VITEEE Physics 2014

1. A coil of resistance 10Ω and an inductance 5 H is connected to a 100 V battery. The energy stored in the coil is

   (a) 325 erg   (b) 125 J

   (c) 250 erg   (d) 250 J

2. A galvanometer has current range of 15 mA and voltage range 750 mV. To current this galvanometer into an ammeter of range 25 A, the required shunt is

   (a) 0.8 Ω   (b) 0.93 Ω

   (c) 0.03 Ω   (d) 2.0 Ω

3. The denial cell is balanced on 125 cm length of a potentiometer. Now, the cell is short circuited by a resistance of 2 Ω and the balance is obtained at 100 cm. The internal resistance of the denial cell is

   (a) $\frac{4}{3}$ Ω   (b) 1.5 Ω

   (c) 1.25 Ω   (d) 0.5 Ω

4. Four resistance of 10 Ω, 60 Ω, 100 Ω and 200 Ω respectively taken in order are used to form a Wheatstone's bridge. A 15V battery is connected to the ends of a 200 Ω resistance, the current through it will be

   (a) 7.5×10^{-5} A   (b) 7.5×10^{-4} A

   (c) 7.5×10^{-3} A   (d) 7.5×10^{-2} A

5. A circuit has a self-inductance of 1 H and carries a current of 2A. To prevent sparking, when the circuit is switched off, a capacitor which can withstand 400 V is used. The least capacitance of capacitor connected across the switch must be equal to

   (a) 50 μF   (b) 25 μF

   (c) 100 μF   (d) 12.5 μF

6. The output Y of the logic circuit shown in figure is best represented as

   (a) ░░░░░░░ F
   (b) ░░░░░░
   (c) ░░░░░░ Y
   (d) ░░░░░░ ░
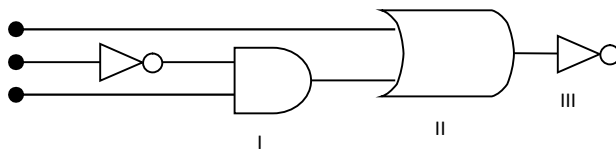
7. A resistor of 6 kΩ with tolerance 10% and another resistance of 4 kΩ with tolerance 10% are connected in series. The tolerance of the combination is about

   (a) 5 %   (b) 10 %

   (c) 12 %   (d) 15 %

8. If we add impurity to a metal those atoms also deflect electrons. Therefore,

(a)   the electrical and thermal conductivities both increase

(b)   the electrical and thermal conductivities both decrease

(c)   the electrical conductivity increases but thermal conductivity decreases

(d)   the electrical conductivity decrease but thermal conductivity decrease but thermal conductivity increase

9. A proton and an α-particle, accelerated through the same potential difference, enter a region of uniform magnetic field normally. If the redius of the proton orbit is 10 cm, then radius of α-particle is

(a) 10 cm   (b) $10\sqrt{2}$ cm

(c) 20 cm   (d) $5\sqrt{2}$ cm

10. An ammeter and a voltmeter of resistance R are connected in series to a electric cell of negligible internal resistance. Their reading are A and V respectively. If another resistance R is connected in parallel with the voltmeter, then

(a)   both A and V will increase

(b)   both A and V will decrease

(c)   A will decrease and V will increase

(d)   A will increase and V will decrease

11. A neutron is moving with velocity u. It collides head on and elastically with an atom of mass number A. If the initial kinetic energy of the neutron is E, then how much kinetic energy will be retained by the neutron after reflection?

(a) $\left(\frac{A}{A+1}\right)^2 E$ (b) $\frac{A}{(A+1)^2} E$

(c) $\left(\frac{A+1}{A-1}\right)^2 E$ (d) $\frac{(A-1)}{(A+1)^2} E$

12. If a magnet is suspended at angle 30^0 to the magnet meridian, the dip of needle makes angle of 45^0 with the horizontal, the real dip is
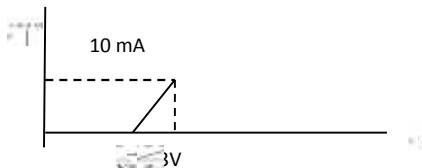
(a) $\tan^{-1}\left(\frac{\sqrt{3}}{2}\right)$ (b) $\tan^{-1}(\sqrt{3})$

(c) $\tan^{-1}\left(\sqrt{\frac{3}{2}}\right)$ (d) $\tan^{-1}\left(\frac{2}{\sqrt{3}}\right)$

13. Which has more luminous efficiency ?

(a) A 40 W bulb

(b) A 40W fluorescent tube

(c)   Both have same

(d) Cannot say

14. The resistance of a germanium junction duiode whose V – I is shown in figure is

(V_k = 0.3 V).

