graph is a straight line?**
Option A	Δl versus 1/l
Option B	Δl versus l^2
Option C	Δl versus 1/ l^2
Option D	Δl versus l
Correct Option	**B**

Q. No. 14 0011014	**A capillary tube of radius r is immersed in water and water rises in it to a height h. The mass of water in the capillary tube is 5 g. Another capillary tube of radius 2 r is immersed in water. The mass of water that will rise in this tube is**
Option A	2.5 g
Option B	5.0 g

Option C	10 g
Option D	20 g
Correct Option	**C**

Q. No. 15 0011015	**When 1 kg of ice at 0^oC melts to water at 0^oC, the resulting change in its entropy, taking latent heat of ice to be 80 cal /g is**
Option A	273 cal/K
Option B	8×10^4cal/K
Option C	80 cal/K
Option D	293 cal/K
Correct Option	**D**

Q. No. 16 0011016	**A Carnot engine, whose efficiency is 40%, takes in heat from a source maintained at a temperature of 500 K. It is desired to have an engine of efficiency 60%. Then, the intake temperature for the same exhaust (sink) temperature must be**
Option A	Efficiency of Carnot engine cannot be made larger than 50%.
Option B	1200 K
Option C	750 K
Option D	600 K
Correct Option	**C**

Q. No. 17 0011017	**Temperature remaining constant, the pressure of gas is decreased by 20%. The percentage change in volume is**
Option A	Increased by 20%
Option B	Decreased by 20%
Option C	increased by 25%
Option D	decreased 25 %
Correct Option	**C**

Q. No. 18 0011018	**At 10^oC, the value of the density of a fixed mass of an ideal gas divided by its pressure is x. At 110^oC, this ratio is**
Option A	x
Option B	(383/283)x
Option C	(10/110)x
Option D	(283/383)x
Correct Option	**D**

Q. No. 19 0011019	**The amplitude of the vibrating particle due to superposition of two SHMs,** $y_1 = \sin(\omega t + \pi/3)$ and $y_2 = \sin \omega t$, **is**
Option A	1
Option B	

[redacted]	$\sqrt{2}$
Option C	2
Option D	$\sqrt{3}$
Correct Option	**D**

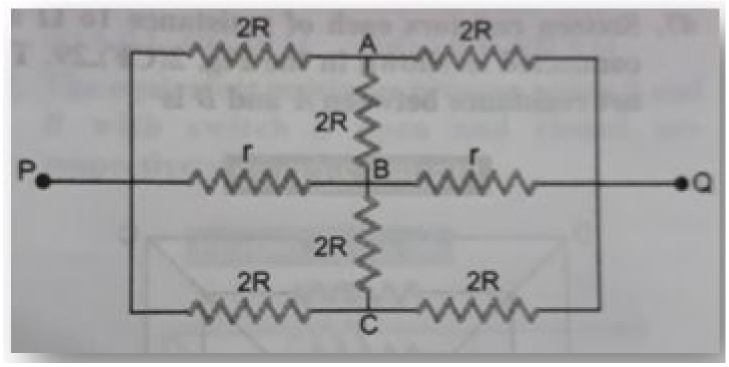
Q. No. 20 0011020	**If a spring of stiffness 'k' is cut into two parts 'A' and 'B' of length lA : lB = 2 : 3, then the stiffness of spring 'A' is given by**
Option A	(5/2)k
Option B	(3/5)k
Option C	2k/5
Option D	k
Correct Option	**A**

Q. No. 21 0011021	**N identical drops of mercury are charged simultaneously to 10 volt. When combined to form one large drop, the potential is found to be 40 V, the value of N is**
Option A	4
Option B	6
Option C	8
Option D	10
Correct Option	**C**

Q. No. 22 0011022	**Two capacitors of capacitance C are connected in series. If one of them is filled with dielectric substance of dielectric constant K, what is the effective capacitance?**
Option A	$\frac{KC}{(1+K)}$
Option B	C(K + 1)
Option C	$\frac{2KC}{(1+K)}$
Option D	1 + C
Correct Option	**A**

Q. No. 23 0011023	**Consider a neutral conducting sphere. A positive point charge is placed outside the sphere. The net charge on the sphere is then**
Option A	Negative and distributed uniformly over the surface of the sphere.
Option B	Negative and appears only at the point on the sphere closest to the point charge.
Option C	Negative and distributed non- uniformly over the entire surface of the sphere.
Option D	Zero.
Correct Option	**D**

