

**PHYSICS**  
**GUJCET**

**Sample Paper-1**

**Time : 1:00 Hr.]**

**STD : XII**

**[Total Marks : 40**

1. Dimensional Formula of  $\epsilon_0$  is .....  
(a)  $M^1 L^{-2} T^{-2} Q^{-2}$  (b)  $M^{-1} L^2 T^{-3} Q^{-1}$   
(c)  $M^{-1} L^{-3} T^2 Q^2$  (d)  $M^{-1} L^3 T^{-2} Q^{-2}$
2. Capacitance of a parallel plate capacitor does not depend, on which of the following ?  
(a) Area of the plate (b) Medium between two plates  
(c) Distance between two plates (d) Metal of the plates
3. A circle of 2.5m radius is made using a wire of uniform cross section and resistivity. If resistance of this wire is  $10\pi\Omega$ , resistivity of the material of the wire is .....  $\Omega m$ .  
(a)  $4\pi$  (b)  $\frac{0.25}{\pi}$   
(c) 2 (d) 1
4. If the voltage across a lamp decreases by 5% then the power output decreases by...  
(a) 2.5 % (b) 5 %  
(c) 10 % (d) 20 %
5. To send 10 % of the main current through a moving coil galvanometer of resistance  $99\Omega$ , the shunt required is...  
(a)  $9.9\Omega$  (b)  $9\Omega$   
(c)  $10\Omega$  (d)  $11\Omega$
6. At a certain place horizontal component is  $\sqrt{3}$  times the vertical component of earth's magnetic field. The angle of dip at the place is .....  
(a) zero (b)  $\frac{\pi}{3}$   
(c)  $\frac{\pi}{6}$  (d) none of the above
7. R/L has the dimension of...  
(a) Time (b) Mass  
(c) Length (d) Frequency
8. A transformer is used to light 140W, 24V lamp from 240V a.c. mains. The current in the mains is 0.7A. The efficiency of transformer is nearest to...  
(a) 90% (b) 80%  
(c) 70% (d) 60%

9. The electromagnetic waves in the range of the wavelengths 3mm to 100cm are used for the purpose of satellite communication. The range of frequencies corresponding to the above range of wavelength is... ( $c = 3 \times 10^8 \text{ms}^{-1}$ )
- (a) 30 MHz to  $10^4$  MHz                      (b) 300 MHz to  $10^5$  MHz  
(c) 3 MHz to  $10^6$  MHz                        (d) 3 MHz to  $3 \times 10^8$  MHz
10. The value of magnification,  $m$  for plane mirror is....
- (a)  $-1$     (b) 1  
(c)  $\infty$     (d) 0
11. If diameter of telescope lens is 0.61 m, wavelength of light used is  $7500 \text{ \AA}$  what is the resolving power of the telescope ?
- (a)  $6.67 \times 10^5$                                   (b)  $6.67 \times 10^6$   
(c)  $6.67 \times 10^2$                                   (d)  $6.67 \times 10^4$
12. Which of the following particles moving with same velocity has minimum De Broglie wavelength ?
- (a) Electron                                      (b) Proton  
(c) Neutron                                        (d)  $\alpha$ -particle
13. If accelerating voltage applied to the anode of X-ray tube is  $V_0$ , then shortest wavelength of emitted X-ray is ...
- (a)  $\frac{eV_0}{h}$     (b)  $\frac{h}{eV_0}$   
(c)  $\frac{eV_0}{hc}$                                         (d)  $\frac{hc}{eV_0}$
14.  ${}_{13}\text{Al}^{27}$  is stable. What can the nucleus of  ${}_{13}\text{Al}^{32}$  emit ?
- (a)  $\alpha$ -particle                                  (b)  $\beta$ -particle  
(c)  $\gamma$ -radiation                                (d) Neutron
15. In transistor amplifier  $\beta = 600$ ,  $R_L = 6000\Omega$  and input resistance is  $600\Omega$ . What is the ratio of power gain and voltage gain ?
- (a) 1    (b) 10  
(c) 100    (d) 600
16. The transmission of audio signal in radio broadcasting is..... type.
- (a) ASK    (b) FSK  
(c) AM    (d) FM
17. There exists an electric field of  $100 \text{ NC}^{-1}$  along Z-direction. The flux passing through a square of 10 cm sides placed on XY plane inside the electric field is :
- (a)  $1.0 \text{ Nm}^2\text{C}^{-1}$                               (b)  $2.0 \text{ Vm}$   
(c)  $10 \text{ Vm}$                                         (d)  $4.0 \text{ Nm}^2\text{C}^{-1}$
18. The unit of volt is equivalent to which of the following units.....
- (a)  $\text{erg cm}^{-1}$                                     (b)  $\text{JC}^{-1}$   
(c)  $\text{JA}^{-1}$                                         (d)  $\text{NC}^{-1}\text{m}^{-1}$

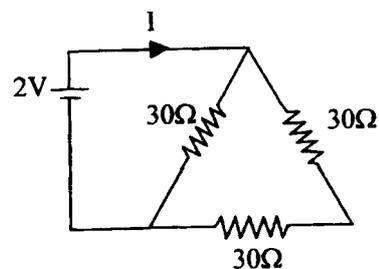
19. The value of current I in the given circuit is .....A

(a)  $\frac{1}{45}$

(b)  $\frac{1}{15}$

(c)  $\frac{1}{10}$

(d)  $\frac{1}{5}$



20. A stationary charged particle does not experience any net electromagnetic force then...

(a) magnetic field may be zero or nonzero

(b) magnetic field must be zero

(c) electric field may be zero or nonzero

(d) electric field must not be zero.

21. For an AC LCR series circuit,  $L = 1 \text{ H}$ ,  $C = 20 \mu\text{F}$  and  $R = 6\Omega$ . Calculate the Q-factor.

(a) 3.72

(b) 0.372

(c) 37.2

(d) 2.37

22. A charge  $q$  is placed at one of the vertices of a cube of side  $b$ . The electric flux through the cube is...

(a)  $\frac{q}{\epsilon_0}$

(b) zero

(c)  $\frac{q}{6\epsilon_0}$

(d)  $\frac{q}{8\epsilon_0}$

23. Earth's surface is considered to be at :

(a) zero potential

(b) negative potential

(c) infinite potential

(d) positive potential

24. The resistance of an ammeter is  $R\Omega$ . For some current passing through it, its reading is to be decreased from 30A to 10A. The value of shunt required is \_\_\_\_\_ $\Omega$ .

(a) R

(b) R/2

(c) R/3

(d) R/4

25. Electric bulb of 210W is kept for 5 minutes then .... calorie heat is produced. ( $J = 4.2 \text{ J/Cal}$ )

(a) 1050

(b) 15000

(c) 63000

(d) 8000

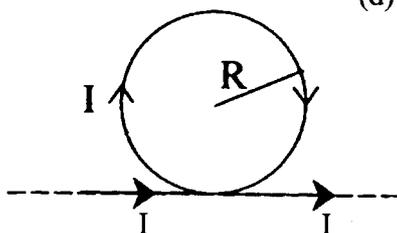
26. An infinite straight current carrying conductor is bent in such a way that a circular loop is formed on it as shown in the figure. If the radius of the loop is  $R$ , the magnetic field at the center of the loop is .....

