SIDDHARTH INSTITUTE OF ENGINEERING TECHNOLOGY :: PUTTUR
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QUESTION BANK (DESCRIPTIVE)

Subject with Code :ENGINEERING PHYSICS(20HS0848)

Course & Branch: B.Tech –CIVIL/AGRI (I –SEM) , ME (II-SEM)

Year & Sem : I-B.Tech & I/II-Sem **Regulation:** R20

UNIT- I
WAVE OPTICS

1	a	State and explain principle of superposition.	[CO1]	[6M]	[L2]
	b	Define interference and summarizing the importance conditions to get sustained interference.	[CO1]	[6M]	[L2]
2	a	Discuss the theory of interference of light due to thin films by reflection with suitable ray diagram.	[CO1]	[4M]	[L1]
	b	Derive the condition for bright and dark rings interference in the case of thin films by reflected light.	[CO1]	[8M]	[L4]
3	a	Describe the formation of Newton's ring with necessary theory with relevant diagram and derive the expressions for dark and bright fringes.	[CO1]	[9M]	[L3]
	b	In a Newton's rings experiment, the diameter of the 5^{th} ring is 0.30 cm and the diameter of the 15^{th} ring is 0.62 cm. Calculate the diameter of the 25^{th} ring.	[CO1]	[3M]	[L4]
4	a	How the wavelength of light sources is determined by using Newton's ring's concept.	[CO1]	[8M]	[L4]
	b	In a Newton's rings experiment the diameter of the 8^{th} ring was 0.35cm and the diameter of the 18^{th} ring was 0.65cm.If the wavelength of the light used is 6000A° then find the radius of curvature of the plano-convex lens.	[CO1]	[4M]	[L4]
5	a	What are engineering applications of interference?	[CO1]	[4M]	[L3]
	b	What are engineering applications of diffraction?	[CO1]	[4M]	[L3]
	c	A parallel beam of light of 6000 A° is incident on a thin glass plate of refractive index 1.5 such that the angle of refraction into the plate is 50^{o}.Calculate the least thickness of the glass plate which	[CO1]	[4M]	[L4]

will appear dark by reflection.

6	a	Define diffraction? Distinguish between Fraunhofer and Fresnel's diffraction,	[CO1]	[6M]	[L2]
	b	Compare Interference and Diffraction.	[CO1]	[6M]	[L2]
7	a	In the study of Fraunhofer diffraction due to single slit how the diffraction fringes formed.	[CO1]	[8M]	[L2]
	b	Obtain conditions for bright and dark fringes in single slit diffraction pattern and draw intensity distribution.	[CO1]	[4M]	[L4]
8	a	Describe Fraunhofer diffraction due to double slit and derive the conditions for principal maxima, secondary maxima and minima.	[CO1]	[8M]	[L2]
	b	A plane transmission grating having 4250 lines per cm is illuminated with sodium light normally. In the second order spectrum, the spectral lines are deviated by 30^0. What is the wavelength of the spectral line?	[CO1]	[4M]	[L4]
9	a	Define diffraction grating and write about construction of diffraction grating.	[CO1]	[8M]	[L1]
	b	Find the highest order that can be seen with a grating having 15000 lines/inches. The wavelength of the light used is 600nm.	[CO1]	[4M]	[L4]
10	a	Define following terms i. Grating spectrum ii. Grating element	[CO1]	[6M]	[L1]
	b	How wavelength light is determined by diffraction grating.	[CO1]	[6M]	[L4]

UNIT –II

CRYSTALLOGRAPHY& X –RAY DIFFRACTION

1	a	What is (i) Unit cell (ii)space lattice (iii) Bravais Lattice iv)Lattice parameters.	[CO2]	[4M]	[L1]
	b	Explain the various types of crystal systems with a neat sketch and examples.	[CO2]	[8M]	[L4]
2	a	Derive the packing factor of SC.	[CO2]	[6M]	[L4]
	b	Derive the packing factor of BCC.	[CO2]	[6M]	[L4]
3	a	Define coordination number and atomic packing factor.	[CO2]	[4M]	[L1]
	b	Show that FCC is mostly closed packed structure than BCC and SC.	[CO2]	[8M]	[L4]
4	a	What are Miller indices? Mention the procedure to find Miller indices.	[CO2]	[8M]	[L2]
	b	Write the important features of Miller indices.	[CO2]	[4M]	[L1]