Q. No. 24 0011024	**The effective resistance between points P and Q of the electrical circuit shown in figure below is**

	
Option A	$\frac{2Rr}{R+r}$
Option B	$\frac{8R(R+r)}{(3R+r)}$
Option C	$2r + 4R$
Option D	$\frac{5R}{2+2r}$
Correct Option	**A**

Q. No. 25 0011025	**A current of 2 A flows through a 2 Ω resistor when connected across a battery. The same battery supplies a current of 0.5 A when connected across a 9 Ω resistor. The internal resistance of the battery is**
Option A	0.5 Ω
Option B	1/3 Ω
Option C	1/4 Ω
Option D	1 Ω
Correct Option	**B**

Q. No. 26 0011026	**A bulb rated 36 W and 12 V is connected across 20 V cell. What resistance is required to glow it with full intensity?**
Option A	1.2 Ω
Option B	2.7 Ω
Option C	5.8 Ω
Option D	7 Ω
Correct Option	**B**

Q. No. 27 0011027	**A coil of n number of turns is wound tightly in the form of a spiral with inner and outer radii a and b respectively. When a current of strength I is passed through the coil, the magnetic field at its centre is**
Option A	$\mu_0 nI/(b-a) \times \log_e a/b$
Option B	$\mu_0 nI/2(b-a)$
Option C	$2\mu_0 nI/b$

Option D	$\mu_0 nI/2(b-a) \times \log_e b/a$
Correct Option	**D**

Q. No. 28 0011028	**A long straight wire of radius 'a' carries a steady current 'i'. The current is uniformly distributed across its cross- section. The ratio of the magnetic field at a/2 and 2a is**
Option A	1/2
Option B	1/4
Option C	4
Option D	1
Correct Option	**D**

Q. No. 29 0011029	**A closely wound solenoid of 2000 turns and area of cross-section $1.5 \times 10^{-4} m^2$ carries a current of 2.0 A. It is suspended through its centre and perpendicular to its length, allowing it to turn in a horizontal plane in a uniform magnetic field 5×10^{-2} tesla making an angle of 30^o with the axis of the solenoid. The torque on the solenoid will be**
Option A	3×10^{-3} N m
Option B	1.5×10^{-3} N m
Option C	1.5×10^{-2} N m
Option D	3×10^{-2} N m
Correct Option	**C**

Q. No. 30 0011030	**A solenoid is placed inside another solenoid, the length of both being equal carrying same magnitude of current. The other parameters like radius and number of turns are in aratio 1:2 for the two solenoids. The mutual inductance on each other would be**
Option A	$M_{12} = M_{21}$
Option B	$M_{12} = 2 M_{21}$
Option C	$2 M_{12} = M_{21}$
Option D	$M_{12} = 4 M_{21}$
Correct Option	**A**

Q. No. 31 0011031	**A transformer is used to light a 100 W and 110 V lamp from 220 V main supply. If the main current is 0.5 A, then efficiency of transformer is**
Option A	91%
Option B	100%
Option C	85%
Option D	95%
Correct Option	**A**

Q. No. 32 0011032	**A horizontal straight wire 20 m long extending from east to west is falling with a speed of 5.0 m/s, at right angles to the horizontal component of the**

	earth's magnetic field 0.30 x 10^{-4}Wb/m^2 . The instantaneous value of the e.m.f. induced in the wire will be
Option A	6.0 mV
Option B	3 mV
Option C	4.5 mV
Option D	1.5 mV
Correct Option	**B**

Q. No. 33 0011033	**The electric and magnetic field of an electromagnetic wave are**
Option A	In opposite phase and perpendicular to each other.
Option B	In opposite phase and parallel to each other.
Option C	In phase and perpendicular to each other.
Option D	In phase and parallel to each other.
Correct Option	**C**

Q. No. 34 0011034	**An electromagnetic wave propogating along north has its electric and magnetic field vector upwards. Its magnetic field vector points towards**
Option A	North
Option B	east
Option C	west
Option D	downwards
Correct Option	**B**

Q. No. 35 0011035	**The refractive index and the permeability of a medium are respectively 1.5 and 5 x 10^{-7}Hm^{-1}. The relative permittivity of the medium is nearly**
Option A	25
Option B	15
Option C	81
Option D	6
Correct Option	**D**

Q. No. 36 0011036	**Mixture of light consisting of wavelength 590 nm and an unknown wavelength illuminates young's double slit and gives rise to two overlapping interference patterns on the screen. The central maximum of both lights coincides. Further, it is observed that a third bright fringe of known light coincides with the fourth bright fringe of unknown light. From this data the wavelength of unknown light is**
Option A	885.0 nm
Option B	442.5 nm
Option C	776.8 nm
Option D	393.4 nm
Correct Option	**B**