(a) infinite

(b) zero

(c)  $\frac{\mu_0 2I}{4\pi R} \pi$

(d)  $\frac{\mu_0 2I}{4\pi R} (\pi + 1)$



27. Retentivity of hard ferromagnetic substance is \_\_\_\_\_ as compared to soft ferromagnetic substance :
- (a) less (b) two times  
(c) more (d) half
28. A metallic wire of length 1.0 m moves with a speed of 10 m/s perpendicular to a magnetic field. If the emf induced in the wire is 1.0V, the magnitude of magnetic field is : \_\_\_\_\_
- (a) 0.01T (b) 0.1T  
(c) 0.2T (d) 0.02T
29. For an A.C. given by  $I = 100 \cos(200t + 45^\circ)$  A. What is the value of  $I_{rms}$  ?
- (a)  $50\sqrt{2}$  A (b) 100A  
(c)  $100\sqrt{2}$ A (d) zero
30. A person can not see the object beyond 100 cm. The power of a lens to correct this vision will be : \_\_\_\_\_
- (a) + 2D (b) -1 D  
(c) + 5D (d) 0.5 D
31. A ray of light is incident on the surface of a glass plate of refractive index 1.55 at the polarizing angle. What is the angle of refraction ?
- (a)  $75^\circ 11'$  (b)  $32^\circ 49'$   
(c)  $147^\circ 11'$  (d)  $0^\circ$
32. The work function of Aluminium is 4.2 eV. Light of wavelength  $2000 \text{ \AA}$  is incident on it. The threshold frequency will be \_\_\_\_\_
- (a)  $10^{19}$  Hz (b)  $10^{13}$  Hz  
(c)  $10^{15}$  Hz (d)  $10^{18}$  Hz
33. The value of principle quantum number for an ionized atom is \_\_\_\_\_
- (a) 1 (b) 0  
(c)  $\infty$  (d) 4
34. When the hydrogen atom gets to its lowest excited level, orbital radius of electron is \_\_\_\_\_ as the radius of first orbit.
- (a) twice (b) half  
(c) same (d) four times
35. Which logic gate characteristic is represented by the truth tabale shown below :
- | A | B | Y |
|---|---|---|
| 1 | 1 | 0 |
| 1 | 0 | 1 |
| 0 | 1 | 1 |
| 0 | 0 | 1 |
- (a) NAND gate  
(b) NOR gate  
(c) AND gate  
(d) OR gate

36. Phase difference between space current and capacitive current is \_\_\_\_\_
- (a)  $\pi$  (b)  $\pi/2$   
(c)  $3\pi/2$  (d) 0
37. Critical angle from glass-air is  $42^\circ$  so velocity of light in glass is :
- (a)  $3 \times 10^8 \text{ ms}^{-1}$  (b)  $2 \times 10^8 \text{ m s}^{-1}$   
(c)  $1.5 \times 10^8 \text{ ms}^{-1}$  (d)  $2.5 \times 10^8 \text{ m s}^{-1}$
38. In Young's experiment the distance between two slits is halved and the distance between the screen and the slit is doubled. The width of the fringe \_\_\_\_\_
- (a) remains the same (b) becomes half  
(c) becomes double (d) becomes four times
39. If photoelectric effect is not seen with the ultraviolet radiations in a given metal, photoelectrons may be emitted with the \_\_\_\_\_
- (a) Infrared Waves (b) Radio Waves  
(c) X-rays (d) Visible Light
40. One gram radioactive substance reduces to  $\frac{1}{3}$  gram in two days. The mass remaining after six days will be \_\_\_\_\_
- (a)  $\frac{1}{9}$  (b)  $\frac{1}{6}$   
(c)  $\frac{1}{27}$  (d)  $\frac{1}{12}$
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Sample Paper-2

Time : 1:00 Hr.]

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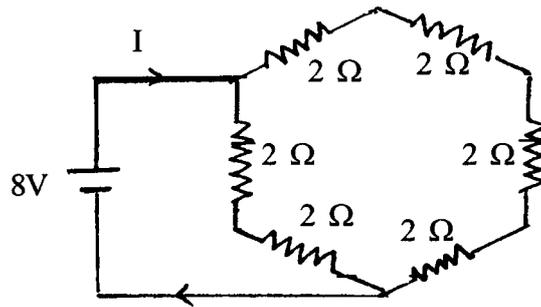
1. Two point charges  $Q$  and  $-3Q$  placed certain distance apart. If the electric field at the location of  $Q$  be  $\vec{E}$ , then at the location of  $-3Q$  will be \_\_\_\_\_.
- (A)  $3\vec{E}$  (B)  $-3\vec{E}$   
(C)  $\frac{\vec{E}}{3}$  (D)  $-\frac{\vec{E}}{3}$
2. In air, leaking of charge starts when electric field intensity is  $2.0 \times 10^6 \text{ NC}^{-1}$ . The largest charge that a metallic sphere of 3 mm radius can hold is \_\_\_\_\_.
- (A) 2 nc (B) 3 nc  
(C) 1.5 nc (D) 6 nc
3. If the electric flux leaving and entering an enclosed surface respectively is  $\phi_1$  and  $\phi_2$ , the electric charge inside the surface will be \_\_\_\_\_.
- (A)  $\frac{\phi_2 - \phi_1}{\epsilon_0}$  (B)  $\frac{\phi_1 + \phi_2}{\epsilon_0}$   
(C)  $\frac{\phi_1 - \phi_2}{\epsilon_0}$  (D)  $\epsilon_0 (\phi_1 - \phi_2)$
4.  $C$  is the capacitance of a parallel plate capacitor. If distance between both the plate is made half, the new capacitance will be \_\_\_\_\_.
- (A)  $4C$  (B)  $2C$   
(C)  $\frac{C}{2}$  (D)  $\frac{C}{4}$
5. 60 pF capacitor has  $3 \times 10^{-8} \text{ C}$  charge on each plate. Then energy stored in it is \_\_\_\_\_.
- (A)  $7.5 \times 10^{-6} \text{ J}$  (B)  $75 \times 10^{-6} \text{ J}$   
(C)  $2.4 \times 10^{-4} \text{ J}$  (D)  $15 \times 10^6 \text{ J}$
6. 27 drops of mercury of equal radii and possessing equal charges combines to form a big drop. The capacitance of a bigger drop composed to each individual drop is \_\_\_\_\_.
- (A) 27 times (B) 54 times  
(C) 3 times (D) 6 times
7.  $J = \sigma E$  shows \_\_\_\_\_ law.
- (A) Coulomb's (B) Ampere's  
(C) Ohm's (D) Gauss's

8. Resistivity of a wire is  $\rho$ . Its length is 4 m and its resistance is  $4\Omega$ . Then the volume of this wire is \_\_\_\_\_  $\text{m}^3$ .

(A)  $\sqrt{\frac{4}{\rho}}$  (B)  $4\rho$

(C)  $\frac{\rho}{4}$  (D)  $\sqrt{4\rho}$

9. Calculate current I in the following circuit.



(A) 1A (B) 2A

(C) 3A (D)  $\frac{1}{3}$  A

10. Electric current passing through an electric bulb is changed by 1%, then power consumed by it changes by \_\_\_\_\_ %.

(A) 1 (B) 2

(C) 10 (D) 100

11. The atomic weight of trivalent Al is 27. The how much electric charge is required to liberate 18 g Al ?

(A)  $\frac{F}{3}$  (B)  $\frac{F}{2}$

(C) F (D) 2F

12. 1 KWH = \_\_\_\_\_ J

(A)  $36 \times 10^6$  (B)  $3.6 \times 10^6$

(C)  $36 \times 10^{-6}$  (D)  $3.6 \times 10^{-6}$

13. A galvanometer is said to sensitive, if it gives a \_\_\_\_\_.

(A) Small deflection for a small current (B) Small deflection for a large current

(C) large deflection for a large current (D) large deflection for a small current

14. A current carrying coil is bent sharply as to convert it into two loops of same radius and both carrying current in the same direction. If B be the initial magnetic field at the centre, what will be the magnetic field at the centre in new situation ?

