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B. Tech 4th Semester Examination
Electronic Device Modelling (N.S.)

EC-223

Time : 3 Hours  Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all, selecting one question from each of the Sections A, B, C & D. Section E is compulsory.

SECTION - A

1. (a) Taking the example of CE amplifier, explain the criterion for selection of a suitable operating point and factors affecting its stability. Hence define stability factor. (10)

   (b) In a fixed biasing circuit, determine $I_B$, $I_C$ and $V_{CE}$ if transistor is of silicon, $V_{CC} = 10V$, $R_B = 2.5 \text{ M}\Omega$, $R_C = 15 \text{ k}\Omega$ and $\beta = 90$. (10)

2. (a) Explain the working of a JFET. Define the parameters of a JFET and develop its equivalent circuit. (10)

   (b) Describe the constructional details of UJT. Sketch its V.I. characteristics and explain its operation. Describe the function of a relaxation oscillator using UJT with waveform. (10)

SECTION - B

3. (a) Draw the circuit diagram of an stable multivibrator. Justify that it is a two stage RC coupled amplifier using feedback. How does it give a square wave? (10)

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Differentiate between the monostable and bistable multivibrator. (10)

4. (a) What is LED? Give its principle of working, construction, circuit symbol, merits, demerits and applications. (10)

(b) What is LCDs? In what respect LCDs are advantageous over LEDs? Give their drawbacks in comparison to LEDs and applications. (10)

SECTION - C

5. (a) Design a combinational circuit that gives a binary output equal to the square of a binary coded decimal numbers 0 through 9. (10)

(b) Give a ROM circuit to realize this function. (10)

6. (a) Explain how a J-K flip flop can be converted into a D-flip-flop. (10)

(b) Design an exclusive-OR circuit using NAND and NOR gates. (10)

SECTION - D

7. (a) What is a ripple counter? Draw the logic diagram of a MOD-10 Count-up ripple counter using count reset. (10)

(b) Explain the working of serial in serial out shift register with logic diagram and waveforms. (10)

8. (a) Consider the NAND implementation of the function \( F = (AB)' + AD \) shown in Fig. 1. Assuming that all gates have the same time delays draw a logic microtiming diagram for the case where A changes while B=D=1. (10)
(b) For the circuit in above problem, draw the K-map, add a hazard covering to eliminate the glitch, and discuss its impact on the hardware.

(10)

SECTION - E

9. (a) Write down the law of mass action.
(b) Draw the equivalent circuit of diode.
(c) How is a P-N junction diode tested?
(d) How $\alpha$ and $\beta$ are related from each other?
(e) Why LCDs are not operated from ac supply of frequency lower than 25 Hz and higher than 50 Hz?
(f) What is a multivibrator?
(g) How do square wave generators differ from pulse generators?
(h) What is Boolean Algebra?
(i) What is Karnaugh map?
(j) What is a state table?  

(2*10=20)