5	a	Deduce the expression for the interplanar distances in terms of miller indices for a cubic system.	[CO2]	[8M]	[L4]
	b	Draw miller indices of planes (1 0 0), (1 0 1), (0 0 1) and ($\bar{1}$ 0 0)	[CO2]	[4M]	[L4]
6	a	State and explain Bragg's law of X-ray diffraction.	[CO2]	[8M]	[L4]
	b	Find the ratiod_{100}:d_{110}: d_{111} for a simple cubic structure.	[CO2]	[4M]	[L3]
7	a	Consider a body centered cubic lattice of identical atoms having radius R. Compute 1) The number atoms per unit cell 2) The coordination number 3) The packing fraction.	[CO2]	[9M]	[L2]
	b	the radius of atoms in α –iron belonging to BCC structure . Take the density of α- iron as 7860kg /$m^3$and atomic weight of iron as 55.85.	[CO2]	[3M]	[L4]
8	a	What is Bravais lattice? What are the different space lattice in the cubic system.	[CO2]	[8M]	[L1]
	b	For a cubic system ,if 'a' is the lattice constant ,then find the interplanar separation for (111) planes.	[CO2]	[4M]	[L3]
9	a	Explain how the X-ray diffraction can be employed to determine the crystal structure.	[CO2]	[9M]	[L4]
	b	The Bragg's angle for reflection from the (111) plane in a FCC crystal is 19.2^o for an X-ray wavelength of 1.54 A.U , Calculate cube edge of the unit cell.	[CO2]	[3M]	[L4]
10	a	Explain the principle, procedure and advantage of Debye-Scherrer (Powder method) of X-ray diffraction.	[CO2]	[9M]	[L2]
	b	Find the angle at which the third order reflection of X-ray of 0.79A^o wavelength can occur in a calcite crystal of 3.04x10^{-10} m spacing?	[CO2]	[3M]	[L3]

UNIT-III
ACOUSTICS AND ULTRASONICS

1.	(a)	Define i) Reverberation ii) Reverberation time iii) loudness and iv) intensity of sound.	[CO3]	[4M]	[L1]
	(b)	What are the basic requirements of acoustically good hall?	[CO3]	[8 M]	[L1]
2.	(a)	Define absorption coefficient of sound and derive it?	[CO3]	[7 M]	[L4]
	(b)	A class room of volume 360 m^3 has a reverberation time 1.6 seconds. Calculate the total sound absorption coefficient of the class room?	[CO3]	[5 M]	[L4]
3.	(a)	Write Sabine's formula for reverberation time? Mention factors controlling the reverberation time?	[CO3]	[7 M]	[L1]
	(b)	A hall of volume 1000 m^3 is found to have a reverberation time of 2 seconds. If the area of the sound absorbing surface is 350 m^2, calculate average absorption coefficient?	[CO3]	[5 M]	[L4]
4.	(a)	Define following terms (1) Reverberation (2) Absorption coefficient (3) Pitch and Loudness of sound	[CO3]	[8M]	[L1]

	(b)	A class room of volume 200 m^3 has a reverberation time 1.6 seconds. Calculate the total sound absorption coefficient of the class room?	[CO3]	[4 M]	[L4]
5.	(a)	What is the importance of acoustics in engineering	[CO3]	[6 M]	[L1]
	(b)	How we optimize the reverberation time in the music halls?	[CO3]	[6 M]	[L2]
6.	(a)	Write the properties of Ultrasonic waves.	[CO3]	[6 M]	[L1]
	(b)	Explain the detection methods of Ultrasonic waves.	[CO3]	[6 M]	[L2]
7.	(a)	Explain Piezoelectric effect.	[CO3]	[4 M]	[L2]
	(b)	Describe the application of Ultrasonic in non-destructive testing (NDT) of material	[CO3]	[8 M]	[L2]
8.	(a)	How ultrasonics are produced by using piezoelectric generator?	[CO3]	[8 M]	[L2]
	(b)	A quartz crystal has a thickness of 4 x 10^{-3} and density 3 x 10^3 kg/m^3. Calculate its fundamental frequency. Give the Youngs modulus of crystal is 8.2 x 10^{10} N/m^2.	[CO3]	[4 M]	[L4]
9.	(a)	Give the important applications of ultrasonic waves?	[CO3]	[6 M]	[L2]
	(b)	How will you classify sound waves based on their frequencies?	[CO3]	[6 M]	[L2]
10.	(a)	Write brief note on medical applications of ultrasonic waves?	[CO3]	[6 M]	[L1]
	(b)	What are the characteristics of sound?	[CO3]	[6 M]	[L1]

