

## CBSE -2004 CLASS XII PHYSICS (Set-3)

### General Instructions:

1. All questions are compulsory.
2. There is no overall choice. However, an internal choice has been provided in one question of two marks, one question of three marks and one question of five marks. You have to attempt only one of the choices in such questions.
3. Question numbers 1 to 5 are very short answer type questions, carrying one mark each.
4. Question numbers 6 to 12 are short answer type questions, carrying two marks each.
5. Question numbers 13 to 24 are also short answer type questions, carrying three marks each.
6. Question numbers 25 to 27 are long answer type questions, carrying five marks each.
7. Use of calculators is not permitted. However, you may use log tables, necessary.
8. You may use the following values of physical constants wherever necessary:

Except for the following questions all the remaining questions have been asked in

[Set I](#) and [Set II](#).

**Q. 5.** 'Microwaves are used in Radar.' Why? **1**

**Q. 9.** Two point charges  $= 10\mu\text{C}$  and  $-10\mu\text{C}$  are separated by a distance of 40 cm in air.  
(i) Calculate the electrostatic potential energy of the system, assuming the zero of the potential energy to be at infinity. (ii) Draw an equipotential surface of the system. **2**

**Q. 10.** An astronomical telescope, in normal adjustment position has magnifying power 5. The distance between the objective and the eye-piece is 120 cm. Calculate the focal lengths of the objective and of the eye-piece. **2**

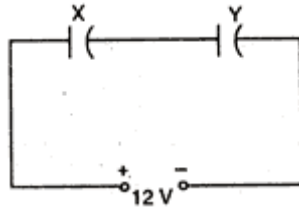
Or

A compound microscope with an objective of 2.0 cm focal length and an eye-piece of 4.0 cm focal length, has a tube length of 40 cm. Calculate the magnifying power of the microscope, if the final image is formed at the near point of the eye.

**Q. 11.** With the help of an example, explain, how the neutron to proton ratio changes during alpha decay of a nucleus. **2**

**Q. 12.** Find the wavelength of electromagnetic waves of frequency  $6 \times 10^{12}$  Hz in free space. Give its two applications. **2**

**Q. 14.** X and Y are two parallel plate capacitors having the same area of plates and same separation between the plates. 'X' has air between the plates and Y contains a dielectric medium of  $\epsilon_r = 5$ .



- (i) Calculate the potential difference between the plates of X and Y.
- (ii) What is the ratio of electrostatic energy stored in X and Y? **3**

**Q. 16.** Draw the energy band diagrams of p-type and n-type semiconductors. A semiconductor has equal electron and hole concentration  $6 \times 10^8 \text{ m}^{-3}$ . On doping with a certain impurity, electron concentration increases to  $8 \times 10^{12} \text{ m}^{-3}$ . Identify the type of semiconductor after doping. **3**