CBCS SCHEME

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BPHYC102/202

First/Second Semester B.E./B.Tech. Degree Examination, June/July 2025
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.	Setup the differential equation for damped oscillations. Explain overdamping, critical damping and under damping by graph.	07	L2	CO1
	b.	With a neat diagram, explain the construction and working of Reddy shock tube. Mention any two applications of shock waves.	09	L2	CO1
	c.	A vibrating system of natural frequency 500 cycles/second is forced to vibrate with a periodic force/unit mass of amplitude 100×10^{-5} N/kg in the presence of damping/unit mass of 0.01×10^{-3} rad/s. Calculate the maximum amplitude of vibration of the system.	04	L3	CO5
		OR			
Q.2	a.	Define stiffness factor of a spring. Obtain an expression for the effective spring constant of springs in series and parallel combinations.	09	L2	CO1
	b.	Define Mach number and Mach angle. Classify the waves based on Mach number.	06	L1	CO1
	c.	A car has a spring system that support the in-built mass 1000 kg. When a person with a weight 980 N sits at the C of G, the spring system sinks by 2.8 cm. When the car hits a bump, it starts oscillating vertically. Find the period of oscillations.	05	L3	CO5
		Module – 2			
Q.3	a.	State and explain Hooke's law. Explain the nature of elasticity with the help of stress-strain diagram.	07	L2	CO1
	b.	Define Bending moment. Derive an expression for Bending moment in terms of moment of inertia.	09	L2	CO1
	c.	A brass bar of length 1 m, area of cross section 0.01 m^2 is clamped horizontally at one end. A mass of 1 kg is applied at the other end. What is the depression produced in the bar? [Given $Y = 9.78\times10^{10}$ N/m^2]	04	L3	CO5
		OR			
Q.4	a.	Define Poisson's ratio and derive the relation between Young's modulus [Y], Rigidity modulus [n] and Poisson's ratio [σ].	09	L2	CO1
	b.	Explain the different types of beams and mention any two applications.	06	L2	CO1
	c.	A solid lead sphere of radius 10.3 m is subjected to a numerical pressure of 10 N/m^2 acting all over the surface. Determine the change in its volume. [Given Bulk modulus [K] for lead is 4.58×10^{10} N/m^2]	05	L3	CO1

		Module – 3			
Q.5	**a.**	What is Radiometry? Explain the radiometric quantities such as Radiant energy, Radiant power, Radiant intensity, Radiance, Irradiance and Radiant exitance along with respective equations.	**10**	**L2**	**CO2**
	b.	Mention any six requisites for acoustics in auditorium.	**06**	**L1**	**CO2**
	c.	A cinema has a volume of 7500 m^3 with reverberation time of 1.5 sec. What should be the total absorption in the hall?	**04**	**L3**	**CO2**
		OR			
Q.6	**a.**	Define reverberation and reverberation time. Based on assumptions made by Sabine deduce the expression for reverberation time.	**10**	**L2**	**CO2**
	b.	What is acoustics? Explain the types of acoustics.	**06**	**L2**	**CO2**
	c.	Explain Cosine law and Inverse square law.	**04**	**L2**	**CO2**
		Module – 4			
Q.7	**a.**	Explain the construction and working of the semiconductor laser with a neat diagram.	**08**	**L2**	**CO3**
	b.	What is attenuation? Discuss the various losses in an optical fibre.	**07**	**L2**	**CO3**
	c.	The ratio of population of two energy levels is 1.059×10^{-30}. Find the wave-length of light emitted by spontaneous emissions at 330 K.	**05**	**L3**	**CO5**
		OR			
Q.8	**a.**	Explain propagation of light through optical fibre arrive at the expression for numerical aperture and angle of acceptance.	**09**	**L2**	**CO3**
	b.	Describe laser range finder in defense and speed checker.	**06**	**L2**	**CO3**
	c.	The attenuation in an optical fibre is 3.6 dB/km. What fraction of its initial intensity remains (i) after 1 km (ii) after 3 km?	**05**	**L3**	**CO3**
		Module – 5			
Q.9	**a.**	What is Landslide? Describe the cause for landslide.	**07**	**L2**	**CO4**
	b.	Enumerate any four causes and adverse effects of tsunami waves.	**08**	**L1**	**CO4**
	c.	The magnitude of earthquake arose in Gujarat during the year 2001 was 6.9. Calculate the energy released.	**05**	**L3**	**CO4**
		OR			
Q.10	**a.**	Define earthquake and mention its causes. Discuss the engineering structures that can be designed to withstand the forces of an Earthquake.	**09**	**L2**	**CO4**
	b.	Mention any three fire proof materials and fire fighting equipments.	**06**	**L1**	**CO4**
	c.	The intensity of one earthquake is 100 times the intensity of other. If the magnitude of the first earthquake is 8.5 , estimate the magnitude of other.	**05**	**L3**	**CO4**

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