USN | | | | | | | | | | |

206BS001

Ph.D./M.S.(Engg.) by Research Degree Examination, Nov./Dec.2024
Laser Physics and Biophysics

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Using Young's double hole experiment, discuss the complex degree of coherence and fringe visibility. **(08 Marks)**

b. With a neat diagram, explain the four types of optical resonators. **(08 Marks)**

c. Define hole burning and explain the importance of hole burning in spectroscopy technique. **(04 Marks)**

OR

2 a. Explain the theory of Laser oscillation and round trip power gain using laser rate equation. **(08 Marks)**

b. Delineate on Line broadening mechanism. **(08 Marks)**

c. Define gain saturation and discuss the gain saturation in homogeneously broadened laser. **(04 Marks)**

Module-2

3 a. Explain the method of obtaining ultimate line width of the Laser. **(08 Marks)**

b. Define multimode oscillation. Give the three difference between single mode and multimode oscillation. **(08 Marks)**

c. Write a note on Laser spiking in terms of dependent condition. **(04 Marks)**

OR

4 a. Define Q-witching. Explain the method of Q-switching. **(08 Marks)**

b. Explain the four advantages of mechanical shutters and four disadvantages of electro-optical shutters. **(08 Marks)**

c. Elucidate on active and passive mode locking techniques. **(04 Marks)**

Module-3

5 a. With a neat energy band diagram, explain the construction and working of Nd : YAG Laser. **(08 Marks)**

b. With a neat diagram, explain the principle and working of copper vapour laser. **(08 Marks)**

c. Discuss the principle of CO_2 Laser. **(04 Marks)**

OR

6 a. With a neat energy band diagram, explain the construction and working of semiconductor laser. **(08 Marks)**

b. Explain any four tuning techniques employed in liquid laser. **(08 Marks)**

c. Write a note on Excimer laser. **(04 Marks)**

Module-4

7 a. Explain the general organization, structure, types and composition of the cells. **(08 Marks)**

b. Define photosynthesis and explain the process of energy trapping and transfer during photosynthesis. **(08 Marks)**

c. Write a note on energy conversion pathways. **(04 Marks)**

OR

8	a.	With a neat diagram, explain the structure and function models of cell membranes.	**(08 Marks)**
	b.	Explain the passive and active process of transport across membranes.	**(08 Marks)**
	c.	With a neat block diagram, explain the information processing in neuronal system.	**(04 Marks)**

Module-5

9	a.	Explain the importance of physics of any four sensory organs.	**(08 Marks)**
	b.	With a neat diagram, explain the mechanism of sound perception.	**(08 Marks)**
	c.	Explain the mechanism of image formation.	**(04 Marks)**

OR

10	a.	Explain the mechanism of chemical somatic receptors.	**(08 Marks)**
	b.	Explain the mechanism of muscle contractibility and mobility.	**(08 Marks)**
	c.	Discuss the basics of biorhythm using temporal organization.	**(04 Marks)**

* * * * *