**B.Sc. DEGREE EXAMINATION, APRIL 2016**

**III YEAR — V SEMESTER**

**Major Paper IX — ELECTROMAGNETISM**

**Time : 3 hours Max. Marks : 60**

**SECTION A — (10 × 1 = 10 marks)**

**Answer any *TEN* questions**

1. Define rms value of alternating current.
2. Write the expression for power factor in a series LCR circuit.
3. State Faraday’s laws of electromagnetic induction.
4. Define self-inductance of a coil.
5. Mention any two uses of eddy current.
6. What is the equivalent inductance when two coils of self-inductance L1, L2 respectively and mutual inductance M between them are connected in series?
7. Mention any two advantages of three phase alternator system.
8. What are the different types of field coil winding in a dc dynamo?
9. Show that the divergence of current density is zero.
10. What is Poynting vector?
11. State the principle of a dc motor.
12. What is meant by wattless current?

**SECTION B — (5 × 4 = 20 marks)**

**Answer any *FIVE* questions**

1. An alternating potential of 100 volt and 50 Hz is applied across a series circuit having an inductance of 5 Henry, a resistance of 100 ohm and a variable capacitance.

At what value of capacitance will the current in the circuit be in phase with the applied voltage? Calculate the current in this condition. What will be the potential differences across the resistance, inductance and capacitance?

1. A solenoid having an air core and 10 cm long has 100 turns and its area of cross is 5 sq.cm. Find the coefficient of self-inductance of the solenoid.
2. Derive an expression for self-inductance of a co-axial cylinders.
3. Discuss the operation of a three phase ac generator.
4. Deduce the modified form of Ampere’s law.
5. Discuss the theory of a choke coil. What is its advantage over a rheostat?
6. Describe Hertz experiment for production and detection of electromagnetic waves.

**SECTION C — (3 × 10 = 30 marks)**

**Answer any *THREE* questions**

1. Deduce the expressions for current and impedance when an alternating emf is applied to a series LCR circuit. Also obtain the condition for resonance.
2. Explain with a circuit diagram, how the self inductance of a coil can be determined by Raleigh’s method.
3. Explain the principle and working of an AC induction motor.
4. Solve Maxwell’s equations in free space to obtain the electromagnetic wave equation and hence determine the velocity of light in vacuum.
5. Describe the principle, construction and working of a DC dynamo.

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