Enrollment No: _____ Exam Seat No:_____

C. U. SHAH UNIVERSITY

Winter Examination-2022

Subject Name : Advances in Solid State Electronic Devices

Subject Code : 5SC04ASS1 **Branch: M.Sc. (Physics)**

Semester: 4 **Date: 19/09/2022** **Time: 02:30 To 05:30** **Marks: 70**

Instructions:

(1) Use of Programmable calculator and any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

SECTION – I

Q-1 **Attempt the Following questions** **(07)**

a.	List the demands for Bipolar devices.	**01**
b.	What problems are observed in Bipolar devices?	**01**
c.	What is the full form of HBTs?	**01**
d.	What is the solution for the Bipolar devices?	**01**
e.	Band gap of polysilicon is?	**01**
f.	Define JFET.	**01**
g.	List the types of MOSFET.	**01**

Q-2 **Attempt all questions** **(14)**

a.	Write a note on GaAs and InGaAs HBTs in detail.	**07**
b.	Write a note on the requirements of BJT and explain the demands, problems and solutions required for BJT.	**07**

OR

Q-2 **Attempt all questions** **(14)**

a.	Explain and discuss with necessary diagram JFET and MESFET in detail.	**14**

Q-3 **Attempt all questions** **(14)**

a.	Write a note on effects in real devices in JFET in detail.	**07**
b.	Explain in detail the small signal characteristics of MESFETs.	**07**

OR

Q-3 **Attempt all questions**

a.	Write a note on MOS capacitor in detail with necessary diagrams and explain its three important regions.	**14**

SECTION – II

Q-4		**Attempt the Following questions**	**(07)**
	a.	Why polysilicon gate is used instead of metal gate?	**01**
	b.	Define Depletion in MOSFET.	**01**
	c.	What is Beer- Lambert law.	**01**
	d.	What do you mean by signal (beam) steering?	**01**
	e.	What is direct band gap?	**01**
	f.	List out the three mechanisms for the recombination in LED.	**01**
	g.	Write the principle of solar cell.	**01**
Q-5		**Attempt all questions**	**(14)**
	a	Write a note on PIN photodetector.	**07**
	b	Explain in detail about LEDs.	**07**
		OR	
Q-5		**Attempt all questions**	
	a	Write a note on laser structure and optical cavity.	**07**
	b	Explain in detail optical absorption and derive absorption coefficient.	**07**
Q-6		**Attempt all questions**	**(14)**
	a	What do you mean by double heterojunction LEDs? Explain in detail.	**07**
	b	Write a note on avalanche photodiode with necessary diagram.	**07**
		OR	
Q-6		**Attempt all Questions**	
	a	Write a note on LASERs: Quantum well, wire and dot.	**07**
	b	Explain in detail about n-channel and p-channel enhancement type MOSFETs with necessary diagrams.	**07**