(A) 2B (B) 4B

(C) 8B (D) Zero

15. After being accelerated through a potential difference of  $V$  volt, an electron moves perpendicular to the magnetic field and experiences a force  $F$ . If the electron is accelerated through a potential difference of  $2V$  volt, then force on electron will be \_\_\_\_\_.
- (A)  $\frac{F}{\sqrt{2}}$  (B)  $\frac{F}{2}$   
 (C)  $\sqrt{2}F$  (D)  $2F$
16. At curie temperature \_\_\_\_\_ substance.
- (A) Paramagnetic is converted into Ferromagnetic.  
 (B) Paramagnetic is converted into Diamagnetic.  
 (C) Ferromagnetic is converted into Paramagnetic.  
 (D) Ferromagnetic is converted into Diamagnetic.
17. Force on one magnetic pole in magnetic field is  $0.08$  N. If intensity of the field is  $0.8$  T, then its pole strength is \_\_\_\_\_ Am.
- (A)  $10$  (B)  $1$   
 (C)  $0.1$  (D)  $0.01$
18. Mutual inductance of system of two coils is  $0.3$  H. If current in one coil is changed from  $10$ A to  $40$ A in  $0.01$  S, then induced emf in the other coil is \_\_\_\_\_.
- (A)  $9 \times 10^2$  V (B)  $90$ V  
 (C)  $9$ V (D)  $9 \times 10^3$  V
19. Unit of magnetic flux density is \_\_\_\_\_.
- (A)  $\text{Vs}^{-1}$  (B)  $\text{Wbm}^{-2}$   
 (C)  $\text{Wbs}^{-1}$  (D) None of above
20. An A.C. current of  $\frac{50}{\pi}$  Hz is passed through a series combination of  $100 \Omega$  resistance and an inductor of  $1$  H. Phase difference between the AC voltage and AC current is \_\_\_\_\_.
- (A)  $60^\circ$  (B)  $45^\circ$   
 (C)  $30^\circ$  (D)  $90^\circ$
21. Resonant frequency for L-C-R series circuit is given by  $f_0 =$  \_\_\_\_\_.
- (A)  $\frac{1}{2\pi\sqrt{LC}}$  (B)  $\frac{2\pi}{\sqrt{LC}}$   
 (C)  $\frac{\sqrt{LC}}{2\pi}$  (D)  $\frac{2\pi}{LC}$
22. Transformation ratio for step down transformer is \_\_\_\_\_.
- (A)  $r > 1$  (B)  $r = 1$   
 (C)  $r < 1$  (D)  $r = 0$

23. In Hertz experiment is frequency of oscillations of electron is  $10^4$  Hz, then the wavelength of emitted electromagnetic wave is \_\_\_\_\_ m.
- (A)  $3 \times 10^4$  (B)  $3 \times 10^5$   
(C)  $3 \times 10^6$  (D)  $5 \times 10^{10}$
24. Maximum magnetic field of electromagnetic wave propagating in vacuum is 300 nT, then maximum electric field is \_\_\_\_\_  $\text{Vm}^{-1}$ .
- (A) 30 (B) 90  
(C) 120 (D) 60
25. Convex lens is immersed from air into the water, its focal length will \_\_\_\_\_.
- (A) increase (B) decrease  
(C) not change (D) none of above
26. The material of optical fibre must have refractive index \_\_\_\_\_
- (A)  $n < \sqrt{2}$  (B)  $n = 2$   
(C)  $n > \frac{1}{\sqrt{2}}$  (D)  $n > \sqrt{2}$
27. Time taken by the sun light to normally through a glass window of thickness 4 mm, whose reference index is 1.5, is \_\_\_\_\_ seconds.
- (A)  $2 \times 10^8$  (B)  $2 \times 10^{-8}$   
(C)  $2 \times 10^{-11}$  (D)  $2 \times 10^{11}$
28. In Young's experiment, distance between two slits is 0.2 mm. If wavelength of light used in the experiment is  $5000 \text{ \AA}$ , the angular position of 3rd bright fringe from central bright fringe is \_\_\_\_\_ rad.
- (A) 0.075 (B) 0.75  
(C) 0.0075 (D) 0.057
29. Plane polarized light of intensity  $I_0$  is incident in such a way that light vectors make an angle  $45^\circ$  with optic axis of the polarid. Intensity of light emerging from polarid is \_\_\_\_\_.
- (A)  $I_0$  (B)  $\frac{I_0}{2}$   
(C)  $\frac{I_0}{\sqrt{2}}$  (D)  $\frac{I_0}{4}$
30. In telescope ratio of resolving power with the light of wavelength  $\lambda = 4000 \text{ \AA}$  and  $\lambda = 6000 \text{ \AA}$  is \_\_\_\_\_.
- (A) 4 : 5 (B) 3 : 2  
(C) 2 : 3 (D) 5 : 4
31. The dimensional formula for Planck's constant is \_\_\_\_\_.
- (A)  $\text{M}^1\text{L}^1\text{T}^{-2}$  (B)  $\text{M}^1\text{L}^2\text{T}^{-1}$   
(C)  $\text{M}^1\text{L}^1\text{T}^{-1}$  (D)  $\text{M}^1\text{L}^2\text{T}^{-2}$

32. The uncertainty in the position of a particle is equal to its De Broglie wavelength, then the uncertainty in its momentum is \_\_\_\_\_.
- (A)  $\frac{h}{2\pi\lambda}$  (B)  $\lambda \cdot \frac{h}{2\pi}$   
 (C)  $\frac{2\pi\lambda}{h}$  (D)  $\frac{h}{\lambda}$
33. The linear speed of the electron in the  $n^{\text{th}}$  Bohr orbit of the hydrogen atom is proportional to \_\_\_\_\_.
- (A)  $n$  (B)  $n^3$   
 (C)  $\frac{1}{n}$  (D)  $\frac{1}{n^3}$
34. If radius of the second orbit in hydrogen atom is  $R$ , then radius of the third orbit is \_\_\_\_\_.
- (A)  $3R$  (B)  $2.25R$   
 (C)  $9R$  (D)  $\frac{R}{3}$
35. The half lives of an element for  $\alpha$ -decay and  $\beta$ -decay are 4 yrs and 12 yrs respectively. What would be its activity in percentage after 9 yrs ?
- (A) 6.25 (B) 12.5  
 (C) 25 (D) 50
36. What is indicated by the slope of the graph of  $\ln N \rightarrow t$  from the following ?
- (A)  $-\lambda$  (B)  $\frac{1}{\lambda}$   
 (C)  $\frac{N_0}{e}$  (D)  $N_0 \cdot e$
37. If the width of depletion layer in a PN junction is  $200 \text{ \AA}$  and the reverse bias voltage is 2V. What is intensity of electric field in the depletion layer ?
- (A)  $10^6 \text{ vm}^{-1}$  (B)  $10^8 \text{ vm}^{-1}$   
 (C)  $10^{10} \text{ vm}^{-1}$  (D)  $10^{-8} \text{ vm}^{-1}$
38. For CE amplifier circuit  $r_i = 1 \text{ K}\Omega$ ,  $R_L = 4 \text{ K}\Omega$ ,  $I_c = 1 \text{ mA}$  and  $I_B = 2 \text{ }\mu\text{A}$ . What is the voltage gain of this amplifier ?
- (A) 100 (B) 150  
 (C) 2000 (D) 200
39. The power radiated from the antenna is proportional to \_\_\_\_\_.
- (A)  $\lambda^{-2}$  (B)  $\lambda^2$   
 (C)  $\lambda^{-1}$  (D)  $\lambda$
40. At a given time the critical frequency of ionosphere is 9 MHz. which of the following frequency will not be reflected by the ionosphere ?
- (A) 3 MHz (B) 6 MHz  
 (C) 9 MHz (D) 12 MHz

