Code No: 113AU **R13**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
ELECTRONIC DEVICES AND CIRCUITS
(Common to EEE, ECE, CSE, EIE, IT, MCT)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) For what voltage will the reverse current in p-n junction Germanium diode reach 90% of its saturation value at room temperature? [2]
b) Write a short note on Varactor diode. [3]
c) Derive the ripple factor for full wave rectifier. [2]
d) Explain voltage regulation using zener diode. [3]
e) Explain how transistor acts as an amplifier. [2]
f) Give the Comparisons between CB, CE, CC configurations. [3]
g) Define thermal runaway. [2]
h) Compare all the three biasing circuits. [3]
i) For a p-channel Silicon FET, with effective width 'a'=2×10^{-4} cm and channel resistivity ρ =10 Ω. Find the pinch off voltage. [2]
j) Draw the circuit diagram of fixed bias arrangement of a JFET. [3]

PART-B

(50 Marks)

2.a) Explain PN diode characteristics in forward bias and reverse bias regions.
b) Find the width of the depletion layer in a germanium junction diode which has the following specifications: Area A = 0.001 cm^2, σ_n = 1 mhos / cm, μ_n = 3800 cm^2/sec, μ_p = 1800 cm^2/sec. [5+5]

OR

3.a) Explain tunnel diode operation with the help of energy band diagrams.
b) Explain the static characteristics of SCR. [5+5]

4.a) A full wave rectifier circuit with C-type capacitor filter is to supply a D.C. Current of 20 mA at 16V. If frequency is 50 Hz ripple allowed is 5%. Calculate:
i) Required secondary voltage of the transformer.
ii) Ratio of I peak/ I_{max} through diodes and the value of C required.
b) With a neat circuit diagram and necessary wave forms explain the operation of half wave rectifier. [5+5]

OR

5.a) An ac supply of 220V is applied to a half wave rectifier circuit through a transformer with a turns ratio of 10:1. Assume the ideal diode. Find:
i) dc output voltage ii) PIV.
b) Compare half wave, full wave and bridge rectifier circuits. [5+5]

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6.a) Explain CE configuration with the help of input and output characteristics.

b) A transistor is operated at a forward current of 2μA and with the collector open circuited. Calculate the junction voltages V_C and V_E, the collector to emitter voltage V_{CE} assuming I_{CO} = 2μA, I_{EO} = 1.6μA and α_N = 0.98. [5+5]

OR

7.a) Draw and explain h-parameter model of BJT.

b) Qualitatively explain the static V-I characteristics of UJT. [5+5]

8.a) Explain the need for biasing in electronic circuits. What are the factors affecting the stability factor.

b) A transistor with β = 100 is to be used in Common Emitter Configuration with collector to base bias. The collector circuit resistance is R_C = 1kΩ and V_{CC} = 10V. Assume V_{BE} = 0.

i) Choose R_B so that the quiescent collector to emitter voltage is 4V.

ii) Find the stability factor. [5+5]

OR

9.a) Determine the quiescent currents and the collector to emitter voltage for a Ge transistor with β = 50 in the self biasing arrangements. The circuit component values are V_{CC} = 20V, R_C = 2kΩ, R_e = 0.1 kΩ, R_1 = 100 kΩ and R_2 = 5 kΩ. Find the stability factor S.

b) Explain the terms Bias Stabilization and Bias Compensation. [5+5]

10.a) Derive the expression for the width of depletion region 'W' in the case of p-channel JFET.

b) Explain the working of a depletion type MOSFET with a neat construction diagram and its characteristics. [5+5]

OR

11. Draw the circuit of source follower Amplifier and derive the expressions for A_I, A_V, R_i and R_o. [10]

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