VITEEE Physics 2012

1. The potential of the electric field produced by point charge at any (x,y,z) is given by $V=3x^2+5$, where x,y are in meters and V is in volts. The intensity of the electric field at (-2,1,0), is

(a) $+17\ Vm^{-1}$ (b) $-17\ Vm^{-1}$

(c) $+12\ Vm^{-1}$ (d) $-12\ Vm^{-1}$

2. The potential of a large liquid drop when eight liquid drops are combined is 20 V. Then the potential of each single drop was

(a) 10 V (b) 7.5 V

(c) 5 V (d) 2.5 V

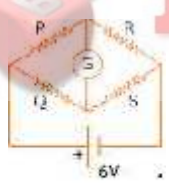
3. A and B are two metals with threshold frequencies $1.8x10^{14}$ Hz. Two identical photons of energy 0.825 eV each are incident on them. Then photoelectrons are emitted by

(Take $h = 6.6x10^{-34}$ J-s)

(a) B-alone (b) A alone

(c) Neither A nor B (d) Both A and B

4. In the Wheatstone's network given, P=10Ω, Q=20Ω, R=15Ω, S=30Ω, the current passing through the battery (of negligible internal resistance) is



(a) 0.36 A
(b) Zero
(c) 0.18 A
(d) 0.72 A

5. Three resistors 1Ω,2Ω and 3Ω are connected to form a triangle. Across 3Ω resistor a 3 V battery is connected. The current through 3Ω resistor is

(a) 0.75 A (b) 1 A

(b) 2 A (d) 1.5 A

6. In a common emitter the input signal is applied across

(a) anywhere (b) emitter-collector

(c) collector-base (d) base-emitter

7. The kinetic energy of an electron get tripled then the de-Broglie wavelength associated with it changes by a factor

(a) $\frac{1}{3}$ (b) $\sqrt{3}$ (c) $\frac{1}{\sqrt{3}}$ (d) 3

8. A radioactive substance contains 10000 nuclei and its half-life period is 20 days. The number of nuclei present at the end of 10 days is

(a) 7070 (b) 9000

(c) 8000 (d) 7500

9. A direct X-ray photograph of the intensities is not generally taken by radiologists because

(a) intensities would burst an exposure to X-rays

(b) The X-rays would be not pass through the intenstines

(c) The x-rays will pass through the intenstines without causing a good shadow for any useful diagnosis

(d) A very small exposure of X-rays causes in the in the intenstines

10. Charge passing through a conductor of cross-section area A=0.3 m^2 is given by $q=3t^2+5t+2$ in coulomb , where t is in second . What is the value of drift velocity at t=2 s? (Given, $n=2x10^{25}/m^3$)

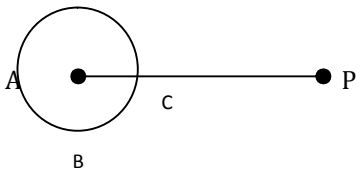
(a) $0.77x10^{-5}$ m/s (b) $1.77x10^{-5}$ m/s

(c) $2.08x10^{-5}$ m/s (d) $0.57x10^{-5}$ m/s

11. Two capacitors of capacities 1 μF and C μF are connected in series and the combination is 80 μC, the energy stored in the capacitor of capacity C in μJ is

(a) 1800 (b) 1600 (c) 14400 (d) 7200

12. A hollow conducting sphere is placed in an electric field produced by a point charge placed at p as shown in figure. Let V_A,V_B,V_C be the potentials at points A,B and C respectively. Then



(a) $V_C>V_B$ (b) $V_B>V_C$

(c) $V_A>V_B$ (d) $V_A=V_C$

13. In a hydrogen discharged tube it is observed that through given cross-section $3.13x10^{15}$ electrons are moving from right to left and $3.12x10^{15}$ protons are moving from left to right. What is is the electric current in the discharged tube and what is its direction?

(a) 1 mA towards right

(b) 1 mA towards left

(c) 2 mA towards left

(d) 2 mA towards right

14. In $CuSO_4$ solution when electric current equal to 2.5 faraday is passed, the gm equivalent deposited on the cathode is

(a) 1 (b) 1.5 (c) 2 (d) 2.5

15. In hydrogen a atom, an electric is revolving in the orbit of radius 0.53 $\AA$ with $6.6x10^{15}$ radiations/s. Magnetic field produced at the centre of the orbit is

(a) 0.125 Wb/m^2 (b) 1.25 Wb/m^2

(c) 12.5 Wb/m^2 (d) 125 Wb/m^2

16. The dipole moment of a short bar magnet is 12.5 $A\text{-}m^2$. The magnetic field on its axis at a distance of the magnet is

(a) $1.0x10^{-4}$ N/A-m

(b) $4x10^{-2}$ N/A-m

(c) $2x10^{-6}$ N/A-m

(d) $6.64x10^{-8}$ N/A-m

17. The turnratio of a transformers is given as 2:3. If the current through the primary coil is 3 A, thus calculate the current through load resistance