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**Sample Paper-3**

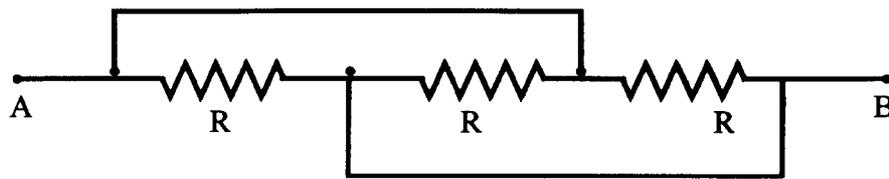
**Time : 1:00 Hr.]**

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**[Total Marks : 40**

1. There is identical capacitors (each of capacitance C) are connected in series and this combination is connected in parallel with one more such identical capacitors. Then, the capacitance of the whole combination is :  
(A) 3 C (B)  $\frac{3}{4}$  C  
(D)  $\frac{4}{3}$  C (D) 2 C
2. Electric field at the centroid of a triangle carrying a charge q at each corner is :  
(A)  $\frac{\sqrt{2}Kq}{r^2}$  (B)  $\frac{1}{\sqrt{2}} \frac{Kq}{r^2}$   
(C)  $\frac{3Kq}{r^2}$  (D) Zero
3. The SI unit of the line integral of electric field is :  
(A)  $NC^{-1}$  (B)  $Nm^2C^{-1}$   
(C)  $JC^{-1}$  (D)  $Vm^{-1}$
4. If one penetrates a uniformly charged spherical shell, the electric field strength E,  
(A) increases (B) decreases  
(C) remains the same as at the surface (D) is zero at all points
5. The potential difference applied to an X-ray tube is 5kV and current through it is 3.2 mA. Then the number of electrons striking the target per second is :  
(A)  $2 \times 10^{16}$  (B)  $5 \times 10^6$   
(B)  $1 \times 10^{17}$  (D)  $4 \times 10^{15}$
6. Give dimensional formula of permittivity  $\epsilon_0$ . Take A as the dimension of electric current :  
(A)  $M^{-1}L^{-3}T^4A^2$  (B)  $M^{-1}L^{-3}T^3A^1$   
(C)  $M^{-1}L^{-2}T^4A^2$  (D)  $M^{-2}L^{-2}T^4A^2$
7. Two plates are 1.5 cm. apart, and potential difference between them is 15 volt. The electric field between the plates is :  
(A) 10  $NC^{-1}$  (B) 500  $NC^{-1}$   
(C)  $10^3 NC^{-1}$  (D) 250  $NC^{-1}$
8. According to Joule's Law if potential difference across a conductor having a material of specific resistance  $\rho$ , remains constant, then heat produced in the conductor is proportional to  
(A)  $\frac{1}{\sqrt{\rho}}$  (B)  $\frac{1}{\rho}$   
(C)  $\rho^2$  (D)  $\rho$

9. Find the resistance between A and B in the figure given below :



- (A)  $\frac{R}{3}$  (B)  $\frac{2R}{3}$   
 (C)  $\frac{3R}{2}$  (D)  $3R$
10. A wire of length  $l$  metre is stretched to a length  $2l$  metre. Then the resistance will
- (A) decrease of  $\frac{1}{4}$  of the original (B) become four times  
 (C) increase four times (D) not change
11. The emf of a Cu – Ni thermocouple is given by  $E = (16.34t - 0.02t^2)\mu V$ .  
 The thermo electric power at  $100^\circ\text{C}$  in  $\frac{\mu\text{V}}{^\circ\text{C}}$  will be :
- (A) 12.34 (B) 12.5  
 (C) 10.0 (D) 20.0
12. Three resistance are connected to from the sides of a triangle ABC. The resistances of the sides AB, BC and CA are  $40\Omega$ ,  $60\Omega$  and  $100\Omega$  respectively. The effective resistance between A and B will be :
- (A)  $32\Omega$  (B)  $64\Omega$   
 (C)  $50\Omega$  (D)  $200\Omega$
13. The conductivity of a super conductor is :
- (A) infinite (B) very large  
 (C) zero (D) very small
14. Current provided a battery is maximum when :
- (A) internal resistance is equal to external resistance  
 (B) internal resistance is greater than external resistance  
 (C) internal resistance is less than external resistance  
 (D) none of these
- (15) Unit of pole strength of a magnet is :
- (A) Am (B)  $\text{Am}^{-1}$   
 (C)  $\text{Am}^2$  (D)  $\text{Am}^{-2}$

16. Force acting on a magnetic pole of  $7.5 \times 10^{-2}$  Am is 15N, magnetic field at that point is :
- (A) 200T (B)  $20 \frac{\text{wb}}{\text{m}^2}$
- (C)  $50 \frac{\text{wb}}{\text{m}^2}$  (D) 112.5T
17. A steel wire of length  $l$  has a magnetic moment  $M$ . It is then bent into a semicircular arc. The new magnetic moment is :
- (A)  $M$  (B)  $\frac{M}{l}$
- (C)  $\frac{2M}{\pi}$  (D)  $M \times l$
18. A closed wound solenoid of 800 turns has area of cross section  $2.5 \text{ c.m}^2$ . Magnetic moment associated with it, when it carries a current of 3A, is :
- (A)  $6 \text{ JT}^{-1}$  (B)  $0.06 \text{ JT}^{-1}$
- (C)  $0.6 \text{ JT}^{-1}$  (D) none of above
19. If dimensional formula of current is A. Dimensional formula of self inductance is
- (A)  $M^1L^2T^{-1}A^{-2}$  (B)  $M^1L^2T^{-2}A^{-1}$
- (C)  $M^1L^2T^{-2}A^{-2}$  (D)  $M^1L^1T^{-2}A^{-2}$
20. Current in a circuit is wattless, if :
- (A) current is alternating (B) resistance in circuit is zero
- (C) inductance in circuit is zero (D) resistance and conductance both are zero
21. A prism ( $\mu = 1.5$ ) has a prism angle of  $30^\circ$ . The angle of deviation of a monochromatic ray incident normally on its one surface will be :
- (A)  $14^\circ$  (B)  $18^\circ 36'$
- (C)  $22^\circ 1'$  (D)  $22^\circ 38'$
22. Two lenses having power as +2D and  $-4D$  respectively put together. Power of the combination would be :
- (A)  $-2D$  (B)  $-4D$
- (C)  $+2D$  (D)  $+4D$
- (23) When a ray of light travels from one medium to the other, then the physical quantity which does not change is :
- (A) velocity (B) wavelength
- (C) refractive index (D) frequency
- (24) According to Snell's generalised law, if  $n_2 > n_1$ , for relative media \_\_\_\_\_ .
- (A)  $\sin\theta_1 > \sin\theta_2$  (B)  $\cos\theta_1 > \cos\theta_2$
- (C)  $\theta_1 > \theta_2$  (D) angle of refraction  $>$  angle of incidence

25. Which of the following phenomenon does not happen in should waves ?
- (A) reflection (B) interference  
(C) diffraction (D) polarization
26. Two coherent sources must have the constant :
- (A) Phase difference (B) Amplitude  
(C) Intensity (D) Phase difference and intensity
27. A ray of light is incident at an angle  $i$ , when it travels from denser to rarer media. Angle between reflected and refracted ray is  $90^\circ$ . Angle of reflection and refraction are  $r$  and  $r'$  respectively, then critical angle will be :
- (A)  $\sin^{-1}(\tan r)$  (B)  $\sin^{-1}(\tan r')$   
(C)  $\sin^{-1}(\tan i)$  (D)  $\tan^{-1}(\sin i)$
28. A photon projected with a velocity  $v$  describes a circle of radius  $r$  in a uniform magnetic field, with what velocity should an alpha particle be projected so that it describes a circle of the same radius in the same magnetic field ?
- (A)  $v/4$  (B)  $v/2$   
(C)  $2v$  (D)  $4v$
29. The momentum of a photom of wavelength  $\lambda$  is,
- (A)  $\frac{h}{C\lambda}$  (B)  $\frac{hC}{\lambda}$   
(C)  $hC$  (D)  $\frac{h}{\lambda}$
30. The kinetic energies of photo elecrons emitted from a metal are  $K_1$  and  $K_2$  when it is irradiated with lights of wave lengths  $\lambda_1$  and  $\lambda_2$  respectively. The work function of the metal is :
- (A)  $\frac{K_1\lambda_1 - K_2\lambda_2}{\lambda_2 - \lambda_1}$  (B)  $\frac{K_1\lambda_1 - K_2\lambda_2}{\lambda_1 + \lambda_2}$   
(C)  $\frac{K_1\lambda_2 - K_2\lambda_1}{\lambda_2 - \lambda_1}$  (D)  $\frac{K_1\lambda_2 - K_2\lambda_1}{\lambda_2 + \lambda_1}$
31. The radioactivity of a radioactive sample is measured as 9750 counts per minute at time  $t = 0$  and as 975 counts per minute at  $t = 5$  minutes. The decay constant is approximately \_\_\_\_\_.
- (A) 0.230 per minute (B) 0.461 per minute  
(C) 0.691 per minute (D) 0.922 per minute

