R09

Code No: 09A30203

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B.Tech II Year I Semester Examinations, June/July-2014

ELECTRONIC DEVICES AND CIRCUITS

(Common to EEE, ECE, CSE, EIE, BME, IT, MCT, ETM, ECOMPE, ICE)

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

Answer any five questions

All questions carry equal marks

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1.a) Two identical Si diodes are connected back-to-back with 10V battery. Calculate potential difference between each diode.

b) Derive the expression for transition capacitance $\left(C_T = \frac{\varepsilon A}{w}\right)$ of a junction diode.

2.a) Define the following terms and derive the equations with respect to half-wave rectifier:
i) Ripple factor
ii) Peak inverse voltage
iii) % Regulation.

b) A HWR circuit supplies 100mA DC current to a 250Ω load. Find the DC output voltage, PIV rating of a diode and the r.m.s. voltage for the transformer supplying the rectifier.

3.a) With the help of a neat diagram explain different current components in an NPN bipolar junction transistor.

b) With reference to bipolar junction transistors, define the following terms and explain.
i) Emitter efficiency
ii) Base Transportation factor.
iii) Large signal current gain.

4.a) What do you mean by the quiescent point of transistor amplifier?

b) What is a load line? Explain its significance.

c) Find the Q-point of self-bias transistor circuit with the following specifications: V_{CC} = 22.5V, R_L = 5.6kΩ, R_C = 1kΩ, R_I = 90kΩ, R_2 = 10kΩ, V_{BE} = 0.7V and β = 55. Assume $I_B >> I_{CO}$.

5.a) Derive the expressions for A_I, A_V, R_i, R_0 for CE Transistor configuration.

b) For the emitter follower with R_S = 0.5K, R_L = 50K, h_{fe} = -50, h_{ie} = 1K, h_{oe} = 25μA/V, h_{re} = 1. Calculate A_V, A_I, Z_i and Z_O.

6.a) With neat sketches, necessary equations explain the drain and transfer characteristics of MOSFET in enhancement mode.

b) Define the FET parameters and derive relation between them.

c) Why is a JFET is called Unipolar and voltage controlled device.

7.a) Draw the small-signal model of common source FET amplifier. Derive expressions for voltage gain and output resistance.

b) Give the UJT symbol and simplified equivalent circuit with external resistors included. Describe its negative-resistance nature, with the help of V-I characteristics.

8. Explain the principle of operation of the following devices:
a) Schottky Barrier diode
b) Tunnel diode through Energy band diagrams.

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