PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2023
(Third Semester)

Branch - **PHYSICS**

ELECTROMAGNETIC THEORY

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1 The divergence theorem for a surface consisting of a sphere is computed in which coordinate system?
(i) Cartesian (ii) Cylindrical
(iii) Spherical (iv) Depends on the function

2 Which of the following is correct?
(i) $\nabla . A = 0$ (ii) $\nabla^2 . A = - \mu_0 J$
(iii) $\nabla . A = 1$ (iv) both (i) & (ii)

3 In the conversion of line integral of H into surface integral, which theorem is used?
(i) Green theorem (ii) Gauss theorem
(iii) Stokes theorem (iv) It cannot be converted

4 The vectors of the electromagnetic wave propagation can be expressed in
(i) Dot product (ii) Cross product
(iii) Unit vector (iv) Perpendicular vector

5 For a TEM wave to propagate in a medium, the medium has to be
(i) Air (ii) Insulator
(iii) Dispersive (iv) Non dispersive

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a State and explain the Poisson and Laplace equations.
OR
b Illustrate Div of E.

7 a What is magnetic force explain it?
OR
b Illustrate Div of B.

8 a Define self inductance and mutual inductance.
OR
b Deduce Faraday's law of electromagnetic induction.

Cont...

9 a Analyze the plane EM waves in free space.

OR

b Analyze the plane EM waves in stationary media.

10 a Illustrate co- axial transmission line.

OR

b What is electric field intensity?

SECTION -C (30 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 6 = 30)

11 a Deduce Clausius – Mossotti equation.

OR

b Determine the charge distribution of electric dipole.

12 a Justify the force on conductors in the presence of dielectrics.

OR

b Define magnetic induction. Derive Biot- Savart law.

13 a Deduce Maxwell's equations.

OR

b Deduce curl of B.

14 a Analyze the propagation of plane EM waves in good conductors.

OR

b Analyze the E and H vectors in linear media.

15 a Explain the TE waves in rectangular wave guide.

OR

b Explain the propagation of TM waves.

Z-Z-Z END