CBCS SCHEME

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BPHYC102/202

First/Second Semester B.E./B.Tech. Degree Examination, Dec.2023/Jan.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.	What is Force Constant? Obtain an expression for effective spring constant of two springs connected in series and parallel.	8	L2	CO1
	b.	Describe the construction and working of Hand operated Reddy shock tube with neat diagram.	7	L2	CO1
	c.	The displacement of two springs connected in series and parallel is respectively 3.86×10^{-2} m and 0.8×10^{-2} m , for a mass 0.05kg. Calculate the force constant of springs when connected in series and parallel. [given $g = 9.8$ m/s^2].	5	L3	CO5
		OR			
Q.2	a.	Mentioning the various forces acting on a system under damped oscillations, setup differential equation for damped oscillations and discuss in brief the types of damping with graphical representation.	7	L3	CO1
	b.	Define the terms Mach numbers and Mach angle. List the characteristics and applications of shock waves (any 3).	8	L2	CO1
	c.	In a Reddy shock tube experiment, the time taken to travel between two pressure sensors is 250 μs. If the distance between the sensors is 120mm. Calculate Mach number. [Given speed of sound 340 m/s].	5	L3	CO1
		Module – 2			
Q.3	a.	State Hooke's Law. Explain stress hardening and softening with the help of stress – strain diagram.	7	L2	CO1
	b.	Define Bending Moment. Derive an expression for bending moment with help of a sketch.	9	L3	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 Young's modulus of material of wire $Y = 2.1 \times 10^{11}$ N/m^2.	4	L3	CO1
		OR			
Q.4	a.	Define Young's modulus. Rigidity modulus and Poisson's ratio. Derive the relation between them.	10	L2	CO1
	b.	What is Fracture? Discuss the failure of Engineering materials.	6	L2	CO1

	c.	A solid lead sphere of radius 10.3m is subjected to a normal pressure of $10N/m^2$ acting all over the surface. Determine change in its volume. Given $K = 4.58 \times 10^{10}$ N/m^2.	4	L3	CO1
		Module – 3			
Q.5	a.	Explain the requisites for good acoustics.	5	L2	CO2
	b.	Define Reverberation time and hence derive Sabine's formula.	10	L3	CO2
	c.	A Cinema hall has a volume of $7500m^3$ with reverberation time of 1.5sec. What should be the total absorption in the hall?	5	L2	CO2
		OR			
Q.6	a.	Explain the impact of noise in multi – stored buildings.	6	L2	CO2
	b.	What is the difference between Radiometry and Photometry? Define the terms Radiant Energy, Radiant Power , Radiant Intensity and Irradiance with equations.	10	L2	CO2
	c.	A classroom has dimensions $20 \times 15 \times 5$ m^3. The reverberation time is 3.5sec. Calculate the total absorption of its surfaces and the average absorption coefficient.	4	L3	CO2
		Module – 4			
Q.7	a.	Define Population Inversion. With a neat labeled diagram, describe the construction and working of semiconductor laser.	8	L2	CO3
	b.	Define Acceptance Angle. Derive an expression for numerical aperture of an optical fiber.	8	L2	CO3
	c.	In a diffraction grating experiment, the light undergoes 2^{nd} order diffraction at an angle of 22°. Find the wavelength of laser source given the slit width is 1.66×10^{-4} cm.	4	L3	CO5
		OR			
Q.8	a.	Discuss the principle, construction and working of optical fiber displacement sensor.	7	L2	CO1
	b.	Mention the requisites of laser system. Write a note on application of lasers in defence (Laser Range finder) and in the measurement of atmospheric pollutants (LIDAR).	9	L2	CO1
	c.	An optical signal losses 15% of its power after travelling a fiber length 400. What is the fiber loss?	4	L2	CO1
		Module – 5			
Q.9	a.	What is an Earthquake? How do we classify earthquakes and explain?	9	L2	CO4
	b.	Discuss how Tsunami waves are created and what are their adverse effects?	7	L2	CO4

	c.	Calculate the intensity of an earthquake of magnitude 7.1 assuming the base intensity as I_O.	4	L3	CO4
		OR			
Q.10	a.	Explain how excess rainfall induces landslides.	7	L2	CO4
	b.	Name any two fire proofing materials. List fire safety and prevention measures required at your workplace.	8	L2	CO4
	c.	Intensity of one earthquake is 40 times the intensity of eh other. If the magnitude of first earthquake is 8.5 , estimate the magnitude of the other.	5	L3	CO4

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