Roll No…….. **Total No. of Printed Pages: 1**
Total No. of Questions: [09]

B. Sc. (Non-Medical) (Semester – 2nd)
ELECTRICITY, MAGNETISM AND EMT (CORE COURSE-IV)
Subject Code: BSNMS1202
Paper ID: [22131408]

Time: 03 Hours **Maximum Marks: 60**

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A **(2 marks each)**

Q1. Attempt the following:

a) Define Stoke's theorem of vector and give its physical significance.
b) What is the gradient and give its significance?
c) What do you mean by displacement vector?
d) Define dielectrics and write their properties.
e) Explain Ampere's circuital law.
f) Differentiate between divergence and curl of magnetic field.
g) Distinguish between scalar and vector potential.
h) Explain Lenze's law.
i) What do you mean by displacement current? Is it due to free charge carriers?
j) Show that electromagnetic waves are transverse in nature.

Section – B **(5 marks each)**

Q2. If $\vec{r}$ and r have their usual meaning, show that div $(r^n\vec{r}) = (n + 3)r^n$

Q3. Derive the expression for electric potential of a dipole.

Q4. State and explain Bio-Savart's law in magnetostatic.

Q5. Define electromagnetic induction and explain Faraday's law of electromagnetic induction.

Q6. Derive Maxwell's equation and explain the physical significance of each equation.

Section – C **(10 marks each)**

Q7. a) Calculate the electric field due to an infinite line of charege

b) Evaluate $\nabla^2 r$ where $r = \sqrt{x^2 + y^2 + z^2}$.

Q8. a) A solenoid 4m long and of mean diameter 8cm has 104 turns. If a current of 5A is flowing through it, calculate the magnetic field at its centre.

b) Calculate the expression for energy stored in magnetic field.

Q9. a) Define Poynting vector and deduce the Poynting theorem for the flow of energy in an electromagnetic field.

b) Differentiate between ferromagnetic, paramagnetic and diamagnetic materials.