(a) 1 A (b) 4.5 A (c) 2 A (d) 1.5 A

18. In an AC circuit, the potential across an inductance and resistance joined in series are respectively 16 V and 20 V. The total potential difference potential difference across the circuit is

(a) 20.0 V (b) 25.6 V

(c) 31.9 V (d) 33.6 V

19. If hydrogen atom is its ground state absorbs 10.2 eV of energy. The orbital angular momentum is increased by

(a) $1.05x10^{34}$ J/s

(b) $3.16x10^{-34}$ J/s

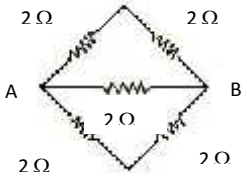
(d) $2.11x10^{-34}$ J/s

(d) $4.22x10^{-34}$ J/s

20. Highly energetic electrons re bombarded on a target of an element containing 30 neutrons. Theratio of radii of nucleus to that of Helium nucleus is $(14)^{1/3}$. The atomic number of nucleus will be

(a) 25 (b) 26 (c) 56 (d) 30

21. Each resistance shown in figure is 2 Ω. Thhe equivalent resistance between A and B is



(a) 2 Ω (b) 4 Ω (c) 8 Ω (d) 1 Ω

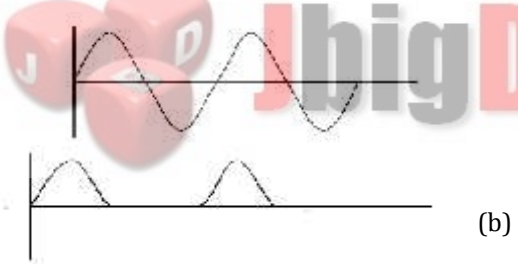
22. If in triode value amplification factor is 20 and plate resistance is 10 kΩ, then its mutual conductance is

(a) 2 milli mho (b) 20 milli mho

(c) (1/2) milli mho (d) 200-mho

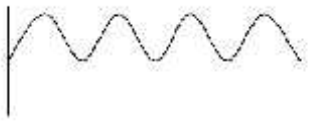
23. The output wave form of full wave rectifier is

(a)



(b)

(c)



(d)

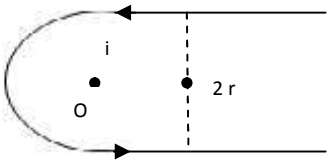
24. Calculate the energy released when three α-particles combined to form a ^{12}C nucleus, the mass defeat is

(Atomic mass of $_2He^4$ is 4.002603 u)

(a) 0.007809 u (b) 0.002603

(c) 4.002603 u (d) 0.5 u

25. In the figure shown, the magnetic field induction at the point O will be



(a) $\frac{\mu_0 I}{2\pi r}$ (b) $\left(\frac{\mu_0}{4\pi}\right)\left(\frac{I}{r}\right)(\pi+2)$

(c) $\left(\frac{\mu_0}{4\pi}\right)\left(\frac{I}{r}\right)(\pi+1)$ (d) $\frac{\mu_0 I}{2\pi r}(\pi-2)$

26. In photoelectric emission process from a metal of work function 1.8 eV, the kinetic energy of most energetic electrons is 0.5 eV. The corresponding stopping potential is

(a) 1.3 V (b) 0.5 V (c) 2.3 V (d) 1.8 V

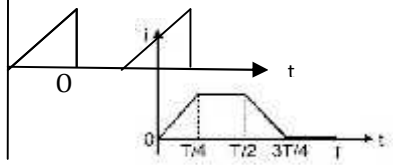
27. A current of 2 A flows a 2Ω resistor when connected across a battery. The same battery supplies a current of 0.5 A when connected across a 9Ω resistor. The internal resistance of the battery is

(a) 1/3 Ω (b) ¼ Ω

(c) 1 Ω (d) 0.5 Ω

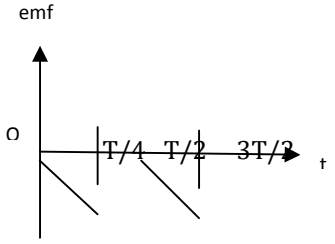
28. The current I in a coil varies with time as shown in figure. The variation of induced emf with time would be

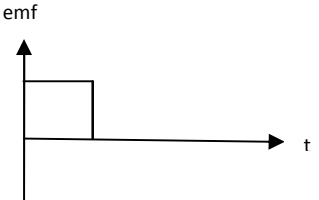
(a)



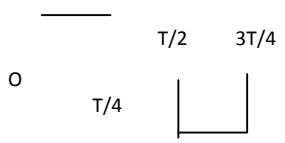
T/4 T/2 3T/2

(b)

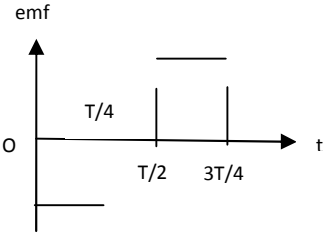




(c)



