

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  $\left(C_T = \frac{\epsilon A}{w}\right)$  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:  $V_{CC} = 22.5V$ ,  $R_L = 5.6k\Omega$ ,  $R_C = 1k\Omega$ ,  $R_1 = 90k\Omega$ ,  $R_2 = 10k\Omega$ ,  $V_{BE} = 0.7V$  and  $\beta = 55$ . Assume  $I_B \gg I_{CO}$ .
  
- 5.a) Derive the expressions for  $A_I$ ,  $A_V$ ,  $R_i$ ,  $R_o$  for CE Transistor configuration.
- b) For the emitter follower with  $R_S = 0.5K$ ,  $R_L = 50K$ ,  $h_{fe} = -50$ ,  $h_{ie} = 1K$ ,  $h_{oe} = 25\mu A/V$ ,  $h_{re} = 1$ . 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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