

PARUL UNIVERSITY
FACULTY OF APPLIED SCIENCE
M.Sc. Winter 2018-19 Examination

Semester: 1
Subject Code: 11204104
Subject Name: Solid State Physics & Electronics-I

Date: 07/12/2018
Time: 10:30 AM TO 1:00 PM
Total Marks: 60

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

- Q.1. A) Essay type (Each of 04 marks) (08)**
 (a) Explain nearly free electron mode.
 (b) Explain Kronig-Penney Model.
- Q.1. B) Answer the following questions (Any two) (04)**
 (a) Short note (Each of 02 marks) (04)
 1. Write Bloch function and explain its significance in short.
 2. Write down the magnitude of energy gap for a silicon and germanium.
 (b) Explain empty lattice approximation in short. (04)
 (c) Draw the energy band diagram with Fermi energy level for a metal, semiconductor, and an insulator. (04)
- Q.2. A) Answer the following questions. (04)**
 (a) Short note. (Each of 02 marks) (04)
 1. Draw the diagram of Reduced zone, and Periodic zone.
 2. Draw the graph for Pseudo potential method and write down its conditions.
 (b) Explain tight binding method for energy bands. (04)
- Q.2. B) Answer the following questions (Any two) (03)**
 (a) Short note. (Each of 01 marks) (03)
 1. For which condition Wigner-Seitz method works?
 2. Write down the units of magnetic field **B**.
 3. Define magnetic break down.
 (b) Calculate the cohesive energy of sodium metal having average energy -6.3eV and ground state energy -5.15eV . (03)
 (c) Draw the diagrams for electron orbit, hole orbit and open orbit. (03)
- Q.3. A) Essay type (Each of 04 marks) (08)**
 (a) Explain Class - A large signal amplifiers.
 (b) Explain Schmitt Trigger circuit.
- Q.3. B) Answer the following questions (Any two) (04)**
 (a) Short note. (Each of 02 marks) (04)
 1. Write any two differences between Monostable, Bistable Multivibrators
 2. Write any two advantages of a transistors.
 (b) Explain Astable Multivibrator in short. (04)
 (c) Explain Class - B Push - Pull amplifiers. (04)
- Q.4. A) Answer the following questions. (04)**
 (a) Short note. (Each of 02 marks) (04)
 1. Write a note on AC amplifiers.
 2. Draw the circuit diagram of a Bridge amplifier.
 (b) Explain current to voltage converter circuit. (04)
- Q.4. B) Answer the following questions (Any two) (03)**
 (a) Short note. (Each of 01 marks) (03)
 1. Define slew rate.
 2. How voltage to current converter circuit works?
 3. Draw the input and output waveform of an integrator circuit.
 (b) Explain triangular wave generators circuit. (03)
 (c) Write any three advantages of amplifiers. (03)