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SUBJECT CODE NO:- B-2148
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. F.Y (Sem.-II) Examination OCT/NOV 2019
Physics Paper-V
Electricity & Magnetism

[Time: Three Hours]   **[Max.Marks:50]**

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

Q.1   a) Define and explain (i) Line integral   10
       (ii) Surface integral (iii) Volume integral
       b) State and prove Gauss law in electrostatics.   10

OR

       c) Derive an expression for magnetic induction due to straight conductor carrying current.   10
       d) Obtain an expression for growth of charge on a capacitor through resistor.   10

Q.2   a) What is scalar triple product? Prove that scalar triple product of vectors is volume of   05
       Parallelopiped.
       b) Find $(\vec{A}, \vec{B}, \vec{C})$, If $\vec{A} = 2\vec{\imath} - \vec{\jmath} + \vec{k}$, $\vec{B} = 4\vec{\jmath}$ & $\vec{C} = 6\vec{\imath}$ 05
       c) Obtain Ampere's law in differential form curl $\vec{B} = \nabla \times \vec{B} = \mu_0 J$ 05
       d) A solenoid has a radius 0.2 m and length 2 meters. It has 4 layers of 1000 turns each. Calculate the   05
       magnetic flux density at its centre when a current of 3A flows through it.

OR

       a) Write a short note on dielectrics   05
       b) Calculate the distance at which point charge of 2×10^{-11} coulomb will produce field strength of   05
       0.5 N/C.
       c) Write a short note on LC circuit.   05
       d) A capacitor charged by a D. C. Source through a resistance of 2 megha ohm takes 0.5 seconds   05
       to charge ¾ of its final value show that capacitance of the capacitor is nearly 0.18 microfarad

Q.3   Multiple choice question.   10
       1. Which of the following is true.
       a) $\vec{A} \times (\vec{B} \times \vec{C}) = \vec{B}(\vec{A}.\vec{C}) - \vec{C}(\vec{A}.\vec{B})$
       b) $\vec{A} \times (\vec{B} \times \vec{C}) = \vec{C}(\vec{A}.\vec{B}) - \vec{B}(\vec{A}.\vec{C})$
       c) $\vec{A} \times (\vec{B} \times \vec{C}) = \vec{B}(\vec{B}.\vec{C}) - \vec{A}(\vec{B}.\vec{A})$
       d) None of above

       2. Which of the following thereon convert line integral to surface integral?
       a) Gauss divergence theorem   b) Stoke's theorem
       c) Green's theorem   d) Stoke's and Green's theorem

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3. The coulomb's law can be formulated from the
a) Gauss law   b) Ampere law
c) Biot-Savart law   d) Lenz law

4.Matehematically the electric displacement is represented by
a) $\vec{D} = \frac{1}{4\pi}\frac{q}{r^2}\hat{r}$ b) $\vec{D} = \in \vec{E}$
c) $\vec{D} = \frac{q}{a}$ d) all of the above

5. The magnetic induction due to a long conductor carrying a current of 1A at a distance of 2m from the conductor is
a) 10^{-7}Wb/m^2 b) 2×10^{-7}Wb/m^2
c) $\frac{1}{2}10^{-7}$Wb/m^2 d) 4×10^{-7}Wb/m^2

6. The magnetic flux density at a distance of 0.01 m from a very long and straight wire carrying current of 10A is
a) 6×10^{-4} Tesla   b) 2×10^{-4} Tesla
c) 6×10^{-3} Tesla   d) 10^{-3} Tesla

7.In LCR circuit for damped condition
a) $\frac{R}{4L} = \frac{1}{LC}$ b) $\frac{R^2}{4L^2} = \frac{1}{LC}$
c) $\frac{R}{4L^2} = \frac{1}{C}$ d) $\frac{R}{4L^2} = \frac{L}{C}$

8. The volume of parallelepiped whose sides are given by$\vec{A} = 2\vec{i} - 3\vec{j}, \vec{B} = \vec{i} - \vec{j} + \vec{k} \& \vec{C} = 3\vec{i} - \vec{k}$
a) $\frac{4}{13}$ b) 4
c) $\frac{2}{7}$ d) None of the above

9. For decay of current m LR circuit time constant is the time required to fall the current from maximum value to
a) $\frac{1}{e}$ times maximum current
b) e times maximum current
c) 2e times maximum current
d) e^{2}times maximum current

10. In LR Circuit having inductance 4H and $R = 1\Omega$ and applied D.C. emf of 6V is switched then maximum current is
a) 6A   b) 2A
c) 3A   d) 5A