

B.Tech II Year I Semester (R13) Regular & Supplementary Examinations December 2015

**ELECTRONIC DEVICES & CIRCUITS**

(Common to EEE, ECE and EIE)

Time: 3 hours

Max. Marks: 70

**PART – A**  
(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

- Differentiate between intrinsic and extrinsic semiconductors.
- A HWR is used to supply 24 V dc to a resistive load of 500  $\Omega$  and the diode has a forward resistance of 50  $\Omega$ . Calculate the maximum value of the ac voltage required at the input.
- Specify the relation between  $\alpha$  and  $\beta$  factors with respect to a transistor.
- Write any two differences between N-channel JFET to a P-channel JFET.
- What is the need for biasing a transistor?
- Define: (i) Thermal resistance. (ii) Thermal runaway.
- Compare CB, CE and CC configurations of a transistor.
- Sketch a simplified CE Hybrid model of a transistor.
- Why Schottky diode is also called as hot carrier diodes?
- Define Latching current and holding currents of a SCR.

**PART – B**

(Answer all five units, 5 X 10 = 50 Marks)

**UNIT - I**

2 What is Fermi Level? By indicating the position of Fermi level in intrinsic, N-type and P-type semiconductor, explain its significance in semiconductors.

**OR**

- Compare the performance of Inductive, L-section and  $\pi$ -section filters used with rectifiers.
- In a FWR using an LC filter,  $L = 10$  H,  $C = 100$   $\mu$ F, and  $R_L = 500$   $\Omega$ . Calculate  $I_{dc}$ ,  $V_{dc}$ , and ripple factor for an input of  $V_i = 30 \sin(100\pi t)$  V.

**UNIT - II**

4 With reference to a BJT, explain the following terms in detail.  
(i) Emitter efficiency. (ii) Base transportation factor. (iii) Large signal current gain.

**OR**

5 Detail the construction of an n-channel MOSFET of depletion type. Draw and explain its characteristics.

**UNIT - III**

- Explain how biasing is provided to a transistor through potential divider bias.
- An NPN transistor with  $\beta = 50$  is used in Common Emitter configuration with  $V_{CC} = 10$  V and  $R_C = 2.2$  k $\Omega$ . Biasing is done through a 100 k $\Omega$  resistance from collector-to-base. Assuming  $V_{BE}$  to be zero volts. Find: (i) The quiescent point. (ii) The stability factor S.

**OR**

7 Describe the significance of operating point, DC and AC load lines to ensure active region operation of a BJT in CE configuration

**UNIT - IV**

- List out the typical values of h-parameters in the three BJT configurations (CE, CB and CC).
- Describe how  $h_{ie}$  and  $h_{fe}$  can be determined from BJT characteristics.

**OR**

9 Draw the basic circuit and small-signal model of Common drain FET amplifier. Derive the expressions for voltage gain and output resistance.

**UNIT - V**

10 Draw the basic structure and equivalent circuit of UJT, explain how the UJT can be used as negative-resistance device with the aid of static characteristics.

**OR**

11 Describe the following briefly:

- Principle of operation of a Photodiode
- Energy band structure and V-I characteristics of a diode.

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