

**P.R. GOVERNMENT COLLEGE (A), KAKINADA**  
**III B.Sc Physics Paper – VII(B) – Semester – VI**  
w.e.f. 2017-18 ADMITTED BATCH

**2017 - 2018**

**Course Code :**

**No. of credits : 03**

**Elective Paper VII(B): Material science**

**No. of Hours per week: 03**

**Total Lectures:45**

**UNIT-I (9 hrs)**

**1. Materials and Crystal Bonding:** Materials, Classification, Crystalline, Amorphous, Glasses; Metals, Alloys, Semiconductors, Polymers, Ceramics, Plastics, Bio-aterials, Composites, Bulk and nanomaterials. Review of atomic structure – Interatomic forces Different types of chemical bonds – Ionic-covalent bond or homopolar bond – Metallic bond – Dispersion bond – Dipole bond – Hydrogen bond – Binding energy of a crystal.

**UNIT-II (9 hrs)**

**2. Defects and Diffusion in Materials:** Introduction – Types of defects - Point defects Line defects- Surface defects- Volume defects- Production and removal of defects Deformation-irradiation- quenching- annealing- recovery - recrystallization and grain growth. Diffusion in solids- Fick's laws of diffusion.

**UNIT-III(9 hrs)**

**3. Mechanical Behavior of Materials:** Different mechanical properties of engineering materials – Creep – Fracture – Technological properties – Factors affecting mechanical properties of a material – Heat treatment - Cold and hot working – Types of mechanical tests – Metal forming process – Powder – Misaligning – Deformation of metals.

**UNIT-IV (9 hrs)**

**4. Magnetic Materials:** Dia-, Para-, Ferri- and Ferromagnetic materials, Classical Langevin theory of dia magnetism, Quantum mechanical treatment of paramagnetism. Curie's law, Weiss's theory of ferromagnetism, Ferromagnetic domains. Discussion of BH Curve. Hysteresis and energy Loss.

**UNIT-V (9 hrs)**

**5. Dielectric Materials:** Dielectric constant, dielectric strength and dielectric loss, polarizability, mechanism of polarization, factors affecting polarization, polarization curve and hysteresis loop, types of dielectric materials, applications; ferroelectric, piezoelectric and pyroelectric materials, Clausius -Mosotti equation.

**Reference books**

1. Materials Science by M.Arumugam, Anuradha Publishers. 1990, Kumbakonam.
2. Materials Science and Engineering V.Raghavan, Printice Hall India Ed. V 2004. New Delhi.
3. Elementary Solid State Physics, 1/e M. Ali Omar, 1999, Pearson India
4. Solid State Physics, M.A. Wahab, 2011, Narosa Publications

**P.R. GOVERNMENT COLLEGE (A), KAKINADA**  
**III B.Sc Physics Paper**  
**Elective Paper VII(B) – Semester – VI – Model Paper**  
 w.e.f. 2017-18 ADMITTED BATCH

2017 - 2018

Course Code : Elective B

No. of credits : 03

**Elective Paper VII(B): Material science**

**Note:-** Set the question paper as per the blue print given at the end of this model paper.  
 Time: 2 1/2 Hrs. Max. Marks: 60

Section	Questions to be given	Questions to be answered	Marks
A	5	3	3 x 10M = 30M
B	9	6	6 x 5 M = 30M
Total	14	9	60M

**Blue Print**

Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
I	1	2	20
II	1	1	15
III	1	2	20
IV	1	2	20
V	1	2	20
Total			95