CBCS SCHEME

USN

BPHYC102/202

First/Second Semester B.E./B.Tech. Degree Examination, June/July 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.	Define Hooke's law and hence derive expressions for the effective spring constant of springs in series and parallel combination.	07	L2	CO1
	b.	With necessary diagram explain construction and working of Reddy Shock Tube and mention any four of its applications.	08	L2	CO1
	c.	A car has a spring that supports the in-built mass 1000 kg, when a person with a weight 980 N sits at the centre of gravity, the spring system sinks by 2.8 cm. When the car hits a bump, it stood oscillating vertically. Find the period and frequency of oscillation.	05	L3	CO5
		OR			
Q.2	a.	Explain various forces acting on a system under damped oscillations, setup differential equation and assuming the solution mention the variation of amplitude with respect to time.	08	L2	CO1
	b.	Explain Mach number, Mach angle, Resonance, Sharpness of resonance.	07	L2	CO1
	c.	A mass 0.5 kg causes an extension 0.03 m in a spring and the system is set for oscillations. Find (i) Force constant K of the spring, (ii) Angular frequency w, (iii) Period T of the resulting oscillation.	05	L3	CO5
		Module – 2			
Q.3	a.	Define Poisson's ratio and derive the relation between Young's modulus, Rigidity modulus and Poisson's ratio.	08	L2	CO1
	b.	Define 3 types of Moduli and discuss stress-strain curve.	08	L2	CO1
	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
		OR			
Q.4	a.	Explain elongation, compression strain and Poisson's ratio and also arrive at the relation between them and explain limiting values of Poisson's ratio.	08	L2	CO1
	b.	Explain Beam, Types of Beams, bending moment, ductile fracture and brittle fracture.	08	L2	CO1
	c.	Calculate the force required to produce an extension of 1mm in steel wire of length 2 meter and diameter 1mm. Given Young's modulus $Y = 2.1\times10^{11}$ N/m^2.	04	L3	CO5
		Module – 3			
Q.5	a.	With some relevant points define and explain Lambert's cosine law and Inverse Square law.	08	L2	CO2
	b.	Define Reverberation and Reverberation Time. Discuss Reverberation time optimum value for good auditorium.	08	L2	CO2
	c.	A hall having volume of 1500 m^3 has total absorption equivalent to 100 m^2 Sabine. Calculate the reverberation time of the hall.	04	L3	CO2
		OR			

Q.6	a.	Define Photometry and Radiometry and also define 4 photometric quantities and 4 radiometric quantities.	10	L2	CO2
	b.	Explain Impact of Noise in Multi-Storied buildings.	05	L2	CO2
	c.	The volume of room is 1500 m^3. The wall area of the room is 260 m^2, the floor area is 140 m^2, and the ceiling area is 140 m^2. The average sound absorption co-coefficient for wall is 0.03, for the ceiling is 0.8 and for the floor is 0.06. Calculate the average absorption co-efficient and the reverberation time.	05	L3	CO2
		Module – 4			
Q.7	a.	Explain construction and working of semiconductor LASER with necessary diagram.	08	L2	CO3
	b.	With necessary diagram, explain propagation of light through optical fibre and obtain expression for Numerical Aperture and angle of acceptance.	08	L2	CO3
	c.	The average output power of Laser source emitting a laser beam of wavelength 6328 A° is 5 mW. Find the number of photons emitted per second by the laser source.	04	L3	CO5
		OR			
Q.8	a.	What are optical fibers? Explain principle of optical fiber. With neat diagrams explain types of optical fibers.	10	L2	CO3
	b.	Define Attenuation co-efficient, induced absorption, spontaneous emission, stimulated emission, population inversion, metastable state.	06	L2	CO3
	c.	An optical fiber has a core material with reactive index 1.55 and its cladding material has a refractive index of 1.5. The light is launched into it in air. Calculate the numerical aperture, the acceptance angle and also the fractional index change.	04	L3	CO5
		Module – 5			
Q.9	a.	Explain the classification of natural hazards and man-made hazards with examples.	10	L2	CO4
	b.	Define earthquake and discuss four types of earthquake.	05	L2	CO4
	c.	A recent earthquake in San Francisco measured 7.1 on the Richter scale. How many times more intense was the San Francisco earthquake earlier registered 8.3 on the Richter scale.	05	L3	CO4
		OR			
Q.10	a.	Enumerate the causes and adverse effects of tsunami waves.	08	L2	CO4
	b.	Define landside and describe the causes for landslides.	08	L2	CO4
	c.	Early in the century the earthquake in San Francisco registered 8.3 on the Richter scale. In the same year, another earthquake was recorded in South America that was four time stronger. What was the magnitude of the earthquake in South America?	04	L3	CO4

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