

**I B.Tech - Regular Examinations, June 2009**

**ENGINEERING PHYSICS**

( Common to Civil Engineering, Mechanical Engineering, Chemical Engineering, Mechatronics, Metallurgy & Material Technology, Production Engineering, Aeronautical Engineering and Automobile Engineering)

**Time: 3 hours**

**Max Marks: 80**

**Answer any FIVE Questions  
All Questions carry equal marks**

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1. (a) What is the use of plano-convex lens in the Newton's rings experiment?  
(b) Explain how Newton's rings are formed and describe the method of determination of the radius of curvature of plano-convex lens.  
(c) Mention the medium used in between the plano convex lens and the bottom glass plate. [4+8+4]
  
2. (a) Explain the factors like reverberation, reverberation time, loudness and echo are affecting the architectural acoustics.  
(b) How the above mentioned difficulties are overcome. [10+6]
  
3. (a) What do you mean by demagnetization?  
(b) Explain the theory of dia magnetism.  
(c) List out the properties of dia magnetic materials. [4+8+4]
  
4. (a) Define the terms number of atoms per unit cell, coordination number, atomic radius and packing factor.  
(b) Derive the expressions for number of atoms per unit cell, coordination number, atomic radius and packing factor of Body Centered Cubic and Face centered cubic. [6+10]
  
5. (a) The first line of principle series of Sodium D - Line at  $5890 \text{ \AA}$ . This corresponds to a transition from the first excited state to the ground state. What is the energy of electron volts of the first excited state?  
(b) Discuss the application of laser in Engineering, Medical and Other fields.  
(c) Explain the pumping methods.
  - i. Optical pumping
  - ii. Electron excitation pumping. [4+8+4]
  
6. (a) Mention the advantages of optical fiber communication over the conventional communication system  
(b) Explain the principle of propagation of laser light through optical fiber.  
(c) How the laser beam is propagated through the fiber? [4+4+8]
  
7. (a) Explain the Debye and Einstein model.

- (b) Mention the importance of the Debye and Einstein models. [12+4]
8. (a) What are nanomaterials? Explain.
- (b) How do the physical and chemical properties of nano-particles vary with their size? [6+10]

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1. (a) Derive an expression for the intensity of the diffracted light from the single slit using Fraunhofer experiment.  
(b) Find the condition for principle maxima and secondary maxima for the above. [12+4]
2. (a) Explain the factors like reverberation, reverberation time, loudness and echo are affecting the architectural acoustics.  
(b) How the above mentioned difficulties are overcome. [10+6]
3. (a) State Meissner effect.  
(b) Explain the Meissner effect with the suitable diagram.  
(c) Explain the penetration depth in a superconductor. [4+8+4]
4. (a) What are Miller indices? What is their significance?  
(b) Draw the successive parallel planes of (100), (110) and (111) of Simple Cubic. [6+10]
5. (a) Classify the laser with major categories and give example for each type.  
(b) What is the principle of laser action? Explain briefly population inversion, Active medium and active centre. Explain different pumping methods involved in laser production.  
(c) Give any four differences between stimulated emission and spontaneous emission. [4+8+4]
6. (a) How optical fiber is classified according to their diameter.  
(b) i. Explain how light propagated through optical fibers.  
ii. What are the basic concepts behind the optical fiber communication?  
iii. Derive the acceptance angle and numerical aperture of a fiber.  
(c) Draw a flow chart how fibers are classified. [4+8+4]
7. (a) What is the polarization mechanisms involved in dielectric polarization?  
(b) With usual notations show that  $p = \epsilon_0 (\epsilon_r - 1)E$ .  
(c) Give the differences between Lorentz force and coulomb force in dielectrics. [4+8+4]

Code No: Z0123 / R07

**Set No. 2**

8. (a) How the physical and chemical properties of nano-particles vary with their size?
- (b) Write the important applications of nanomaterials. [10+6]

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1. (a) Define interference of light.  
(b) Describe and explain the phenomenon of interference of light.  
(c) Two coherent sources whose intensity ratio is 36:1 produce interference fringes. Deduce the ratio of maximum intensity to minimum intensity. [4+8+4]
2. (a) Explain the factors like reverberation, reverberation time, loudness and echo are affecting the architectural acoustics.  
(b) How the above mentioned difficulties are overcome. [10+6]
3. (a) Define Curie temperature.  
(b) Explain the theory of ferro magnetism.  
(c) List out the properties of ferro magnetic materials. [4+8+4]
4. (a) Describe an experiment of Bragg's X-ray spectrometer with a single crystal.  
(b) Explain how the Bragg's spectrum is used for the determination of the structure of the crystal. [10+6]
5. (a) What is the principle involved in Semiconductor laser?  
(b) Discuss the construction and working of homojunction semiconductor laser.  
(c) Write the application of semiconductor laser. [4+8+4]
6. (a) What are the points are important to mention single mode fiber?  
(b) Explain with a block diagram, the basic instrumentation technique adopted to explain the communication system.  
(c) A fiber has a core refractive index of 1.44 and cladding refractive index of 1.4. Find its numerical aperture and acceptance angle. [4+8+4]
7. (a) Explain the electric polarization.  
(b) Discuss the ionic polarization with neat diagram and also prove ionic polarization is inversely proportional to the square of the natural frequency of the ionic molecule and directly proportional to its reduced mass.  
(c) Compare active and passive dielectrics. [4+8+4]
8. (a) Write a detailed note on nanoscience.

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**Set No. 3**

(b) Why nanomaterials exhibit different properties? Explain. [6+10]

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1. (a) What are coherent sources?  
(b) Explain the fundamental conditions for the production of interference fringes.  
(c) Two straight and narrow parallel slits 1 mm apart are illuminated by monochromatic light. Fringes formed on the screen held at a distance of 70 cm from the slits are 0.5 mm apart. What is the wavelength of the light? [4+8+4]
2. (a) Explain the factors like reverberation, reverberation time, loudness and echo are affecting the architectural acoustics.  
(b) How the above mentioned difficulties are overcome. [10+6]
3. (a) What are ferromagnetic domains?  
(b) Discuss Weiss theory of ferromagnetism.  
(c) What are its merits and demerits? [4+8+4]
4. (a) Describe an experiment of Bragg's X-ray spectrometer with a single crystal.  
(b) Explain how the Bragg's spectrum is used for the determination of the structure of the crystal. [10+6]
5. (a) The first line of principle series of Sodium D - Line at  $5890 \text{ \AA}$ . This corresponds to a transition from the first excited state to the ground state. What is the energy of electron volts of the first excited state?  
(b) Discuss the application of laser in Engineering, Medical and Other fields.  
(c) Explain the pumping methods.
  - i. Optical pumping
  - ii. Electron excitation pumping. [4+8+4]
6. (a) Explain the phenomena of holography.  
(b) Explain the method of reconstruction of images from the hologram. [6+10]
7. (a) What is the polarization mechanisms involved in dielectric polarization?  
(b) With usual notations show that  $p = \epsilon_0 (\epsilon_r - 1)E$ .  
(c) Give the differences between Lorentz force and coulomb force in dielectrics. [4+8+4]

8. (a) What are nanomaterials? Explain.
- (b) How the physical and chemical properties of nano-particles vary with their size? [6+10]

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