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(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2024-25 ONLY)

SUBJECT CODE 24 PPS 205

REG.NO. :

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : MAY– 2025

M.Sc. – PHYSICS **MAXIMUM MARKS: 75**

II SEMESTER **TIME : 3 HOURS**

ELECTROMAGNETIC THEORY & ELECTRODYNAMICS

SECTION – A (10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS. (K1)

1. The presence of the electric field may change the behaviour of a/an _____
   a) Conductor b) Insulator c) Semiconductor d) Dielectric
2. At every point of space, the field vector curl H is equal to ___
   a) $\bar{J} - \frac{\partial D}{\partial T}$ b) $\bar{J} - \frac{\partial B}{\partial T}$ c) $\bar{J} + \frac{\partial D}{\partial T}$ d) $\bar{J} + \frac{\partial B}{\partial T}$
3. The ratio |E/H| is ____
   a)_ Real & Positive b) Imaginary & Positive
   c) Real & Negative d) Imaginary & Negative
4. The total scattering cross section σ is equal to ____
   a) $\frac{P_{ST}}{S_{IT}}$ b) $\frac{P_{ST}}{S_{ST}}$ c) $\frac{S_{IT}}{P_{ST}}$ d) $\frac{S_{ST}}{P_{ST}}$
5. Maxwell's equations are _____ under Lorentz Transformation.
   a) Variant b) invariant c) reversible d) irreversible

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES. (K2)

6. Explain how current density is irrotational.
7. Show electromagnetic potentials are solution of Poisson's equation.
8. Write Drude-Lorentz expression for conductivity
9. Write Fresnel formulae.
10. List the two properties of 4-vectors.

SECTION – B (5 X 5 = 25 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. (K3)

11. a) Describe how Clausius – Mossotti relation been beneficial for a number of Gases.

(OR)

b) Show the equation to find the force between current carrying conductors

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12. a) Compute the equation for displacement current.

(OR)

b) Interpret Lorentz Gauge with its advantages.

13. a) Examine electromagnetic waves in free space

(OR)

b) Show the dynamic value of conductivity.

14. a) Explain Scattering and its parameter.

(OR)

b) Compare reflection and refraction of EMW

15. a) Explain about 4-Tensors.

(OR)

b) Describe the electromagnetic field tensor.

SECTION – C (5 X 8 = 40 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

(K4/K5)

16. a) Obtain the Debye Relation and study of molecular structure

(OR)

b) Evaluate Biot-Savart Law and deduce the Ampere's circuital law from it.

17. a) Formulate Maxwell's equations

(OR)

b) Discuss the Retarded Potential

18. a) Analyse propagation of EM waves in isotropic dielectrics

(OR)

b) Discuss propagation of EM waves in ionized media

19. a) Interpret Rayleigh Scattering

(OR)

b) Develop Brewster's Law and polarisation of EMW

20. a) Construct Transformation equations for the electromagnetic potentials A and ϕ

(OR)

b) Compute covariance of Maxwell equation in 4-tensor forms

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