Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–I &II (NEW) EXAMINATION – SUMMER-2019

Subject Code: 3110018 **Date: 03/06/2019**

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.**

			Marks
Q.1	**(a)**	Give formation and applications of SQUID.	**03**
	(b)	Explain intrinsic and extrinsic semiconductors with necessary diagram.	**04**
	(c)	What is PN junction diode? What is external bias? Describe its forward and reverse bias conditions with appropriate diagram.	**07**
Q.2	**(a)**	What is photo conductivity, photoluminescence, phototransistor?	**03**
	(b)	Calculate the energy gap of Si, given that radiation of wavelength 11,000 Å is incident on it. Also find allowed wavelength for Ge with energy gap 0.90 eV.	**04**
	(c)	Write a note on energy band diagram and formation of energy bands.	**07**
		OR	
	(c)	Define Hall effect and Hall coefficient. Derive equation to find Hall voltage. What does it signify?	**07**
Q.3	**(a)**	Differentiate between soft and hard superconductors	**03**
	(b)	What is London penetration depth? Derive its equations.	**04**
	(c)	Derive equations for n-type semiconductor to determine dependence of fermi level on temperature and doping concentration.	**07**
		OR	
Q.3	**(a)**	The critical current density equal to 1.71×10^8 A/m^2 is required to change a superconducting wire of radius 0.5 mm at 4.2 K. If the critical temperature of the material is 7.18 K, calculate the maximum value of the critical magnetic field.	**03**
	(b)	Explain BCS theory for superconductivity.	**04**
	(c)	Write a note on metal semiconductor junctions.	**07**
Q.4	**(a)**	Write a note on exciton.	**03**
	(b)	Give details of applications of solar cell (at least 4)	**04**
	(c)	What is radiative and non-radiative transition. Explain in brief the optical joint density of states.	**07**
		OR	
Q.4	**(a)**	What are direct and indirect band gap?	**03**
	(b)	What is deep level transient spectroscopy (DLTS)? Give its experimental procedure.	**04**
	(c)	Discuss the technique to obtain band gap by UV-Vis spectroscopy using absorption or transmission.	**07**
Q.5	**(a)**	What are capacitance voltage measurements?	**03**
	(b)	Consider n-type silicon semiconductor with a length of 100 μm, cross sectional area 10^{-7} cm^2, minority charge carrier life time 10^{-6} s, μ_e is 0.13 m^2 / Vs and μ_h is 0.05 m^2 / Vs. Find (a) Electron transit time	**04**

(b) Photo conductor gain when voltage applied to the photoconductor is 12 V

(c) Discuss Van Der Pauw method. **07**

OR

Q.5 **(a)** What is the cause and remedy for optical loss in photovoltaic cell? **03**

(b) State principle and discuss working of semiconductor laser. **04**

(c) What is photovoltaic effect? Explain construction and working of a solar cell with suitable diagram **07**

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