

Code No: R10103/R10**Set No - 1****I B.Tech I Semester Supplementary Examinations, July - 2011****ENGINEERING PHYSICS - I****(Common to All Branches)****Time: 3 hours****Max. Marks :75****Answer any FIVE Questions
All Questions carry equal marks***** * * * ***

- 1 (a) What are the necessary conditions for obtaining interference fringes?
(b) Discuss the theory of Newton's rings with relevant diagram.
(c) Two coherent sources whose intensity ratio is 36:1 produce interference fringes. Deduce the ratio of maximum intensity to minimum intensity.
- 2 (a) What is meant by Diffraction of light? Explain it on the basis of Huygen's wave theory.
(b) Explain with necessary theory, the Fraunhofer diffraction due to 'n' slits.
(c) Calculate the maximum number of orders possible for a plane diffraction grating.
- 3 (a) How the polarized light is different from ordinary light?
(b) Explain Double refraction and Write notes on Nicol prism.
(c) Find the minimum thickness of half and quarter wave plates for a light beam, $\lambda=589.3\text{nm}$ if $\mu_e=1.48640$ and $\mu_o=1.65833$.
- 4 (a) What are Lattice parameters?
(b) What are the seven crystal systems and write the relation between lattice parameters in various crystal systems.
(c) Classify various lattice types in the crystal system and specify the effective number of lattice points per unit cell in each lattice type.
- 5 (a) State Bragg's law of X-ray diffraction.
(b) Describe Bragg's X-ray spectrometer and explain how Bragg's law can be verified.
(c) Monochromatic X-rays of wavelength 1.5\AA are incident on a crystal face having an interplanar spacing of 1.6\AA . Find the highest order for which Bragg's reflection maximum can be seen.
- 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.

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Set No - 1

- 7 (a) Explain the principle behind the functioning of optical fiber.
(b) Derive expression for acceptance angle for an optical fiber. How is it related to numerical aperture?
(c) What are the advantages of optical fiber communication system?
- 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.

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Code No: R10103/R10**Set No - 2****I B.Tech I Semester Supplementary Examinations, July - 2011****ENGINEERING PHYSICS - I****(Common to All Branches)****Time: 3 hours****Max. Marks :75****Answer any FIVE Questions
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- 1 (a) Explain the concept of coherence.
 - (b) Discuss why two different sources of light of the same wavelength cannot produce interference fringes.
 - (c) Give the theory of interference and obtain the condition for constructive and destructive interference.
- 2 (a) Explain what is meant by diffraction of light.
 - (b) Differentiate between interference and diffraction intensity patterns. How do you differentiate the Fresnel diffraction from Fraunhofer diffraction?
 - (c) How many orders will be visible, if the wavelength of light is 5000\AA . Given that the number of lines per centimeter on the grating is 6655.
- 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.
- 4 (a) What is Primitive cell? How does it differ from unit cell?
 - (b) Illustrate the SC, BCC and FCC crystal structures.
 - (c) Derive the expression for density of the crystal in terms of lattice constant.
- 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) Copper has FCC structure and the atomic radius is 0.1278 nm. Calculate the interplanar spacing for (1 1 0) and (2 1 2) planes.
- 6 (a) What do you understand by Population inversion? How can it be achieved?
 - (b) Derive the relation between the probabilities of spontaneous and stimulated emissions in terms of Einstein coefficients.
 - (c) Mention some important applications of lasers.

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Set No - 2

- 7 (a) Explain the principle behind the functioning of optical fiber.
(b) What is meant by Intermodal dispersion in optical fibers? How to overcome this problem? Explain.
(c) What are the advantages of optical fiber communication system?
- 8 (a) Explain the working of Ultrasonic flaw detector.
(b) Explain three different and most common types of scans used in Ultrasonic inspection.

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Code No: R10103/R10**Set No - 3****I B.Tech I Semester Supplementary Examinations, July - 2011****ENGINEERING PHYSICS - I****(Common to All Branches)****Time: 3 hours****Max. Marks :75****Answer any FIVE Questions****All Questions carry equal marks***** * * * ***

- 1 (a) With necessary theory explain the experimental procedure to determine the wavelength of the light using Newton's rings setup.
- (b) Newton's rings are observed in the reflected light of wavelength 5900\AA . The diameter of 10^{th} dark ring is 0.5cm . Find the radius of curvature of the lense used..
- 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.
- 3 (a) How the polarized light is different from ordinary light?
- (b) Explain Double refraction and Write notes on Nicol prism.
- (c) Find the minimum thickness of half and quarter wave plates for a light beam, $\lambda=589.3\text{nm}$ if $\mu_e= 1.48640$ and $\mu_o= 1.65833$.
- 4 (a) What is Primitive cell? How does it different from unit cell?
- (b) Illustrate the SC, BCC and FCC crystal structures.
- (c) Derive the expression for density of the crystal in terms of lattice constant.
- 5 (a) Discuss Bragg's law of X-ray diffraction.
- (b) Describe the powder method to determine 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.
- 6 (a) Explain the characteristics of Lasers.
- (b) Mention any two applications of laser each in the field of scientific research, engineering and medicine.
- (c) Explain the construction and working of semiconductor Laser.
- 7 (a) Explain the principle behind the functioning of optical fiber.
- (b) Derive expression for acceptance angle for an optical fiber. How is it related to numerical aperture?
- (c) What are the advantages of optical fiber communication system?
- 8 (a) Explain the working of Ultrasonic flaw detector.
- (b) Explain three different and most common types of scans used in Ultrasonic inspection.

Code No: R10103/R10**Set No - 4****I B.Tech I Semester Supplementary Examinations, July - 2011****ENGINEERING PHYSICS - I****(Common to All Branches)****Time: 3 hours****Max. Marks :75****Answer any FIVE Questions
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- 1 (a) Explain the Principle of Superposition of waves.
- (b) Describe and explain the phenomenon of interference of light by Young's double slit experiment.
- (c) In Young's double slit experiment the separation of the slits is 1.9mm and the fringe spacing is 0.31mm on a screen placed at a distance of 1 m from the slits. Calculate the wavelength of light.

- 2 (a) Explain what is meant by diffraction of light. How diffraction is different from interference?
- (b) Explain with necessary theory how wavelength of spectral line is determined using plane diffraction grating.
- (c) Show that the grating with 500 lines/cm cannot give a spectrum in the 4th order for the light of wavelength 5890Å.

- 3 (a) Discuss various methods by which polarized light can be produced.
- (b) What are Quarter and Half wave plates?
- (c) Calculate the thickness of half wave plate of quartz for a wavelength 500nm. Here $\mu_e = 1.553$ and $\mu_o = 1.544$.

- 4 (a) Explain the terms '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.

- 5 (a) State and explain Bragg's law.
- (b) Explain how the X-ray diffraction can be employed to determine the crystal structure.
- (c) Find the ratio of interplanar distances of (100), (110) and (111) planes for a simple cubic structure.

- 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.

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Set No - 4

- 7 (a) Explain the principle behind the functioning of optical fiber.
(b) What is meant by Intermodal dispersion in optical fibers? How to overcome this problem? Explain.
(c) What are the advantages of optical fiber communication system?
- 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.

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