

**BS-2051**  
**LASERS-II**  
**(Semester-IV)**

Time : Three Hours]

[Maximum Marks : 30

**Note** : Attempt *two* questions each from Section A and B, in Section C attempt any *five* parts.

**SECTION-A**

- I. Derive expressions for Einstein relations. 5
- II. What do you understand by laser ? Explain the characteristic of laser light. 5
- III. Explain the concept of coherence. Discuss the temporal coherence and spatial coherence. 5
- IV. What do you understand by broadening of spectral lines ? Discuss Doppler broadening of spectral lines. 5

**SECTION-B**

- V. What is Q-Switching ? Explain different types of Q-Switching. 5
- VI. Explain the principle, construction and working of He-Ne laser. 5

- VII. Discuss the semiconductor laser. 5
- VIII. Discuss the laser applications. 5

### SECTION-C

- IX. Attempt any *five* parts.
- (a) Discuss the pumping in laser.
  - (b) What do you understand by metastable energy state ?
  - (c) Discuss quality factor.
  - (d) Find the coherence length of a laser source of monochromatic light with frequency width of 500 Hz.
  - (e) Give the active and passive optical devices.
  - (f) What is spiking ?
  - (g) Under what conditions a medium amplifies the light ?  
(5×2=10)
-