Sanjay Ghodawat University, Kolhapur

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EXM/P/09/00

M. Sc. I

PHS515R1

School of Science

Introduction to Electrodynamics

End Semester Examination

Department: Physics

Semester : I

Time : 2 Hrs.

Max Marks : 50

Instructions: 1) All Questions are compulsory.

		Marks	Bloom's Level	CO
Q.1	**Answer the following**			
a)	Discuss how Poynting theorem has been evolved to state the law of conservation of energy?	8	L4	CO1
b)	If in electrostatics (∇ x E) = 0, then what is value of ∇ x E in electrodynamics? Why Lorentz gauge is preferred over Coulomb gauge?	8	L3	CO2
	OR			
b)	i) How integral forms of Maxwell's equations are used to discuss boundary conditions for electromagnetic fields?	4	L3	CO1
	ii) Consider a charge particle is moving with velocity 'V'. When this charge accelerates, it emits electromagnetic energy. Assuming an observer at inclined position, derive retarded potentials associated with the electric and magnetic fields of the electromagnetic wave.	4	L3	CO2
Q.2	**Answer the following**			
a)	An accelerating charge particle moves with high velocity 'V' from retarded time 't_r' to time 't'. Find out the power expression for electromagnetic wave emitted by an accelerating charge particle.	8	L3	CO3
b)	Considering an accelerating charge particle moving with the high velocity and with condition of velocity parallel to acceleration, find out expression for power of electromagnetic radiation emitted by an accelerating point charge.	8	L2	CO3
	OR			
b)	Considering an accelerating charge particle moving with the high velocity and with condition of velocity perpendicular to acceleration, find out expression for power of electromagnetic radiation emitted by an accelerating point charge.	8	L2	CO3

Q.3 **Answer the following**

a)	Prove that the "dot product of two different four vectors" and "scalar product of four vectors with itself" remain invariant under Lorentz transformations.	9	L4	CO4
b)	Verify that the field tensor leads to the Maxwell's relations.	9	L3	CO4
	OR			
b)	Write expression for dual field tensor and derive Maxwell's relations.	9	L3	CO4

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