32. In Bohr's model of hydrogen atom, the centripetal force is provided by the coulomb's attraction between the proton and electron. If  $a_0$  is the radius of the ground state orbit,  $m$  is the mass,  $e$  is the charge of an electron and  $\epsilon_0$  is the vacuum permittivity, the speed of electron is :

- (A) zero (B)  $\frac{e}{\sqrt{\epsilon_0 a_0 m}}$   
 (C)  $\frac{e}{\sqrt{4\pi \epsilon_0 a_0 m}}$  (D)  $\frac{\sqrt{4\pi \epsilon_0 a_0 m}}{e}$

33. Photons of energy 6 eV are incident on a surface of work function 2.1 eV what is magnitude of stopping potential ?

- (A) 6V (B) 2.1V  
 (C) 3.9V (D) 8.1V

34. For the alkali metals values of threshold frequencies fall in \_\_\_\_\_ region.

- (A) Ultraviolet (B) X-rays  
 (C) Visible (D) Microwaves

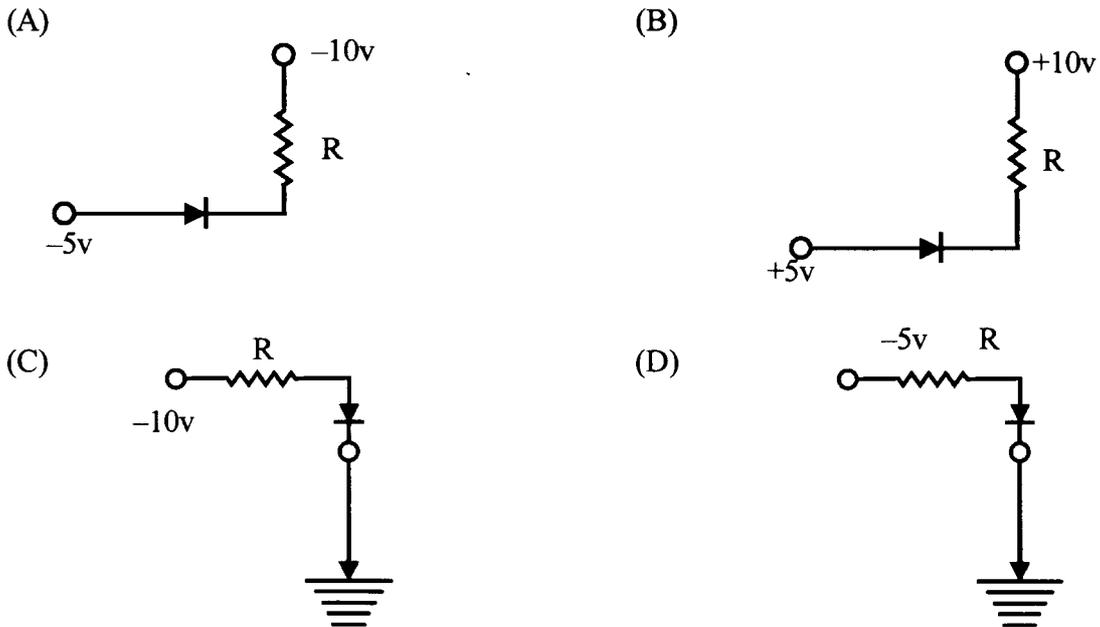
35. At absolute zero temperature, the electrical conductivity of a pure semiconductor is :

- (A) zero (B) about  $10^3 (\Omega m)^{-1}$   
 (C) about  $10^7 (\Omega m)^{-1}$  (D) infinite

36. In a transistor, a change of 8.0 mA in the emitter produces a change of 7.8 mA in the collector current. What change in the base current is necessary to produce the same change in the collector current ?

- (A) 50  $\mu A$  (B) 100  $\mu A$   
 (C) 150  $\mu A$  (D) 200  $\mu A$

37. Which of the junction diodes shown in figures is forward biased ?





**PHYSICS**  
**GUJCET**

**Sample Paper-4**

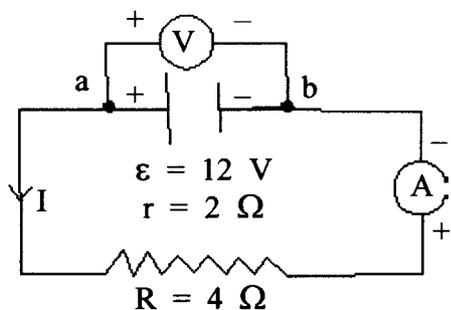
**Time : 1:00 Hr.]**

**STD : XII**

**[Total Marks : 40**

1. A particle having a charge of  $-1\mu\text{C}$  is placed close to a very large sheet having uniform surface charge density  $8.85 \times 10^{-6} \text{ cm}^{-2}$ . Find the force of attraction between the particle and the sheet of charge.  
(A) 0.25 N (B) 0.5 N  
(C) 1 N (D) 2 N
2. In a region of space the electric field is given by  $\vec{E} = (8\hat{i} + 5\hat{j} + 4\hat{k}) \text{ NC}^{-1}$ . What is the electric flux through a surface area  $100 \text{ m}^2$  lying in x - y plane ?  
(A)  $800 \text{ Nm}^2 \text{ C}^{-1}$  (B)  $600 \text{ Nm}^2 \text{ C}^{-1}$   
(C)  $500 \text{ Nm}^2 \text{ C}^{-1}$  (D)  $400 \text{ Nm}^2 \text{ C}^{-1}$
3. A solid sphere is charged. Volume charge density is uniform on it. The electric field due to it is maximum :  
(A) at a double distance than its radius from the centre  
(B) inside the sphere  
(C) out side the sphere  
(D) on its surface
4. A parallel plate capacitor has eapacitance  $50 \mu\text{F}$  in air and  $100 \mu\text{F}$  in oil. The dielectric constant of oil is.  
(A) 0.4 (B) 0.5  
(C) 2 (D) 2.2
5. What is the energy stored in a capacitor of capacitance  $20 \mu\text{F}$ , when charged to  $4 \times 10^3 \text{ V}$  ?  
(A) 1.6 J (B) 16 J  
(C) 160 J (D) 1600 J
6. A point electric charge of  $20 \mu\text{C}$  is placed at the origin of the cartesian coordinate system. What is the electric potential at a point (1, 2, 2) m ?  
(A)  $6 \times 10^4 \text{ V}$  (B)  $8 \times 10^4 \text{ V}$   
(C)  $12 \times 10^4 \text{ V}$  (D)  $15 \times 10^4 \text{ V}$
7. Two point charges placed at a distance r in the air experiance certain force, then the distance at which they will experience the same force in the medium of dielectric constant K is  
(A) Kr (B)  $\frac{r}{K}$   
(C)  $\frac{r}{\sqrt{K}}$  (D)  $r\sqrt{K}$

8. Four wires are made up of same material. Which wire has maximum resistance ?  
 (A) Short and Thin (B) short and Thick  
 (C) Long and Thin (D) Long and Thick
9. If the voltage across a lamp decreases by 1.5%, then the power output decreased by  
 (A) 30% (B) 20%  
 (C) 10% (D) 3%
10. Current capacity of ammeter with  $2.7 \Omega$  resistance is 1 A. What will be the value of the shunt require to increase current capacity to 10 A ?  
 (A)  $0.3 \Omega$  (B)  $3.0 \Omega$   
 (C)  $0.03 \Omega$  (D)  $2.7 \Omega$
11. As shown in the circuit an ammeter A and a resistor of resistance  $R = 4 \Omega$  have been connected to a battery of emf  $\epsilon = 12 \text{ V}$  and internal resistance of  $2 \Omega$ . What is voltmeter reading ?



