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NMAM INSTITUTE OF TECHNOLOGY, NITTE (Section: F -

(An Autonomous College under VTU, Belgaum)

II Sem B.E. (Credit System) Mid Semester Examinations – I March 2009

Time: 1 Hour

PH102 – ENGINEERING PHYSICS

Marks:3

Note: Answer ONE from each part.

PART-I

1. a) What is dielectric break down? Explain the causes for dielectric break down. 04
   b) What is dielectric loss? Discuss the polarization mechanism and the absorption of energy from the field , for a dielectric material in an a.c.field. 07
   c) A parallel plate capacitor has an area of 6.45×10^{-4} m^2 and the plates are separated by a distance of 2×10^{-3} m across which a pd of 10 V is applied. If a material with dielectric constant 6 is introduced between the plates, determine the capacitance, the charge stored on each plate and the polarization. 04

2. a) Write a note on ferroelectric materials. 04
   b) Discuss the temp dependence of dielectric constant in polar and non-polar dielectrics. 07
   c) Calculate the relative dielectric constant of Barium Titanate crystal which when inserted in a parallel plate capacitor of area 10 mm x 10 mm and distance of separation of 2mm gives a capacitance of 10^{-19} F. 04

PART-II

3. a) What is a LDR? Explain with the principle the working of a LDR. 04
   b) What is a semiconductor? How do they differ from conductors? Why an increase in temperature decreases the resistivity of a semiconductor? 07
   c) A current of 3 mA is flowing in a semiconducting material of length 2 cm and width 1mm. Calculate the Hall voltage measured, if the hall coefficient is 3.66×10^{-4} m^3 / C. Also calculate the charge carrier concentrations. Given B=1Tesla. 04

4. a) With principle explain the construction and working of a light emitting diode. 04
   b) What is Hall Effect? Obtain the expression for Hall co- efficient and mobility of charge carriers 07
   c) What is a superconductor? Mention its properties. 04

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II Sem B.E. (Credit System) Mid Semester Examinations – II April 2009

Time: 1 Hour PH102 – ENGINEERING PHYSICS Marks:30

Note: Answer any ONE full question from each Part.

PART- I

a) With energy level diagram explain the construction and working of a He-Ne laser. (07)

b) Define numerical aperture in an optical fiber and derive an expression for the same. (04)

c) Calculate the energy difference between two energy levels of Ne atoms of a He-Ne gas laser, the wavelength of emitted light is 632.8 nm. Also find the number of photons emitted/sec if the output power is 1mW. (04)

a) Discuss briefly the principle of light propagation through optical fibers. Describe a graded index multimode fiber. (07)

b) Write any four differences between semiconductor laser and carbon dioxide laser. (04)

c) Calculate the R.I of cladding and angle of acceptance for an optical fiber of core R.I. 1.5 and N.A. 0.2441. (04)

PART - II

a) Define atomic packing factor. Calculate atomic packing factor of simple cubic, bcc and fcc structures (07)

b) What are Miller indices? Explain the procedure for finding miller indices with an example. (04)

c) Draw the following planes in a cubic lattice. (04)

(1 3 2) (0 1 0) (2 0 1) (101)

a) Define unit cell and space lattice. Derive an expression for the interplanar spacing in terms of Millier indices. (07)

b) Describe the structural features of ZnS (04)

c) Find the Miller indices of set of parallel planes which make intercepts in the ratio 3a:4b and are parallel to z-axis; where a, b and c being primitive vectors of the lattice. Also calculate the interplanar spacing of the planes by assuming the lattice to be cubic with lattice constant 3A°. (04)