Code No: R10103/R10

Set No. 1

I B.Tech I Semester Supplementary Examinations, Jan/Feb 2015
ENGINEERING PHYSICS-I
(Common to Civil Engineering, Electrical & Electronics Engineering, Mechanical Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Chemical Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Computer Engineering, Aeronautical Engineering, Bio-Technology, Automobile Engineering, Mining and Petroliem Technology)

Time: 3 hours   Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks
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1. Explain the following:
   (a) Superposition Principle
   (b) Concept of Coherence
   (c) colours in thin films   [3x5=15]

2. (a) Explain with necessary theory, the Fraunhofer diffraction due to 'n' slits.
   (b) Calculate the maximum number of orders possible for a plane diffraction grating.   [12+3]

3. (a) Describe the construction and working of a Nicol's prism.
   (b) Explain how a Nicol's prism acts as a polarizer and analyser.   [8+7]

4. (a) What is a Primitive cell? How does it differ from a unit cell?
   (b) Derive the expressions for packing fractions of BCC & FCC crystals.
   (c) Calculate the no. of atoms per unit cell of a metal with lattice parameter $2.9A^o$. Molecular weight 55.85, density = 7870 kg/m^3 and Avogadro number 6.02×10^{23}mol^{-1}.   [4+5+6]

5. (a) State and explain Bragg's law.
   (b) Describe with suitable diagram, the powder method of determination of crystal structure.
   (c) Monochromatic X-rays of wavelength 1.5 A.U. are incident on a crystal face having an interplanar spacing of 1.6 A.U. Find the highest order for which Bragg's reflection maximum can be seen.   [4+7+4]

6. (a) What is meant by population of an energy state?
   (b) What is Population inversion? How is it achieved? Why is it necessary for lasing action?
   (c) What are the three Einstein coefficients? Derive the relations between them.
                                                                              [2+5+8]

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7. (a) What are the conditions to produce total internal reflection in optical fiber.
   (b) Describe structure of different types of Optical fibers with ray paths.
   (c) Explain the role of optical fibers in medicine and industry.   [3+8+4]

8. (a) Explain the basic principle of ultrasonic testing.
   (b) What are the advantages and limitations of ultrasonic testing.   [5+10]

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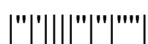
Code No: R10103/R10

$$\boxed{\textbf{Set No. 2}}$$

I B.Tech I Semester Supplementary Examinations, Jan/Feb 2015
ENGINEERING PHYSICS-I
(Common to Civil Engineering, Electrical & Electronics Engineering,
Mechanical Engineering, Electronics & Communication Engineering,
Computer Science & Engineering, Chemical Engineering, Electronics &
Instrumentation Engineering, Bio-Medical Engineering, Information
Technology, Electronics & Computer Engineering, Aeronautical
Engineering, Bio-Technology, Automobile Engineering, Mining and
Petroliem Technology)

Time: 3 hours   **Max Marks: 75**
Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Explain the interference of light due to thin films in Reflection Geometry.
   (b) What is Coherent Length? Explain   [12+3]

2. (a) Differentiate between interference and diffraction intensity patterns. How do
   you differentiate the Fresnel diffraction to that of Fraunhofer diffraction?
   (b) How many orders will be visible, if the wavelength of light is 5000. Given that
   the number of lines per centimeter on the grating is 6655.   [11+4]

3. (a) What is a quarter wave plate? Deduce its thickness for a given wave length
   in terms of its refractive indices.

   (b) Find the minimum thickness of half wave and quarter wave plates for a light
   beam of wavelength 589.3nm. If $\mu_o = 1.65833$ and $\mu_e = 1.48640$.   [11+4]

4. (a) Describe the seven crystal systems with diagrams.
   (b) Classify various lattice types in the crystal system.   [10+5]

5. (a) Explain how the crystal structure will be determined by Powder method?

   (b) Calculate distance between two successive parallel planes having miller indices
   (hkl).   [7+8]

6. (a) What is laser? What are the important characteristics of lasers?

   (b) Derive the expression for energy density of radiation in terms of Einstein
   coefficients.

   (c) What are the industrial applications of lasers?   [5+7+3]

7. (a) Describe the structures of different types of optical fibers with ray paths.

   (b) What are the conditions to produce total internal reflection in optical fiber.

   (c) Calculate the numerical aperture for an optical fiber with core and cladding
   refractive indices being 1.48 and 1.45 respectively.   [8+3+4]

8. (a) Write a detailed notes on the methods and systems corresponding to Non
   destructive testing using ultrasonic waves.

