CHAPTER-8

ELECTROMAGNETIC WAVES

One mark questions

1. Who has experimentally demonstrated the existence of electromagnetic waves? (K)
2. Name the scientist who argued that electric field changing with time gives rise to magnetic field.(K)
3. Which set of equations mathematically express all the basic laws of electromagnetism? (K)
4. Which is the most important prediction to emerge from Maxwell's equations?(K)
5. Whose work unified the domain of electricity, magnetism and light.(K)
6. What is displacement current?(K)
7. What modification was made by Maxwell in Ampere's circuital law?(U)
8. What is conduction current?(K)
9. Name the law associated with the following equation $\oint B \cdot dl = \mu_0 i_c + \mu_0 \varepsilon_0 \frac{d\varphi}{dt}$ **(U)**
10. What is the unit of displacement current?(K)
11. How electromagnetic waves are produced?(U)
12. Give an example for an accelerating charge.(K)
13. Name the Indian physicist who has worked in the field of production of electromagnetic wave.(K)
14. Mention the invention made by Indian physicist J.C.Bose in the field of electromagnetic waves. (K)
15. What is the angle between electric field vector and magnetic field vector of electromagnetic waves?(K)
16. What is the angle between electric field vector / magnetic field vector with the direction of propagation in an electromagnetic wave?(K)
17. What is the direction of magnetic field in a capacitor?(U)
18. What is the direction of electric field in a capacitor?(U)
19. Mention the expression for the speed of propagation of electromagnetic waves in free space in terms of permittivity and permeability of free space. (K)
20. Mention the expression for the speed of propagation of electromagnetic waves in a material medium.(K)
21. What is the source of an electromagnetic wave? (K)
22. Who proposed electromagnetic wave theory? (K)
23. Write the expression for the displacement current.(U)
24. What are electromagnetic waves?(K)
25. Name the hypothetical medium assumed for the propagation of transverse waves.(K)
26. Whose experiment demolished the hypothesis of ether?(K)
27. Is a material medium essential for the propagation of electromagnetic waves?(K)
28. Do electromagnetic waves carry energy and momentum?(U)
29. What is radiation pressure?(U)
30. Write the expression for momentum transferred by an electromagnetic wave if it is absorbed completely?(U)
31. Why do we feel warmth when exposed to sunlight?(U)
32. In which field the great technological importance of the property of electromagnetic waves carrying energy is used? (K)
33. What is an electromagnetic spectrum?(K)
34. What are electromagnetic waves?(K)

QUESTION BANK

35. Arrange IR rays, Gamma rays, visible rays, X- rays in increasing order of wave length.(U)
36. Arrange Micro waves, Gamma rays, visible rays, X- rays in increasing order of frequency.(U)
37. Name the electromagnetic radiation having highest frequency in the electromagnetic spectrum. (U)
38. Name the electromagnetic radiation with highest Wave length.(U)
39. Name the electromagnetic radiation with lowest frequency. (U)
40. Name the electromagnetic radiation with lowest wave length.(U)
41. What is the wave length range of visible light?(K)
42. How are radio waves produced?(U)
43. Mention one application of radio waves.(K)
44. How are micro waves produced?(U)
45. Name the domestic application of micro waves.(K)
46. How are IR waves produced?(U)
47. Name a source of UV rays?(K)
48. What is the harmful effect of UV rays? (K)
49. Why one should not continuously get exposed to U-V radiation? (U)
50. Why, one cannot get tanned or sun burn through glass window?(U)
51. Why do welders wear special glass goggles or face masks while in their work?(A)
52. Expand LASIK.(U)
53. What is the role of ozone layer in the atmosphere?(A)
54. How are X- rays produced?(U)
55. Give one use of Gamma rays.(K)
56. Mention the application of X-rays. (K)
57. How are gamma rays produced?(U)

Two mark questions

1. Distinguish between conduction current and displacement current. (U)
2. What is displacement current? Write the expression for displacement current.(K)
3. After the discovery of displacement currents what was the generalisation made by Maxwell? (U)
4. State Ampere-Maxwell law. Write its mathematical form.(K)
5. What was Marconi's invention in electromagnetic waves? What for it is used now?(U)
6. Why it was not easy to demonstrate experimentally electromagnetic waves existence?(U)
7. Write the equations representing electric and magnetic fields of electromagnetic waves. (U)
8. Briefly explain, how does an accelerating charge act as a source of an electromagnetic wave? (U)
9. Write the expression for the speed of electromagnetic wave in (a) vacuum and (b)a material medium in terms of electric permittivity and magnetic permeability . (K)
10. Obtain the relation between wavelength, frequency ad speed of electromagnetic wave. (K)
11. Give any two uses of radio waves.(K)
12. Write any two uses of micro waves.(K)
13. Give any two uses of IR-waves(K)
14. Mention any two uses of UV waves.(K)
15. Explain briefly the inconsistency in Ampere's circuital law.(U)
16. State any two properties of displacement current.(K)

Three mark questions

1. Why Maxwell suggested about displacement current? (U)
2. What are the predictions of Maxwell from Maxwell's equations? (K)
3. Explain clearly how Maxwell was led to predict the existence of electromagnetic waves. (U)
4. What are the contributions of Hertz in the field of electromagnetic waves? (K)
5. Write any three properties of electromagnetic waves. (K)
6. Name the main parts of the electromagnetic spectrum giving their wavelength range or frequency range (U)
7. Mention Maxwell's equations. (U)
8. Write any three applications of IR rays.(K)
9. A plane electromagnetic wave of frequency 97.2 K Hz travels in free space along x-direction. Calculate the magnetic field at a point in space and time where the electric field is 9.6 Vm^{-1} in y-axis. (A)   **[3.2X10^{-8} T]**
10. Light from a source incident on a non-reflecting surface of area 25 cm^2 for about 20 minutes. If the energy flux of light is 20Wcm^{-2} calculate the total momentum absorbed for complete absorption. (A)
[2X10^{-3} Kgms^{-1}]

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