Electromagnetic Waves

- **WORK SHEET-I**

ONE MARKS QUESTIONS

1. Write the expression for the displacement current?
2. The charging current for capacitor is 0.5 A. What is the displacement current across its plate?
3. Write an expression for the speed of e.m. waves in free space.
4. For an electromagnetic wave, write the relationship between amplitude of electric and magnetic fields in free space.
5. What was the range of wavelength of em waves produced by Professor J.C.Bose?

TWO MARKS QUESTIONS

6. What is displacement current? Why was this concept introduced?
7. Give one uses of each of the following:
    a. Microwave
    b. Infra-red wave
    c. Ultra violet radiation
    d. Gamma rays
8. Identify the following electromagnetic radiation as per the wavelength given below. Write one application of each.
    a. 1mm
    b. 10^{-3}nm

THREE MARKS QUESTIONS-

9. Identify the following electromagnetic radiation as per the wavelength given below. Write one application of each.

1. 10^{-12}m
2. 10^{-4}m
3. 10^{6}m

10. Name the electromagnetic radiation having the wavelength range from 1mm to 700nm. Give its two important applications.
11. What is meant by electromagnetic spectrum? Give its four uses.

Answer of work sheet -1

1. $I_D = \varepsilon_0 \frac{d\phi_E}{dt} = \varepsilon_0 \frac{d}{dt}(EA)$
2. According to the property of conductivity,
   The displacement current = Charging current. = 0.25A
3. The speed of an em wave in free space is
   $c = \frac{1}{\sqrt{\mu^\circ \epsilon^\circ}}$
4. $c = E^\circ / B^\circ$
5. 25mm to 5mm
6. The displacement current is that current which comes into existence, in addition in to the conduction current, whenever the electric field and hence the electric flux changes with time.
7. A. radar b. treatment of muscular complaints c. sterilizing surgical instruments d. radiation therapy.
8. A. microwave used in radar system b. infra red used in treatment of muscular complaints.
9. Identification:- a. gamma rays use- radiotherapy b. Infrared rays use – haze photography c. long radio wave use in radio communication.
10. X-rays used in a. medical diagnosis and b. in study of crystal structure.
11. All the known radiation from the big family of electromagnetic wave which stretch over a long range of wavelengths. The orderly distribution of the electromagnetic wave in accordance with their wavelengths or frequency in to distinct group having widely different properties is called electromagnetic spectrum. For example the X rays is one part of spectrum whose use are-

(i) used in detecting fractures in bones
(ii) used in detecting faults,cracks,haws & holes in metal sheets
(iii) used in studying crystal structure
(iv) used in radiotherapy

(v) used in detecting pearls, oysters etc.

12. An oscillating charge radiates electromagnetic waves and these waves carry energy.