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QUESTION PAPER CODE- 51052

University Institute of Engineering & Technology

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

Kurukshetra University, Kurukshetra

Roll No. -

THEORY EXAMINATION – DEC 2019

TIME – 3 Hrs.

B.TECH – ECE & ME

SEMESTER - III

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)	What are travelling waves?
(ii)	What is the difference between wavefront and the ray?
(iii)	Define phase angle.
(iv)	Write Maxwell's equations.
(v)	What do you mean by division of wavefront?
(vi)	Write the condition for destructive interference due to reflected light, in case of division of amplitude.
(vii)	Write two conditions for sustained interference.
(viii)	What do you understand by the term path difference?
(ix)	What do you mean by diffraction of light?
(x)	Define Brewster's law.
(xi)	How positive crystals are different from negative crystals?
(xii)	What is half-wave plate?
(xiii)	What do you mean by Normal Population?
(xiv)	Write the main components of LASER.
(xv)	Give the prerequisites for LASER action to take place.

**PART-B (20 Marks)**

UNIT-I		
2	Obtain the relation between phase velocity and group velocity.	5
UNIT-II		
3	How Fresnel's Biprism is used to measure the thickness of thin transparent sheet?	5
UNIT-III		
4	Explain the construction and working of Nicol Prism. How can it be used as an analyzer?	5
UNIT-IV		
5	Discuss Einstein's coefficients. Derive relation between them.	5

**PART-C (40 Marks)**

UNIT-I		
6	Derive an expression for wave equation in free space.	10
7	Describe Energy density, the Poynting vector and Intensity.	10
UNIT-II		
8	Show that the reflected system and transmitted system of interference pattern in case of thin film are complementary to each other.	10
9	Describe the construction and theory of Michelson's interferometer. How this can be use for the measurement of resolution of closely spaced spectral lines?	10
UNIT-III		
10	Explain theory, secondary maxima and secondary minima, width of principal maxima, absent spectra and overlapping spectra of plane transmission diffraction grating.	10
11	Derive expressions for Dispersive Power and Resolving Power of diffraction grating.	10
UNIT-IV		
12	Explain the principle, construction and working of Ruby laser.	10
13	Describe the construction and working of Carbon dioxide laser.	10