(d)



29. A transistor is operated in common emitter configuration at V_c = 2 V such that a change in the base current from 100 μA to 300 μA produces a change in the collector current from 10 mA. The current gain is

(a) 75 (b) 100 (c) 25 (d) 50

30. A uniform electric field and a uniform magnetic field are acting along the same direction in a certain region. If an electron is projected in the region such that its velocity is printed along the direction of fields, then the electron

(a) speed will decrease (b) speed will increase

(c) will turn towards left of direction of motion

(d) will turn towards right of direction a motion

31. Change q is uniformly spread on a thin ring of radius R. The ring rotates about its axis with a uniform frequency f Hz. The magnitude of magnetic induction at the centre of the ring is

(a) $\frac{\mu_0 q f}{2R}$ (b) $\frac{\mu_0 q}{2 f R}$

(c) $\frac{\mu_0 q}{2\pi f R}$ (d) $\frac{\mu_0 q f}{2\pi R}$

32. A galvanometer of resistance, G is shunted by a resistance S ohm. To keep the main current in the circuit unchanged, the resistance to be put in series with galvanometer is

(a) $\frac{S^2}{(S+G)}$ (b) $\frac{SG}{(S+G)}$

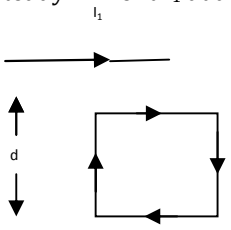
(c) $\frac{G^2}{(S+G)}$ (d) $\frac{G}{(S+G)}$

33. Three charges, each +q, are placed at the corners of an isosceles triangle ABC of sides BC and AC, 2a. D and E are the mid-points of BC and CA. The work done in taking a charge Q from D to E is

(a) $\frac{eqQ}{8\pi\varepsilon_0 a}$ (b) $\frac{qQ}{8\pi\varepsilon_0 a}$

(c) Zero (d) $\frac{3qQ}{8\pi\varepsilon_0 a}$

34. A square loop, carrying a steady current I, is placed in horizontal plane near a long straight conductor carrying a steady current I_1 at a distance d from the conductor as shown in figure. The loop will experience

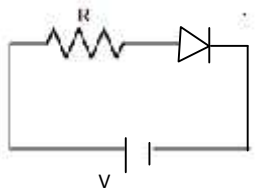


(a) A net repulsive force away from the conductor
(b) A net torque acting upward perpendicular to the horizontal plane
(c) A net torque acting downward normal to the horizontal plane
(d) A net attractive force towards the conductor

35. The threshold frequency for a photo-sensitive metal is 3.3×10^{14} Hz. If light of frequency 8.2×10^{14} Hz is incident on this metal, the cut off voltage for the photo-electric emission is nearly

(a) 2 V (b) 3 V (c) 5 V (d) 1 V

36. For the given circuit of p-n junction diode, which of the following statement is correct



(a) In forward biasing the voltage across R is V
(b) In forward biasing the voltage across R is 2 V
(c) In reverse biasing the voltage across R is V
(d) In reverse biasing the voltage across R is 2 V

37. If the binding energy per nuclear in Li^7 and He^4 nuclei are respectively 5.60 MeV and 7.06 MeV, then energy of reactor

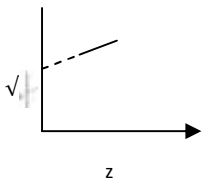
$Li^7 + P \rightarrow 2\ {}_2He^4$ is

(a) 19.6 MeV (b) 2.4 MeV

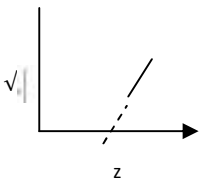
(c) 8.4 MeV (d) 17.3 MeV

38. The graph between the square root of the frequency of a specific line of characteristic spectrum of X-ray and the atomic number of the target will be

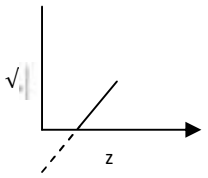
(a)



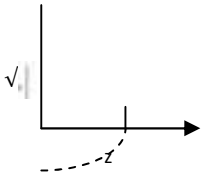
(b)



(c)



(d)



39. A resistor R, an inductor L and capacitor C are connected in series to an osciller of frequency n. If the resonant frequency is n_r, then the current lags behind voltage, when

(a) $n=0$ (b) $n<n_r$

(c) $n=n_r$ (d) $n>n_r$

40. A parallel plate capacitor ha scapacitance C. If it is equally filled with parallel layers of materials of dielectric constant K_1 and K_2 its capacity becomes C_1. The ratio of C_1 and C is

(a) K_1+K_2

(b) $\frac{K_1K_2}{K_1+K_2}$

(c) $\frac{K_1+K_2}{K_1K_2}$

(d) $\frac{2K_1K_2}{K_1+K_2}$