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(b) Explain in detail the classification of the different types of ultrasonic waves with diagrams and specific utility. [8+7]

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Set No. 3

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ENGINEERING PHYSICS-I
(Common to Civil Engineering, Electrical & Electronics Engineering,
Mechanical Engineering, Electronics & Communication Engineering,
Computer Science & Engineering, Chemical Engineering, Electronics &
Instrumentation Engineering, Bio-Medical Engineering, Information
Technology, Electronics & Computer Engineering, Aeronautical
Engineering, Bio-Technology, Automobile Engineering, Mining and
Petroliem Technology)

Time: 3 hours   Max Marks: 75
Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Explain the phenomenon of interference.

   (b) What are the necessary conditions for obtaining interference fringes.

   (c) Give the analytical treatment of interference of light and hence obtain the condition for maximum and minimum intensity.   [3+4+8]

2. (a) What is meant by diffraction of light? Explain it on the basis of Huygen's wave theory.

   (b) Obtain the condition for primary maxima in Fraunhofer diffraction due to single slit and derive an expression for width of the central maxima.

   (c) Write notes on Rayleigh's Criterion   [4+7+4]

3. (a) Describe the construction and working of a Nicol's prism.
   (b) Distinguish between Un Polarized and Polarized Lights.   [8+7]

4. (a) What is space lattice? Find the Packing Fraction for BCC & FCC crystals.

   (b) Define Coordination number & Atomic radius.

   (c) Iron has BCC structure with atomic weight 55.85 and density 7860 kg/m^3. Find the lattice constant.   [7+4+4]

5. (a) Explain how the crystal structure will be determined by Laue method?

   (b) Derive the expression for the Bragg's law.   [7+8]

6. (a) What is meant by life time of an energy level? What are the life times of ground state, excited state and metastable state?

   (b) Derive the relation between different Einstein coefficients.

   (c) Describe the lasing action in lasers.   [5+7+3]

7. (a) Explain the principle of optical fiber

   (b) What is meant by Numerical aperture? Derive expression for Numerical aperture.

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(c) The numerical aperture of an optical fiber is .039. If the fractional refractive index change of the material of its core and cladding is 0.05. Calculate the refractive index of material of the core. [3+8+4]

8. (a) What are Ultrasonic transducers? Write a note on quartz crystal transducer.

(b) Explain the need of inspection standards in ultrasonic inspection.

(c) Write a note on couplants used in ultrasonic inspection. [6+6+3]

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Technology, Electronics & Computer Engineering, Aeronautical
Engineering, Bio-Technology, Automobile Engineering, Mining and
Petroliem Technology)

Time: 3 hours   **Max Marks: 75**
Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Explain the principle of Superposition of waves.

   (b) Explain Young's experiment and derive the expression for fringe width.

   (c) Two coherent sources produce interference pattern. Intensity ratio of bright
   fringe to dark fringe is 9:1. Calculate the intensity ratio of the sources.
   [3+8+4]

2. (a) What is meant by Diffraction of light? Explain it on the basis of Huygen's
   wave theory.

   (b) Explain with necessary theory how wavelength of spectral line is determined
   using plane diffraction grating.   [7+8]

3. (a) What is a quarter wave plate? Deduce its thickness for a given wave length
   in terms of its refractive indices.

   (b) Find the minimum thickness of half wave and quarter wave plates for a light
   beam of wavelength 589.3nm. If $\mu_o = 1.65833$ and $\mu_e = 1.48640$.   [11+4]

4. (a) What is Crystal structure? Can a Unit cell be a primitive cell?
   (b) Distinguish between a crystal and an amorphous solid?
   (c) Derive the expression for density of crystal in terms of lattice constant. [5+5+5]

5. (a) Explain how the crystal structure will be determined by Powder method?

   (b) Calculate distance between two successive parallel planes having miller indices
   (hkl).   [7+8]

6. (a) Explain the basic principles for producing laser beam.
   (b) Distinguish between ordinary light and laser light.
   (c) Explain the uses of laser in various fields.   [6+5+4]

7. (a) Explain the principle behind the functioning of an optical fiber.

   (b) Define Numerical aperture and derive expression for it.

   (c) Calculate the angle of acceptance of a given optical fiber, if the refractive
   indices of the core and cladding 1.5 and 1.45 respectively.   [4+4+7]

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$$\boxed{\textbf{Set No. 4}}$$

8. (a) Discuss various non-destructive testing systems which are commonly adopted in industries using ultrasonics.

(b) Describe the ultrasonic flaw detector with suitable diagram. [8+7]

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