

Reg. No.

Question Paper Code

12097

27 JUL 2023

**B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2023**

Third Semester

**Electronics and Instrumentation Engineering**

(Common for Instrumentation and Control Engineering)

**20EIPC303 - ANALOG ELECTRONIC CIRCUITS**

(Regulations 2020)

Duration: 3 Hours

Max. Marks: 100

**PART - A (10 × 2 = 20 Marks)**

Answer ALL Questions

- |  | <i>Marks,<br/>K-Level, CO</i> |
|--|-------------------------------|
| 1. Compare transition and diffusion capacitance.   | 2,K2,CO1                      |
| 2. Draw the two transistor model of an SCR with its characteristics curve.                                     | 2,K2,CO1                      |
| 3. Define crossover distortion in power amplifier.   | 2,K1,CO2                      |
| 4. Determine the amplification factor of FET if $r_d=4K$ and $g_m=4mA/V$ .                                     | 2,K2,CO2                      |
| 5. List the effect of bandwidth in a negative feedback amplifier.  | 2,K1,CO3                      |
| 6. If $L_1 = 1$ mH, $L_2 = 2$ mH and $C = 0.1$ nF, find the frequency of oscillation for a Hartley oscillator. | 2,K2,CO3                      |
| 7. State and draw zero crossing detectors with input and output waveforms.                                     | 2,K1,CO4                      |
| 8. List the Ideal Characteristics of OP-AMP.   | 2,K1,CO4                      |
| 9. Mention the applications of 555 Timer.  | 2,K1,CO5                      |
| 10. Why input and output capacitors are connected in three terminal IC regulators?                             | 2,K1,CO5                      |

**PART - B (5 × 13 = 65 Marks)**

Answer ALL Questions

11. a) (i) Explain the theory of PN Junction Diode along with its V-I Characteristics. 7,K2,CO1  
(ii) Compare CE, CB and CC transistor configuration in detail. 6,K2,CO1
- OR**
- b) Demonstrate the stability factor of Voltage divider bias circuit and explain why it is advantageous than fixed bias circuit. 13,K2,CO1
12. a) Derive gain, input and output impedance of common source JFET amplifier with neat diagram. 13,K2,CO2
- OR**
- b) Explain the working of complementary symmetry class B push pull amplifier. List its merits, demerits and applications. 13,K2,CO2
13. a) Explain the effect of a current series feedback on input and output resistance of a BJT amplifier. Explain the same, with necessary circuit, equivalent circuit and equations. 13,K2,CO3

*K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create*

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OR

- b) Write about the working principle of RC phase shift oscillator circuit diagram also derive the expression for frequency of oscillation and condition for sustained oscillation. 13.K2.CO3

14. a) Sketch the basic circuit using op amp to perform the mathematical operation of differentiation and explain? What are the limitations of an ordinary op-amp differentiator? Draw and explain the operation of a practical differentiator that will eliminate the limitations. 13.K2.CO4

OR

- b) Describe the operation of Monostable multi vibrator using op amp. 13.K2.CO4

15. a) With the internal diagram of IC555 timer, Explain the operation of a stable multi vibrator. 13.K2.CO5

OR

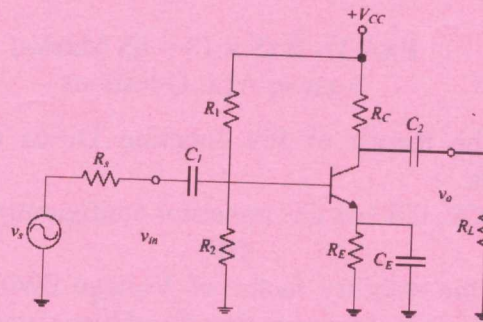
- b) (i) Draw the functional diagram of IC 723 regulator. Explain how it can be used as a high voltage regulator. 7.K2.CO5

- (ii) Write Short notes on IC8093 function generator. 6.K2.CO5

**PART - C (1 × 15 = 15 Marks)**

16. a) Consider the common-emitter BJT amplifier circuit shown in Figure 1. Assume  $V_{CC} = 15\text{ V}$ ,  $\beta = 150$ ,  $V_{BE} = 0.7\text{ V}$ ,  $R_E = 2.7\text{ k}\Omega$ ,  $R_C = 4.7\text{ k}\Omega$ ,  $R_1 = 47\text{ k}\Omega$ ,  $R_2 = 10\text{ k}\Omega$ ,  $R_L = 47\text{ k}\Omega$ ,  $R_S = 100\ \Omega$ . Determine 15.K3.CO1

- (i) The Q-point parameters.  
(ii) Draw the AC equivalent circuit and determine the AC model parameters.



OR

- b) In a Colpitts oscillator, the values of the inductors and capacitors in the tank circuit are  $L = 40\text{mH}$ ,  $C_1 = 100\text{pF}$  and  $C_2 = 500\text{pF}$ . Evaluate the following: 15.K3.CO3

- (i) Frequency of oscillations.  
(ii) If the output voltage is 10V, find the feedback voltage.  
(iii) Find the minimum gains if the frequency is changed by changing L alone.  
(iv) Find the value of  $C_1$  for a gain of 10.  
(v) Also find the new frequency.