- (A) 12 V (B) 2 V  
 (C) 4 V (D) 8 V
12. An electron and a proton having equal momenta enters a uniform magnetic field at right angles to the field lines. What will be the ratio of the radii of curvature of their trajectory ?  
 (A) 2 : 1 (B) 1 : 1  
 (C) 1 : 2 (D) None of the above
13. 3.2 A current is flowing through a closely wound coil having 100 turns. Radius of the coil is 10 cm. What is magnitude of magnetic field at the centre of the coil in tesla ?  
 Take  $\pi \times 3.2 = 10$   
 (A)  $2\pi \times 10^{-3}$  (B)  $4 \times 10^{-3}$   
 (C)  $2 \times 10^{-3}$  (D)  $8 \times 10^{-3}$
14. An ammeter and a milliammeter are converted from the same type of galvanometers. Which of the following is correct statement ?  
 (A) The milliammeter has higher resistance than the ammeter  
 (B) The ammeter has higher resistance than the milliammeter  
 (C) Both the meters have same resistance  
 (D) Nothing can be said about their resistances

15. The period of oscillations of two magnets in the same field are in the ratio 1 : 2. If their moments of inertia are equal, ratio of their magnets moment is :

- (A) 1 : 2 (B) 2 : 1  
(C) 4 : 1 (D) 1 : 4

16.  $R/L$  has the dimension of

- (A) Time (B) Length  
(C) Mass (D) Frequency

17. In a step up transformer, use of 100 V A.C. line provides output potential difference of 2000 V. If the primary coil has 75 turns, the number of turns in secondary coil is :

- (A) 150 (B) 1500  
(C) 1000 (D) 1075

18. What is the power dissipation in an A.C. circuit in which voltage and current are given by

$$V = 300 \sin \left( \omega t + \frac{\pi}{2} \right) \text{ and } I = 5 \sin \omega t.$$

All quantities are in SI.

- (A) 300 W (B) 150 W  
(C) Zero (D) 5 W

19. If a rate of change of current of  $2 \text{ AS}^{-1}$  induces an emf of 10 mV in a solenoid, what is the self inductance of the solenoid ?

- (A)  $5 \times 10^{-3} \text{ H}$  (B)  $50 \times 10^{-3} \text{ H}$   
(C)  $0.5 \times 10^{-3} \text{ H}$  (D) Zero

20. Coercivity of a magnet is  $6 \times 10^3 \text{ AM}^{-1}$ . It is put in a solenoid having 5000 turns in unit length. To demagnetise it. A current is required to pass through the solenoid.

- (A) 0.6 (B) 6  
(C) 1.2 (D) 12

21. In myopia.

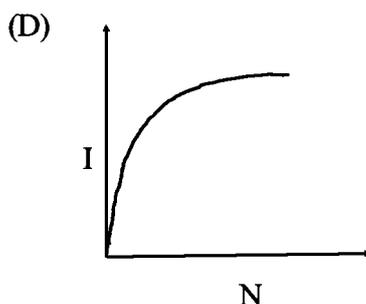
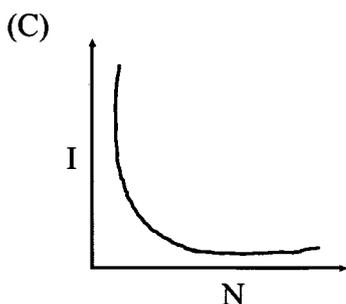
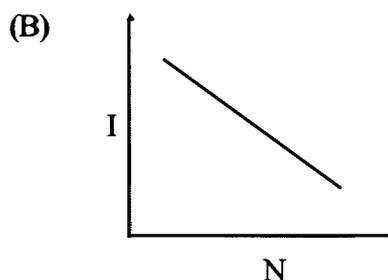
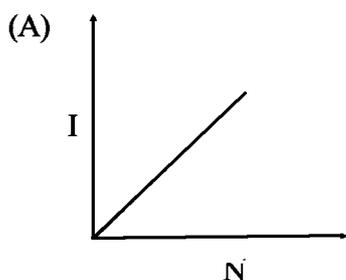
- (A) image is formed behind the retina  
(B) image is formed in front of the retina  
(C) image is formed on the retina  
(D) no image is formed

22. In the Fraunhofer diffraction pattern by a single slit, the angle at which the first order minimum is observed for the light of wavelength  $3000 \text{ \AA}$ , is also one at which the first order maximum is obtained for light of unknown wavelength. What is the value of unknown wavelength ?

- (A)  $4000 \text{ \AA}$  (B)  $3000 \text{ \AA}$   
(C)  $2000 \text{ \AA}$  (D)  $1000 \text{ \AA}$

23. A Camera objective has on aperture diameter  $d$ . If the aperture is reduced to diameter  $d/2$ , the exposure time under identical conditions of light should be made.
- (A)  $2\sqrt{2}$  times (B)  $\sqrt{2}$  times  
(C) 2 times (D) 4 times
24. In Young's double slit-experiment the intensity on screen at a point - where path difference  $\lambda$  is  $I$ . What will be intensity at the point where path difference is  $\lambda/4$  ?
- (A) Zero (B)  $I$   
(C)  $I/2$  (D)  $I/4$
25. The unit of expression  $\mu_0 \epsilon_0$  is :
- (A)  $\frac{m}{s}$  (B)  $\frac{m^2}{s^2}$   
(C)  $\frac{s}{m}$  (D)  $\frac{s^2}{m^2}$
26. To a bird in air, a fish in water appears to be at 30 cm from the surface. If refractive index of water is  $4/3$ , the true depth of fish is :
- (A) 30 cm (B) 45 cm.  
(C) 40 cm. (D) none of these
27. When polaroid is given one complete rotation, the intensity of emerging light varies but never reduces to zero. It shows that the incident light is :
- (A) Completely polarised (B) partially polarised  
(C) unpolarised (D) none of the above
28. The radius of first orbit of electron in hydrogen atom is  $0.53 \text{ \AA}$ . Then what is the radius of its third orbit ?
- (A)  $0.193 \text{ \AA}$  (B)  $4.77 \text{ \AA}$   
(C)  $4.24 \text{ \AA}$  (D)  $8.48 \text{ \AA}$
29. In hydrogen atom the De-Broglie wavelength associated with an electron in the  $n^{\text{th}}$  Bohr orbit, is,
- (A)  $n$  (B)  $\frac{1}{n}$   
(C)  $2\pi n$  (D)  $\frac{2\pi r}{n}$
30. Three  $\alpha$  particles and one  $\beta^-$  particle is emitted due to disintegration of a nucleus of  ${}_{88}\text{Ra}^{228}$ . What will be the end nucleus at the end of the process ?
- (A)  ${}_{83}\text{X}^{215}$  (B)  ${}_{83}\text{X}^{216}$   
(C)  ${}_{84}\text{X}^{220}$  (D)  ${}_{86}\text{X}^{220}$

31. The correct curve of relation between the activity  $I$  of radioactive substance and the number of nuclei ( $N$ ) yet to be disintegrated is :



32. Magnetic field can deflect -

- (A) X-rays (B) Neutrons  
(C) Alpha Particles (D) Gamma rays

33. A radioactive element remains 25% undecayed after 16 days. What is the half-life of the radioactive element in days ?

