

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE –SEMESTER 1&2(NEW SYLLABUS)EXAMINATION- WINTER 2018**

**Subject Code: 3110018****Date: 04-01-2019****Subject Name: Physics****Time: 10:30 am to 01:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Give assumptions of classical free electron theory. **03**  
(b) Explain mechanism of superconductivity. **04**  
(c) What is photovoltaic effect. Explain construction and working of solar cell. **07**

- Q.2** (a) Give difference between N type and P type semiconductors. **03**  
(b) Derive an expression for joint density of states. **04**  
(c) Explain Kronig Penney model in detail. **07**

**OR**

- (c) Explain properties of superconductors. **07**  
**Q.3** (a) What are hot probe method. **03**  
(b) Explain fermi levels. **04**  
(c) Explain classification of materials as conductors, insulators and semiconductors. **07**

**OR**

- Q.3** (a) Give difference between intrinsic and extrinsic semiconductors. **03**  
(b) Explain drift and diffusion current. **04**  
(c) Explain direct and indirect band gap with E-k diagrams. **07**  
**Q.4** (a) Define superconductivity and critical temperature. **03**  
(b) Discuss fermi golden rule. **04**  
(c) Explain diffusion mechanism in detail. **07**

**OR**

- Q.4** (a) Define radiative and non-radiative transitions. **03**  
(b) Explain emission and absorption. **04**  
(c) Explain experimental procedure for DLTS. **07**  
**Q.5** (a) The critical temperature of Nb is 9.15 K. At zero kelvin, the critical field is 0.196 T. Calculate the critical field at 6 K. **03**  
(b) Explain Drude model. **04**  
(c) Why two probe method for resistivity measurement failed and hence explain four probe method. **07**

**OR**

- Q.5** (a) Give success and drawback of classical free electron theory. **03**  
(b) Derive expression of electron concentration in conduction band. **04**  
(c) Discuss UV – VIS method for band gap measurement of semiconductors. **07**

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