Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 91440

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019
Second/Third Semester
Electrical and Electronics Engineering
EC 6202 – ELECTRONIC DEVICES AND CIRCUITS
(Common to Biomedical Engineering/Electronics and Instrumentation Engineering/Instrumentation and Control Engineering/Medical Electronics/ Robotics and Automation Engineering)
(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. Define Diffusion Capacitance.
2. When a reverse bias is applied to a germanium PN junction diode, the reverse saturation current at room temperature is 0.3 μA. Determine the current flowing in the diode when 0.15 V forward bias is applied at room temperature.
3. Derive the relationship between α and β of a BJT.
4. The transistor has I_E = 10 mA and α = 0.98. Determine the values of I_C and I_B.
5. Give the characteristics of CE amplifier.
6. What is meant by β cut off frequency ?
7. What is the need of Multistage amplifiers ?
8. Mention the coupling schemes used in multistage amplifier.
9. An amplifier has an open loop gain of 1000 and a feedback ratio of 0.04. If the open loop gain changes by 10% due to temperature, find the percentage change in gain of the amplifier with feedback.
10. In an RC phase shift oscillator, if $R_1 = R_2 = R_3 = 200$ kΩ and $C_1 = C_2 = C_3 = 100$ pF. Find the frequency of oscillations.

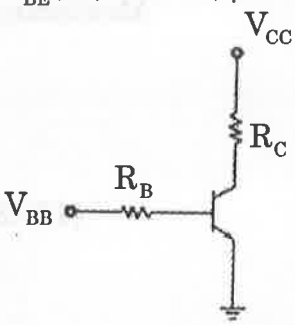
PART – B (5×13=65 Marks)

11. a) i) Explain the V-I characteristics of zener diode. (8)
ii) Show that zener diode can be used as a voltage regulator. (5)

(OR)

b) i) Explain the V-I characteristics of PN junction diode. (8)
ii) With a neat diagram explain the working of full wave rectifier circuit realized using PN junction diode. (5)

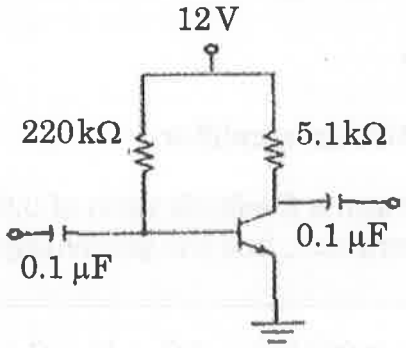
12. a) i) Explain the input and output characteristics of a BJT in CB configuration. (7)
ii) Determine the base, collector and emitter currents and V_{CE} for a CE circuit shown below. For V_{CC} = 10 V, V_{BB} = 4 V, R_B = 200 kΩ, R_C = 2 kΩ, V_{BE}(on) = 07 V, β = 200. (6)



(OR)

b) i) Describe the working principle of SCR with V-I characteristics. (7)
ii) Draw the equivalent circuit of UJT and explain its input characteristics. (6)

13. a) i) Draw the circuit diagram of a CE amplifier and explain its working. (8)
ii) Determine the input impedance, output impedance, voltage gain and current gain for the CE amplifier of the figure shown below. The h-parameters of the transistor are h_{fe} = 60, h_{ie} = 500 Ω at I_C = 3 mA. (5)



(OR)

b) i) Draw the small signal model of FET amplifier in CS connection and derive the equations for voltage gain, input impedance and output impedance. **(8)**

ii) A BJT has $g_m = 38$ mmhos, $r_{b'e} = 5.9\ k\Omega$, $h_{ie} = 6\ k\Omega$, $r_{bb'} = 100\ \Omega$, $C_{b'c} = 12$ pF, $C_{b'e} = 63$ pF and $h_{fe} = 224$ at 1 kHz. Calculate α and β cut off frequencies and f_T. **(5)**

14. a) What is neutralization ? Explain the hazeltine neutralization method. **(13)**

(OR)

b) Draw the equivalent circuit of capacitance coupled single tuned amplifier and derive the equation for voltage gain. **(13)**

15. a) What are the different types of negative feedbacks ? Explain the types with neat block diagram. **(13)**

(OR)

b) Explain the working of Hartley and Wien bridge oscillator. **(13)**

PART – C **(1×15=15 Marks)**

16. a) i) In the biasing with feedback resistor method, a silicon transistor with feedback resistor is used. The operating point is at 7 V, 1 mA and $V_{CC} = 12$ V. Assume $\beta = 100$. Determine the value of R_B, stability factor and what will be the new operating point if $\beta = 50$ with all other circuit values are same ? **(8)**

ii) In a colpitts oscillator the values of the inductors and capacitors in the tank circuit are L = 40 mH, $C_1 = 100$ pF and $C_2 = 500$ pF.

i) Find the frequency of oscillations.

ii) If the output voltage is 10 V find the feedback voltage.

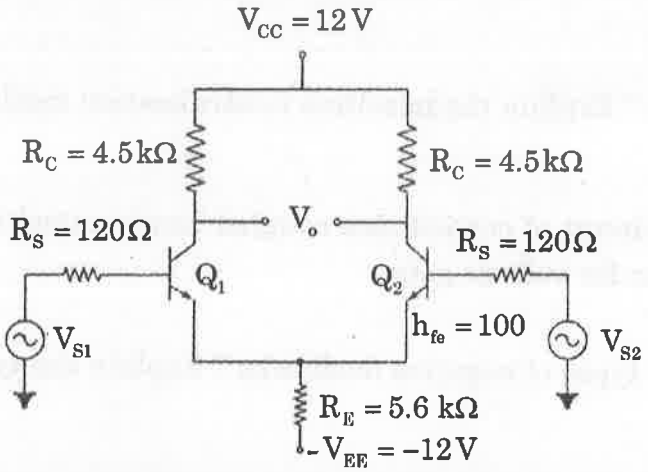
iii) Find the minimum gains if the frequency is changed by changing L alone.

iv) Find the value of C1 for a gain of 10 and

v) Find the new frequency. **(7)**

(OR)

b) i) Calculate the operating point values, differential gain, common mode gain, CMRR, output if $V_{S1} = 60$ mV (peak to peak) at 1 kHz and $V_{S2} = 40$ mV (peak to peak) at 1 kHz for the differential amplifier shown below. Assume the transistor is made of silicon with $h_{ie} = 3.2$ kΩ. **(10)**



ii) The diode current is 0.6 mA when the applied voltage is 400 mV and 20 mA when the applied voltage is 500 mV. Determine η. Assume kT/q = 25 mV. **(5)**