

14.  $r_0$  (d) Scattering angle 13
15.  $\square$  (e) Radiation resistance. 12

Answer in 1 or 2 sentences :

16. Define electrostatic energy.
17. Explain End-fire array.
18. Define Snell's law.
19. What is meant by dispersion?
20. Explain Lorentz force law.

SECTION B — (3 × 6 = 30 marks)

Answer ALL questions, choosing either (a) or (b).

21. (a) Prove that  $\text{grad}\left(\frac{1}{r}\right) = -\left(\frac{r}{r^3}\right)$ .

Or

(b) Use Gauss's theorem to obtain the field due to an infinite, straight uniformly charged wire.

22. (a) Derive an expression for displacement current.

Or

(b) Starting with the equation of continuity and assuming Ohm's law, show that the charge density in a conductor obeys the equation :

$$\frac{\sigma}{\epsilon} \rho + \frac{\partial q}{\partial t} = 0.$$

23. (a) A plane electromagnetic wave travels through a uniform plasma. Calculating the poynting vector, show that it vanishes if the frequency of the wave is equal to the plasma frequency.

Or

(b) What is a wave guide? Discuss the propagation of electromagnetic waves along a hollow wave guide of uniform cross section.

24. (a) Differentiate between Coherence and incoherence in scattered light.

Or

(b) What is meant by Resonance Scattering?

AP  
TST