(a)   5 kΩ
(b)   0.2 kΩ
(c)   2.3 kΩ
(d) $\left(\frac{10}{23}\right)$ kΩ

15.   In hydrogen discharge tube, it is observed that through a given cross-section 3.31×10^{15} electrons are moving from right to left and 3.12×10^5 protons are moving from left to right. The current in the discharge tube and its direction will be

(a)   2 mA towards left

(b)   2 mA, towards right

(c)   1 mA, towards right

(d)   2 mA, towards left

16.   In a semiconductor, separation between conduction and valence band is of the order of

(a) 0 eV   (b) 1 eV

(c) 10 eV   (d) 50 eV

17.   If 1000 droplets each of potential 1V and redius r are mixed to form a big drop. Then, the potential of the drop as compared to small droplets, will be

(a) 1000 V   (b) 800 V

(c) 100 V   (d) 20 V

18.   A Zener diode, having breakdown voltage equal to 15 V is used in a voltage regulator circuit shown in figure. The current through the diode is
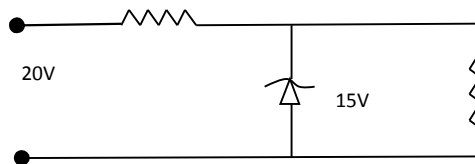
(a)   10 mA   (b) 15 mA

(c)   20 mA   (d) 5 mA

19.   The activity of a radioactivity sample is measured as N_0 counts per minute at t = 0 and N_0/C counts per minute at t=5 min. The time, (in minute) at which the activity reduces to half its value, is

(a) $\log_e \frac{2}{5}$ (b) $\frac{5}{\log_e 2}$

(c) $5 \log_{10} 2$ (d) $5 \log_e 2$

20.   If the electron in the hydrogen atom jumps from third oirbit to second orbit, the wavelength of the emitted radiation in term of Rydberg constant is

(a) $\frac{6}{5R}$ (b) $\frac{36}{5R}$

(c) $\frac{n4}{7R}$ (d) None of these

21. Silver has a work function of 4.7 eV. When ultraviolet light of wavelength 100 nm is incident on it a potential of 7.7 V is vrequired to stop the photoelectrons from reaching the collector plate. How much potential will be required to stop photoelectrons, when light of wavelength 200 nm is incident on it?

(a) 15.4 V   (b) 2.35 V

(c) 3.85 V   (c) 1.5 V

22. If the distance of 100 W lamp is increased from a photocell, the saturation current I in the photocell varies with the distance d as
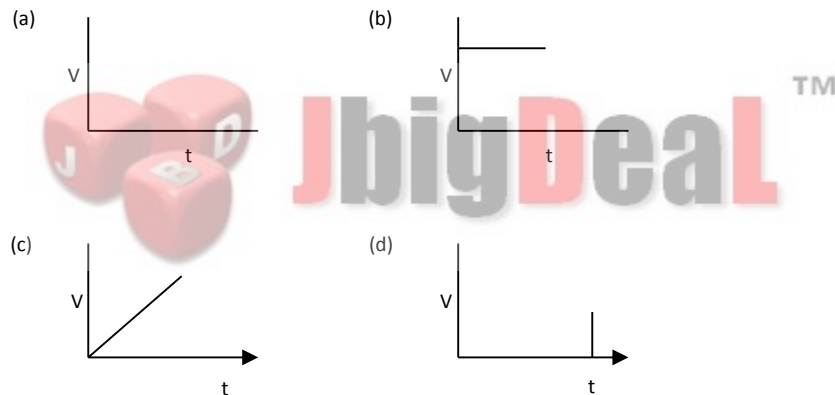
(a) $I \propto d^2$ (b) $I \propto d$ (c) $I \propto \frac{1}{d}$ (d) $I \propto \frac{1}{d^2}$

23. Following process is known as

hv ⟷ e⁺ + e⁻

    (a) Pair production   (b) photoelectric effect

    (c) Compton effect   (d) Zeeman effect

24. During charging a capacitor, variations of potential V of the capacitor with time t is shown as

(a)

V

t

(b)

V

t

(c)

V

t

(d)

V

t

25. When a resistor of 11 Ω is connected in series with a electric cell. The current following in it is 0.5 A. Instead when a resistor of 5Ω is connected to the same electric cell in series, the current increases of the cell is

(a) 1.5Ω   (b) 2Ω

(c) 2.5Ω   (d) 3.5Ω

26. A battery is charged at a potential of 15 V in 8 h when the current flowing is 10A. The battery on discharge supplies a current of 5A for 15 h. The mean terminal voltage during discharge is 14V. The watt-hour efficiency of battery is

