Question Paper Code : **X20438**

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020
AND APRIL/MAY 2021
Second/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, Biomedical
Engineering and Medical Electronics)
(Regulations 2013)
(Also Common to : PTEC 6202 – Electronic Devices and Circuits for B.E. (Part-Time)
– Second Semester – Electrical and Electronics Engineering (Regulations 2014))

Time : Three Hours   Maximum : 100 Marks

Answer ALL questions

PART – A   (10×2=20 Marks)

1. Draw the symbol of the following devices :
   a) PN diode
   b) Zener diode
   c) LED
   d) UJT.

2. Calculate the diffusion Capacitance for a silicon diode with a 15 mA forward current, if the charge carrier transit time is 70 nsec.

3. Differentiate between JFET and MOSFET.

4. Draw the transfer and drain characteristic curves of JFET.

5. A common emitter amplifier has an input resistance 2.5 kΩ and voltage gain of 200. If the input signal voltage is 5 mV. Find the base current of the amplifier.

6. Define an intrinsic stand off ratio of UJT.

7. CMRR of an amplifier is 100 dB, calculate common mode gain, if the differential gain is 1000.

8. Define conversion efficiency of power amplifier.

9. An amplifier has a current gain of 240 and input impedance of 15 k without feedback. If negative current feedback (current attenuation = 0.015) is applied, what will be the input impedance of the amplifier ?

10. What are the essential blocks of a transistor oscillator ?

PART – B **(5×13=65 Marks)**

11. a) Draw the circuit diagram and explain the working of full wave bridge rectifier with output filter and derive the expression of average output current and ripple factor. **(13)**

(OR)

b) i) Derive the expression for diffusion capacitance of PN junction diode. **(7)**

ii) Explain how zener diode can be acts as a voltage regulator. **(6)**

12. a) i) Explain the selection of Q point for a transistor bias circuit and discuss the limitations on the output voltage swing. **(7)**

ii) Draw the cross section diagram for an N type enhancement mode MOSFET. Briefly explain its operation. **(6)**

(OR)

b) i) Draw the basic construction and equivalent circuit of a Uni Junction Transistor. Briefly explain the device operation. **(7)**

ii) Sketch the four layer construction of an SCR and the two transistor equivalent circuit. Explain the device operation. **(6)**

13. a) i) Explain the working of a common emitter amplifier. **(9)**

ii) The data sheet of an enhancement MOSFET gives $I_{D(on)}$ = 500 mA at V_{GS} = 10 V and $V_{GS(th)}$ = 1 V. Find the drain current for V_{GS} = 5 V. **(4)**

(OR)

b) i) Make a high frequency analysis of a common source amplifier. **(6)**

ii) Compare the characteristics of CB, CE and CC amplifiers. **(7)**

14. a) Explain the common mode and differential mode analysis of differential amplifier and derive its CMRR. **(13)**

(OR)

b) What is Neutralization ? Explain any two methods of Neutralization. **(13)**

15. a) Identify the nature of feedback in Figure 15(a). Let $R_{C1} = 3\ k\Omega$, $R_{C2} = 500\ \Omega$, $R_E = 50\ \Omega$, $R_S = R_F = 1.2\ k\Omega$, $h_{fe} = 50$, $h_{ie} = 1.1\ k\Omega$, $h_{re} = h_{oe} = 0$. Determine overall voltage gain (A_{vf}), overall current gain (A_{if}), input impedance (R_{if}) and output impedance (R_{of}).
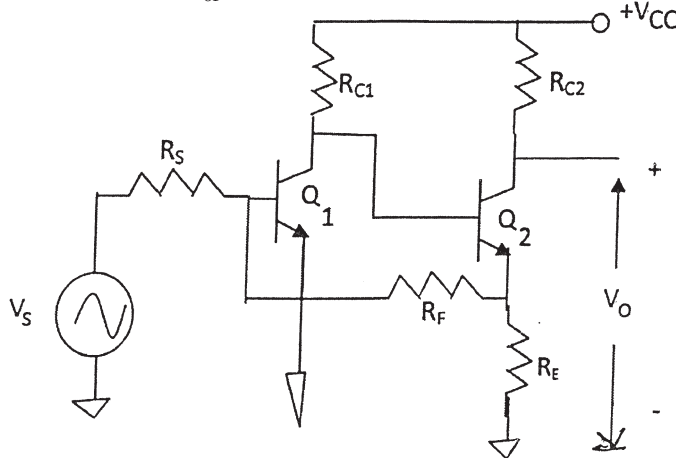

Figure 15 (a)

(OR)

b) i) Draw and explain the RC-phase shift oscillator using BJT and also derive the condition for Oscillation. **(10)**

   ii) In Colpitt's Oscillator $C_1 = 1\ nF$ and $C_2 = 100\ nF$. If the frequency of oscillation is 100 kHz, find the value of inductor. Also find the minimum gain required for obtaining sustained oscillations. **(3)**

PART – C   **(1×15=15 Marks)**

16. a) There is an application which needs the output voltage to be regulated. Choose an appropriate diode/device, that would ensure this operation with appropriate circuit, describe how it regulates voltage. Consider a specific example, design the circuit with appropriate values of components involved. State the important constraints that need to be considered. **(15)**

(OR)

b) When a portion of the output signal is fed to input, as you are aware, feedback is generated. Distinguish between negative feedback and positive feedback and elaborate on their individual advantages. How different parameters of an amplifier (say) will be affected by these two types of feedback ? **(15)**

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