[06 BENG – 2103]

II/IV B.Tech. DEGREE EXAMINATION.

First Semester

Electrical and Electronics Engineering

ELECTRONIC DEVICES AND CIRCUITS

(Effective from the admitted batch of 2015–2016)

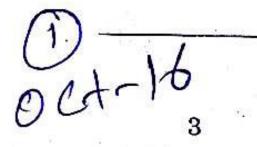Time : Three hours   Maximum : 70 marks

Answer any FIVE questions and Question No.1 is compulsory.

All questions carry equal marks.

1.   (a) Draw the energy band diagram of germanium and a metal.

    (b) A silicon diode has a saturation current of 7.5 μA at room temperature to 300 °K. Calculate the saturation current at 400 ° K.

    (c) Explain how PN junction is formed.

    (d) What is the necessity of Filters? List the types of Filters?

    (e) Define Early effect, input impedance and output impedance of a transistor.

(f) Define and give the relation between transconductance g_m, drain resistance r_d and amplification factor μ of a FET.

(g) Draw the h model circuit for CB.

2. (a) Determine the concentration of free electrons and holes in a sample of germanium at 3000K which has a concentration of donor atoms equal to 2×1014 atoms/cm^3 and concentration of acceptor atoms equal to 3×1014 atoms/cm^3. Is this P-or n- type germanium.

(b) Explain Hall effect.

3. (a) With a neat diagram explain the working of a PN junction diode in forward bias and reverse bias and show the effect of temperature on its V-I characteristics.

(b) Explain V-I characteristics of Zener diode.

4. (a) With neat diagram explain the construction and working of LED.

(b) Explain the operation and functioning of Photo diode.

5. (a) Draw the circuit diagram and explain the working of full wave bridge rectifier and derive the expression for average output current and rectification efficiency.

(b) With circuit and necessary waveforms explain the operation of Bridge Rectifier with filter.

6. (a) In an NPN transistor emitter is grounded, base is connected with 5 Volts supply in series with 100 K ohms resistor and collector base is connected with 200 K ohms. Assume $V_{CC} = 12$ Volts, $V_{BE} = 0.65$ volts, $\beta = 100$. Find I_B, I_C and I_E.

   (b) Explain the switching characteristics of a transistor with neat sketch.

7. (a) In an N-channel JFET based voltage divider common drain configuration, determine the value of resistor RS so as to have the operating point as $I_{DQ} = 5mA$, $V_{DSQ} = 10V$. Given that $V_{DD} = 28V$, $R_1 = 1$ M ohms; $R_2 = 0.5$ M ohms, saturation drain current of the FFET is 10 mA and gate source pinch off voltage is '$-5v$'.

   (b) Explain the construction and characteristics of JFET.

8. (a) Derive the expression for current gain, input impedance and voltage gain of a CE Transistor Amplifier.

   (b) For a common emitter circuit draw the h-parameter equivalent circuit and write the expressions for input impedance, output impedance and voltage gain.

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[05 – 2113]

II/IV B.E. DEGREE EXAMINATION.

First Semester

Electronics and Communication Engineering

ELECTRONIC DEVICES AND CIRCUITS

(Common with EEE, E and IE and Dual Programme in ECE and EEE)

(Effective from the admitted batch of 2006–2007)

Time : Three hours   Maximum : 70 marks

Question No. 1 is compulsory.

Answer any FOUR questions from the remaining.

All questions carry equal marks.

1.   (a)   Explain the importance of Hall effect.

     (b)   Discuss the effect of temperature on P-N Junction diode.

     (c)   What is meant by PIV? Explain.

     (d)   List out the different methods of transistor biasing.

     (e)   Explain with a diagram, how a transistor will be operated in saturation region?

(f) Give the comparison between JFET and BJT.

(g) Give the comparison between CE and CB transistor configuration.

2. (a) What is meant by P-type semi conductor? Explain with the help of diagram how holes contribute to electric current.

(b) Discuss in detail about continuity equation.

3. (a) The reverse bias saturation current for a P-N junction diode is 1 μA at 300 K. Determine its ac resistance at 150 mV forward bias.

(b) Write about schottky barrier diode in detail.

4. (a) With a neat diagram, explain the operation of full-wave rectifier and derive an expression for the d.c output current. (10)

(b) Define Transformer Utilization - Factor. (4)

5. (a) With a neat diagram, explain the mechanism of current flow in a PNP transistor.

(b) Name the three possible transistor connections. Explain the operation of transistor as an amplifier.

6. (a) Explain with a neat diagram, the operation of depletion mode MOSFET.

(b) Discuss about static characteristic curves of FET.

7. (a) Write about self bias configuration in FET.

(b) Write short notes on :

(i) Thermal run away

(ii) Thermal stability.

8. (a) Explain the operation of common base amplifier with neat diagram.

(b) Write about the effect of emitter bypass capacitor on low frequency response.

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