Code No: R10103/R10

Set No. 1

I B.Tech I Semester Supplementary Examinations, Sept- 2014
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) Discuss the theory of Newton's rings with relevant diagram.
   (b) Derive the expression for the diameters of dark and bright rings.

   [7+8]

2. (a) What is diffraction of light? Explain.
   (b) What are the types of diffraction and write the differences between them.
   (c) Write notes on Rayleigh's criterion of resolution.

   [5+5+5]

3. (a) Explain the concepts of double refraction.
   (b) Describe the construction and action of Nicol prism.
   (c) Find the polarizing angle for a glass of refractive index 1.732.   [3+8+4]

4. (a) Illustrate the Simple Cubic crystal structure.

   (b) Find the Coordination Number, Nearest Neighbour Distance, Atomic Radius
       and Packing Fraction for SC lattice.

   (c) Is unit cell of SC lattice a primitive or not? Why?   [4+9+2]

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 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) Explain the principle behind the functioning of an optical fiber.

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(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.   [5+5+5]

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

(b) Explain different types of scans in Ultrasonic testing.   [7+8]

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Code No: R10103/R10

Set No. 2

I B.Tech I Semester Supplementary Examinations, Sept- 2014
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) How do you obtain circular rings in Newton's rings experiment?

   (b) With necessary theory explain the experimental procedure to determine the refractive index of transparent liquid by using Newton's rings method.

   (c) In a Newton's rings experiment, the diameter of 10th dark ring changes from 1.40cm to 1.27cm when a liquid is introduced between the lense and the plate. Calculate the refractive index of the liquid. [4+7+4]

2. (a) What is diffraction of light? Explain.
   (b) What are the types of diffraction and write the differences between them.
   (c) Write notes on Rayleigh's criterion of resolution.

   [5+5+5]

3. (a) Define double refraction. Describe double refraction in calcite crystal to produce polarized light.

   (b) What are uniaxial and biaxial crystals? Give examples. Distinguish between them. [8+7]

4. (a) Explain unit cell and lattice parameters. What is a primitive cell and how does it differ from unit cell?

   (b) Obtain the relations between the edge of the unit cell and atomic radius for the BCC and FCC lattices.

   (c) Chromium has BCC structure. Its atomic radius is 0.1249nm. Calculate the free volume/unit cell. [5+6+4]

5. (a) What are Miller indices? How are they obtained?

   (b) Deduce the expression for the interplanar distance in terms of Miller indices for a cubic system.

   (c) Obtain Miller indices of a plane which intercepts at a, b/2 and 3c in simple cubic unit cell. Draw a neat diagram showing the plane. [5+6+4]

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Set No. 2

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) Define fractional Refraction index change. How is it related with Numerical Aperture.

   (b) Write notes on Attenuation losses in optical fiber.

   (c) Calculate the fractional index change for a given optical fiber. If the refractive indices of the core and cladding are 1.563 and 1.498. [5+5+5]

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

Set No. 3

I B.Tech I Semester Supplementary Examinations, Sept- 2014
ENGINEERING PHYSICS-I
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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) Explain with necessary theory how wavelength of spectral line is determined using plane diffraction grating.   [7+8]

3. (a) How the polarized light is different from ordinary light?

   (b) Write notes on Nicol prism.

   (c) Find the minimum thickness of half and quarter wave plates for a light beam, λ=589.3nm if μ_e= 1.48640 and μ_o= 1.65833.   [4+7+4]

4. (a) What is unit cell? What is primetime cell?

   (b) What are the seven crystal systems and write the relationship between lattice parameters in various crystal systems.

   (c) During its conversion from Iron BCC to FCC decrease of volume is 0.5%. Show that the maximum radius of the sphere that can just fit into the void at the center of FCC structure coordinated by the facial atoms is 0.414r, where r is the radius of atom.   [3+5+7]

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]

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Set No. 3

6. (a) What is laser? How does it differ from an ordinary source of light?
   (b) Define Einstein coefficients and obtain the relations between them.
   (c) What are the advantages of lasers in communication?   [4+8+3]

7. (a) Explain how the optical fibers are classified.

   (b) Explain the applications of optical fibers

   (c) An optical fiber has a numerical aperture of 0.2 and a cladding refractive index of 1.59. Find the acceptance angle for the fiber in water which has a refractive index of 1.33.   [6+5+4]

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

   (b) Explain different types of scans in Ultrasonic testing.   [7+8]

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Code No: R10103/R10 $\boxed{\textbf{Set No. 4}}$

I B.Tech I Semester Supplementary Examinations, Sept- 2014
ENGINEERING PHYSICS-I
(Common to Civil Engineering, Electrical & Electronics Engineering,
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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) State the principle of Superposition of waves.

   (b) With necessary theory explain the experimental procedure to determine the wavelength of the light using Newton's rings.

   (c) Newton's rings are observed in the reflected light of wavelength $5900 A^o$. The diameter of 10th dark ring is 0.5cm. Find the radius of curvature of the lens used.

   [2+9+4]

2. (a) Explain what is meant by diffraction of light. How diffraction is different from interference?

   (b) Discuss Fraunhofer single slit diffraction. Draw intensity distribution curves and give conditions for bright and dark fringes in single slit diffraction pattern.

   [5+10]

3. (a) What do you mean by polarization?

   (b) If the angle of incidence corresponds to the Brewster's angle, then show that the angle between reflected and refracted beams is 90^0.

   (c) The critical angle for a certain material is 45°. What is its polarizing angle.

   [5+5+5]

4. (a) What is unit cell? What is primitive cell?

   (b) What are the seven crystal systems and write the relationship between lattice parameters in various crystal systems.

   (c) During its conversion from Iron BCC to FCC decrease of volume is 0.5%. Show that the maximum radius of the sphere that can just fit into the void at the center of FCC structure coordinated by the facial atoms is 0.414r, where r is the radius of atom.   [2+5+8]

5. (a) What are Miller Indices? How are they obtained?
   (b) State and prove Bragg's law of X-ray diffraction.
   (c) What is the limiting condition for Bragg's law?   [5+8+2]

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Set No. 4

6. (a) Explain the characteristic properties of Laser.

   (b) With the help of suitable diagrams, explain the principle, construction and working of a He-Ne laser.

   (c) Mention some important applications of lasers. [4+8+3]

7. (a) Write notes on classification of optical fibers.

   (b) Explain the transmission of optical signals through different optical fibers with neat diagram. [7+8]

8. (a) What is ultrasonic testing and explain the basic principle?
   (b) What are the properties of Ultrasonic Waves? [7+8]

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