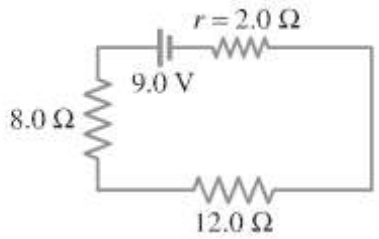
CBSE Sample Paper 2

General Instruction:

1. Answer all questions
2. Internal choices are provided for some questions
3. Question numbers 1 to 8 are very short answer questions and carry 1 mark each.
4. Question numbers 8 to 18 are short answer questions and carry 2 marks each.
5. Question numbers 19 to 27 are also short answer questions and carry 3 marks each.
6. Question numbers 28 to 30 are long answer questions and carry 5 marks each.
7. Use log tables if necessary.

Very Short Answer type questions

Question 1
Find the current in the circuit



Question 2
What is the main difference between the principle of working
1)Direct current instrument
2)Alternating current instrument

Question 3
A wire is bent into a circular loop of radius R_0 and carries a current I. The magnetic field at the center of the loop is B. The same wire is bent into double loop and both loops carry the current I in the same direction. Find the magnetic field at the center of loop in this case in terms of B?

Question 4
What is the physical quantity for the dimension FM^{-1} ?.

Question 5
State the difference between the atoms of diamagnetic and paramagnetic materials?

Question 6
What is the unit of magnetic moment?

Question 7

What is the relation between collector current,base current and emitter current of a transistor?

Question 8
What are fraunhofer lines and explain their origin?

Short Answer type questions

Question 9
a)What is the relation between electric field **E** and the current density **j** inside a conductor ?
b) What is the unit of specific conductance of the conductor

Question 10
Why is energy released in nuclear fission ?
Which of the two U^{238} and U^{235} is more useful for nuclear fission and why?

Question 11
i)Write down the properties of electric lines of Forces
ii) why two electric lines do not intersect?

Question 12
State the law's of Kirchoff's?

Question 13
Two bulb of resistance R_1 and R_2 ($R_2 > R_1$) are connected in parallel ,which bulb will be brighter? What if the bulb are connected in series?

Question 14
75% of the radioactive element disintegrates in 24years? Calculate the half life of the element?

Question 15
What is fluorescence and phosphorescence? And explain them

Question 16
A point change q is surrounded by a spherical Gaussian surface of radius r and now if the sphere is replaced by the cube of side r,will the electric flux through this surface will be larger then spherical surface ?. Explain

Question 17
In a car spark –coil,when the current in the primary is reduced from 4.0 A to zero in 10μs ,an emf of 40,000 V is induced in the secondary . Find the mutual inductance M of the primary and secondary winding of the spark coil?

Question 18
In a common –emitter amplifier the load resistance of the output circuit is 1000 times the load resistance of the input circuit . If α =.98 ,the calculate the voltage gain

Question 19
What are the advantages of a transistor over a triode valve?

Question 20
An AC is given by
$I = I_A \cos \omega t + I_B \sin \omega t$

What is the value of rms current?

Question 21
What is the path of the charged particle in the uniform magnetic field if its velocity is not perpendicular to the magnetic field? Explain

Question 22
Explain the meaning of photo electric work function by giving necessary equation?

Question 23
When a current flows in the coil of a transformer, its core become hot ?

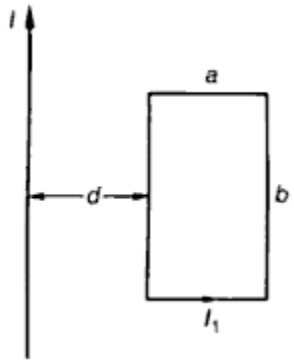
Question 24
A pure inductor is connected across the AC source. Show mathematically that current in its lags behind the applied EMF by an phase angle π/2. What is its inductive reactance? Draw a graph showing the variation of inductive reactance with the frequency of the AC source

Question 25
The stopping potential for the photo electrons emitted from a metal surface of work function 1.7 eV is 10.4 V.
i)Find the wavelength of the radiation used?
ii) Also identify the energy levels in hydrogen atom which will emit this wavelength

Given
$h=6.63X10^{-34}$ Js
$c=3.0X10^{8}$ m/s
$e=1.6X10^{-19}$ C

Question 26
Deduce the lens maker's formula for a thin biconvex lens?

