Hall Ticket Number:

1	6	0	2	2	2	7	8	2	0	1	8

Code No. : 12122 N

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

B.E. II-Semester Main Examinations, August-2023

Optics, Acoustics and Sensors

(Civil Engg.)

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

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

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Mention two real-life examples of simple harmonic and damped harmonics oscillations.	2	1	1	1,2,12
2.	Write a note on logarithmic decrement.	2	1	1	1,2,12
3.	Give conditions required to observe sustained interference pattern of light	2	2	2	1,2,12
4.	State and explain Brewster's law	2	1	2	1,2,12
5.	Differentiate between spontaneous and stimulated emission.	2	2	3	1,2,12
6.	List out any four applications of optical fibers	2	1	3	1,2,12
7.	Recall any four applications of ultrasonic waves in various fields.	2	1	4	1,2,12
8.	Define Open Window Unit (OWU).	2	1	4	1,2,12
9.	Cite any four benefits of Structural Health Monitoring in civil engineering	2	1	5	1,2,12
10.	What is a thermocouple? Give uses of thermocouples	2	1	5	1,2,12
	Part-B (5 × 8 = 40 Marks)				
11. a)	Derive equation of motion of a damped harmonic oscillator and discus its solution under different damping conditions.	5	3	1	1,2,12
b)	When a spring is attached to a mass of 5Kg, it stretches 10 cm by a force 12.5N. Determine the force constant of the spring and the time period of oscillation.	3	3	1	1,2,12
12. a)	Define polarization of light? Describe the principle, construction and working of Nicol's prism.	5	2	2	1,2,12
b)	A plane transmission grating has 15, 000 lines per inch. Compute the number orders it can produce when a light of wavelength $5893A^0$ is incident on it and diffracted at an angle 30^0.	3	2	2	1,2,12
13. a)	Ascertain the construction and working of Ruby laser long with necessary diagrams	5	3	3	1,2,12
b)	An optical fiber has core diameter 40μm and refractive index 1.528. The fractional change of index is 0.02. Compute the numerical aperture, acceptance angle, V-number.	3	2	3	1,2,12

Contd... 2

14. a)	State piezo electric effect and explain the production of ultrasonics by piezo electric oscillator.	5	2	4	1,2,12
b)	A theatre has a volume of 10,000m^3. Estimate the reverberation time of the theatre if the total absorption due to seats and curtains is 950 OUW.	3	3	4	1,2,12
15. a)	What are load cells? Discuss various types of load cells and their applications	5	3	5	1,2,12
b)	Write a note on tilt meters and their applications	3	2	5	1,2,12
16. a)	Derive expression for the total energy of a simple harmonic oscillator.	4	3	1	1,2,12
b)	Obtain conditions for maximum and minimum intensities of light due to single slit diffraction.	4	2	2	1,2,12
17.	Answer any ***two*** of the following:				
a)	Examine various losses in optical fibers?	4	4	3	1,2,12
b)	Analyze different factors that affect acoustics of buildings and discuss the remedies	4	4	4	1,2,12
c)	Elaborate on Optical fiber sensors used in civil engineering	4	2	5	1,2,12

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

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	39%
iii)	Blooms Taxonomy Level – 3 & 4	41%

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