Code No: R10103/R10 **Set No. 1**

I B.Tech I Semester Supplementary Examinations, Feb/Mar 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)Explain the interference of light due to thin films.
   (b)What is Coherent Length? Explain [12+3]
2. (a) Explain Rayleigh's criterion of resolution.
   (b) Write a note on resolving power of a grating. [9+6]
3. (a) Discuss the various methods by which polarized light can be produced?
   (b) The refractive index of glass is 1.5. Calculate the Brewster's angle for it. Also calculate the angle of refraction. [9+6]
4. (a) What is Primitive cell? How does it differs from unit cell?
   (b) Illustrate the SC, BCC and FCC crystal structures.
   (c) Write different crystal systems [3+9+3]
5. (a) Explain the principle, procedure and advantage of Debye-Scherrer method of X-ray diffraction.
   (b) 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. [11+4]
6. (a) What are important characteristics of Laser?
   (b) What are the Scientific, Industrial and Medical applications of Laser?
   (c) What is the role of optical cavity and active medium in a Laser [4+6+5]
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) Calculate the angle of acceptance of a given optical fiber, if the refractive indices of the core and the cladding are 1.563 and 1.498 respectively. [3+8+4]
8. (a) Explain the working of Ultrasonic flaw detector.
   (b) Explain three different and most common types of scans used in Ultrasonic inspection. [6+9]

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Code No: R10103/R10 **Set No. 2**

I B.Tech I Semester Supplementary Examinations, Feb/Mar 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) State and explain Superposition principle?
   (b) With ray diagram discuss the theory of thin films and derive the condition for constructive and destructive interference in the case of reflected system. [3+12]

2. (a) What is meant by diffraction of light? Explain.
   (b) What is Rayleigh's Criterion for resolving power?
   (c) Define Resolving power of a grating. Derive the expression for Resolving power of a grating based on Rayleigh's Criterion. [3+6+6]

3. (a) What do you mean by Polarisation?
   (b) Distinguish between Polarised and Unpolarised lights.
   (c) Discuss how the Circular and Elliptical Polarised lights can be produced? [4+5+6]

4. (a) Explain the terms:
   (i) Space Lattice (ii) Basis (iii) Unit Cell (iv) Primitive Cell
   (b) Write notes on Bravias lattices
   (c) Lithium crystallizes in BCC structure. Calculate the lattice constant, given that atomic weight and density of Lithium are 6.94 and 530 kg/m^{3}respectively. [8+3+4]

5. (a) Derive Bragg's law and obtain the limiting condition for it.
   (b) 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. [11+4]

6. (a) Explain the construction and working of Ruby laser.
   (b) What are the differences between Homo junction Laser and Hetero junction Laser? [10+5]

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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) 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, Feb/Mar 2014
ENGINEERING PHYSICS-I
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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. [6+8]
2. (a) Describe Fraunhofer diffraction due to single slit.
   (b) Describe the action of plane transmission grating in producing diffraction spectrum.
   (c) Show that the grating with 500 lines/cm cannot give a spectrum in the 4^{th} order for the light of wavelength 5890. [6+5+4]
3. (a) What is quarter wave plate? Deduce expression for its thickness
   (b) Draw a ray diagram for extraordinary and ordinary rays before and after passing through a quarter wave plate.
   (c) At what wavelength, the given quarter wave plate of wavelength 600nm will act as half wave plate.
4. (a) Explain the terms 'Unit Cell', 'Basis' and 'Space lattice'.
   (b) Obtain the relation between the edge of the unit cell and atomic radius for SC, BCC and FCC lattices.
   (c) Chromium has BCC structure. Its atomic radius is 0.1249 nm. Calculate the free volume per unit cell. [3+8+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]
6. (a) Distinguish between Spontaneous and Stimulated emissions.
   (b) What is the reason for mono chromaticity of laser beam?

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(c) Derive the expression for energy density of radiation in terms of Einstein coefficients. [5+3+7]

7. (a) Define acceptance angle and derive expression for it in terms of fractional index change.
   (b) Write notes on scattering and Absorption loss in the optical fibers. [11+4]

8. (a) What is ultrasonic testing and explain the basic principle?
   (b) What are the properties of Ultrasonic Waves? [10+5]

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Code No: R10103/R10 **Set No. 4**

I B.Tech I Semester Supplementary Examinations, Feb/Mar 2014
ENGINEERING PHYSICS-I
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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. [6+8]
2. (a) What are the types of diffractions and give the differences between them.
   (b) Obtain the condition for primary maxima in Fraunhofer diffraction due to single slit and derive an expression for width of the central maxima. [5+10]
3. (a) What is meant by Double Refraction?
   (b) Write notes on Optic axis and its characteristics.
   (c) Discuss the construction and action of Nicol prism. [2+5+8]
4. (a) Define Packing fraction and Show that FCC crystals are closely packed than BCC crystals.
   (b) Explain the crystal structures of BCC and FCC crystals. [9+6]
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) Derive Einstein coefficients and explain their significance?
   (b) Describe the construction and working of a semiconductor Laser? [7+8]
7. (a) Describe the construction of an optical fiber and give typical dimensions of various parts.
   (b) Write notes on Attenuation losses in optical fiber communication.
   (c) Calculate the angle of acceptance of a given optical fiber, if the refractive indices of the core and cladding 1.563 and 1.498 respectively. [8+3+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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