CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

BPHYC102/202

First/Second Semester B.E./B.Tech. Degree Supplementary Examination, June/July 2024
Applied Physics for Civil Engineering Stream

Time: 3 hrs.　　　　　　　　　　　　　　　　　　　　　Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
*　　　2. VTU Formula Hand Book is permitted.*
*　　　3. M : Marks , L: Bloom's level , C: Course outcomes.*

		Module – 1	M	L	C
Q.1	**a.**	Define simple harmonic motion. Give example. Write the differential equation for SHM and explain the terms.	05	L2	CO1
	b.	With a neat diagram, explain the construction and working of Reddy tube and hence mention any four applications of shock waves.	10	L2	CO1
	c.	A free particle is executing SHM in a straight line. The maximum velocity it attains during any oscillation is 62.8 m/s. Find the frequency of oscillation if its amplitude is 0.5 m.	05	L3	CO3
		OR			
Q.2	**a.**	What are forced oscillations? Derive the expression for amplitude of vibration of a body undergoing forced vibrations.	10	L2	CO1
	b.	Define Mach number and hence give the classification of waves on the basis of Mach number.	05	L2	CO1
	c.	A vibrating system of natural frequency 500 CPS is forced to vibrate with a periodic force/unit mass of amplitude 100×10^{-5} N/kg in the presence of a damping/unit mass of 0.01×10^{-3} rad/s. Calculate the maximum amplitude of vibration of the system.	05	L3	CO5
		Module – 2			
Q.3	**a.**	Define elongation strain coefficient, compression strain coefficient and Poisson's ratio. Mention the equation for the same.	06	L2	CO1
	b.	Derive the relation between Young's modulus rigidity modulus and Poisson's ratio.	09	L2	CO1
	c.	Calculate the extension produced in a wire of length 2m and radius 0.013×10^{-2} m due to a force of 14.7 N applied along its length. Given $Y = 2.1 \times 10^{11}$ Nm^{-2}.	05	L3	CO5
		OR			
Q.4	**a.**	What are beams? Discuss I – shaped beam in brief and hence mention its advantages, disadvantages and uses.	09	L2	CO1
	b.	What is fracture? Distinguish between brittle fracture and ductile fracture.	06	L2	CO1
	c.	Calculate the force required to produce an extension of 1 mm in steel wire of length 2m and diameter 1 mm. Given $Y = 2 \times 10^{11}$ N/m^2.	05	L3	CO5
		Module – 3			
Q.5	**a.**	Define reverberation time. Based on the assumptions made by Sabine deduce the expression for reverberation time.	09	L2	CO2
	b.	Discuss the remedial measures taken to improve the acoustic quality in the auditorium.	06	L2	CO2
	c.	A class room is having dimensions $20 \times 15 \times 5$ m^3. The reverberation time is 3.5 s. Calculate total absorption of surface and average absorption coefficient.	05	L3	CO2

		OR			
Q.6	a.	What is photometry? Explain different photometric quantities.	07	L2	CO2
	b.	Define absorption coefficient and absorption power. Explain in detail how the absorption coefficient of a material is measured using Sabine's formula.	08	L2	CO2
	c.	A lecture hall has volume 600 m^3. Its floor area is 120 m^2, walls area is 220 m^2 and ceiling area is 120 m^2. The walls, floor and ceiling are covered by materials of absorption coefficient 0.03, 0.06 and 0.80 respectively. Calculate reverberation time.	05	L3	CO2
		Module – 4			
Q.7	a.	Expand the term LASER and discuss the interaction of radiation with matter.	07	L2	CO3
	b.	With neat diagrams, explain the construction and working of semiconductor LASER diagram. Mention the applications of semiconductor laser.	08	L2	CO3
	c.	A pulsed laser emits photons of wavelength 780 nm with average power/pulse 20 mW. Calculate the number of photons contained if each pulse duration is 10×10^{-9} s.	05	L3	CO3
		OR			
Q.8	a.	Define angle of acceptance and numerical aperture (NA). Derive the expression for NA.	09	L2	CO3
	b.	Explain the construction and working of fiber optic temperature sensor.	06	L2	CO3
	c.	An optical fiber has a core material with RI 1.55 and its cladding material has a RI of 1.50. Calculate its numerical aperture and angle of acceptance.	05	L3	CO3
		Module – 5			
Q.9	a.	Discuss the classification of Earthquakes.	09	L2	CO4
	b.	Discuss the engineering structures to withstand earthquakes.	06	L2	CO4
	c.	Calculate the intensity of the earthquake of magnitude 6.5. Assume the base intensity is I_0.	05	L3	CO4
		OR			
Q.10	a.	Describe various causes for land sliding.	08	L2	CO4
	b.	Write a note on forest fires and fire protection.	07	L2	CO4
	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.	05	L3	CO4

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