

AMIETE – ET (NEW SCHEME)

Time: 3 Hours

JUNE 2012

Max. Marks: 100

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.

- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after 45 Minutes of the commencement of the examination.
- Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

Q.1 Choose the correct or the best alternative in the following: (2×10)

- a. Force between two point charges q_1 and q_2 situated at point A and B respectively separated by a distance d can be expressed as

(A) $F_A = \frac{Kq_1q_2}{d^2} i_{BA}$

(B) $F_A = \frac{Kq_1q_2}{d}$

(C) $F_A = \frac{Kq_1q_2}{d^2}$

(D) $F_A = \frac{Kq_1q_2}{d} i_{BA}$

- b. The equation $\Delta J = 0$ is called

(A) Laplacian equation

(B) Kirchoff's node equation

(C) Poisson's equation

(D) Continuity equation for discrete currents

- c. Ohm's law relates the current density J with field intensity E as

(A) $J = \sigma E$

(B) $J = \sigma^2 E$

(C) $J = \frac{E}{\sigma}$

(D) $J = \frac{E^2}{\sigma}$

- d. Intrinsic or Characteristic impedance of free space has a value of

(A) 120π ohm

(B) π ohm

(C) 73 ohm

(D) 73π ohm

- e. An electric field of 50 V/m has the charge of $0.3 \mu\text{C}$, what is the force on that charge.

(A) $15 \mu\text{N}$

(B) $12.5 \mu\text{N}$

(C) $18 \mu\text{N}$

(D) $10.5 \mu\text{N}$

Code: AE63 Subject: ELECTROMAGNETICS & RADIATION SYSTEMS

- Q.6** a. Explain the concept of force on a moving charge and derive the Lorentz force equation. **(10)**
- b. A solenoid of 20 cm long and 1 cm diameter has 100 turn winding. If this is placed in uniform magnetic field of strength 2Wb/m^2 and current of 10 amp flows through it, calculate the maximum torque on solenoid. **(6)**
- Q.7** a. Derive the continuity equation for time varying fields. **(8)**
- b. Write Maxwell's equations in point and in integral form. **(8)**
- Q.8** a. Define the following:
- | | |
|------------------------|---------------------|
| (i) Critical Frequency | (ii) Virtual height |
| (iii) MUF | (iv) Skip distance |
- (8)**
- b. Electromagnetic waves are said to be transverses; what does this mean? **(6)**
- c. Determine the length of antenna operating at a frequency of 800 KHz. Take velocity factor as 0.95. **(2)**
- Q.9** a. With reference to the Antenna, define the following terms.
- | | |
|----------------------|---------------------------------|
| (i) Directive gain | (ii) Directivity and power gain |
| (iii) Antenna losses | (iv) Polarization |
| (v) Phased Array | |
- (10)**
- b. What is parabola? With sketches, show why its geometry makes it a suitable basis for antenna reflectors? **(6)**