

Seat No. : _____

SI-124

September-2020

B.Sc., Sem.-VI

CC-307 : Electronics

Time : 2 Hours]

[Max. Marks : 50

- Instructions :** (1) All Questions in **Section I** carry equal marks.
(2) Attempt any **THREE** questions in **Section I**.
(3) Question No. 9 in **Section II** is **COMPULSORY**.

Section – I

1. (A) Draw the circuit of Op-Amp log amplifier using transistor as feedback element and derive necessary equation for output voltage. 7
(B) Describe the application of Op-Amp as differentiator and obtain expression of output voltage. Also draw frequency response of the differentiator circuit. 7
2. (A) Describe the application of Op-Amp comparator as zero crossing detector and window detector. 7
(B) Write a short note on regenerative comparator using Op-Amps. 7
3. (A) Draw the block diagram of PLL and explain basic principle of PLL. 7
(B) Describe digital phase detector using Ex-OR gate. Also draw its input and output waveforms. Show that the phase conversion ratio $K\phi=1.59$ V/Radian. 7
4. (A) Explain the application of PLL as AM detector. 7
(B) Write a short note on Edge-Triggered phase detector using NOR gates. 7
5. (A) Explain the working of SCR using proper circuit diagram. 7
(B) Explain the terms used for SCR (1) breakover voltage (2) holding current (3) forward current rating. 7
6. (A) Explain following SCR turn-off methods (1) Anode current interruption (2) Forced commutation. 7
(B) A half wave rectifier circuit employing an SCR is adjusted to have a gate current of 1mA. The forward breakdown voltage of SCR is 100 V for $I_g=1mA$. If a sinusoidal voltage of 200 V peak is applied, find : (1) firing angle (2) conduction angle (3) average current.
Assume load resistance =100 Ω and the holding current to be zero. 7

7. (A) Explain the operation of Triac in different possible modes. 7
 (B) Write a short note on Triac phase control circuit. 7
8. (A) Explain the application of UJT in the relaxation oscillator. 7
 (B) In a basic UJT relaxation oscillator circuit, $R_1 = 33 \Omega$, $R_2 = 330 \Omega$, $\eta = 0.54$, $C = 0.2 \mu\text{F}$, a variable resistor R_E (between positive terminal of V_{in} and emitter) is used to change the frequency of pulses delivered at V_{out} . The variable resistor is initially set at $5 \text{ k}\Omega$ and then adjusted to $10 \text{ k}\Omega$. Determine the frequency of the voltage spikes produced for (1) $5 \text{ k}\Omega$ setting and (2) $10 \text{ k}\Omega$ setting. 7

Section – II

9. Attempt any **Eight** : 8
- (A) What is ‘virtual ground’ ?
 (B) Write the names of any two applications of analog multipliers.
 (C) Define ‘slew rate’.
 (D) Draw the basic circuit of voltage to current converter using Op-Amp.
 (E) Draw basic integrator circuit using Op-Amp.
 (F) Enlist any three applications of PLL.
 (G) What is capture range ?
 (H) Which is greater ‘capture range’ or ‘lock range’ ?
 (I) What is the full form of VCO ?
 (J) Draw the symbol of SCR.
 (K) Enlist any two advantages of SCR as switch over a mechanical or electro-mechanical switch.
 (L) Draw the V-I characteristics of SCR.
 (M) Define Peak Reverse Voltage of an SCR.
 (N) How many junction/junctions a UJT has ?
 (O) Define: Triac
 (P) What is the normal way to turn on the DIAC ?