Reg. No. : ....

Name : ....

IV Semester M.Sc. Degree (C.B.S.S. – Reg./Supple.-(One Time Mercy Chance)/Imp.) Examination, April 2024
(2014 Admission Onwards)
PHYSICS
PHY 4E06 : Optoelectronics

Time : 3 Hours   Max. Marks : 60

SECTION – A

Answer **both** the questions. (Either **a** or **b**).

1. a) Explain the theory of mode locking in lasers. Also describe one technique for mode locking.

    OR

   b) Explain the principle, working and basic structure of Avalanche photo diode. Also mention advantages of Avalanche photo diode over photodiode.

2. a) Explain the principle and working of acousto optic modulator.

    OR

   b) Explain the second and third order harmonic generations in an optically anisotropic medium.   (2×12=24)

SECTION – B

Answer **any four** questions. (**One** mark for Part **a**, **3** marks for Part **b**, **5** marks for Part **c**)

3. a) Define the efficiency of LED.

   b) Derive the expression for the efficiency of LED.

   c) Determine the wavelength of light emitted from LED which is made up of GaAsP semiconductor whose forbidden energy gap is 1.875 eV. Also mention the colour of the light emitted. Find the efficiency and power of the LED if the life times for radiative and non-radiative recombination respectively are 12 microseconds and 50 microseconds.

P.T.O.

4. a) Describe the unstable resonators and its advantages.

   b) Explain the importance of Q switching.

   c) Explain any two methods of Q switching.

5. a) Define the term absorption coefficient.

   b) Describe the principle of photo conductive detector.

   c) Prove that there is an internal amplification of output current in a phototransistors.

6. a) Distinguish between direct and indirect band gap semiconductors.

   b) State and prove Ramos theorem.

   c) Discuss different types of noises in photodetectors.

7. a) Distinguish between transverse and longitudinal electro optic modulators.

   b) Explain Kerr effect.

   c) Explain the working of Faraday rotator.

8. a) What is the requirement of nonlinear material ?

   b) Explain two photon absorption.

   c) Describe temperature tuning and angle tuning.   (4×9=36)

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