

**(DPHY21)**

**ASSIGNMENT-1**

**M.Sc. (Second) DEGREE EXAMINATION, DEC. – 2017**

**Second Year**

**PHYSICS**

**Electromagnetic Theory and Modern Optics**

**MAXIMUM MARKS:30**

**Answer ALL Questions**

- Q1)** Find the boundary conditions prevailing at the interface of two dielectrics, assuming no free charge to be present.
- Q2)** a) Explain the polarization on reflections and by refraction.  
b) Write a note on total internal reflection.
- Q3)** a) Give a brief account on applications of lasers.  
b) Explain the amplification in a laser medium
- Q4)** a) Explain the attainment of population inversion in two – level lasers.  
b) What is optical resonator? Explain
- Q5)** a) Write a brief note on different broadening mechanisms.  
b) Describe the principle and working of ruby laser

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**ASSIGNMENT-2**

**M.Sc. (Second) DEGREE EXAMINATION, DEC. – 2017**

**Second Year**

**PHYSICS**

**Electromagnetic Theory and Modern Optics**

**MAXIMUM MARKS:30**

**Answer ALL Questions**

- Q1)** a) What is hologram? Explain the principles and characteristics of holograms.  
b) Write the applications of holography.
- Q2)** a) Obtain the wave guide equations for step index fibers.  
b) Distinguish between step index and graded index fibers
- Q3)** a) Explain the signal degradation and attenuation in optical fibers  
b) Explain mode coupling and fiber cabling.
- Q4)**
- a) Absorption of FM waves
  - b) Einstein co-efficients
  - c) Source Coherence and stability in holography
  - d) Mode theory of circular wave guides



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**ASSIGNMENT-1**

**M.Sc. (Second) DEGREE EXAMINATION, DEC. – 2017**

**Second Year**

**PHYSICS**

**Nuclear Physics, Molecular & Resonance Spectroscopy**

**MAXIMUM MARKS:30**

**Answer ALL Questions**

- Q1)** a) Explain nuclear stability and nuclear magnetic moment.  
b) Explain the charge independence and spin dependence of nuclear forces.
- Q2)** a) Explain p – p and n – p scattering.  
b) Briefly explain the shell model of the nucleus.
- Q3)** a) What is Q – equation? Explain its significance.  
b) Explain the Threshold energy and cross sections for nuclear reactions.
- Q4)** a) Explain the Gamow's theory of  $\alpha$  - decay.  
b) Explain the interaction between elementary particles.
- Q5)** a) Explain the spin – lattice and spin – spin relaxation mechanisms.  
b) Briefly explain the working of NMR.

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**ASSIGNMENT-2**

**M.Sc. (Second) DEGREE EXAMINATION, DEC. – 2017**

**Second Year**

**PHYSICS**

**Nuclear Physics, Molecular & Resonance Spectroscopy**

**MAXIMUM MARKS:30**

**Answer ALL Questions**

**Q1)** a) What is electron spin resonance? Explain the fine structure of unpaired electrons.

b) Explain the working of NQR spectrometer with neat block diagram.

**Q2)** a) Explain the diatomic linear symmetric top and asymmetric top molecules.

b) Explain the rotational spectra of Rigid rotator.

**Q3)** a) Explain the vibrational energy of diatomic molecules.

b) Explain the principle and applications of IR spectroscopy.

**Q4)**

a) Yukawa potential

b) Fermi's theory of  $\beta$  - decay

c) Working of ESR

d) PQR branches



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**ASSIGNMENT-1**

**M.Sc. (Second) DEGREE EXAMINATION, DEC. – 2017**

**Second Year**

**PHYSICS**

**Solid State Physics - I**

**MAXIMUM MARKS:30**

**Answer ALL Questions**

- Q1)** a) Define unit cell and explain different symmetry operations in crystals.  
b) Explain the determination of crystal structure with reciprocal lattice.
- Q2)** a) State and explain Bragg's law in X – ray diffraction.  
b) Explain the determination of lattice constants.
- Q3)** a) Distinguish between primary and secondary bonds and explain cohesive energy.  
b) Explain the lattice vibrations in one dimensional diatomic chain.
- Q4)** a) Explain the general theory of Harmonic approximation.  
b) Explain the quantization of lattice vibrations.
- Q5)** a) Give the assumptions of classical theory of lattice heat capacity.  
b) Explain anharmonic effects in solids.

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**ASSIGNMENT-2**

**M.Sc. (Second) DEGREE EXAMINATION, DEC. – 2017**

**Second Year**

**PHYSICS**

**Solid State Physics - I**

**MAXIMUM MARKS:30**

**Answer ALL Questions**

**Q1)** Discuss the Kronig – penny model for the motion of an electron in a periodic potential.

**Q2)** a) Discuss the nearly free electron theory of metals.

b) Obtain the expression for density of electrons in an intrinsic semiconductor.

**Q3)** a) State and explain Hall effect.

b) Explain Thermoelectric effect.

**Q4)**

a) Construction of reciprocal lattice

b) Inelastic neutron scattering.

c) Quantum theory of heat capacity.

d) Magneto resistance.



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**ASSIGNMENT-1**

**M.Sc. (Second) DEGREE EXAMINATION, DEC. – 2017**

**Second Year**

**PHYSICS**

**Solid State Physics - II**

**MAXIMUM MARKS:30**

**Answer ALL Questions**

- Q1)** Explain what is meant by polarization in dielectrics? Arrive at the relation between dielectric constant and atomic polarizability.
- Q2)** Explain the chief characteristics and its classification of ferroelectric materials.
- Q3)** Briefly explain the imperfections in crystals and discuss the role of dislocations in crystal growth.
- Q4)** Explain the quantum theory of diamagnetism and paramagnetism of materials.
- Q5)** Describe the weiss molecular field theory of ferromagnetism and derive the curie – weiss law.

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**ASSIGNMENT-2**

**M.Sc. (Second) DEGREE EXAMINATION, DEC. – 2017**

**Second Year**

**PHYSICS**

**Solid State Physics - II**

**MAXIMUM MARKS:30**

**Answer ALL Questions**

**Q1)** Discuss the domain structure in ferromagnetic materials and give Neel's theory of antiferro magnetism.

**Q2)** Briefly outline the BCS theory of super conductivity and explain the evidence for the existence of energy gap.

**Q3)** Describe the Landan theory of superconductivity and explain high temperature super conductors.

**Q4)**

- a) Piezoelectricity and Electrostriction
- b) Grain boundaries
- c) GMR – CMR materials
- d) Isotope effect in super conductors.

