

**PARUL UNIVERSITY**  
**FACULTY OF APPLIED SCIENCE**  
**M.Sc., Winter 2017-18 Examination**

**Semester: 1****Subject Code: 11204104****Subject Name: Solid State Physics & Electronics-I****Date: 26/12/2017****Time: 02:00pm to 04:30pm****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) Answer the following questions. (Each of 04 marks) (08)**
- (a) Discuss the origin of band gap on the basis of nearly free electron model?
  - (b) Explain working of class-A push pull power amplifier?
- Q.1. B) Answer the following questions. (Any two) (04)**
- (a) Do as directed. (Each of 02 marks) (04)
    1. Define Fermi energy and Fermi volume?
    2. Write applications of current to voltage convertor?
  - (b) Explain Kronig-Penny model? (04)
  - (c) Explain Reduced Zone Scheme. (04)
- Q.2. A) Answer the following questions. (04)**
- (a) Do as directed. (Each of 02 marks) (04)
    1. Write a note on Fermi surface?
    2. Define bistable multivibrator?
  - (b) Describe Op-amp as Square wave generator with necessary figure? (04)
- Q.2. B) Answer the following questions (Any two) (03)**
- (a) Do as directed. (Each of 01 marks) (03)
    1. What is an external orbit?
    2. Define energy gap.
    3. State any one advantage and disadvantages of single ended transformer coupled amplifier.
  - (b) Write a note on Quantization of orbits. (03)
  - (c) Explain Class B in detail? (03)
- Q.3. A) Answer the following questions. (Each of 04 marks) (08)**
- (a) Explain Bloch function in detail?
  - (b) Draw and explain working of integrator circuit using Op-amp
- Q.3. B) Answer the following questions (Any two) (04)**
- (a) Do as directed. (Each of 02 marks) (04)
    1. Define lattice constant in detail?
    2. Write a short note on Slew rate?
  - (b) Draw and explain working of differentiator circuit using Op-amp. (04)
  - (c) Write a note on pseudo potential method. (04)
- Q.4. A) Answer the following questions. (04)**
- (a) Do as directed. (Each of 02 marks) (04)
    1. Write a short note on Frequency compensation in op-amps?
    2. Write a note on Bloch Theorem.
  - (b) Draw three energy bands of a linear lattice in different zones schemes? (04)
- Q.4. B) Answer the following questions (Any two) (03)**
- (a) Do as directed. (Each of 01 marks) (03)
    1. What do you mean by frequency compensation in op-amps
    2. Define Fermi surface?
    3. Define De-Hans-van Alphen effect
  - (b) Draw circuit diagram of Schmitt trigger using transistor and explain its working in Short? (03)
  - (c) Discuss tight binding method for studying electron energy band in solid with short Discussion? (03)