University Institute of Engineering & Technology

(Recognised Under Section 2(f) and 12B of UGC)

Kurukshetra University, Kurukshetra

Roll No. - [redacted]

THEORY EXAMINATION – DEC 2022	
B.TECH – ECE, ME	**SEMESTER - III**

TIME – 3 Hrs.

M.M. -75

PAPER - BS-201

SUBJECT- Optics and Waves

Note: All questions in Part-A and Part-B are compulsory. Attempt any four questions from Part-C selecting at least one from each unit.

PART-A (15 Marks)

Q. No. – 1 Answer the following questions. **15x1=15**

(i)	How phase velocity is different from group velocity?
(ii)	Write three characteristics of real light waves.
(iii)	What do you mean by uniform plane wave?
(iv)	Give two examples of mechanical waves.
(v)	Write two conditions for sustained interference.
(vi)	What do you understand by Division of Wavefront?
(vii)	Write mathematical relations for constructive and destructive interference in case of reflected light.
(viii)	What are the applications of Newton's ring experiment?
(ix)	What do you mean by overlapping of spectral lines in context of diffraction grating?
(x)	How an interference phenomenon is different from diffraction phenomenon?
(xi)	State Malus law.
(xii)	What is the use of quarter-wave plate?
(xiii)	What is the function of optical resonator?
(xiv)	Can a two level system be used for the Laser production?
(xv)	Write down the condition for population inversion.

PART-B (20 Marks)

	UNIT-I	
2	What are Travelling waves? Describe mathematical representation of travelling waves.	5
	UNIT-II	
3	How Fresnel's biprism is helpful to determine thickness of thin transparent sheet?	5
	UNIT-III	
4	Write construction and working of Nicol prism. How can it be used as an analyzer?	5
	UNIT-IV	
5	Write a note on Nd-YAG Laser.	5

PART-C (40 Marks)

	UNIT-I	
6	Explain wave equation for free space.	10
7	Derive relations for reflection coefficient and transmission coefficient in context of wave incident normally on boundary.	10
	UNIT-II	
8	Describe the principle, construction and working of Michelson interferometer.	10
9	Discuss the formation of Newton's ring in reflected light.	10
	UNIT-III	
10	Explain Fraunhofer diffraction at a single slit.	10
11	Define Specific rotation. Describe principle, construction and working of Biquartz polarimeter.	10
	UNIT-IV	
12	What are Einstein's coefficients? Derive relation between them.	10
13	Describe the principle, construction and working of He-Ne laser .	10