U.S.N.										

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

Autonomous Institute Affiliated to VTU

September 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

		Module - I	*CO*	*PO*	*Marks*
1	a)	Mention the characteristics of LASER. Write a note on application of LASER in the measurement of pollutants in atmosphere.	CO1	PO1	08
	b)	Explain briefly the interaction of radiation with matter.	CO1	PO1	08
	c)	The ratio of population of two energy levels is 1.059×10^{-30}. Find the wavelength of light emitted at 300 K.	CO1	PO2	04
		OR			
2	a)	Define attenuation and discuss the causes of attenuation.	CO1	PO1	08
	b)	Define numerical aperture. With a neat diagram derive an expression for numerical aperture in terms of refractive indices of core and clad of an optical fiber.	CO1	PO1	08
	c)	Calculate the numerical aperture and angle of acceptance of a given optical fiber if the refractive indices of the core and cladding are 1.563 and 1.498, respectively.	CO1	PO2	04
		Module - II			
3	a)	What are forced oscillations? Arrive at the expressions for amplitude and phase of the forced oscillations.	CO1	PO1	08
	b)	Explain logarithmic decrement, relaxation time and quality factor for a damped oscillator.	CO1	PO1	08

		c)	A particle executes SHM of amplitude 5 cm. When the particle is 3 cm from the mean position its acceleration is found to be 48 cm s^{-2}. Calculate its velocity at the same instant.	**CO1**	**PO2**	**04**
			Module - III			
	4	a)	What are Miller indices? Derive an expression for interplanar spacing in terms of Miller indices.	**CO1**	**PO1**	**08**
		b)	Describe powder diffraction method for the determination of crystal structure with the help of a suitable diagram.	**CO1**	**PO1**	**08**
		c)	Find the interplanar spacing for a (1 2 1) plane in a simple cubic lattice whose lattice constant is 0.412 nm.	**CO1**	**PO2**	**04**
			OR			
	5	a)	State Bragg's law. Describe how Bragg's X-ray diffractometer is used to determine the wavelength of an X-ray beam?	**CO1**	**PO1**	**08**
		b)	Obtain the relation between atomic radius and lattice constant in SC, BCC and FCC crystal structures.	**CO1**	**PO1**	**08**
		c)	A beam of X-rays of wavelength 0.071 nm is diffracted by (110) plane of cubic lattice with lattice constant 0.28 nm. Find the glancing angle for the second order diffraction.	**CO1**	**PO2**	**04**
			Module - IV			
	6	a)	State Hooke's law**.** Show the relation between K, Y, n and σ, where the symbols have their usual meaning.	**CO1**	**PO1**	**08**
		b)	Derive an expression for couple per unit twist of a solid cylinder.	**CO1**	**PO1**	**08**
		c)	Calculate the twisting couple on a solid shaft of length 1.5 m and diameter 120 mm, when it is twisted through an angle 0.6°. The co-efficient of rigidity for the material of shaft may be taken to be 93 x 10^9 N/m^2.	**CO1**	**PO2**	**04**
			Module - V			
	7	a)	What is a Tsunami? Write a brief note on causes of tsunami.	**CO1**	**PO1**	**08**
		b)	What are fire hazards? Discuss the causes for fire hazards.	**CO1**	**PO1**	**08**
		c)	How many times more intense is an earthquake that measures 6.2 on the Richter scale than an earthquake that measures 5.1 on the Richter scale?	**CO1**	**PO2**	**04**

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