Q. No. 37 0011037	**A lens having focal length *f* and aperture of diameter *d* forms an image of intensity *I*. Aperture of diameter d/2 in central region of lens is covered by a black paper. Focal length of lens and intensity of image now will be respectively**
Option A	$f \text{and} \frac{I}{4}$
Option B	$\frac{3f}{4}\ and\ \frac{I}{2}$
Option C	$f \text{and} \frac{3I}{4}$
Option D	$\frac{f}{2}\ and\ \frac{I}{2}$
Correct Option	**C**

Q. No. 38 0011038	**Which of the following is not due to total internal reflection?**
Option A	Working of optical fibre.
Option B	Difference between apparent and real depth of a pond.
Option C	Mirage on a hot summer day.
Option D	Brilliance of diamond.
Correct Option	**B**

Q. No. 39 0011039	**The threshold wavelength for a photoelectric emission from a material is 4800 Å . Photoelectrons will be emitted from the material, when it is illuminated with light from a**
Option A	40 W blue lamp
Option B	40 W green lamp
Option C	100 W red lamp
Option D	100 W yellow lamp
Correct Option	**A**

Q. No. 40 0011040	**In phtoelectric emmision process from a metal of work function 1.8 eV, the kinetic energy of the most energetic electron is 0.5 eV. The corresponding stopping potential is**
Option A	1.8 V
Option B	1.3 V
Option C	0.5 V
Option D	2.3 V
Correct Option	**C**

Q. No. 41 0011041	**If a source of power 4 kW produces 10^{20} photons/second, the radiation belongs to a part of the spectrum called**
Option A	Ultraviolet rays
Option B	microwaves

Option C	γ-rays
Option D	X-rays
Correct Option	**D**

Q. No. 42 0011042	**The half life period of a radioactive element X is same as the mean life time of another radioactive element Y. Initially, they have the same number of atoms. Then,**
Option A	X and Y decay at the same rate always.
Option B	X will decay faster then Y.
Option C	Y will decay faster than X.
Option D	X and Y have same decay rate initially.
Correct Option	**C**

Q. No. 43 0011043	**The energy of a hydrogen atom in the ground state is -13.6 eV. The energy of a He^{+} ion in the first excited state will be**
Option A	-13.6 eV
Option B	-27.2 eV
Option C	-54.4 eV
Option D	-6.8 eV
Correct Option	**A**

Q. No. 44 0011044	**Two samples X and Y contain equal amounts of radioactive substances. If 1/16th of sample X and 1/256th of sample Y remain after 8 hr, then the ratio of half periods of X and Y is**
Option A	2:1
Option B	1:2
Option C	1:4
Option D	1:16
Correct Option	**A**

Q. No. 45 0011045	**Sodium has body centred packing. Distance between two nearest atoms is $3.7\mathring{A}$. the lattice parameter is**
Option A	$4.3\mathring{A}$
Option B	$3.0\mathring{A}$
Option C	$8.6\mathring{A}$
Option D	$6.8\mathring{A}$
Correct Option	**A**

Q. No. 46 0011046	**Which of the following bonds produces a solid that reflects light in the visible region and whose electrical conductivity decreases with temperature and has high melting point?**
Option A	Metallic bond

Option B	Vander waal's bonding
Option C	ionic bonding
Option D	covalent bonding
Correct Option	**A**

Q. No. 47 0011047	**If a small amount of antimony is added to germanium crystal**
Option A	It becomes a p-type semiconductor.
Option B	The antimony becomes an acceptor atom.
Option C	There will be more free elctrons than holes in the semiconductor.
Option D	Its resistace is increased.
Correct Option	**C**

Q. No. 48 0011048	**The sky wave propogation is suitable for radiowaves of frequency**
Option A	Upto 2 MHz
Option B	from 2 MHz to 20 MHz
Option C	from 2 MHz to 30 MHz
Option D	from 2 MHz to 50 MHz
Correct Option	**C**

Q. No. 49 0011049	**Which of the following device is full duplex?**
Option A	Mobile phone
Option B	Walky-talky
Option C	Loud speaker
Option D	Radio
Correct Option	**A**

Q. No. 50 0011050	**Which of the following frequencies will be suitable for beyond the horizon communication?**
Option A	10kHz
Option B	10MHz
Option C	1GHz
Option D	1000GHz
Correct Option	**B**