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Question Bank: Semester VI
Paper: CC-13T: Electromagnetic Theory.

Short questions: (4 marks each)

1. Write the Maxwell's electromagnetic field equations and explain each term.
2. What is displacement current?
3. State and derive the principle of continuity.
4. What is Poynting vector? Derive an expression for it.
5. What is dielectric and dielectric polarisation?
6. Define dielectric constant and wave impedance.
7. State and explain Brewster's law.
8. What is plane, circularly and elliptically polarised light?
9. Describe uniaxial and biaxial crystals.
10. What are the phase retardation plates?
11. Give the principle of quarter wave plate.
12. What is rotatory polarisation?
13. Describe a Nicol prism.
14. Explain the phenomenon of double refraction.
15. Give the characteristics of electromagnetic waves.

Long Questions: (12 marks each)

1. State Maxwell's field equations for electromagnetic waves in free space and hence set up wave equations for the same.
2. Show by mathematical treatment that electromagnetic waves are transverse in nature.
3. Calculate the relation between field strengths of reflected and incident EM wave when it is horizontally polarised due to reflection at the plane boundary of a dielectric.
4. State and explain Poynting theorem and Poynting vector. Interpret each term.
5. State and explain the boundary conditions obeyed by E, H, B and D at the plane interface of two dielectrics.
6. Establish the laws of reflection and refraction at the boundary of two dielectric media for plane electromagnetic wave propagation at an oblique incidence.

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7. Write down Maxwell's field equations in differential and integral forms and explain their physical meaning. State and prove Poynting theorem relating the flow of energy at a point in space in an electromagnetic field.
8. Explain the theory of propagation of EM waves in a conducting medium and also explain why in high frequency circuits current flows only on the surface of the conductors.
9. Give the theory, construction and working of Babinet compensator. How is it used to analyse the polarised light?
10. Give the Fresnel's theory of optical rotation. How is it experimentally verified.

