B.Sc.-M.Sc. Integrated Program
Semester-I Examination, 2021
Paper Title: Basics of Physics and Biology or Mathematics
Paper Code: BCH-GE-01-TH A and B
Section: PHYSICS

Time: 90 min Max Marks: 38

Attempt all questions. Use only A4 sheets. All parts of a question must be attempted in continuation. Start answer of a fresh question on a new page. Cite examples and draw labelled diagrams wherever necessary.

Q. 1: MCQ (Attempt ALL) **(2 x 4)**

I. A periodic motion:
(a) is oscillatory (b) is not oscillatory
(c) may or may not be oscillatory (d) none of these

II. A photon of 2.1 eV energy is placed in which part of the EM spectrum?
(a) visible (b) infrared
(c) radio waves (d) UV

III. In Young's Double Slit Experiment, the shape of slits is:
(a) circular (b) square
(c) triangular (d) rectangular

IV. Two spontaneously emitted photons are:
(a) in the same direction (b) in the opposite directions
(c) usually not in the same direction (d) in orthogonal directions

Q. 2: Attempt ANY TWO questions **(6 x 2)**

A. Discuss EM spectrum and write three differences between UV and infrared radiation.

B. In Young's Double Slit Experiment, demonstrate that the dark fringes cannot be completely dark if amplitudes of light from the slit 1 and slit 2 are not equal.

C. Write six differences between a laser and a common light.

Q. 3: Attempt ANY TWO questions **(9 x 2)**

A. Consider a harmonic motion, in which the force (F) and the displacement (y) are related by equation $F_{H\,M} = -[y + (½)ky^3]$. It can be approximated $F_{SHM} = -y$; for small values of y. Find out the value of k if $F_{SHM}/F_{HM} = 0.9$, for y = 0.1 m.

B. How are Newton's Rings formed? Find the wavelength of light if the diameters of 8th and 12th dark fringes are 4.16 mm and 5.09 mm, respectively. The radius of curvature is 1000 mm.

C. Discuss the difference between spontaneous and stimulated emission. With appropriate diagrams, discuss the working mechanism of a He-Ne laser in detail.

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