

Code: EC2T4

I B.Tech-II Semester-Regular Examinations - July 2013

ELECTRONIC DEVICES & CIRCUITS
(For Electronics & Communication Engineering)

Duration: 3 hours

Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

1. a) Draw the forward and reverse characteristics of a p-n junction diode and explain them qualitatively. 7 M
- b) Explain the energy band structure of an open-circuit P-N junction. Prove that $E_0 = kT \log (N_D N_A / n_i^2)$ 7 M
2. a) The capacitance of a varactor diode can be varied from 5pF to 50 pF when used in a tuning circuit of a radio receiver. If $L = 10$ mH, then determine the tuning range of the circuit. 7 M
- b) What is zener diode? Draw the equivalent circuit of an ideal zener in the breakdown region. 7 M
3. a) Draw the circuit for a half-wave rectifier. And derive the expression for
 - (i) DC current
 - (ii) DC load voltage and
 - (iii) RMS current. 7 M

- b) A full-wave rectifier with a load resistance of $15\text{ k}\Omega$ uses an inductor filter of 15 Henry . The peak value of the applied voltage is 250 V and the frequency is 50 Hz . Calculate the D.C load current, ripple factor and D.C output voltage. 7 M
4. a) Describe the principle of working of LED. What are the merits of LEDs? 8 M
- b) Explain photo diode with the help of its characteristics. 6 M
5. a) Explain input and output characteristics of NPN transistor in Common Emitter Configuration . 7 M
- b) Derive the relation between α , β and Υ . 7 M
6. a) Draw the circuit diagram of self biased CE amplifier using diode compensation for V_{BE} . Describe how bias compensation is achieved. 7 M
- b) Derive the stability factor for a fixed bias circuit 7 M
7. a) Explain the working principle of MOSFET in depletion mode. Sketch its typical characteristics. 7 M
- b) Explain the working principle of JFET. Define parameters of a JFET and draw its equivalent circuit. 7 M

8. a) In an n-channel JFET biased by voltage divider method, it is required to set the operating point at $I_D=2.5$ mA and $V_{DS}=8$ V. If $V_{DD}=30$ V, $R_1=1M\Omega$ and $R_2=500k\Omega$, find the value of R_S . The parameters of JFET are $I_{DDSS}=10$ mA and $V_p= -5$ V. 7 M

b) Derive diode current equation. 7 M