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SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES (SITAMS)

AUTONOMOUS - NAAC ACCREDITED

**Awarded 'A' Grade by Technical Education, Govt. of A.P.
Approved by AICTE, New Delhi & Permanently Affiliated to JNTUA, Ananthapuramu
An ISO 9001:2015 Certified Institution**

**Counselling
Code:**

SSCC

Department Of Science and Humanities

ENGINEERING PHYSICS

QUESTION BANK

(Common to Mechanical & Civil Branches)

Regulations : R20

Compiled by:

Dr.H.Umamahesvari

Professor

Department of Science and Humanities

SITAMS, Chittoor

Sreenivasa Institute of Technology and Management Studies (AUTONOMOUS)

20BSC123

ENGINEERING PHYSICS
(Common to Civil and Mechanical branches)

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Course Educational Objectives:

1. To enlighten the periodic arrangement of atoms in crystals, Bragg's law and to provide fundamentals related to structural analysis through powder diffraction method.
2. To identify the importance of the optical phenomenon i.e. interference and diffraction related to its Engineering applications.
3. To understand the mechanisms of Lasers and the propagation of light wave through optical fibres along with engineering applications
4. To acquire the knowledge in dielectric, magnetic materials and nano materials and their applications in different fields of Engineering
5. To familiarize the concepts of theoretical acoustic to practical use in engineering field. To explain the significance of ultrasound and its application in NDT for diversified engineering application.

UNIT-1: CRYSTALLOGRAPHY AND X-RAY DIFFRACTION (9)

Crystallography: Space lattice, Basis, unit cell and lattice parameters – Bravais Lattice – Crystal systems – Packing fraction – Coordination number – Packing fraction of SC, BCC & FCC. **X-Ray Diffraction:** Bragg's law – Bragg's X-ray diffractometer – Crystal structure determination by Powder method.

UNIT- 2: WAVE OPTICS (9)

Interference: Interference – Principle of superposition – Interference of light – Conditions for sustained interference – Interference in thin films (Reflection Geometry) – Colors in thin films – Newton's Rings – Determination of wavelength and refractive index. **Diffraction:** Diffraction – Introduction – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction due to single slit.

UNIT -3: LASERS AND FIBER OPTICS (9)

Lasers: Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – Nd-YAG laser – He-Ne laser – Applications of lasers. **Fiber Optics:** Introduction – Principle of optical fiber – Acceptance Angle – Numerical Aperture – Classification of optical fibers based on refractive index profile and modes – Propagation of electromagnetic wave through optical fibers – Propagation Losses (Qualitative) – Applications.

UNIT -4: ENGINEERING MATERIALS (9)

Dielectric Materials: Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant – Types of polarizations: Electronic, Ionic and Orientation polarization (Qualitative) – Lorentz internal field – Clausius-Mossotti equation. **Magnetic Materials:** Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and permeability – Origin of permanent magnetic moment – Classification of magnetic materials: Dia, para & Ferro –

UNIT-1: CRYSTALLOGRAPHY AND X-RAY DIFFRACTION**PART-A (Two Marks Questions)**

Q.No	Question	PO attainment
1	What are space lattices?	PO1
2	What is unitcell?	PO1
3	What are basis?	PO1
4	What is primitive lattice?	PO1
5	Define co-ordination number	PO1
6	Define packing fraction	PO1
7	What is body centre cubic lattice?	PO1
8	What is base centre cubic lattice?	PO1
9	What is face centre cubic lattice?	PO1
10	What are Lattice parameters?	PO1
11	What is Bragg's Law?	PO1
12	What are Bravais Lattices?	PO1
13	How many types of crystal structures and what are they?	PO1
14	Which crystal system has 4 types of lattices	PO1
15	Give the lattice parameters of cubic crystal system	PO1
16	What is packing fraction of SC structure	PO1
17	What is packing fraction of BCC structure	PO1
18	What is packing fraction of FCC structure	PO!
19	Give the lattice parameters of rhombohedral crystal system	PO1
20	Give the lattice parameters of hexagonal crystal system	PO1
PART-B (Marks-10)		
1	Explain 1. Lattice 2. Basis 3. Unit cell 4. Lattice Parmeters 5. Packing fraction	PO1.PO2
2	Expalin about sevenscrystal systems	PO1.PO2
3	What are Bravais lattices and explain the bravais lattices in various crystal system	PO1.PO2
4	Show that FCC is possessing the closely packed sturture	PO1.PO2
5	Show that BCC is possessing the loosely packed sturture by calculating its packing fraction.	PO1.PO2
6	Show that SC is possessing the loosely packed sturture by calculating its packing fraction.	PO1.PO2
7	Expalin Braggs Law	PO1.PO2
8	Explain the Powder crystal method of predicting crystal structure	PO1.PO2
9	Compare the packing fractions of SC, BCC and FCC	PO1.PO2
10	Expalin about seven crystal systems with the number of Bravais lattices possible in each case.	PO1.PO2

