

Section – 1

- Q-1 (A) For the log amplifier using op-amp, prove that the output voltage is proportional to the logarithm of the input voltage. 7
- (B) Write a short-note on op-amp differentiator. Draw sine and square waves and their differentiated forms. 7
- Q-2 (A) Write a short-note on op-amp integrator. 7
- (B) Explain op-amp zero-crossing detector as an application of comparator. 7
- Q-3 (A) Draw the schematic block diagram of the PLL. Explain function of each block in detail. 7
- (B) Write a short note on digital phase detector using Ex-OR gate. 7
- Q-4 (A) Describe the edge triggered phase detector using IC CD4001. 7
- (B) Draw the PIN configuration and block diagram of NE/SE 566 VCO. Explain shortly the block diagram. 7
- Q-5 (A) Draw the V-I characteristics of an SCR. Explain forward and reverse characteristics in detail. 7
- (B) Draw the equivalent circuit of an SCR and explain SCR's working from this equivalent circuit. 7
- Q-6 (A) Explain the terms break-over voltage, holding current, PRV and forward current rating as used in connection with SCR analysis. 7
- (B) An SCR has a break-over voltage of 400 V, a trigger current of 10 mA and holding current of 10 mA. What do you infer from it? What will happen if gate current is made 15 mA? 7
- Q-7 (A) Discuss the construction of TRIAC in detail. 7
- (B) Explain TRIAC operation with the help of suitable circuit diagram. 7
- Q-8 (A) Give the constructional details of the DIAC. Explain the operation of DIAC with the help of V-I characteristics. 7
- (B) Write a short note on UJT relaxation oscillator. 7

Section – 2

- Q-9 Answer in short (ANY EIGHT): 8
- 1 Give the mathematical relationship between $\log_{10} X$ and $\ln X$.
 - 2 IC _____ is a typical four quadrant analog op amp multiplier.
 - 3 Differentiation of a sine wave gives _____ wave and differentiation of square wave gives _____ wave.
 - 4 For a lossy integrator circuit, the component values $R_1 = 10 \text{ k}\Omega$, $R_f = 100 \text{ k}\Omega$, $C_f = 10 \text{ nF}$, determine the lower frequency limit of integration.
 - 5 What is the full form of PLL?
 - 6 IC _____ is monolithic PLL available in 14 pin D-I-P package.
 - 7 What is the function of the phase detector in the PLL?
 - 8 Give any two medical instrumentation applications of VCO.
 - 9 The free running frequency of a PLL is 300 kHz and the bandwidth of low pass filter is 10 kHz. Will the PLL acquire lock for an input signal of 320 kHz?
 - 10 Write the full form of SCR.
 - 11 Why SCR is called 'Thyristor' ?
 - 12 Three terminals of an SCR are _____, _____ and _____.
 - 13 An SCR in a circuit is subjected to a 50 Amp surge that lasts for 12 ms. Determine whether or not this surge will destroy the device. Given that circuit fusing rating is $90\text{A}^2\text{s}$.
 - 14 Why TRIAC makes no mention of rectification in its name?
 - 15 Draw the symbol of TRIAC.
 - 16 For a UJT $R_{B1} = 6 \text{ k}\Omega$ and $R_{B2} = 4 \text{ k}\Omega$, calculate the value of intrinsic stand-off ratio η .