

AO-109

April-2017

B.Sc., Sem.-II

CC-1-103 : Physics**Time : 3 Hours]****[Max. Marks : 70**

1. (a) Derive an expression for growth of current in R-L series dc circuit. 7

OR

Explain the working of half wave rectifier with necessary diagram.

- (b) Explain the method to find frequency of ac by using Wein bridge. 7

OR

Explain the method to find inductance using Maxwell bridge.

2. (a) Prove that the average of electric field due to a charge Q placed inside a sphere of volume V is $\langle E \rangle = \frac{-Q\gamma_o}{3\epsilon_o V}$. Where γ_o is position vector of the charge Q . 7

OR

Find electric potential and electric field on the point of axes of ring which has radius R and charge density λ .

- (b) Derive an expression for the electric potential at a point situated at some distance from the centre of an electric dipole. 7

OR

Derive an expression for the force acting on an electric dipole placed in a non-uniform electric field.

3. (a) Derive the equation $D_a = 2D_i$ for the ambi polar diffusion in plasma. 7

OR

What is plasma ? Discuss in brief and explain its specific characteristics.

- (b) Derive the Einstein's equation showing the relation between diffusion and mobility in plasma. 7

OR

- (i) Explain recombination process in plasma and obtain relation $\eta = 1/\alpha t$ 4

- (ii) Obtain ohms law $\vec{j} = \sigma \vec{E}$ for current density in plasma. 3

P.T.O.

4. (a) In $A \rightarrow B \rightarrow C$ stable element transformation, derive the following formula :

$$N_B = \frac{N_0 \lambda_A}{\lambda_B - \lambda_A} (e^{-\lambda_A t} - e^{-\lambda_B t}).$$

OR

What is artificial radioactivity ? Describe Rutherford's experiment and write equations of nuclear reactions.

- (b) Explain the Rutherford model of atomic nucleus.

OR

What is Q-equation ? Obtain the standard form of Q- value equation.

5. Answer in short :

- (1) What is rectifier ?
- (2) Give symbol of P-N Junction diode.
- (3) Define Ripple factor.
- (4) How many diodes are used in bridge rectifier ?
- (5) Write unit of time constant.
- (6) Static electric field is conservative. Is this statement true or false ?
- (7) Give the unit of permittivity in free space.
- (8) Which quantity is electric dipole ?
- (9) Write the integral form of Gauss law.
- (10) Write Poisson's equation.
- (11) Give SI unit of thermal conductivity of plasma.
- (12) State Paschen's law.
- (13) $1 \text{ amu} = \underline{\hspace{2cm}} \text{ MeV}.$
- (14) Define the average life time.