(a) 80%   (b) 90%

(c) 87.5%   (d) 82.5%

27. A circular current carrying coil has a radius R. The distance from the centre of the coil on the axis, where the magnetic induction will be $\frac{1}{8}$th to its value at the centre of the coil is

(a) $\frac{R}{\sqrt{3}}$ (b) $R\sqrt{3}$

(c) $2\sqrt{3}$ R   (d) $\frac{2}{\sqrt{3}}$ R

28. The incorrect statement regarding the lines of force of the magnetic field B is

    (a) magnetic intensity is a measure of lines of force passing through unit area held normal to it

    (b) magnetic lines of force forms a close curve

    (c) inside a magnet, its magnetic lines of force move from north pole of a magnetic towards its south pole

    (d) due to a magnetic lines of force never cut each other

29. Two coils have a mutual inductance 0.55 H. The current changes in the first coil according to equation I = I_0 sin ωt. where, I_0 = 10A and ω = 100π rad/s. The maximum value of emf in the second coil is

    (a) 2π (b) 5π

    (c) π (d) 4π

30. An L-C-R circuit contains R = 50Ω, L = 1 mH and C = 0.1μF. The impedence of the circuit will be minimum for a frequency of

    (a) $\frac{10^5}{2\pi}$Hz   (b) $\frac{10^6}{2\pi}$Hz

    (c) 2π x 10^5 Hz   (d) 2π x 10^6 Hz

31. An eye can detect 5 x 10^4 photons per square meter per sec of green light (λ = 5000 Å) while the ear can detect 10^{-13}W/m^2. The factor by which the eye is more sensitive as a power detector then ear is close to

    (a) 5   (b) 10

    (c) 10^6 (d) 15

32. The amplification factor of a triode is 50. If the grid potential is decreased by 0.20 V. What increase,in plate potential will keep the plate current unchanged?

    (a) 5 V   (b) 10 V

    (c) 0.2 V   (d) 50 V

33. If the nuclear fission,piece of uranium pof mass 5.0 g is lost,the energy obtained in kWh is

    (a) 1.25 x 10^7 (b) 2.25 x 10^7

    (c) 3.25 x 10^7 (d) 0.25 x 10^7

34. Current in the circuit will be

20Ω 30Ω

20Ω 5Ω
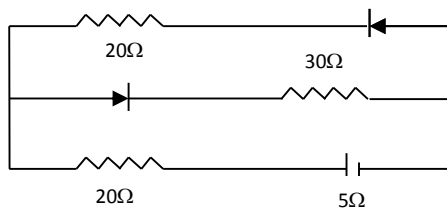
    (a) $\frac{5}{40}$A   (b) $\frac{5}{50}$A

(c) $\frac{5}{10}$ A   (d) $\frac{5}{20}$ A

35. An installation consisting of an electric motor driving a water pump left 75 L of water per second to a height of 4.7 m.If the motor consumes a power of 5 kW, then the efficiency of the installation is

(a) 39%   (b) 69%

(c) 93%   (d) 96%

36. A potential difference across the terminal bof a battery is 50 V when 11 A current is drawn and 60 V,when 1 A current is drawn. The emf and the internal resistance of the battery are

(a) 62 V, 2 Ω (b) 63 V, 1 Ω

(c) 61 V, 1 Ω (d) 64 V, 2 Ω

37. beyond which frequency, the ionosphere bands any incident electromagnetic radiation but do not reflect it back towards the earth?

(a) 50 MHz   (b) 40 MHz

(c) 30 MHz   (d) 20 MHz

38. A metallic surface ejects electrons. When exposed to green light of intensity I but no photoelectrons are emitted,when exposed to yellow light of intensity I.It is possible to eject electron from the same surface by

(a) yellow light of same intensity which is more than /

(b) green light of any intensity

(c) red light of any intensity

(d) None of the above

39. An electron moves at right angle to a magnetic field of 5 x 10^{-2} T with a speed of 6x10^7 m/s.If the specific charge of the electron is 1.7x10^{11}C/kg. The redius of the circular path will be

(a) 2.9 cm   (b) 3.9 cm

(c) 2.35 cm   (d) 2 cm

40. A solenoid 30 cm long is made by winding 2000 loops of wire on an iron rod whose cross-section is 1.5 cm^2.If the relative permeability of the iron is 6000. What is the self-inductance of the solenoid?

(a) 1.5 H   (b) 2.5 H

(c) 3.5 H   (d) 0.5 H