MAKE-UP EXAM

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BPHYC102/202

First/Second Semester B.E./B.Tech. Degree Examination, Nov./Dec.2023
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.	What are damped oscillations? Set up the differential equation for damped oscillations. And assuming the expression for solution of the different equation, explain the three cases of damping briefly.	10	L2	CO1
	b.	What is Mach number and Mach angle? Distinguish between subsonic, supersonic waves and transonic on the basis of Mach number.	05	L2	CO1
	c.	A 20 gm oscillator with natural angular frequency 10 rad/sec is vibrating in a damping medium. The damping force is proportional to the velocity of the vibrator. If the damping co-efficient is 0.17, how does the oscillations decay?	05	L3	CO5
		OR			
Q.2	a.	Define the term stiffness factor. And explain the physical significance. Derive the expressions for equivalent force constant for two springs in series and parallel.	10	L2	CO1
	b.	Explain the construction and working of Reddy Shock tube.	06	L2	CO1
	c.	The distance between the two pressure sensors in a shock tube is 150 mm. The time taken by the shock wave to travel this distance is 0.3 mS. If the velocity of sound under the same condition is 340 ms^{-1}. Find the Mach number of the Shock wave.	04	L3	CO1
		Module – 2			
Q.3	a.	Explain the nature of elasticity with the help of stress strain diagram.	06	L2	CO2
	b.	Define three types of moduli. Derive the relation between K, Y and σ for an elastic body.	09	L2	CO2
	c.	Calculate the extension produced in a wire of length 2 m and radius 0.013×10^{-2} m due to a force of 14.7 Newton applied along its length. Given, Young's modulus of the material of the wire $Y = 2.1\times10^{11}$ N/m^2.	05	L3	CO5
		OR			
Q.4	a.	Define Poisson's Ratio and derive the relation between Young's modulus, Rigidity modulus and Poisson's ration.	08	L2	CO2
	b.	Explain following terms : (i) Beam (ii) Bending Beam. (iii) Ductile fracture (iv) Brittle fracture (v) Fatigue	08	L2	CO2
	c.	Calculate the extension produced in a wire of length 2 m and radius 0.013×10^{-2}m due to a force of 14.7 Newton applied along its length. Given, Young's modulus of the material of the wire, $Y = 2.1\times10^{11}$ N/m^2.	04	L3	CO5
		Module – 3			
Q.5	a.	Define the terms reverberation and reverberation time in acoustics. And mention the basic requisites of an acoustically good auditorium.	08	L2	CO2
	b.	Derive Sabine's formula for reverberation.	08	L2	CO2
	c.	Explain the terms Reflectance and Transmittance.	04	L2	CO2
		OR			
Q.6	a.	Write a note on noise and a few of its impacts and preventive measures in multi-storied buildings.	08	L2	CO2

	b.	Explain Lambert's cosine law and inverse square law. Mention few relevant points for both the laws.	08	L2	CO2
	c.	If a university lecture hall (15 m×8 m×3 m) is heavily damped with absorption co-efficient 0.3. Calculate its reverberation time.	04	L3	CO2

		Module – 4			
Q.7	a.	Discuss the possible ways through which radiation and matter interaction takes place.	06	L2	CO3
	b.	With a neat diagram, derive an expression for numerical aperture in an optical fiber.	09	L2	CO3
	c.	The average output power of laser source emitting a laser beam of wavelength 6328 $\mathring{A}$ is 5 mW. Find the number of photons emitted per second by the laser source.	05	L3	CO5

		OR			
Q.8	a.	Explain the construction and working of semiconductor laser.	08	L2	CO3
	b.	Explain the principle and working of Fiber optic displacement sensor and Fiber optic temperature sensor with neat diagrams.	08	L2	CO3
	c.	The refractive indices of core and cladding are 1.50 and 1.48 respectively in an optical fiber. Find the numerical aperture and angle of acceptance.	04	L3	CO5
		Module – 5			
Q.9	a.	What is an earthquake? Define the terms focus, epicenter and seismic waves.	05	L2	CO4
	b.	What is a Land slide? Explain its effects and civil engineering solutions for protection from land slides.	10	L2	CO4
	c.	In a diffraction grating experiment, the laser light undergoes second order diffraction. With diffraction angle of 7.68°. The grating constant is 10^{-5} m and the distance between the grating and laser source is 1 m, find the wavelength of laser light.	05	L3	CO5
		OR			
Q.10	a.	What is TSUNAMI? Explain the causes risks and mitigation measures.	10	L2	CO4
	b.	What is Richtor scale? Explain the safety precautions against an earth quake.	05	L2	CO4
	c.	In an optical fibre experiment, the laser light propagating through an optical fiber made a spot diameter of 2.05 cm on the screen. The distance between the end of the optical fibre cable and the screen is 2 cm. Calculate the numerical aperture and the angle of acceptance.	05	L3	CO5

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