**PSG COLLEGE OF ARTS & SCIENCE**
(AUTONOMOUS)

**MSc DEGREE EXAMINATION MAY 2018**
(Third Semester)

Branch – **PHYSICS**

## ELECTROMAGNETIC THEORY

Time: Three Hours Maximum: 75 Marks

Answer **ALL** questions
**ALL** questions carry **EQUAL** marks (5 x 15 = 75)

1 a What is an electric dipole? Derive the expressions for electric potential and electric field intensity at a point which is at a distance from the centre of the dipole. Discuss the concept of multipoles.

OR

b Obtain the expression for electric field, both inside and outside (i) a class A dielectric sphere with a point charge at its center and (ii) the bar electret.

2 a Find (i) the force between two long parallel wires and (ii) the magnitude and direction of magnetic field induction B on the axis of the circular coil carrying current.

OR

b Derive the expression for the vector potential A and determine the magnetic induction b for a long straight wire.

3 a Explain the law of conservation of electric charge and find the charge density in a conductor.

OR

b What is meant by self inductance? Determine the self inductance of (i) solenoid and (ii) torroidal coil.

4 a Obtain the wave equation for E and H for the plane electromagnetic waves propagating in homogeneous, isotropic, linear and stationary media.

OR

b Explain the propagation of plane electromagnetic waves in good conductors. Also find the propagation in copper at 1 MHz.

5 a Discuss the propagation of Transverse electric and magnetic (TEM) waves in a straight line. Obtain the boundary conditions at the surface of the metallic wave guides.

OR

b Explain the propagation of electromagnetic waves through the coaxial line and obtain the expression for characteristic impedance of a coaxial line.

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