

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: IMSC
BRANCH: PHYSICS

SEMESTER : III
SESSION : MO/2025

SUBJECT: PH24203 ELECTRICITY AND MAGNETISM

TIME: 02 HOURS

FULL MARKS: 25

INSTRUCTIONS:

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates
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		CO	BL
Q.1(a)	Explain Gauss's law in electrostatics. Write its integral and differential form.	[2]	1 II
Q.1(b)	Starting from Gauss's law formulate Poisson's and Laplace equations in electrostatics.	[3]	1 VI
Q.2(a)	Find an expression for the potential at a point due to an electric dipole.	[2]	1 I
Q.2(b)	Find a unit vector normal to the surface $x^3+y^3+3xyz=3$ at the point (1,2, -1)	[3]	1 I
Q.3(a)	What do you mean by relative permittivity of the dielectric medium?	[2]	2 I
Q.3(b)	Determine the capacitance of a spherical capacitor consisting of two concentric spheres of radii a and b respectively, the space between them being filled with a dielectric of permittivity ϵ .	[3]	2 V
Q.4(a)	What is image charge?	[2]	2 I
Q.4(b)	A point charge q is placed at a distance d from the Centre of sphere of radius 'a' maintained at zero potential. Find the potential at an external point due to charge induced on the sphere by the method of images.	[3]	2 I
Q.5(a)	Interpret Ampere's circuital law.	[2]	3 IV
Q.5(b)	Apply this law to find out the magnetic field due to a long current carrying solenoid at an internal and external points.	[3]	3 III

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