U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

October 2024 Supplementary Examinations

Programme: B.E. **Semester: I / II**
Branch: Civil Engineering **Duration: 3 hrs.**
Course Code: 22PH1BSPCV / 22PH2BSPCV **Max Marks: 100**
Course: Applied Physics for Civil Engineering

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Physical constants:

Mass of electron, $m_e = 9.1\times10^{-31}$ kg
Electronic charge, $e = 1.602\times10^{-19}$ C
Boltzmann constant, $k_B = 1.38\times10^{-23}$ J/K
Permittivity of free space$=8.85\times10^{-12}$ F/m
Speed of light, $c = 3\times10^{8}$ m/s
Planck constant, $h = 6.626\times10^{-34}$ Js
Mass of neutron, $m_n = 1.67\times10^{-27}$ kg
Mass of proton, $m_p = 1.67\times10^{-27}$ kg

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		Module - I	*CO*	*PO*	Marks
1	a)	Derive an expression for energy density of radiation in terms of Einstein's co-efficient's under thermal equilibrium.	*CO 1*	*PO 1*	**8**
	b)	Describe the construction and working of a semiconductor diode laser with an energy level diagram.	*CO 1*	*PO 1*	**8**
	c)	A laser is emitting a laser beam with an average power of 4.5 mW. Find the number of photons emitted per second by the laser. The wavelength of the emitted radiation is 6328 Å.	*CO 1*	*PO 2*	**4**
		OR			
2	a)	Define co-efficient of attenuation and give its formula. Discuss the three causes of attenuation.	*CO 1*	*PO 1*	**8**
	b)	Discuss the different types of optical fibers with suitable diagrams.	*CO 1*	*PO 1*	**8**
	c)	Fractional index change of an optical fiber and refractive index of core are 0.5 % and 1.533, respectively. Calculate the angle of acceptance.	*CO 1*	*PO 2*	**4**
		Module - II			
3	a)	Define SHM and mention any two examples. Derive the differential equation for SHM.	*CO 1*	*PO 1*	**8**
	b)	Give the theory of damped vibrations and discuss the case of over damping.	*CO 1*	*PO 1*	**8**

		c)	A damped oscillator of frequency 10 Hz starts with an initial amplitude of 10 cm. After 25 seconds, its amplitude is measured to be 9 cm. Calculate relaxation time and quality factor.	*CO 1*	*PO 2*	**4**
			Module - III			
	4	a)	What are Miller indices? Derive an expression for interplanar distance in terms of Miller indices.	*CO 1*	*PO 1*	**8**
		b)	Describe how Bragg's spectrometer is used to determine the wavelength of an X-ray beam?	*CO 1*	*PO 1*	**8**
		c)	Draw the following planes in a cubic unit cell (011), (102), (132) and (200).	*CO 1*	*PO 2*	**4**
			OR			
	5	a)	Define unit cell. Describe the seven crystal systems with neat sketches.	*CO 1*	*PO 1*	**8**
		b)	Describe the principle, construction and working of X-ray Photoelectron Spectroscope.	*CO 1*	*PO 1*	**8**
		c)	The interplanar spacing of (110) plane is 2 Å for a FCC crystal. Find atomic radius.	*CO 1*	*PO 2*	**4**
			Module - IV			
	6	a)	State Hooke's law. Describe stress-strain diagram.	*CO 1*	*PO 1*	**8**
		b)	Derive an expression for couple per unit twist of a solid cylinder.	*CO 1*	*PO 1*	**8**
		c)	A wire of 3 m long and 0.625×10^{-4} m^2 in cross section is found to stretch 0.003 m under a tension of 1200 kg. What is the Young's modulus of the material of the wire?	*CO 1*	*PO 2*	**4**
			Module - V			
	7	a)	Discuss the classification of earthquakes.	*CO 1*	*PO 1*	**8**
		b)	What are fire hazards? Discuss the causes for fire hazards.	*CO 1*	*PO 1*	**8**
		c)	The intensity of one earthquake is 100 times the intensity of the other. If the magnitude of the first earthquake is 8.9, estimate the magnitude of the other.	*CO 1*	*PO 2*	**4**

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