Total No. of Printed Pages:2

SUBJECT CODE NO:- 2026
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. F.Y (Sem-II)
Examination March/April-2022 (To Be Held In June/July-2022)
Physics Paper-V
Electricity & Magnetism

[Time: 1:53 Hours]   [Max. Marks:50]

Please check whether you have got the right question paper.
N.B.   i) Attempt all questions.
                              ii) Use of logarithmic table and Electronic pocket calculator is allowed.

Q.1   a) State and prove Gauss's divergence theorem.   10
       b) Derive the expression for potential and field due to electric dipole.   10
                                        OR
       a) State and prove Amper's law.   10
       b) Derive the expression for decay of current in LR Circuit.   10

Q.2   a) Define and explain scalar triple product   05
       b) Prove that $\nabla . (\nabla \times \vec{A}) = 0$ where A is position vector.   05
       c) State and explain Biot-Savart law.   05
       d) Find the magnetic Induction at distance of 10 cm from straight conductor carrying current   05
          of 500 mA ($\mu_0 = 4\Pi \times 10^{-7}$ S. I. unit.
                                        OR
       a) Derive the relation between D,E and P.   05
       b) The force between the two charges is $4 \times 10^9 N$ when the two charges of 12nc and 10nc.   05
          Calculate the distance between them.
       c) Write a note on time constant of charging condenser through resistance.   05
       d) A capacitor of capacitance 0.1 µf is first charged and then discharge through a resistance of 05
          10mΩ. Find the time potential will take to fall half of it's original value.

Q.3   Multiple Choice Question   10
       1. For current carrying solenoid the Amper law can be written as
          (a) $\oint B. dl . \mu_0 IN$ (b) $\oint B. dl = \mu_0 I$
          (c) $\oint B. dl = \mu_0$ (d) $\oint B. dl = I/\mu_0$

       2. $\nabla . (AB)$=……………
          (a) $(\nabla . A)(\nabla . B)$ (b) $\nabla A + \nabla B$
          (c) $\nabla^2 AB$ (d) $B\nabla A + A\nabla B$

       3. If divergence of velocity V of fluid is zero then.
          a) Fluid is in compressible
          b) V is solenoidal vector
          c) There is no net flow of fluid.
          d) All the above

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4. The potential difference of 2 volts is applied between two metallic plates separated by 2 cm the Electric field is
   a) 50 V/m   b) 100 V/m   c) 200 V/m   d) 20 V/m

5. The electric potential due to point charge varies as
   a) r b) r^{-1} c) r^{-2} d) r^2

6. Electric Intensity is
   a) Scalar   b) Tensor   c) Vector   d) Both a and b

7. The magnetic induction due to straight conductor carrying current of 200mA at a point 2 cm from it is
   a) 2×10^{-6}T   b) 2×10^{-7}T   c) 2×10^{-5}T   d) 2×10^{-4}T

8. The time constant of LR Circuit for L=50H and R=5Ω is
   a) 100 sec   b) 150 sec   c) 5 sec   d) 10 sec

9. Decay of current in LR Circuit is given by
   (a) $I = I_0 e^{-Rt/L}$ (b) $I = I_0 e^{Rt/L}$
   (c) $I = I_0 e^{-Lt/R}$ (d) $I = I_0 e^{-Lt/R}$

10. If $(\vec{A} + \vec{B}) = \vec{A}.\vec{B}$ then the angle between Vector A and B is
    a) $\Pi/4$ b) $\Pi/2$ c) $3\Pi/2$ d) $3\Pi/4$

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