- (A) 32 (B) 8  
(C) 64 (D) 28

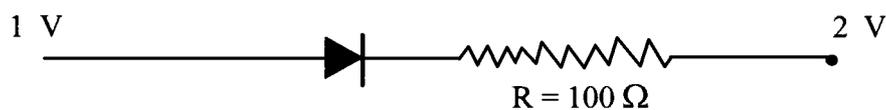
34. In the photoelectric effect, the slope of the graph of stopping potential ( $V_0$ ) versus frequency ( $f$ ) of incident light for a given metallic surface is :

- (A)  $h$  (B)  $\frac{h}{e}$   
(C)  $eh$  (D)  $e$

35. Which of the following gates is a fundamental logic gate in digital electronics circuit ?

- (A) XOR (B) NOR  
(C) NAND (D) AND

36. In the arrangement shown in the figure, the current through the diode is :



- (A) 20 mA (B) 10 mA  
(C) Zero (D) 1 mA

37. For communication at what angle geo-stationary satellites should be kept to cover entire surface of the earth ?
- (A)  $60^\circ$  (B)  $90^\circ$   
(C)  $120^\circ$  (D)  $270^\circ$
38. The collector supply voltage in a CE transistor amplifier is equal to 10 V. The base current is equal to  $10\mu\text{A}$  in the absence of the input signal voltage between the collector and the emitter is 4 V. The current gain  $\beta = 300$ . Find load resistance ( $R_L$ ) connected in the amplifier
- (A)  $200\ \Omega$  (B)  $20\ \Omega$   
(C)  $2\ \text{K}\Omega$  (D)  $20\ \text{K}\Omega$
39. Which of the following is not a transmission channel ?
- (A) Transmission Line (B) Co-axial Cable  
(C) Optical Fibre (D) Fax
40. Which gate will be obtained by shorting the two ends of the NAND gate ?
- (A) OR gate (B) NOR gate  
(C) AND gate (D) NOT gate
-

**PHYSICS**  
**GUJCET**

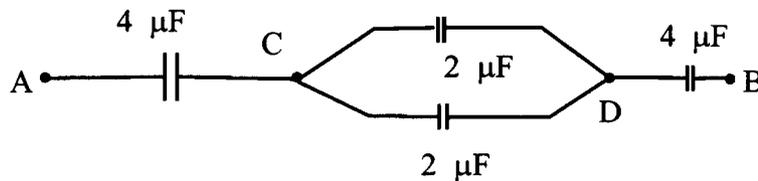
**Sample Paper-5**

**Time : 1:00 Hr.]**

**STD : XII**

**[Total Marks : 40**

1. There is equal surface charge density on two isolated conducting A and B of radius  $R_1$  and  $R_2$  ( $R_1 < R_2$ ). Now, electric field intensity on surface of the sphere \_\_\_\_\_.
- (A) A is more. (B) B is more.  
(C) A and B is same. (D) A and B depends on distance between them.
2. A dipole of electric dipole moment  $\vec{p}$  is placed in a uniform electric field of strength  $\vec{E}$ . If  $\theta$  is angle between  $\vec{p}$  and  $\vec{E}$ , then potential energy of the dipole becomes maximum, when  $\theta$  is \_\_\_\_\_.
- (A)  $\pi$  (B)  $\frac{\pi}{2}$   
(C)  $\frac{\pi}{4}$  (D) Zero
3. Equivalent capacitance between A and B in circuit given below is \_\_\_\_\_.
- (A)  $1.33 \mu\text{F}$  (B)  $13.3 \mu\text{F}$   
(C)  $0.75 \mu\text{F}$  (D)  $7.5 \mu\text{F}$

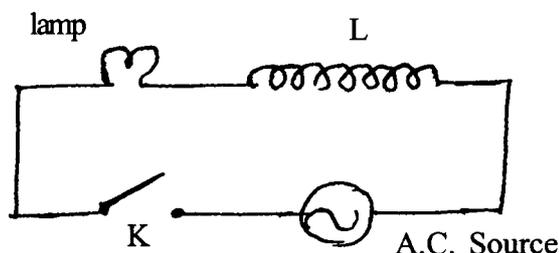


4. A charge  $q$  is placed at one of the vertices of a cube of side  $b$ . The electric flux through the cube is \_\_\_\_\_.
- (A)  $\frac{q}{8\epsilon_0}$  (B)  $\frac{q}{6\epsilon_0}$   
(C)  $\frac{q}{3\epsilon_0}$  (D)  $\frac{q}{\epsilon_0}$
5. In a parallel plate capacitor the capacitance increases from 4 microfarad to 80 microfarad, on introducing a dielectric medium replacing air between the plates. What is electric constant of the medium ?
- (A) 320 (B) 20  
(C) 0.05 (D) 2

6. Two point charges  $q_1$  and  $q_2$  of  $+10^{-8}\text{C}$  and  $-10^{-8}\text{C}$  respectively are placed 0.1 m apart. What is the magnitude of electric field intensity at the centre of line joining these charges ?
- (A)  $7.2 \times 10^4 \text{ NC}^{-1}$  (B)  $3.6 \times 10^4 \text{ NC}^{-1}$   
 (C)  $1.8 \times 10^4 \text{ NC}^{-1}$  (D) Zero
7. What is the work done in moving a charge of 10 nc between two points situated at a distance 10 cm from each other on an equipotential surface ?
- (A) Zero (B) 10 J  
 (C) 0.1 J (D) 100 J
8. The resistivity of a potentiometer wire is  $40 \times 10^{-8} \text{ ohm-m}$  and Its length is 4 m and its area of cross section is  $4 \times 10^{-6} \text{ m}^2$ . If 0.1A current is flowing through the wire, the potential gradient will be \_\_\_\_\_
- (A)  $10^{-2} \frac{\text{volt}}{\text{m}}$  (B)  $10^{-1} \frac{\text{volt}}{\text{m}}$   
 (C)  $3.2 \times 10^{-2} \frac{\text{volt}}{\text{m}}$  (D)  $1 \frac{\text{volt}}{\text{m}}$
9. Which is dimensional formula for conductance from the given below ? Take A is dimensional formula of electric current.
- (A)  $M^1L^2T^{-3}A^{-2}$  (B)  $M^{-1}L^{-2}T^3A^2$   
 (C)  $M^{-1}L^{-3}T^3A^2$  (D)  $M^1L^3T^{-3}A^{-2}$
10. The ratio of the units of thermo emf and Thomson co-efficient is \_\_\_\_\_ .
- (A) Volt (B) Joule  
 (C) Ampere (D) Celcius
11. An electron having mass  $m$  and kinetic energy  $E$  enters perpendicularly in the uniform magnetic field of intensity  $B$ . The frequency in its circular path will be \_\_\_\_\_ .
- (A)  $\frac{2\pi m}{eB}$  (B)  $\frac{E}{emB}$   
 (C)  $\frac{Be}{2\pi m}$  (D)  $\frac{2m}{eBE}$
12. Rating of two electric bulbs 'A' and 'B' are 220 V, 60W and 220 V, 100 W respectively. From the following which one is correct statement ?
- (A) The bulb 'A' has a greater resistance.  
 (B) The bulb 'B' has a greater resistance.  
 (C) Both the bulbs 'A' and 'B' have same resistance.  
 (D) Nothing can be said about their resistance.

