CBCS SCHEME

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BPHYC102/202

First/Second Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

Applied Physics for Civil Engg 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 Stiffness factor of a spring and hence derive expressions for the effective spring constant of springs in series and parallel combinations.	07	L2	CO1
	b.	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
	c.	Calculate the mach angle if the object is travelling with a speed of 660 m/s given the speed of sound in the medium is 330 m/s.	05	L3	CO1
		OR			
Q.2	a.	Mention four mach regimes and explain the construction and working of Reddy shock tube with the help of neat sketch.	09	L3	CO1
	b.	Explain the types of springs and their applications.	06	L2	CO1
	c.	Evaluate the resonance frequency of a spring of force constant 2467 Nm carrying a mass of 100 gm.	05	L3	CO5
		Module – 2			
Q.3	a.	Mention the types of engineering materials and with figure explain brittle and ductile fractures in engineering materials.	09	L2	CO1
	b.	Define a beam and explain the types of beams.	06	L2	CO1
	c.	A metal cube of side 0.20 m is subjected to a shearing force of 4000 N. The top surface is displaced through 0.50 cm with respect to the bottom. Calculate the shear modulus of elasticity of the metal.	05	L3	CO5
		OR			
Q.4	a.	Describe stress hardening and stress softening.	06	L2	CO1
	b.	Define Poisson's ratio, Young's modulus and rigidity modulus and derive the relation between them.	09	L2	CO1
	c.	Calculate the force required to produce an extension of 1mm in wire made of material with Young's modulus 100 GPa and of length 1 m and diameter 1 mm.	05	L3	CO5

		Module – 3			
Q.5	**a.**	Give the qualitative explanation of radiometric quantities such as radiant energy, radiant power, radiant intensity, radiance, radiant existence etc along with respective equations.	**10**	**L2**	**CO2**
	b.	Describe reflectance and transmittance.	**05**	**L2**	**CO2**
	c.	Explain the impact of noise in multi-storied buildings.	**05**	**L2**	**CO2**
		OR			
Q.6	**a.**	Define reverberation and reverberation time and hence derive Sabine's formula.	**09**	**L2**	**CO2**
	b.	Explain Cosine law and Inverse square law.	**06**	**L2**	**CO2**
	c.	The reverberation time is found to be 1.5 sec for an empty hall and it is found to be 1 sec when a curtain cloth of 20 m^2 is suspended at the center of the hall. If the dimensions of the hall are $10\times8\times6$ m^3, calculate the coefficient of absorption of the curtain cloth.	**05**	**L3**	**CO2**
		Module – 4			
Q.7	**a.**	Enumerate the requisites of a laser system and describe the construction and working of semiconductor laser with a neat sketch and energy level diagram.	**09**	**L2**	**CO3**
	b.	Derive an expression for numerical aperture in terms of refractive indices of core, cladding and the surrounding.	**06**	**L2**	**CO3**
	c.	Calculate the number of photons emitted per second for a LASER with power output 10 MW given the wavelength of fiber 690 nm.	**05**	**L3**	**CO5**
		OR			
Q.8	**a.**	Define attenuation in fiber with the expression for attenuation coefficient and describe the various fiber losses.	**10**	**L2**	**CO3**
	b.	Explain the construction and working of fiber optic temperature sensor.	**05**	**L2**	**CO3**
	c.	Calculate the numerical aperture and acceptance angle for an optical fiber of RI of core 1.5 and RI of cladding 1.45 placed in water of RI 1.33.	**05**	**L3**	**CO5**
		Module – 5			
Q.9	**a.**	Discuss the classification of earthquakes.	**09**	**L2**	**CO4**
	b.	Enumerate the causes and adverse effects of tsunami waves.	**06**	**L2**	**CO4**
	c.	Calculate the intensity of earthquakes of magnitude 6.5 assuming the base intensity as I_0.	**05**	**L3**	**CO4**
		OR			
Q.10	**a.**	Define landslide and describe the causes for landslides.	**08**	**L2**	**CO4**
	b.	Discuss the engineering structures to withstand earthquakes and Tsunami waves.	**07**	**L2**	**CO4**
	c.	The intensity of one earthquake is 100 times the intensity of the other. If the magnitude of the first earthquake is 8.9 estimate the magnitude of the other.	**05**	**L3**	**CO4**

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