OPTICS AND LASERS - II

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all. Select *one* question each from Section A, B, C, and D Q. No. 9 Section E is compulsory, attempt any *five* parts from it. Use of Non-programmable calculator is allowed.

Section : A

1. Describe the principle and working of Febry Perot inerferometer. How this interferometer is used to determine the difference between two closely situated wavelengths ? 15

2. (a) What is Non-reflecting film and how is it achieved ? 5
   (b) Explain and differentiate between Division of wave front and Division of wave front. 5
   (c) What are coherent sources of light ? How are they realised in practice ? 5

Section : B

3. (a) What is Half-period zones ? On its basis, explain propagation of light. 8
   (b) What is the difference between a Convex lens and a Zone plate ? 7

4. (a) How will you analyse Plane Polarised, Circularly polarised and Elliptically polarised light ? 10
   (b) Distinguish between the Fresnel's and Fraunhoffer's class of diffraction. 5

Section : C

5. (a) What are Einstein co-effcients ? Derive a relation between Eienstein's spontaneous and stimulated emission co-efficients. 10
   (b) How will you define Line width ? 5

6. (a) Explain Doppler broadening. 10
   (b) What is Population inversion ? How is it obtained ? 5

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Section : D

7. (a) Discuss the principle, construction and working of He–Ne laser. 10
   (b) What are the main features of Laser Light ? 5
8. (a) Explain the main features and conditions for laser action in semiconductors. 10
   (b) What is Holography ? What are its uses ? 5

Section : E
(Compulsory Question)

9. Answer any *five* of the following in short ?
   (a) Explain Temporal and Spatial coherence.
   (b) How will you justify that interference in just redistribution of energies ?
   (c) Explain what is elliptically polarised light.
   (d) What is the difference between Interference and Diffraction ?
   (e) Explain the term Pumping.
   (f) What do you mean by Broadening of spectral lines ?
   (g) What is the basic difference between Ruby laser and Helium-Neon laser ?
   (h) What are the various applications of Lasers ? 5×3=15

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