13. 1A of current is passed through  $\text{CuSO}_4$  electrolyte for 10 second. Find the approximate number of Copper ions deposited at the cathode. Take charge on electron =  $1.6 \times 10^{-19}$  C and valancy of Copper = 2.
- (A)  $1.6 \times 10^{19}$  (B)  $3.1 \times 10^{19}$   
 (C)  $4.8 \times 10^{19}$  (D)  $6.2 \times 10^{19}$
14. A current element  $\Delta \vec{l} = \Delta x \hat{i}$  is placed at the origin and carries a large amount of current of 10A. What is magnetude of the magnetic field on the y-axis at a distance of 0.5 m from it. Take  $\Delta x = 1$  cm and  $\mu_0 = 4\pi \times 10^{-7} \frac{\text{Tm}}{\text{A}}$ .
- (A)  $4 \times 10^{-8}$  T (B)  $8 \times 10^{-8}$  T  
 (C)  $2.5 \times 10^{-8}$  T (D)  $\pi \times 10^{-8}$  T
15. 2.0 A current is passing through the Rowland ring. The number of turns on the ring is 500 and the average circumference of the ring is 50 cm. In this situation the magnetic field produced in the material inside the ring is 12.57 T. Find the magnetization intensity (M).
- (A)  $9998 \times 10^3 \text{ Am}^{-1}$  (B)  $7998 \times 10^3 \text{ Am}^{-1}$   
 (C)  $9.998 \times 10^3 \text{ Am}^{-1}$  (D)  $8999 \times 10^3 \text{ Am}^{-1}$
16. A square coil having length of a cross section 0.1 metre and 1000 turns is placed in such a way that its cross section remains normal to a magnetic field which is increasing at the rate of  $1\text{T s}^{-1}$ . What is emf produced in the coil ?
- (A) 0.1 V (B) 1 V  
 (C) 10 V (D) 100 V
17. What is the ratio of inductive and capacitive reactances in an A.C. circuit ?
- (A)  $\omega^2 L$  (B)  $\omega^2 LC$   
 (C) 1 (D) Zero
18. A pure inductor of 25 mH is connected to an A.C. source having 220V, 50 Hz. Find the inductive reactance in the circuit.
- (A) infinite (B) Zero  
 (C)  $7.85 \Omega$  (D)  $785 \Omega$
19. Earth's magnetic field always has a horizontal component except at \_\_\_\_\_.
- (A) At inclination of  $60^\circ$  (B) altitude of  $60^\circ$   
 (C) magnetic poles (D) equator

20. A lamp and an open coil inductor are connected to an a.c. source through a key as shown in the figure. The switch is kept on and after some time an iron rod is inserted into interior of the inductor. The glow of the light bulb
- (A) increases (B) decreases  
(C) remains unchanged (D) becomes zero



21. The sun delivers with  $10^3 \frac{\text{W}}{\text{m}^2}$  intensity of electro-magnetic radiation to earth surface. The total power that is incident on a roof of dimension  $80 \text{ m} \times 20 \text{ m}$  will be
- (A)  $2.56 \times 10^5 \text{ W}$  (B)  $6.4 \times 10^6 \text{ W}$   
(C)  $4.0 \times 10^6 \text{ W}$  (D)  $1.6 \times 10^6 \text{ W}$
22. A convex lens of material of  $\mu = 1.5$  has a focal length of  $25 \text{ cm}$  in air. The focal length of the lens when immersed in water having  $\mu = \frac{4}{3}$  is \_\_\_\_\_.
- (A)  $100 \text{ cm}$  (B)  $50 \text{ cm}$   
(C)  $25 \text{ cm}$  (D)  $12.5 \text{ cm}$
23. Ratio of intensities of two waves is given by  $9 : 1$ . Then ratio of the amplitudes of the two waves is \_\_\_\_\_.
- (A)  $1 : 9$  (B)  $3 : 1$   
(C)  $1 : 3$  (D)  $9 : 1$
24. Young's experiment of interference establishes that
- (A) light consists of particles (B) light propagates in form of waves  
(C) light is neither particle nor wave (D) light is both, a particle and a wave
25. In a transparent polythin bag air is filled so it takes a shape of convex lens. Now it is immersed in water. In water it behaves like \_\_\_\_\_.
- (A) convergent lens (B) divergent lens  
(C) a opaque slab (D) prism
26. A person standing in front of mirror finds his image larger than himself. This implies that the mirror is \_\_\_\_\_.
- (A) Convex (B) Concave  
(C) Plane (D) None of the above type

27. The path difference between two interfering waves corresponding to a phase difference  $\pi$  is \_\_\_\_\_
- (A)  $\lambda$  (B)  $3\lambda$   
 (C)  $\frac{\lambda}{2}$  (D)  $\frac{\lambda}{4}$
28. Which of the following physical quantities has the dimension  $M^1L^2T^{-1}$  ?
- (A) Angular momentum and linear momentum  
 (B) Planck's constant and linear momentum  
 (C) Angular momentum and energy  
 (D) Angular momentum and Planck's constant
29. In Bohr hydrogen atom as the quantum number decreases, the difference of radii between consecutive orbits \_\_\_\_\_.
- (A) decreases (B) increases  
 (C) remains same (D) sometime increases and sometime decreases
30. In the radioactivity decay of an element it is found that the count rate reduces from 1024  $\frac{\text{decay}}{\text{second}}$  to 128  $\frac{\text{decay}}{\text{second}}$  in 3 minutes. What will be its half-life in minutes ?
- (A) 1 (B) 2  
 (C) 3 (D) 5
31. Monochromatic light of frequency  $6.0 \times 10^{14}$  Hz is produced by a laser source. The power emitted is  $2.0 \times 10^{-3}$  W. How many photons per second, on the average, are emitted by the source ? Take  $h = 6.625 \times 10^{-34}$  Js
- (A)  $0.5 \times 10^{15}$  (B)  $10 \times 10^{15}$   
 (C)  $5 \times 10^{15}$  (D)  $20 \times 10^{15}$
32. The maximum wavelength of Lyman series in terms of Rydberg's constant (R) is \_\_\_\_\_.
- (A)  $\frac{4}{3R}$  (B)  $\frac{1}{R^2}$   
 (C)  $\frac{C}{R}$  (D)  $\frac{1}{RC}$
33. Complete the following fission process :
- $${}_{92}\text{U}^{235} + {}_0\text{n}^1 \rightarrow {}_{51}\text{Sb}^{133} + {}_{41}\text{Nb}^{99} + \text{_____}$$
- (A)  $2({}_0\text{n}^1)$  (B)  $3({}_0\text{n}^1)$   
 (C)  $4({}_0\text{n}^1)$  (D)  ${}_0\text{n}^1$

34. When  ${}_{90}\text{Th}^{228}$  gets converted into  ${}_{83}\text{Bi}^{212}$ , during the process how many  $\alpha$ -particles and  $\beta$ -particles are emitted respectively ?
- (A)  $4\alpha$ ,  $7\beta$  (B)  $8\alpha$ ,  $7\beta$   
 (C)  $4\alpha$ ,  $1\beta$  (D)  $4\alpha$ ,  $4\beta$
35. In a common emitter transistor amplifier circuit  $\beta = 50$ , input resistance is  $500\Omega$ , and output resistance =  $10\text{ K}\Omega$ , what is the value of voltage gain of circuit ?
- (A) 100 (B) 1000  
 (C) 500 (D) 5000
36. In a tuned collector oscillator circuit an output signal of 1 MHz frequency is obtained. The value of Capacitance  $C = 100\text{ pF}$ . What should be the value of the capacitor if a signal be the value of the capacitor if a signal of 2MHz frequency is to be obtained ?
- (A) 50 pF (B) 75 pF  
 (C) 25 pF (D) 100 pF
37. Which is the relation between uplink and downlink frequencies in satellite communication ?
- (A) Both frequency are same.  
 (B) Frequency of uplink is more than downlink.  
 (C) Frequency of downlink is more than uplink.  
 (D) can not be any relation.
38. The communication by a modem is of \_\_\_\_\_.
- (A) simple type (B) Full Duplex type  
 (C) Half Duplex type (D) Double Duplex type
39. There are  $6 \times 10^{19}$  holes per unit cubic meter of pure semiconductor. What will be the number of holes for this semiconductor of dimension  $1\text{ cm} \times 1\text{ cm} \times 2\text{ cm}$  ?
- (A)  $6 \times 10^{19}$  (B)  $6 \times 10^{13}$   
 (C)  $12 \times 10^{19}$  (D)  $12 \times 10^{13}$
40. A layer of ionosphere does not reflect waves with frequencies greater than 10 MHz, find the maximum electron density.
- (A)  $2.13 \times 10^{12}\text{ m}^{-3}$  (B)  $1.32 \times 10^{12}\text{ m}^{-3}$   
 (C)  $1.23 \times 10^{12}\text{ m}^{-3}$  (D)  $3.21 \times 10^{12}\text{ m}^{-3}$
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