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Sl. No.

Total No. of Pages : 3

III Semester B.Sc. Examination, March/April - 2021
(Semester Scheme) (CBCS)
PHYSICS
Electricity and Electromagnetism (Paper - III)

Time : 3 Hours

Max. Marks : 80

Instruction : *Answer any Two from PART-A, any Two from PART-B, any Three from PART-C and any Ten from PART-D.*

PART - A

1. a) Give the thermodynamic theory of thermoelectric effect. [7]

   b) State and prove Thevenin's theorem. [5]

2. a) Derive wave equation for the field vectors in free space. [6]

   b) Describe Hertz experiment for the production and detection of electro magnetic waves. [6]

3. a) Set up the Maxwell's field equations. [6]

   i) $\vec{\nabla}.\vec{E} = \rho/\epsilon_0$

   ii) $\vec{\nabla} \times \vec{E} = -\dfrac{\partial \vec{B}}{\partial t}$

   b) State and explain Stoke's theorem. [3]

   c) Explain the physical significance of divergence of a vector field. [3]

PART - B

4. a) Explain the growth of current in series RLC circuit and arrive at an expression for current in it. [6]

   b) State and prove maximum power transfer theorem. [6]

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5. a) Obtain an expression for instantaneous current in an RL circuit fed with an AC, also give the expression for phase angle between current and voltage. **[5]**

   b) Derive an expression for self inductance of a coil using Anderson's bridge. **[7]**

6. a) What is high pass filter? Discuss the frequency response of high pass RC filter and obtain an expression for cut-off frequency. **[6]**

   b) Give the construction and working of CRO. **[6]**

PART - C

7. Calculate the thermo emf of silver Iron thermo couple with the junctions at 0° and 90°c given a = 13.31 μv/°c and b = − 0.019 μv/°c. Calculate its neutral temperature. **[4]**

8. A circuit having capacitor of capacitance 10 μF in series with a resistance of 5Ω is fed to 200 V, 50 Hz ac supply calculate the maximum current and power factor. **[4]**

9. Using Norton's theorem calculate the current flowing through 12Ω resistor shown in circuit diagram. **[4]**
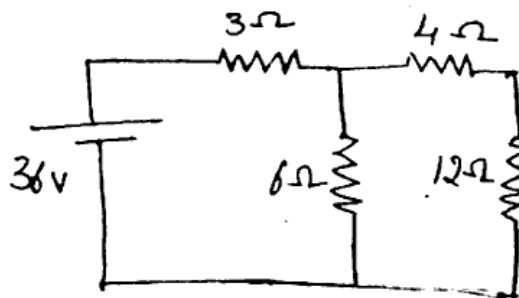
10. A coil of self inductance 10 H in series with a resistance of 100Ω is connected to a 100V dc supply. Calculate the time constant of the circuit. What is the final steady state value of current? **[4]**

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PART - D

a) Explain seebeck effect.   [2]

b) State superposition theorem.   [2]

c) State Kirchhoff's voltage law.   [2]

d) What is instrinsic impedence of free space? Explain.   [2]

e) What is Displacement Current? Explain.   [2]

f) Explain the concept of oscillating dipoles.   [2]

g) Define Quality factor of a series resonant circuit.   [2]

h) What is power factor in a AC circuit? Explain.   [2]

i) Define root mean square value of AC.   [2]

j) What are Band pass filters? Explain.   [2]

k) Define Half-power frequencies of a series LCR circuit fed with AC. [2]

l) Draw the circuit diagram of De sauty bridge and hence give the condition
   for balance.   [2]