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Question Paper Code : 57278

B.E/B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Third Semester

Electrical and Electronics Engineering

EC 6202 – ELECTRONIC DEVICES AND CIRCUITS

(Common to Electronics and Instrumentation Engineering, Instrumentation and Control Engineering, Robotics and Automation Engineering & Second Semester BPO Medical Engineering)

(Regulations 2013)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Define diode-resistance.
2. Mention the applications of diode.
3. Differentiate between JFET and MOSFET.
4. Draw the transfer and drain characteristic curves of JFET.
5. Draw the small signal model of BJT device.
6. Differentiate between power transistor and signal transistor.
7. Define CMRR. How to improve it ?
8. Compare the characteristics of CE, CB and CC amplifiers.
9. List-out the advantages of negative feedback.
10. Define Barkhausen's criteria.

PART – B (5 × 16 = 80 Marks)

11. (a) (i) Explain the VI characteristics of PN junction diode. **(8)**

(ii) Explain the VI characteristics of Zener diode. **(8)**

OR

(b) Briefly discuss the following terms :

(i) Transition and diffusion capacitance

(ii) Temperature effect of PN junction

(iii) Laser Diode **(6 + 5 + 5)**

12. (a) (i) For an n-channel silicon FET with a = 3×10^{-4} cm and Nd = 10^{15} electrons/cm^{-3}. Find (a) the pinch off voltage and (b) the channel half-width for $V_{GS} = 0.5\ V_P$. **(6)**

(ii) Elaborately discuss the drain current characteristics and transfer characteristics of MOSFET. **(10)**

OR

(b) (i) Elaborately discuss the structure and characteristics of the IGBT. **(8)**

(ii) Explain the operation of the UJT. **(8)**

13. (a) (i) Determine the voltage gain and input impedance of common-base amplifier. **(8)**

(ii) Determine the mid band gain, upper Cutoff frequency of a Common-Source amplifier fed with the signal having internal resistance Rsig = 100 kΩ (Figure 13(a) (ii)). The amplifier has R_G = 4.7 MΩ, R_D = R_L = 15 kΩ, gm = 1 mA/V, ro = 150 kΩ, Cgs = 1 pF and Cgd = 0.4 pF. **(8)**

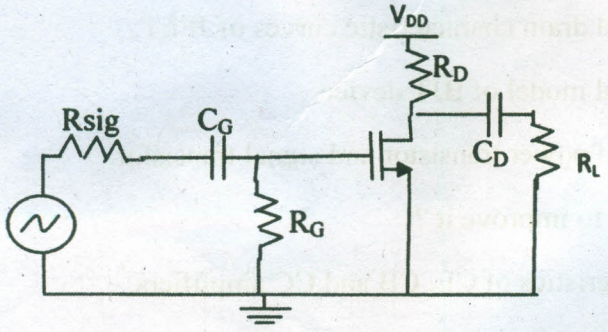

Figure 13(a) (ii)

OR

(b) Determine the mid-band gain and bandwidth of a CE amplifier (shown in Figure 13(b)) Assume lower cutoff frequency is 100 Hz. Let hfe = β = 100, cbe = 4pF, cbc = 0.2PF and $V_A = \infty$. **(16)**

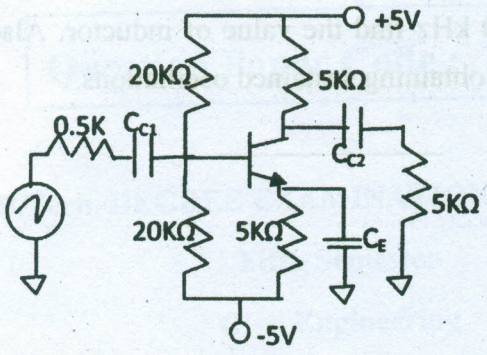

Figure 13(b)

14. (a) (i) Explain single tuned amplifier and derive for gain, resonant frequency and cutoff frequencies. **(12)**

(ii) Briefly explain Hazeltine neutralization used in tuned amplifier for stabilization. **(4)**

OR

(b) Explain the common mode and differential mode operation of the differential amplifier. **(16)**

15. (a) (i) Identify the nature of feedback in Figure 15(a) (i). Let R_{C1} = 3 kΩ, R_{C2} = 500 Ω, R_E = 50 Ω, $R_S = R_F$ = 1.2 kΩ, hfe = 50, hie = 1.1 kΩ, hre = hoe = 0. Determine overall voltage gain (Avf), overall current gain (Aif), input impedance (Rif) and output impedance (Rof). **(16)**

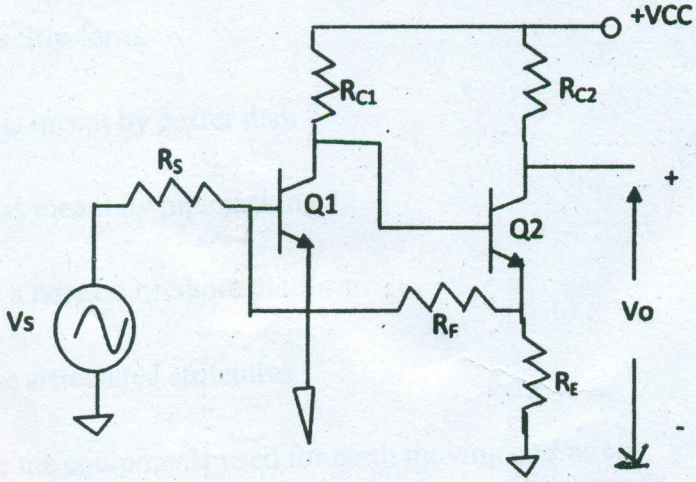

Figure 15(a) (i)

OR

(b) (i) Draw and explain the RC-phase Shift oscillator using BJT and also derive the condition for Oscillation. **(12)**

(ii) In Colpitt's Oscillator C1 = 1nF and C2 = 100 nF. If the frequency of oscillation is 100 kHz find the value of inductor. Also find the minimum gain required for obtaining sustained oscillations. **(4)**
