Hall Ticket Number:

Code No.: 11023C

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (CBCS) I-Semester Main Examinations, Dec.-2018 / Jan.2019

Waves and Optics

(EEE & ECE)

Time: **3** hours Max. Marks: **60**

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** from **Part-B***

Q. No	Stem of the Question	M	L	CO	PO
	Part-A (10 × 2 = 20 Marks)				
1.	Distinguish between damped oscillations and forced oscillations.	2	3	1	1,12
2.	Define Quality factor of Oscillations.	2	1	1	1,12
3.	Explain Rayleigh criterion for limit of Resolution.	2	2	2	1,12
4.	If an intensity I_o falls on a polarizer with its electric field making an angle of 30^0 with the transmission axis, find the intensity of the resultant of incident light is plane polarized.	2	3	2	1,12
5.	Why laser source is finding numerous engineering applications when compared with ordinary light source? Discuss.	2	5	3	1,12
6.	Mention four important applications of lasers in engineering.	2	2	3	1,12
7.	What are different types of losses in optical fibre?	2	3	4	1,12
8.	List the two light sources that are used in optical fibers.	2	3	4	1,12
9.	Write four Maxwell equations in integral form.	2	1	5	1,12
10.	In framing the electromagnetic wave equations, which basic law (Gauss / Ampere / Faraday) was modified by Maxwell and why?	2	5	5	1,12
	Part-B (5 × 8 = 40 Marks)				
11. a)	What are forced oscillations? Derive an equation for forced oscillator and discuss about its solution.	6	2	1	1,12
b)	A particle executes SHM with a period of 0.002 seconds and amplitude 10cm. Find its acceleration when it is 4 cm away from its mean position.	2	3	1	1,12
12. a)	Distinguish between Interference by Division of Wave front and Division of amplitude.	3	4	2	1,12
b)	Prove that the diameter of Newton's interference dark ring is proportional to the square root of the order of ring.	5	1	2	1,12
13. a)	Explain the working of He-Ne laser with the help of energy level diagram.	5	2	3	1,12
b)	What is population inversion? Explain the necessity of population inversion for lasing.	3	3	3	1,12
14. a)	Derive an expression for numerical aperture of an optical fiber.	4	2	4	1,12
b)	An optical fiber has a core of refractive index1.55 and cladding of 1.50.Calculate numerical aperture	2	2	4	1,12
c)	Mention 4 important applications of optical fiber.	2	4	4	1,12

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15. a)	State Poynting theorem and prove E X H represents the power flow per unit area.	6	2	5	1,12
b)	Distinguish between displacement current and conduction current.	2	4	5	1,12
16. a)	Define and get expressions for relaxation time and logarithmic decrement	4	2	1	1,12
b)	Explain the phenomenon of double refraction.	4	2	2	1,12
17.	Answer any ***two*** of the following:				
a)	Compare three level and four level pumping schemes of lasers.	4	3	3	1,12
b)	Explain optical communication system with the help of block diagram.	4	2	4	1,12
c)	Obtain the wave equation for electric field in non-conducting medium from appropriate Maxwell Equations.	4	4	5	1,12

M: Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome

S. No.	Criteria for questions	Percentage
1	Fundamental knowledge (Level-1 & 2)	55%
2	Knowledge on application and analysis (Level-3 & 4)	40%
3	*Critical thinking and ability to design (Level-5 & 6) (*wherever applicable)	5%