MUTHAYAMMAL ENGINEERING COLLEGE

(An Autonomous Institution)

(Approved by AICTE, New Delhi, Accredited by NAAC & Affiliated to Anna University)
Rasipuram - 637 408, Namakkal Dist., Tamil Nadu

Department of Physics
Question Bank - Academic Year (2021-22)

Course Code & Course Name	:	**21BSS01 & ENGINEERING PHYSICS**
Name of the Faculty	:	
Year/Sem/Sec	:	

UNIT I   ACOUSTICS AND ULTRASONICS

Part-A (2 Marks)

1. State Weber-Fechner law
2. Define sound intensity level and write its units
3. What is reverberation and reverberation time ?
4. What are the acoustical factors to be considered while we construct any building?
5. What are echoes? How is it avoided ?
6. Define decibel.
7. Define absorption coefficient of a material with its unit .
8. What is meant by ultrasonic waves?
9. State the properties of ultrasonic waves.
10. State the principle of Magnetostriction effect?

Part-B (16 Marks)

1. (i) What is acoustic of building ? Explain the various factors affecting the architectural acoustics of a building and their remedies. (10)

   (ii) Write A short note on SONAR (6)

2. (i)What is reverberation time? Using Sabine's formula explains how the sound absorption   coefficient of a material is determined.(10)

   (ii) Explain the resonance effect in acoustics(6)

3. (i) Describe piezo electric method for producing ultrasonic waves with its advantages and disadvantages. (10)

   (ii) Write a short note on resonance mthod in NDT (6)

4. (i) Explain the methods available to detect ultrasonic waves.(8)

   (ii) What are the advantages of Non destructive Technique (8)

5. (i) Describe magnetostriction effect for producing ultrasonic waves.(10)

   (ii) Explain the application of ultrasonic waves in Industry (6)

UNIT II   LASERS

Part-A (2 Marks)

1. What are the properties of laser?

2. Differentiate spontaneous emission from stimulated emission.

3. What is meant by population inversion?

4. What is an optical pumping?

5. What is optical resonant cavity?

6. What is electrical discharge method?

7. What are the important components of the laser system?

8. What is an active material?

9. What are the industrial applications of laser?

10. What are the applications of hologram?

Part-B (16 Marks)

1. (i) Derive an expression for Einstein's theory of A and B coefficients? (12)

   (ii) Explain the Stimulated process in Laser (4)

2. (i) List out the applications of laser beam in industries and medical field.(8)

   (ii) Differentiate spontaneous emission from stimulated emission (8)

3. (i) Explain the construction and working of Nd-YAG laser with energy level diagram. (12)

   (ii) List out the medical applications of laser (4)

4. (i) With a neat diagram explain the principle, construction and working of He-Ne laser.(10)

   (ii) Write a short notes on population inversion (6)

5. (i) Explain the construction and reconstruction of hologram. (10)

   (ii) Explain the applications of hologram (6)

UNIT III   FIBRE OPTICS AND ITS APPLICATIONS

Part-A (2 Marks)

1. What is the principle of fiber optic communication?

2. Define acceptance angle and numerical aperture?

3. A step index fiber has a numerical aperture 0.26, refractive index of core is 1.5.
   Calculate the refractive index of cladding.

4. Classify step index and graded index fiber.

5. What is intermode dispersion?

6. What is attenuation?

7. Classify the optical fiber based on the materials used.

8. What are the advantages of single mode fiber?

9. Write a short note on medical endoscope.

10. What are the advantages of fibre optic communication system.

Part-B (16 Marks)

1. (i) Explain the propagation of light through optical fiber.(12)

   (ii) Write a short note on Total internal reflection (4)

2. (i) Describe the double crucible techniques for the manufacturing of an optical fiber.(8)

   (ii) Describe the classification of fibre based on materials (8)

3. (i) Explain the classification of optical fiber based on their refractive index profile

   and mode of propagation.(12)

   (ii) What are the advantages of intermodal dispersion (4)

4. (i) Explain the fiber optical communication system with a neat diagram.(12)

   (ii) What are the advantages of fiber communication system (4)

5. (i) Explain the attenuation loss occurs in fibre optics.(8)

   (ii) Explain the splicing methods in fiber. (8)

UNIT IV   CRYSTAL PHYSICS

Part-A (2 Marks)

1. What is space lattice?

2. What are bravais lattices?

3. The distance between the Miller indices (1 1 0) is 2.86 A^0. Calculate the lattice constant.

4. Draw the planes for Miller indices (1 0 1) and (0 0 1) in a cubic structure.

5. What are Miller indices?

6. Define primitive cell.

7. Define unit cell.

8. Name the classification of seven crystal system.

9. What is meant by tightly packed and loosely packed crystal structure?

10. State the coordination number and packing factor for HCP and Diamond structure?

Part-B (16 Marks)

1. (i) Deduce the equation for interplaner distance.(10)

   (ii) Differentiate the crystalline materials from amorphous materials. (6)

2. (i) Calculate the Atomic radius and APF of SC and BCC structures.(10)

   (ii) Explain the procedure to find miller indices (6)

3. (i) Calculate the Packing factor of FCC structures.(12)

   (ii) Write a short note on Burger vector (4)

4. (i) Derive the expression for c/a ratio in HCP crystal structures.(10)

   (ii) Write a short note on line defect (6)

5. (i) Calculate number of atoms per unit cell, coordination number, atomic radius and atomic packing factor for HCP structure.(12)

   (ii) Write a short note on line defect (4)

UNIT V   PROPERTIES OF MATTER AND THERMAL PHYSICS
Part-A (2 Marks)

1. What is Elasticity?
2. Define stress and strain and write down their units.
3. Define Young's modulus.
4. Define Poisson's ratio
5. Explain neutral axis.
6. State Hooke's law.
7. What are the factors that affect the elasticity?
8. Explain the term heat conduction.
9. Define the heat convection process.
10. Define thermal conductivity.

Part-B (16 Marks)

1. (i) How will you determine the Young's modulus of a beam using uniform bending? (10)

   (ii) Explain the factors affecting elasticity of a material (6)

2. (i) What is cantilever? Explain the method to determine the Young's modulus of the beam with neat diagram (12)

   (ii) Write a short note on I-shpe girders (4)

3. (i) Derive the relation between the three elastic moduli.(8)

   (ii) Explain the modes of heat transfer (8)

4. (i) Derive an expression for the amount of heat conducted through the radial distance of rubber tube (12)

   (ii) Describe the Newton's law of cooling (4)

5. (i) Explain the conduction of heat through compound media (10)

   (ii) Write a short note on Lee's disc method (6)

Course Faculty   **HOD**