UNIT – IV

MECHANICS OF SOLIDS

1	a	Define the following i) Elasticity ii) isotropic materials iii) rigid body iv) Plasticity v) Hooke's law	[CO4]	[5M]	[L1
	b	What is stress? Explain different types of stresses.	[CO4]	[7M]	[L4]
2	a	What is Hooke's law? Explain.	[CO4]	[4M]	[L1]
	b	Describe the behavior of a wire under an increasing load.	[CO4]	[8M]	[L2]
3	a	Define i) Young's modulus ii) Bulk modulus iii) Rigidity modulus iv) Poisson's ratio	[CO4]	[4M]	[L1]
	b	Derive the relation between different elastic moduli.	[CO4]	[8M]	[L4]
4	a	Mention different types of supports.	[CO4]	[8M]	[L1]
	b	Calculate Poisson's ratio for silver. Given its Young's modulus =7.25x10^{10} $N/m^2$and bulk modulus = 11x10^{10} N/m^2.	[CO4]	[4M]	[L4]
5	a	Classify different types of beams.	[CO4]	[8M]	[L2]
	b	Obtain an expression for the internal energy due to strain.	[CO4]	[4M]	[L4]
6	a	Define strain. Explain the types of strain.	[CO4]	[8M]	[L2]
	b	A wire of 3.0 m long and 0.625 sq.cm in cross section is found to stretch by 0.3 cm under a tension of 1200 kg. What is Young's modulus of the material of the wire?	[CO4]	[4M]	[L1]
7	a	Define Young's modulus and bulk modulus.	[CO4]	[4M]	[L1]
	b	Obtain the relation between the Young's modulus and bulk modulus.	[CO4]	[8M]	[L4]
8	a	Define Young's modulus and rigidity modulus.	[CO4]	[4M]	[L1]
	b	Obtain the relation between rigidity modulus and Young's modulus.	[CO4]	[8M]	[L4]
9	a	Define shear strain. Explain how shear strain is related to modulus of rigidity.	[CO4]	[8M]	[L2]
	b	The Young's modulus for steel is Y=2x$10^{11}$$N/m^2$ and its rigidity	[CO4]	[4M]	[L4]

		modulus $\eta=8x10^{10}N/m^2$. Estimate the Poisson's ratio and its bulk modulus.			
10	a	Deduce an expression for energy stored per unit volume in stretched wire.	[CO4]	[7M]	[L4]
	b	Estimate the work done in stretching a wire of cross section 1.25 mm^2 and length 1.9 m through 0.14 mm. The Young's modulus of wire is 45 $x10^9$ N/m^2.	[CO4]	[5M]	[L4]

UNIT-V
SUPERCONDUCTIVITY AND PHYSICS OF NANOMATERIALS

1	a	Define Superconductivity? And Prove that super conductor is a very good diamagnetic material.	[CO5]	[8M]	[L5]
	b	Write the properties of Superconductors.	[CO5]	[4M]	[L1]
2	a	Explain the Type-I and Type-II superconductors.	[CO5]	[8M]	[L2]
	b	What is Meissner effect? Explain how Superconductors are behave like a Diamagnetic material.	[CO5]	[4M]	[L1]
3	a	Explain BCS theory of superconductors.	[CO5]	[8M]	[L2]
	b	Calculate the critical current for a lead wire of 0.5mm radius at4.2K . Given for lead T_c = 7.18K, Ho=6.5 x 10^4A/m.	[CO5]	[4M]	[L3]
4	a	i) Define Flux Quantization?	[CO5]	[2M]	[L1]
		ii) Explain flux quantization?	[CO5]	[6M]	[L2]
	b	i) Define Critical Temperature?	[CO5]	[2M]	[L1]
		ii) A superconducting material has a critical temperature of 3.7K and a magnetic field of 0.0306T at 0 K. Find the critical field at 2K.	[CO5]	[2M]	[L3]
5	a	Explain DC and AC Josephson effects in superconductors.	[CO5]	[8M]	[L2]
	b	What are the applications of superconductors.	[CO5]	[6M]	[L1]
6	a	i) What is nanomaterial?	[CO6]	[2M]	[L1]
		ii) Write the classification of nanomaterials.	[CO6]	[4M]	[L1]
	b	Explain the basic principle of nanomaterials.	[CO6]	[6M]	[L2]
7	a	i) Define Nano Science and Nano Technology?	[CO6]	[2M]	[L1]
		ii) Explain the concept of Quantum Confinement in nano materials.	[CO6]	[4M]	[L2]
	b	What are the applications of nanomaterials in different fields.	[CO6]	[6M]	[L1]
8	a	Explain why surface area to volume ratio very large for nano materials?	[CO6]	[6M]	[L2]
	b	What are the mechanical, magnetic and optical properties of nanomaterials.	[CO6]	[6M]	[L1]
9	a	What are the techniques available for synthesizing nanomaterials?	[CO6]	[4M]	[L1]
	b	Explain ball milling technique for synthesis of nanomaterial?	[CO6]	[8M]	[L2]

10	a	Explain Sol-Gel technique for synthesis of nanomaterial?	[CO6]	[8M]	[L2]
	b	What are the advantages of sol-gel process?	[CO6]	[4M]	[L1]

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