

Registration No :

--	--	--	--	--	--	--	--	--	--

Total Number of Pages : 02

M.Sc.
16MPYC203

2nd Semester Back Examination 2017-18
BASIC CONDENSED MATTER PHYSICS
BRANCH : M.Sc.(AP)

Time : 3 Hours

Max Marks : 70

Q.CODE : C807

Answer Question No.1 which is compulsory and any five from the rest.

The figures in the right hand margin indicate marks.

Answer all parts of a question at a place.

- Q1. Answer the following questions: (2 x 10)**
- a) What is packing factor value of bcc structure?
 - b) What do you mean by Cooper pair?
 - c) What is isotope effect?
 - d) Write two differences between metal, semiconductor and insulator.
 - e) What is Lorenz number?
 - f) What you mean by flux quantization?
 - g) State Bloch's theorem.
 - h) Write the relationship between transition temperature T_c and critical magnetic field H_c for a superconductor.
 - i) Write the expression for the density of vibrational modes in a continuous elastic medium?
 - j) Define coherence length for electrons in superconductor.
- Q2. a) What is Josephson's effect? Discuss d.c Josephson's effect. (6)**
b) Write some applications of superconductor. (4)
- Q3. a) Discuss the variation of specific heat capacity of solid with temperature and give the Einstein's theory to explain it. (7)**
b) What are the main drawbacks of classical free electron theory? (3)
- Q4. a) Discuss the Kronig-Penny model for the motion of an electron in a periodic potential. (7)**
b) What is Brillouin zone? Draw the 2-D representation for it. (3)
- Q5. a) Derive the dispersion relation for lattice vibration occurring in diatomic molecules. (6)**
b) Derive Weidman-Franz law. (4)
- Q6. a) Describe the seven systems of crystals with suitable diagrams. (6)**
b) Obtain the Miller indices of a plane which intercepts at a , $b/2$ and $3c$ in an SC unit cell. Draw the neat diagram showing the plane. (4)

Q7. What is superconductivity? Explain Meissner effect? Describe in detail, how Meissner effect explain type-I and type-II superconductors? **(10)**

Q8. Write short answer on any TWO : **(5 x 2)**

- a) London theory
- b) Effect of temperature on Fermi-Dirac distribution.
- c) Carbon nano tubes
- d) BCS theory