Progressive Education Society's

Modern College of Arts, Science & Commerce Ganeshkhind, Pune – 16 (Autonomous)

End Semester Examination: MAR / APR 2025

***Total No. of Questions**: 3 / 17* ***Total No. of Pages**: 02*

F.Y.B.Sc. (General)

24PHY12101: Physics Principles and Applications

(Semester II)

Program: B.Sc. (Gen 03) **Credits:** 2
Program Specific: General B.Sc. **Time:** 2 Hours
Course Type: Major **Max. Marks:** 30
Paper: I **SET: A**

Instructions to the candidate:

1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Draw a well labelled diagram wherever necessary.*
4) *Use of log tables or non-programmable electronic calculator is allowed.*

Q1) Attempt **ANY SIX** of the following: **(6/8)** **[6 X 2 = 12]**

a) What is population inversion?

b) What is a twisted pair cable? Where is it used?

c) What is blue and red shift?

d) Write the formula to generate wave numbers of lines in different spectral series.

e) State basic principle of microwave oven.

f) Fiber optic communication is based on which principle?

g) Given the energy level of 6.624×10^{-18} J imparted to an electron stream by x- ray device. Calculate frequency in MHz and wavelength. (Given: $h = 6.624 \times 10^{-34}$ J)

h) Calculate the energy of a photon in eV of yellow light with a frequency of 5.25×10^{14} Hz. (Given: 1 eV = 1.6×10^{-19} J)

Q2) Attempt **ANY THREE** of the following: **(3/5)** **[3 X 4 = 12]**

a) The He-Ne system is capable of lasing at several different IR wavelengths, one being 1.15 µm. Determine the energy difference between the upper and lower levels of this wavelength in (eV). (Given: 1 eV = 1.6×10^{-19} J, h = 6.624×10^{-34}J and c = 3×10^{8} m/s)

b) (i) How does Radar work?

(ii) A Radar sends radio signal towards an aero plane in the sky and receives echo after 1 millisecond. What is the distance of the aero plane from radar?

c) Show that the radii of Bohr orbits is directly proportional to square of the principal quantum number. Hence find the radius of the first orbit using standard values.

d) With the help of a neat diagram, explain working of a solar cell.

e) Draw block diagram of general communication system. Explain function of different blocks.

Q3) Attempt **ANY TWO** of the following: **(2/4)** **[2 X 3 = 06]**

a) Explain the process of stimulated emission.

b) Write a note on applications of communication.

c) With the help of a neat diagram, explain what are twisted pair and coaxial cables?

d) Calculate the longest wavelength of lines in Lyman series of hydrogen spectrum. (Given: $R = 1.097 \times 10^7\ m^{-1}$)

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