NTK/KW/15/7301/7306

Faculty of Engineering & Technology

Third Semester B.E. (Electronics Engg.)/ET/EC

(C.B.S.) Examination

ELECTRONIC DEVICES & CIRCUITS

Time : Three Hours] [Maximum Marks : 80

INSTRUCTIONS TO CANDIDATES

(1) All questions carry marks as indicated.

(2) Due credit will be given to neatness and adequate dimensions.

(3) Assume suitable data wherever necessary.

(4) Illustrate your answers wherever necessary with the help of neat sketches.

(a) Explain the transition and diffusion capacitance in p-n junction diode. 6

(b) Two p-n junction Ge diodes are connected as shown in Fig 1(b). Find the voltage across each diode if the breakdown voltage is greater than 5 V.

What will be the current in the circuit if breakdown voltage is 4.9 V ? I_o = 5 μA. 7

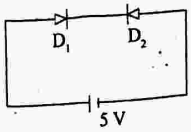

Fig. 1(b)

OR

2. (a) Explain the working of full wave bridge rectifier with the help of waveforms and circuit diagram. 7

(b) Show that maximum rectification efficiency of half wave rectifier is 40.6%. 6

3. (a) Explain Early effect or Base width modulation. 6

(b) Find if the transistor is in active or saturation region. Assume β = 100 and neglect junction voltages.

(i) Calculate V_o for the circuit.

(ii) What is the minimum value of β that will saturate the transistor ? 8

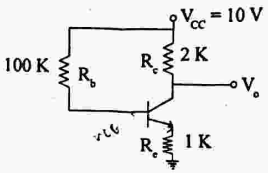

Fig. 3(b)(ii)

OR

4. (a) Explain thermal runaway in a power transistor. 3

(b) What are the factors that affect stability of operating point ? 5

(c) Explain self bias circuit and derive expression for its stability factor. 6

5. (a) What is small signal condition ? Why hybrid parameters are used in analyzing low frequency network ? 4

(b) Find A_i, Z_i, A_v and A_{vs} for the circuit shown Fig. 5(b).

$h_{ie} = 1.1$ K , $h_{re} = 2.5 \times 10^{-4}$

$h_{fe} = 50$, $\frac{1}{h_{oe}} = 40$ K 9

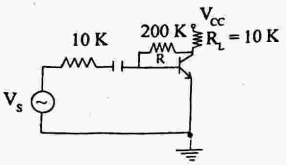

Fig. 5(b)

OR

6. (a) Explain the following feedback topologies and draw the practical circuits :
   (i) Current series feedback
   (ii) Voltage shunt feedback. 6
   (b) An amplifier without feedback gives 30 V with 10% second harmonic distortion when input is 0.025 V.
   (i) If 1.5% of output is feedback into the input with –ve voltage series feedback what is output V_o ?
   (ii) If output is maintained at 30 V but second harmonic distortion is reduced to 1%, what is the input voltage ? 7

7. (a) Explain Barkhausen's criterion to generate oscillations. With the help of neat sketch explain working of RC phase shift oscillator. 7
   (b) A Hartley oscillator has $L_1 = 2$ mH, $L_2 = 20$ µH and a variable capacitor. If the frequency of oscillations is to be changed between 950 KHz and 2050 KHz then find the range of capacitance value. 6

OR

8. (a) Explain working of crystal oscillator with the help of neat sketch. What are its advantages over other types of filter ? 7
   (b) Explain working of monostable multivibrator. 6

9. (a) Draw the circuit and explain the working of class A push-pull amplifier with input and output transformer. 7
   (b) A power transistor is operating in class A is to deliver a maximum of 5 W power to a load of 4 Ω. The quiescent point is adjusted for symmetrical clipping and $V_{cc} = 20$ V with ideal characteristics.
   (i) What is turn ratio $\frac{n_2}{n_1}$?

12. (a) Explain how FET is used as a voltage variable resistance. 4

(b) Draw and explain the small signal equivalent model of JFET. 6

(c) For P-channel Si FET with a = 2×10^{-4} cm and channel resistivity ρ = 10 Ω cm, find the pinch off voltage. 3