UNIT-2: WAVE OPTICS**PART-A (Two Marks Questions)**

Q.No	Question	PO attainment
1	Define Superposition Principle	PO1
2	Define the condition for maximum displacement in Superposition Principle	PO1
3	Define the condition for minimum displacement in Superposition Principle	PO1
4	Define interference.	PO1
5	Differentiate between constructive interference and destructive interference.	PO1
6	Define constructive interference.	PO1
7	Define destructive Interference	PO1
8	Define the characteristics of coherence Source	PO1
9	Give the expression of path difference between the two rays reflected from the uniform thin film	PO1
10	Give the condition for constructive and destructive interference in the uniform thin film	PO1
11	List two important conditions to produce sustained Interference.	PO1
12	Name the type of light source used in Newton's rings formation.	PO1
13	Describe the conditions to obtain dark and bright rings?	PO1
14	Explain Why the central spot is dark in the Newton's rings formed by reflected light.	PO1
15	Explain why Newton's rings consists of concentric rings.	PO1
16	Define diffraction?	PO1
17	Which type of source and wavefronts are used in Fresnel Diffraction	PO1
18	Which type of source and wavefronts are used in Fraunhofer's Diffraction	
19	Differentiate between Fresnel's diffraction and Fraunhofer's diffraction	PO1
20	Define diffraction grating?	PO1
PART-B (Marks-10)		
1	Explain the phenomena of interference in two parallel thin films.	PO1.PO2
2	Derive an expression for the path difference in two parallel thin films.	PO1.PO2
3	Explain the formation of parallel fringes in a uniform thin film and hence give the conditions to get bright and dark fringes	PO1.PO2
4	Describe Newton's Rings experimental setup and hence explain the conditions to get bright and dark fringes	PO1.PO2
5	Calculate the wavelength of the monochromatic source by Newton's rings experiment	PO1.PO2
6	Calculate the refractive index of the given liquid by Newton's rings experiment	PO1.PO2
7	Distinguish between Fresnel diffraction and Fraunhofer diffraction.	PO1.PO2
8	Explain Fraunhofer diffraction due to a single slit with necessary theory.	PO1.PO2
9	What is Diffraction grating? Explain.	PO1.PO2
10	Differentiate between diffraction and interference	PO1.PO2

UNIT-3 LASERS& FIBER OPTICS**PART-A (Two Marks Questions)**

Q.No	Question	PO attainment
1	Give the important properties of <u>LASER</u>	PO1
2	Give the drawbacks of conventional light sources compare to LASERs	PO1
3	Define the process of absorption	PO1
4	Define the process of spontaneous emission	PO1
5	Define the process of stimulated emission	PO1
6	Differentiate between spontaneous emission and stimulated emission.	PO1
7	Explain What is population inversion?	PO1
8	Name the important components of laser device.	PO1
9	List out applications of Lasers.	PO1
10	Who invented Helium-Neon Laser?	PO1
11	Explain what is an optical fiber?	PO1
12	Name the principle of optical fiber?	PO1
13	Name the parts in optical fiber.	PO1
14	Define numerical aperture.	PO1
15	Define acceptance angle.	PO1
16	List out the applications of optical fiber.	PO1
17	Name the types of optical fibers.	PO1
18	List the advantages of optical fibers?	PO1
19	Differentiate between single mode step index and Multi mode Step index fibers.	PO1
20	Contrast step index and graded index fibers.	PO1
PART-B (Marks-10)		
1	Explain the terms 1.Absorption 2. Spontaneous emission 3. Stimulated emission	PO1.PO2
2	What is mean by Pumping mechanism elaborately discuss about various types of pumping mechanisms to achieve Population inversion	PO1.PO2
3	Explain the construction and working of a He-Ne Laser with suitable diagrams.	PO1.PO2
4	Explain the construction and working of Nd: YAG With the help of suitable diagram.	PO1.PO2
5	What is the acceptance angle of an optical fiber and derive an expression for it.	PO1.PO2
6	Define the following terms for an optical fiber • Cone acceptance • Numerical aperture • acceptance angle and Fractional refractive index change	PO1.PO2
7	What is Total internal reflection? Discuss its importance in optical fibers.	PO1.PO2
8	Describe the different types of optical fibers with neat Diagrams.	PO1.PO2
9	Differentiate between light propagation in	PO1.PO2

