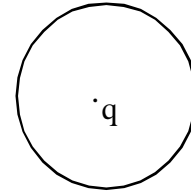


1. We have a plane sheet of charge having infinite area.

- (a) Name the theorem that can be used to find the electric field at a point due to this sheet of charge $(\frac{1}{2})$
- (b) State the theorem. (1)
- (c) Find the electric field E at a point due to the plane sheet of charge. $(1\frac{1}{2})$

2. Consider a surface shown in figure.

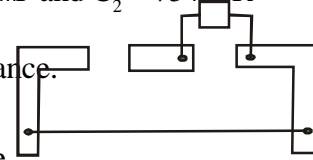
- (a) What is the work done in moving a charge through this surface? (1)
- (b) What is the direction of electric field at this surface. $(1\frac{1}{2})$



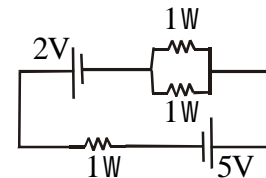
3. You are given two capacitors C_1 and C_2 ($C_1 > C_2$). You can connect them in series or in parallel to a battery of potential V. How will you connect them so that,

- (a) Charge stored is maximum. (1)
- (b) Charge stored is minimum. (1)
- (c) Also find the maximum and minimum capacitance if $C_1 = 100 \text{ mF}$ and $C_2 = 75 \text{ mF}$. (1)

- 4. (a) Completer the circuit diagram for finding the unknown resistance. (1)
- (b) Name the principle used and name the device. (1)
- (c) Describe the experiment to determine the unknown resistance. $(1\frac{1}{2})$
- (d) What happens to the balance point if the position of the cell and galvanometer are interchanged? $(\frac{1}{2})$



5. In the given fig, apply kirchoff's law to find the current in the circuit.



6. A charged particle moving in a magnetic field experiences a force.

- (a) Name the force. $(\frac{1}{2})$
- (b) Give the condition for this force to be maximum. (1)
- (c) Can you suggest a device which works, based on this force? $(\frac{1}{2})$
- (d) With the help of diagram, derive expression for frequency of a charged particle. (3)

7. How will you convert a galvanometer into ammeter?

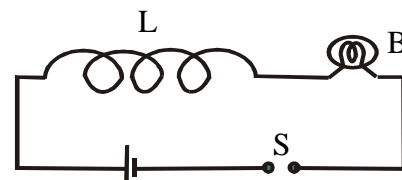
(1)

8. An electric bulb is rated 100W for a 220 V supply. Find

- (a) Resistance of bulb. (1)
- (b) Peak voltage of source. (1)
- (c) The rms value of current through the filament. (1)

9. In the given figure, when S is closed, the bulb glows slowly.

- (a) What is the phenomenon behind it? Explain



(2)

- (b) The flux linked with a coil is $\phi = 4t^3 + 5t^2 + 8t + 5$ weber . If the resistance of the coil is 3.1W calculate the induced current in $t = 2$ s. (2)
- (c)What happens to the glow, when some iron rods are insertd into the coil L. (1)

10. Show that Lenz's law is in accordance with law of conservation of energy. (2)

11. In a plane electromagnetic wave, electric field oscillates sinusoidally at a frequency 2.0×10^{10} Hz. and amplitude 48 Vm^{-1} .

- (a) What is the wavelength of the wave? (1)
- (b) What is the amplitude of oscillating magnetic field? (1)

12. A lens is a refracting medium bounded by two spherical surfaces.

- (a) Write down the lens equation. (1)
- (b) With the help of neat diagram obtain lens maker's formula. (4)
- (c) How will you convert a converging lens into diverging lens. (2)

13. The vibrations of light restricted to a single plane is called polarised light.

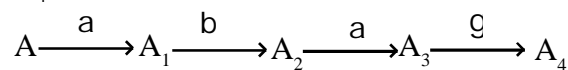
- (a) Polarisation shows that light waves are waves. (longitudinal, transverse) (1)
- (b) State Brewster's law. (1)
- (c0 What is polarising angle of medium of $n = \sqrt{3}$. (2)

14. When light or uv radiations fall on a metal surface, electrons are emitted.

- (a) The phenomenon is known as (1)
- (b) Derive Einstein's photo electric equations. (2)

15.(a) Half life of radioactive element is 800 years. After how many years will 100 g of the element reduces to 12.5 g? (1)

- (b) A radio active nucleus undergoes a series of decay according to the follwing equation. If the mass number and atomic number of A are 180 and 72 respectively, what are the atomic number and mass number of A_4 ? (2)



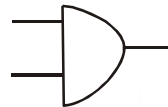
16.(a) Find out the number of protons, neutrons and electrons in ${}_{92}\text{U}^{238}$. (1)

(b) Classify the follwoing groups as isotopes, isotones and isobars.

- (i) ${}_{20}^{40}\text{Ca}$ ${}_{19}^{40}\text{K}$ (ii) ${}_{12}^{12}\text{C}$ ${}_{6}^{11}\text{C}$ (iii) ${}_{17}^3\text{Cl}$ ${}_{19}^{39}\text{K}$ (1)

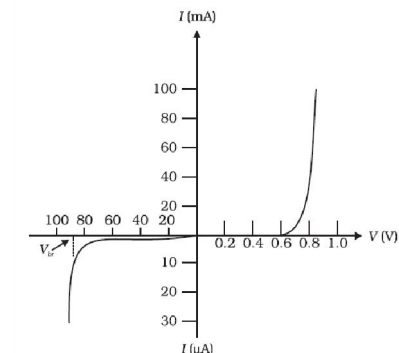
17. The circuit symbol of a two input logic gate is given.

- (a) Name the gate (1)
- (b) Draw the truth table of the gate (1)



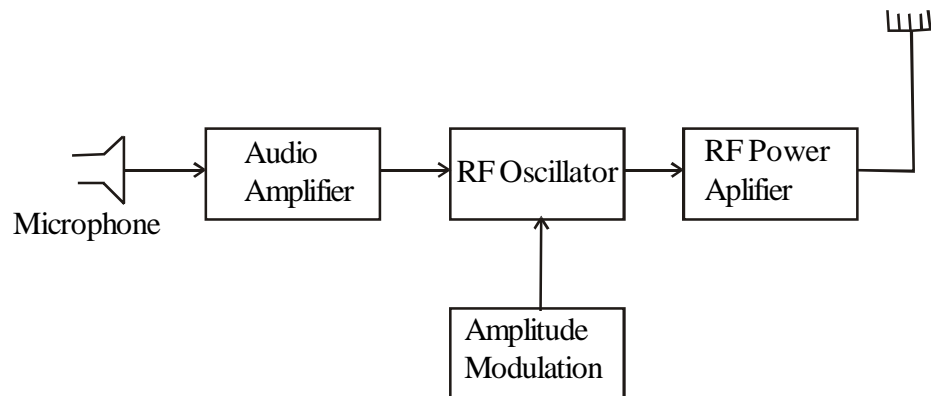
18.. The current - voltage relation for an electronic component is as shown.

- (a) identify the component. (1)
- (b) Can the device be used to convert a complete ac cycle to dc? If yes explain how? (2)



19.(a) Arrange the following flow chart in correct order.

(1)



(b) Explain the necessity of modulation.

(2)