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Code No: 123AU

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year I Semester Examinations, February -2024

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) Explain the difference between ideal operation and practical operation of the P-N junction diode using I-V Characteristics. [2]

b) Illustrate the V-I characteristics of Tunnel diode. [3]

c) What do you understand by the term "Rectifier"? What is the need of Rectifier in the circuit operation? [2]

d) What is the voltage breakdown phenomenon of the diode? Tell how the supply can be regulated? [3]

e) Show the schematic of the n-p-n Transistor. What do you understand by Uni-polar and Bi-polar Transistor. [2]

f) Compare the gains of the CB, CE and CC amplifier. Show the relationship between the gains of different amplifier configurations. [3]

g) Interpret the DC load line and AC load line, to define the operating point of the transistor. [2]

h) Compare the fixed bias and voltage divider bias in terms of various input output Parameters. [3]

i) Illustrate the pinch-off process in the field effect transistor. [2]

j) Compare FET and BJT. [3]

PART – B

(50 Marks)

2.a) Analyze the operation of P-N junction diode with no applied voltage or open circuit condition with suitable diagram distribution of voltage, charge and electric field.

b) Solve for new nominal zener potential at 100°C, if zener breakdown voltage (V_z) is 10V, and the temperature coefficient is 0.0072V. [5+5]

OR

3.a) Analyze the operation of P-N junction diode with forward bias condition with suitable diagram distribution of voltage, charge and electric field.

b) Justify that the forward current of the p-n junction diode is dependent on reverse Saturation current and temperature. [5+5]

4.a) Give the Analysis of full wave rectifier with the help of circuit diagram and input-output waveforms.

b) Prove that the ripple factor of half wave rectifier is higher than that of full wave rectifier. [5+5]

OR

5.a) Prove that the maximum efficiency of the full wave rectifier is 81.2%.

b) Construct the Bridge rectifier circuit using diodes and explain the working for both positive and negative half cycle. [5+5]

6.a) Examine the operation of the transistor as an amplifier. Also show the operating region, in which the transistor is used as an amplifier.

b) Explain the Small signal low frequency transistor model of BJT. [5+5]

OR

7.a) Discuss the three different operating regions of the transistor on the input output characteristic graph and also show the difference between them.

b) Explain a transistor amplifier using h-parameter model. [5+5]

8.a) Elaborate the need of Transistor biasing with the help of characteristic curve.

b) Discuss the "stability" of the transistor. Derive the equation for stability factor of the transistor. [4+6]

OR

9.a) Analyze the operation of Emitter feedback bias circuit with the help of circuit diagram. Also give the merits and demerits of Emitter feedback bias circuit.

b) Analyze the operation of Collector feedback bias circuit with the help of circuit diagram. Also give the merits and demerits of Collector feedback bias circuit. [5+5]

10.a) Apply the voltage V_{ds} in FET and keep the V_{gs} constant. Explain the working of the FET for the above said condition.

b) Utilize the Drain characteristics of n-channel JFET and explain the pinch-off region and breakdown region in n-Channel JFET. [5+5]

OR

11.a) Classify the MOSFET in terms of the channels between source and drain. Also explain why it is called as voltage-controlled capacitor.

b) Distinguish between the depletion type and enhancement type p-channel MOSFET with the help of construction and I-V characteristics. [5+5]

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