

M.Sc.(Phy.) Semester - 1 (CBCS) Examination

Nov/Dec - 2022 [NEW COURSE]

Solid State Electronic Devices and Circuits(Core (New))

Time: 2:30 Hours

Marks: 70

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate marks.

Q.1 Answer in brief any **seven**: **14**

- (a) What is the operational principle of solar-cell?
- (b) For GaAs the energy band gap $E_g = 1.43$ eV. Calculate the corresponding wavelength λ_g .
- (c) What is LCD? Differentiate LCD and LED.
- (d) Define: Noise margins for a logic family.
- (e) Show that logical sum of all the minterms of a Boolean function of N-variables is 1.
- (f) Define the pinch off voltage for JFET.
- (g) For an N-channel JFET, $I_{DSS} = 8$ mA; $V_P = -4$ V; $V_{GS} = -1$ V. Determine I_D and g_m .
- (h) The Boolean expression: $(A+B).(A+C) = A + B.C$ is True or False.
- (i) Why NAND and NOR gates are known as universal gates ?
- (j) What are the advantages of MOS logic family over TTL family?

Q.2 Answer any **two** of following questions: **14**

- (a) Write a brief note on E-MOSFET.
- (b) Write a brief note on JFET biasing with necessary figures.
- (c) Differentiate FET and BJT. Describe the construction of N-channel JFET and explain its drain source characteristics. Also, define I_{DSS} .

Q.3 (a) Sketch the circuit of TTL-NAND gate using transistors and explain its operation in detail. **07**

- (b) Write a note on comparison of properties of standard TTL and other TTL versions. **07**

OR

- (a) Write a note on LEDs: Physics of light emission and LED materials. **07**
- (b) What is LDR? Explain it in detail. **07**

Q.4 Answer any **two** of following questions: **14**

- (a) Sketch the structure of TRIAC and explain its various modes of operations.
- (b) What is Zener diode? Explain its I-V characteristics and also describe how it can be used as a voltage regulator.
- (c) Write a short note on semiconductor LASER.

Q.5 Answer any **two** of following questions: **14**

- (a) Write a short note on DE-MOSFET.
- (b) Describe LDR, Photo diode and PIN photodiode.
- (c) Write a note on ECL.
- (d) Write a brief note on Source Follower.