Question 27



A long wire carrying current I=10A lies in the plane of rigid rectangular loop with I_1=1A parallel to its longer sides as shown in above figure.
Given a=.2 m ,b=.3 m and d=.25 m

Find the magnitude and direction of the resultant force on the loop

Question 28

i)What do you understand by threshold frequency and work function?
ii) Deduce Einstein equation of photo electric emission

$$\frac{1}{2}mv^2 = h(\nu - \nu_0)$$

iii) write the three uses of photoelectric cell

Question 29

i) Define the term the root mean square (rms) value of AC and derive the relation between the peak and rms value
ii) A capacitor of capacitance 10 μF is connected in series with an inductance of 1H having an alternating current source of frequency 50hz. Calculate the impedence of this combination

Question 30

a)Define the terms potential barrier and depletion region for p-n junction
b) What is the effect of forward biasing of the junction on them?
c)How is the p-n junction diode use as the full wave rectifier? Explain with the help of circuit diagram

Solutions

Solution 1

All of the resistors are in series, so the equivalent resistance is just the sum of the resistors. Using Ohm's law then to find the current

$$I = \frac{V}{R_1 + R_2 + R_3} = .409A$$

Solution 2

1) it works on the principle of magnetic effect of current
2) it works on the principle of heating effect of current

Solution 3

The radius of the double loop

$r=R_0/2$

Magnetic field due a loop of radius r at the center of the loop is

$$B_1 = \frac{\mu_0 I}{2r} = \frac{\mu_0 I}{R} = 2B$$

Similarly for other loop

$$B_2 = \frac{\mu_0 I}{2r} = \frac{\mu_0 I}{R} = 2B$$

Since the current in same direction,
Total magnetic field $=B_1+B_2=4B$

Solution 4
Electrical permittivity

Solution 5
Atoms of paramagnetic material have permanent magnetic moment while in atoms of diamagnetic substance net magnetic material is zero

Solution 6
Ampere $-m^2$

Solution 7
$i_E = i_B + i_C$

Solution 9

E=ρ**j**
Where ρ is the specific resistance of the conductor

Unit of specific resistance is Ohm-m

Solution 10

Solution 14
12 years

Solution 16
The electric flux depends only on the charge enclosed by the gaussian surface, not on the shape of the surface. Φ will be the same for the cube as for the sphere

Solution 20

$$I_{rms} = \sqrt{\frac{I_A^2 + I_B^2}{2}}$$

Solution 25

If the radiation of wavelength λ ejects photoelectron of maximum kinetic energy E_k from a metal surface,then

$$E_K = \frac{hc}{\lambda} - W$$

Where W is the work function of the surface
If V_0 volt be the stopping potential ,then
$E_k = eV_0$ where e is electronic charge,then

$$eV_0 = \frac{hc}{\lambda} - W$$

$$\lambda = \frac{hc}{W + eV_0}$$

Substituting all the known values,we get
λ=1027 Å

The photon energy corresponding to λ=1027 Å is

$$\frac{12375}{1027} = 12.1eV$$

Now ,the energy levels of the hydrogen atom is given by

$$E_n = -\frac{13.6}{n^2}eV$$

This gives
E_1=-13.6eV
E_2=-3.4eV
E_3=-1.5eV
Now
E_3-E_1=12.1eV
Thus energy levels emitting 1027Å are n=3 and n=1

Solution 27

$$F = \frac{\mu_0 I I_1}{2\pi} b\left[\frac{1}{d} - \frac{1}{d+a}\right]$$

F=1.067X10^{-6} N and it is away from the wire

Solution 29
Impedance of the circuit is

$$Z = \omega L - \frac{1}{\omega C}$$

Substituting the given values
Z=4.5Ohm