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

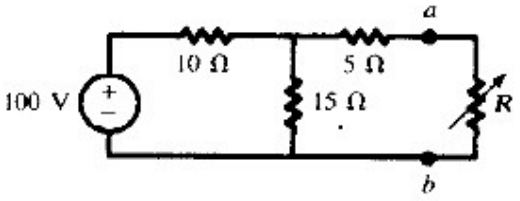
CLASS: IMSc **SEMESTER : III**
BRANCH: PHYSICS **SESSION : MO/2024**

SUBJECT: PH102R1 ELECTRICITY AND MAGNETISM

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Show that the potential due to an arbitrary charge distribution of finite extent at a large distance can be expressed as a sum of multipole potentials.	[5]	1	2
Q.1(b)	Apply Gauss law to calculate the electric field due to charged sphere.	[5]	1	3
Q.2(a)	Develop the expression of electrostatic energy in term of field distribution.	[5]	2	3
Q.2(b)	Explain why the introduction of a dielectric medium between the plates of a capacitor changes its capacitance.	[5]	2	5
Q.3(a)	What do you mean by hysteresis in ferromagnetic material? Explain with the help of magnetization curve.	[5]	3	1
Q.3(b)	A proton at a distance 10cm from a long straight wire carrying current 1 A is moving parallel to the direction of current flow with a speed 0.6C. Determine the force on the proton.	[5]	3	5
Q.4(a)	Explain the term power factor and wattless current in connection with ac circuits.	[5]	4	2
Q.4(b)	Draw and explain the phasor diagram of series LCR circuit.	[5]	4	2
Q.5(a)	Solve for the power transferred across adjustable resistance *R* shown in the figure. Sketch the power transferred as a function of *R* and identify the condition for maximum power transfer.	[5]	5	3



Q.5(b)	State and explain Thevenin's theorem with the help of a suitable example.	[5]	5	3

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