	(i)Step Index Fiber(ii)Graded Index fiber.	
10	What are monomode and Multimode Optical Fibers	PO1.PO2

UNIT-4 ENGINEERING MATERIALS		
PART-A (Two Marks Questions)		
Q.No	Question	PO attainment
1	What is electric dipole?	PO1
2	Define electric dipole moment	PO1
3	What is polarization?	PO1
4	Define is electronic polarization	PO1
5	Define is ionic polarization	PO1
6	Define is orientation polarization	PO1
7	What is magnetic dipole?	PO1
8	Define orbital Magnetic Moment	PO1
9	Define spin Magnetic Moment	PO1
10	Define magnetic susceptibility.	PO1
11	Define magnetic permeability.	PO1
12	What are diamagnetic materials.	PO1
13	What are paramagnetic materials.	PO1
14	What are ferromagnetic materials.	PO1
15	What are nanomaterials?	PO1
16	Explain the significance of nanomaterials	PO1
17	What are the types of nanomaterials	PO1
18	What are the two approaches in the fabrication of nanomaterials	PO1
19	Give any two advantages of ball milling method	PO1
20	Give any two advantages CVD	PO1
PART-B (Marks-10)		
1	Define following terms a) Magnetic Dipole b) Magneticmoment b) Magnetic susceptibility (χ) d) Magnetic permeability (μ) e) Relative permeability (μ_r)	PO1.PO2
2	Differentiate between Hard and Soft Magnetic Materials	PO1.PO2
3	What is mean by Magnetic Hysteresis? Explain in detail the Magnetic Hysteresis loop.	PO1.PO2
4	Classify Magnetic materials on the basis of magnetic moment.	PO1.PO2
5	What is an Internal Field? Derive an Expression for Internal field	PO1.PO2
6	Derive Clausius-Mossotti equation	PO1.PO2
7	What are nanomaterials and Expalint the types of nanomaterials with their significance	PO1.PO2
8	Expalin Ball milling method	PO1.PO2
9	Expalin about chemical Vapour deposition	PO1.PO2
10	Give tha applications of nanomaterials	PO1.PO2

UNIT 5 :ACOUSTICS AND ULTRASONICS**PART-A (Two Marks Questions)**

Q.No	Question	PO attainment
1	What are acoustic waves?	PO1
2	What is acoustics?	PO1
3	What are the characteristics of Acoustics in a good auditorium?	PO1
4	What is meant by Reverberation ?	PO1
5	What is Reverberation time?	PO1
6	Define the absorption of sound waves	PO1
7	Define absorption coefficient	PO1
8	What is Air-Borne noise	PO1
9	What is Structure-borne noise	PO1
10	Give two steps to control reverberation	PO1
11	Write sabin's formula for reverberation time	PO1
12	Write Sabine's formula for absorption coefficient	PO1
13	What are ultrasonic waves	PO1
14	Give any two properties of ultrasonic waves	PO1
15	Give any two applications of ultrasonic waves	PO1
16	What is mean by piezo electric effect?	PO1
17	What is mean by inverse piezo electric effect?	PO1
18	What is mean by non destructive testing?	PO1
19	Give any two method implemented for non destructive testing	PO1
20	What are Audible waves ?	PO1
PART-B (Marks-10)		
1	What are the characteristics of Acoustics in a good auditorium?	PO1.PO2
2	What is meant by Reverberation and Reverberation time?	PO1.PO2
3	Derive Sabine's formula using the Growth and Decay method.	PO1.PO2
4	Explain the absorption of sound waves and absorption coefficient.	PO1.PO2
5	Define absorption coefficient and Determination of absorption coefficient:by stationary wave method and reverberation method	PO1.PO2
6	Mention the factors affecting architectural Acoustics and their remedies.	PO1.PO2
7	Explain Extraneous noise and sound insulation.	PO1.PO2
8	What are ultrasonic waves and give their properties	PO1.PO2
9	Explain the piezoelectric method of producing piezoelectric methos	PO1.PO2
10	Explain about non destructive testing through Pulse echo method system	PO1.PO2