PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech., Winter 2018 - 19 Examination

Semester: 1   Date: 11/12/2018
Subject Code: 203192101   Time: 2:00 pm to 4:30 pm
Subject Name: Engineering Physics   Total Marks: 60

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions. (15)

1. Which of the following is scalar?
   a) Curl of electric field   b) Magnetic field
   c) Electric potential   d) Electric field

2. $\nabla \times B = \mu_0 J$ is
   a) Faraday's law   b) Coulomb's law
   c) Gauss law   d) Ampere's law

3. Electric field due to a charge distribution is algebraic sum of individual electric field. This is known as
   a) Coulomb's Principle   b) Ohm's Principle
   c) Superposition Principle   d) Thevenin's Principle

4. What is unit of line charge density?
   a) Coulomb / m^2 b) Coulomb / m^3
   c) Coulomb / m   d) m / Coulomb

5. Electric field is directly proportional to
   a) $1/r$ b) $1/r^2$
   c) $1/r^3$ d) $1/r^4$

6. Unit of dipole moment is _____.

7. A changing _____ induces an electric field.

8. _____ Law is useful in calculating the magnetic field.

9. $\nabla \cdot B =$ _____.

10. The theory of steady currents which produce constant magnetic field is called _____.

11. Name the physical quantity whose unit is NC^{-1}.

12. Define the term electric dipole moment.

13. Write the formula of Poynting vector.

14. Who did the correction in Ampere's law?

15. What is Lenz's law?

Q.2 Answer the following questions. (Attempt any three) (15)

A) Define: (a) Relative permeability   (b) Polarization   (c) Magnetization
         (d) electromagnetic induction   (e) Bound currents

B) What is the size of electrostatic force acting on two charges (q_1 & q_2) of magnitude 1.40×10^{-12}C each, separated at a distance of 106 nm?

C) What is electric flux? Derive Laplace and Poisson's equation for inhomogeneous medium.

D) Derive the equation of energy stored in Magnetic field.

Q.3 **Answer the following questions.**

A) 1. Write Maxwell's equations and give their physical significance **(04)**

2. Two point charges 2μc and -6μc are separated by a distance of 1m in air. At what point on the line **(03)** joining the charges is the electric potential zero?

B) 1. Consider the parallel plate capacitor, where V = 0v at X = 0 and V = 80v at X = f. **(04)** Assuming the region between the plates is charge free. Calculate potential and electric field between the plates.

2. Explain magnetic susceptibility and according to that Differentiate Paramagnetic, ferromagnetic **(04)** and diamagnetic materials.

OR

B) 1. If 80J of work must be done in moving a charge of 4C from a point where potential is **(04)** -15V towards a point where potential is V volts. Find V?

2. Derive the expression for Divergence of Magnetic field using Biot Savart's law. **(04)**

Q.4 **Answer the following questions.**

A) 1. Derive a formula for Electric field due to a dipole at equatorial position. **(04)**

2. Explain briefly Biot Savart's law. **(03)**

OR

A) 1. Derive the equation of poynting theorem. **(05)**

2. Explain electromagnetic induction. **(02)**

B) 1. Write the boundary conditions inside a dielectric material. **(04)**

2. An infinite solenoid (n turns per unit length, current I) is filled with linear material of **(04)** susceptibility χ_m. Find the magnetic field inside the solenoid.