



CBCS SCHEME

BPHYC102/202

First/Second Semester B.E/B.Tech. Degree Examination, June/July 2026 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. M : Marks , L: Bloom's level, C: Course outcomes.
3. VTU Formula Hand Book is permitted.

		Module – 1	M	L	C
1	a.	Define Simple Harmonic Oscillation and give two examples. Obtain the differential equation for simple harmonic oscillation using Hooke's Law.	6	L2	CO1
	b.	Classify the waves based on Mach number and mention any five applications of shock waves.	9	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) The force constant 'K' of the spring ii) Angular frequency ω iii) Period 'T' of the resulting oscillation.	5	L3	CO1
OR					
2	a.	Set up the differential equation for forced oscillations and assuming the equations of amplitude and phase discuss the dependence of amplitude on frequency of the applied external periodic force.	9	L2	CO1
	b.	Derive the expressions for the effective spring constant of springs in series and parallel combination.	6	L2	CO1
	c.	In a Reddy shock tube experiment, the time taken to travel between the two sensors is 195 μ s. If the distance between two sensors is 100 mm. Calculate the Mach number. Assume speed of sound as 340 m/s.	5	L3	CO1
		Module – 2			
3	a.	Derive the expression for bending moment with a neat diagram.	9	L2	CO1
	b.	Explain the nature of elasticity with the help of stress-strain curve.	6	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 N, applied along its length. Given Young's modulus of material of wire $Y = 2.1 \times 10^{11}$ N/m ² .	5	L3	CO1

OR

4	a.	Define Poisson's ratio. Mention its limiting value. Derive the relation between Young's modulus, Rigidity modulus and Poisson's ratio.	8	L2	CO1
	b.	Explain Beam, types of beams, bending moment, ductile fracture and brittle fracture.	8	L2	CO1
	c.	Calculate the force required to produce an extension of 1 mm in steel wire of length 2 meters and diameter 1 mm. Given Young's modulus $Y = 2.1 \times 10^{11} \text{ N/m}^2$.	4	L3	CO1

Module – 3

5	a.	Define reverberation and reverberation time and hence derive Sabine's formula.	10	L2	CO2
	b.	Explain the impact of noise in multistoried buildings.	5	L2	CO2
	c.	A hall has a volume of $1,20,000 \text{ m}^3$. It has a reverberation time of 1.5 seconds. What is the average absorbing power of the surface if the total absorbing surface area is $25,000 \text{ m}^2$?	5	L3	CO2

OR

6	a.	Define Photometry and Radiometry and also define 4 photometric quantities and 4 radiometric quantities.	10	L2	CO2
	b.	Explain the requisites for good acoustics.	5	L2	CO2
	c.	A cinema hall has a volume of 7500 m^3 with reverberation time of 1.5 second. What should be the total absorption in the hall?	5	L3	CO2

Module – 4

7	a.	What are optical fibers? Explain principle of optical fiber. With neat diagram explain types of optical fibers.	9	L2	CO3
	b.	Define numerical aperture and hence derive an expression for numerical aperture of an optical fiber.	6	L2	CO3
	c.	An optical fiber kept in air has core and cladding of refractive index 1.41 and 1.40 respectively. Calculate the numerical aperture and angle of acceptance.	5	L3	CO3

OR

8	a.	Define : i) LASER ii) Population inversion iii) Active medium iv) Induced absorption v) Pumping vi) Meta stable state.	6	L2	CO3
	b.	Discuss the principle, construction and working of optical fiber sensors - Displacement sensor and Temperature sensor.	9	L2	CO3
	c.	In a diffraction grating experiment the light undergoes 2 nd order diffraction at an angle of 1.5°. Find the wavelength of LASER source given the grating constant = 4.7×10^{-5} m.	5	L3	CO5

Module – 5

9	a.	Discuss the Engineering structure to withstand Earthquake and Tsunami waves.	7	L2	CO4
	b.	Define Landslide and describe the causes for landslides.	8	L2	CO4
	c.	Intensity of one earthquake is 40 times the intensity of the other. If the magnitude of first earthquake is 8.5, estimate the magnitude of the other.	5	L3	CO4

OR

10	a.	Explain the classification of Natural Hazards and man-made hazards with examples.	10	L2	CO4
	b.	What are the causes of forest fire and how are they detected using remote sensing.	6	L2	CO4
	c.	How many times more intense is a 5.0 magnitudes earthquake compared to a 1.0 magnitude earthquake?	4	L3	CO4
