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Code No: 123AU

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year I Semester Examinations, September/October - 2023

ELECTRONIC DEVICES AND CIRCUITS

(Common to EEE, ECE, CSE, IT)

Time: 3 Hours

Max. Marks: 75

Note: i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

- 1.a) Write the applications of photo diode. [2]
- b) Write the effect of temperature on diode characteristics. [3]
- c) Define Transformer utilization factor [2]
- d) What is the need of a capacitive filter? [3]
- e) Which of the BJT configurations are suitable for impedance matching applications and why? [2]
- f) Give the other name of early effect and explain the same [3]
- g) Mention the need for biasing? [2]
- h) What is emitter follower? Draw the circuit diagram of CC configuration. [3]
- i) Why FET is called voltage controlled device? [2]
- j) What do you mean by pinch-off in JFET? [3]

PART – B

(50 Marks)

- 2.a) Explain V-I characteristics of Zener diode.
- b) A Ge diode has a saturation current of $10\mu\text{A}$ at 300°K . Determine the saturation current at 400°K . [5+5]

OR

- 3.a) With neat diagram, explain the construction and working of Varactor Diode.
- b) Explain Transition and Diffusion Capacitances of a PN Junction diode. [5+5]

- 4.a) Explain Zener diode shunt regulator circuit.
- b) Derive the expression for Ripple factor for Full Wave Rectifier with L-Section filter. [5+5]

OR

- 5.a) A full-wave single phase rectifier employs a pi-section filter consisting of two $4\mu\text{F}$ capacitances and a 20H choke. The transformer voltage to the center tap is 300V rms . The load current is 500mA . Calculate the dc output voltage and the ripple voltage. The resistance of the choke is 200Ω .
- b) Show that the maximum efficiency of half wave rectifier is 40.6% [5+5]

6.a) A transistor is operated at a forward current of $2\mu\text{A}$ and with the collector open circuited. Calculate the junction voltages V_C and V_E , the collector to emitter voltage V_{CE} assuming $I_{CO} = 2\mu\text{A}$, $I_{EO} = 1.6\mu\text{A}$ and $\alpha_N = 0.98$.

b) Analyze the working mechanism of CB configuration of BJT [5+5]

OR

7.a) Explain the leakage currents in CB and CE configurations of BJT.

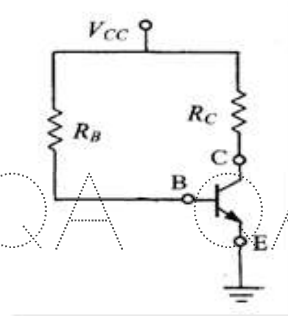
b) Explain how a BJT can be used as a switch. [5+5]

8.a) Demonstrate the voltage divider biasing and calculate the stability factor for BJT.

b) For the circuit shown $\beta = 150$, $V_{CC} = 10\text{ V}$, $R_B = 300\text{K } \Omega$ and $R_C = 1100\text{ } \Omega$. [5+5]

Find:

- i) Quiescent Current I_{CQ}
- ii) Quiescent Voltage V_{CEQ} .



OR

9.a) The hybrid parameters for a transistor used in CE configuration are $h_{ie} = 5\text{k}\Omega$; $h_{fe} = 180$; $h_{re} = 1.25 \times 10^{-4}$; $h_{oe} = 16 \times 10^{-6}$ ohms. The transistor has a load resistance of $20\text{ K}\Omega$ in the collector and is supplied from a signal source of resistance $5\text{ K}\Omega$. Compute the value of input impedance, output impedance, current gain and voltage gain.

b) Draw a transistor amplifier using self-bias (CE configuration) and explain the operation. [5+5]

10.a) Describe working of n-channel JFET with help of constructional diagram and draw its drain characteristic.

b) Define three FET parameter g_m , r_d and μ . Prove that $\mu = g_m \times r_d$. [5+5]

OR

11.a) Compare and contrast MOSFET with JFET.

b) With neat diagram, explain the operation of MOSFET in Depletion mode. [5+5]

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