DPHY21

M.Sc. DEGREE EXAMINATION, JUNE/JULY - 2019

(Second Year)
PHYSICS
Electromagnetic Theory and Modern Optics

Time : 3 Hours   Maximum Marks : 70

Answer any Five of the following
All questions carry equal marks

Q1) a) Explain the boundary conditions at the plane of separation between two dielectric media.

   b) Explain the change of phase on reflection.

Q2) a) Discuss the propagation of EM waves to conducting surface.

   b) Obtain an expression for transmission coefficient.

Q3) a) What are Einstein co-efficients? Obtain the relation between them.

   b) Write a note on Lasar pumping.

Q4) a) Explain the attainment of population inversion in two level Laser system.

   b) Explain the working of Ruby Lasar.

Q5) a) Explain the characteristics of holograms.

   b) Explain the Film resolution, source coherence and stability in holography.

Q6) a) Define total internal reflection in Fibre optics and write down the configurations.

   b) Explain the Mode theory of circular wave guides.

Q7) a) Distinguish between step index and graded index fibre structures.

   b) Explain the signal degradation in optical fibres.

Q8) a) Explain the pulse broodening in graded index fibres.

   b) Explain the method for the fabrication of optical fibres.

Q9) Write any Two of the following :

   a) Total internal reflector in F.M Theory.

   b) Optical resonator.

   c) Applications of holography.

   d) Radiative and core - Cladding losses in optical fibres.

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DPHY22

M.Sc. DEGREE EXAMINATION, JUNE/JULY - 2019

(Second Year)
PHYSICS
Nuclear Physics, Molecular & Resonance Spectroscopy

Time : 3 Hours   **Maximum Marks : 70**

Answer any Five of the following
All questions carry equal marks

Q1)   a)   Obtain an expression for mass defect binding energy of the nucleus.

   b)   Explain the ground state of Deuteron.

Q2)   a)   Explain the prediction of magic numbers.

   b)   Explain the liquid drop model of the nucleus.

Q3)   a)   Explain the different nuclear reaction with examples.

   b)   Write a note on nuclear reactors.

Q4)   a)   Explain the Fermi's theorem of β-decay.

   b)   Explain the interaction between the elementary particles.

Q5)   a)   Explain the determination of Spin-lattice and spin-spin relaxation times by pulse method.

   b)   Describe the working of NMR spectrometer.

Q6)   a)   Define ESR and explain the significance of 'g' factor in E.S.R.

   b)   Explain the fundamental requirements of NQR spectroscopy.

Q7)   a)   Explain different top molecules with examples.

   b)   Explain the vibrational energy of diatomic molecules.

Q8)   a)   Write a note on PQR branches.

   b)   Qualitatively explain the IR spectroscopy.

Q9)   Write any Two of the following :

   a)   Meson theory of Nuclear forces.

   b)   Gamow's theory of α-decay.

   c)   Working of ESR spectrometer.

   d)   Rotational spectra of Rigid rotator.

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DPHY23

M.Sc. DEGREE EXAMINATION, JUNE/JULY - 2019

Second Year
PHYSICS
Solid State Physics - I

Time : 3 Hours   **Maximum Marks : 70**

<u>Answer any Five of the following</u>
<u>All questions carry equal marks</u>

Q1)   a)   Explain the basis of crystal structure and unit cell.

      b)   Explain the meaning of a n-fold rotation axis and n-fold screw axis.

Q2)   a)   Show that reciprocal of 'fcc' is 'bcc' lattice.

      b)   Explain the determination of lattice constants.

Q3)   a)   Explain cohesive energy and electron affinity.

      b)   Explain the Ball and Spring model of a harmonic crystal.

Q4)   a)   Explain the normal modes of real crystals.

      b)   Discuss the quantization of lattice vibrations.

Q5)   a)   Explain the classical heat capacity of lattice and obtain an expression for it.

      b)   Write a note on anharmonic effects.

Q6)   a)   Explain the consequences of periodicity in electron energy bands.

      b)   Briefly explain the Kronig-Penny model.

Q7)   a)   Describe the zone schemes for energy bands.

      b)   Explain the classification of semiconductors with examples.

Q8)   a)   Explain the temperature dependence of electrical conductivity.

      b)   Write a note on integral quantum Hall effect.

Q9)   Write notes on any Two of the following :

      a)   Laue method in X-ray diffraction.

      b)   Primary and Secondary bonds.

      c)   Quantum theory of heat capacity.

      d)   Thermoelectric effect.

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DPHY24

M.Sc. DEGREE EXAMINATION, JUNE/JULY - 2019

(Second Year)
PHYSICS
Solid State Physics - II

Time : 3 Hours   Maximum Marks : 70

<u>Answer any Five questions</u>
<u>All questions carry equal marks</u>

Q1) a) Define polarization in dielectric and obtain an expression for dielectric constant.
  b) Write a note on dielectric losses.

Q2) a) Explain the Thermodynamic Theory of Ferroelectric transitions.
  b) Explain the Piezoelectricity and electrostriction.

Q3) a) Explain the Line and Planar imperfections in crystals.
  b) Explain the role of dislocations in crystal growth.

Q4) a) Explain diamagnetism and paramagnetism.
  b) Discuss the Nuclear paramagnetism by adiabatic demagnetization.

Q5) a) Distinguish between Ferromagnetism, Anti-ferromagnetism and ferrimagnetism.
  b) Write a note on Ferromagnetic domains.

Q6) a) Explain the Neel model of Ferrimagnetism.
  b) Write a note on GMR-CMR materials.

Q7) a) Explain the significance of energy gap in superconductivity.
  b) Explain the important predictions of the BCS theory.

Q8) a) Explain the Ginzburg-Landay theory of superconductivity.
  b) Write a note on High Tc superconductors.

Q9) Write any Two of the following :
  a) Applications of piezoelectric crystals.
  b) Point defects in crystals.
  c) Weiss theory oif Ferromagnetism.
  d) Isotope effect in superconductor.