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NEPWT—13—2024

FACULTY OF SCIENCE

M.Sc. (Second Year) (Third Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

PHYSICS

Paper–(SPHYC-501)

(Electrodynamics)

(Tuesday, 10-12-2024) **Time : 2.00 p.m. to 5.00 p.m.**

Time—3 *Hours* *Maximum Marks*—80

N.B. :— (*i*) *All* questions carry equal marks.

(*ii*) Question No. **1** is compulsory.

(*iii*) Solve any *three* questions of the remaining five questions (Question Nos. **2** to **6**).

(*iv*) Figures to the right indicate full marks.

1. Solve the following questions. (Each question carries **5** marks) : 20

(*a*) Define skin depth. Obtain an expression for skin depth.

(*b*) Explain total internal restection.

(*c*) Discuss the fields due to linear centre fed half wave antenna.

(*d*) Explain the length contraction as special theory relativity.

P.T.O.

2. (*a*) Discuss the propagation of plane electromagnetic wave in conducting media. 10

(*b*) State Maxwell's field equations for the electromagnetic field and obtain the wave equation for E and B at a plane interface. 10

3. (*a*) Derive an expression for the wave guide wavelength of TE Mode propagating in rectangular wave guide. 10

(*b*) Derive an expression for Fresnel's equation in case of the incident wave polarized with its vector E normal to the plane of incidence in conducting medium. 10

4. (*a*) Show that the radiation resistance of half wave antenna is much higher than the dipole antenna. 10

(*b*) Discuss the array of antennae in detail. 10

5. (*a*) Explain the 4-potential and 4-current in electrodynamics. 10

(*b*) Express Maxwell's field equations in tensor form and thereby define electromagnetic field in tensor form. 10

6. Write short notes on (Each question carries **5** marks) : 20

(*a*) Gauge transformation

(*b*) Brewester's angle

(*c*) Full wave antenna

(*d*) 4-Vector.