



**K. K. Wagh Institute of Engineering Education & Research, Nashik**  
(An Autonomous Institute From A.Y. 2022-23)

SUMMER-2024	
Exam Seat No.:	
Academic Year:2023-2024	Semester:III
Class:SY	Program:B.Tech
Branch Code:ETC	Pattern:2022
Name of Course:Electronic Circuits	Course Code:ETC222005
Max. Marks:60	Duration:2.30 Hrs.

**Instructions:** Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains \_\_\_\_\_page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

**Question No. 1 Attempt following Question**

- 1a) Draw and explain EMOSFET Common source voltage divider bias circuit. Analyze gate voltage if  $R_1=33\text{ K}\Omega$  and  $R_2=18\text{ K}\Omega$ . Assume that a DC power supply of 6 V is connected. (6) CO1

**Question No. 2 Attempt following Question**

- 2a) The Capacitors of 5 nF and resistors of 10 K $\Omega$  are connected in the feedback network of RC phase Shift Oscillator. What will be the frequency of oscillations produced? Draw this RC phase Shift Oscillator circuit diagram with all component values. (6) CO2

**Question No. 3 Attempt following Question**

- 3a) A square waveform with 10 KHz frequency is to be integrated. Design the circuit with DC gain of 10. Assume  $R_1=10\text{ K}\Omega$ . Draw the circuit diagram of final design. What will be the output waveform? (8) CO3

**OR**

- 3b) The circuit is needed which detects when the input sine wave crosses zero. Explain operation of such circuit using op-amp with circuit diagram. Draw and explain input output waveforms. Draw and relate the transfer characteristics. (8) CO3

- 3c) Draw and explain the circuit diagram to get  $V_o=-(V_a+V_b+V_c)$ . Derive expression of its output voltage. Design the circuit component values to get average of all the inputs. (8) CO3

**OR**

- 3d) Can opamp comparator be used as a square and triangular wave generator? Explain its operation with circuit diagram and waveforms. Write the equation of output frequency. (8) CO3

- 4a) A communication system needs a circuit to remove high frequency noise with frequencies greater than 10 KHz. Draw and explain such circuit along with its frequency response. Design a first order circuit with pass band gain of 2. A  $10\text{ K}\Omega$  resistor is connected in the feedback. Assume capacitor value as  $0.001\text{ }\mu\text{F}$ . (8) CO4

**OR**

- 4b) Elaborate the concept of wide band pass filter with circuit diagram and frequency response. What is the value of quality factor for the same? (8) CO4

- 4c) Design an active notch filter to reject frequency of 50 Hz with  $0.47\text{ }\mu\text{F}$  capacitor value. Draw final designed circuit. Also draw frequency response of notch filter. (8) CO4

**OR**

- 4d) A system needs a circuit to remove low frequency signals. Draw and explain such circuit along with its frequency response. For such first order filter, analyze cut off frequency if  $15\text{ K}\Omega$  resistance and  $0.01\text{ }\mu\text{F}$  capacitor is used. Calculate pass band gain for  $R_F=10\text{ K}\Omega$  and  $R_1=5\text{ K}\Omega$ . (8) CO4

**Question No. 5 Attempt following Question**

- 5a) Explain significance of the term SMPS. Which basic SMPS convertor circuit provides step up output voltage? Explain the circuit diagram with waveforms. (8) CO5

**OR**

- 5b) Elaborate the circuit operation of Digital to analog convertor which uses only two different values of resistors. What is the largest value of output voltage from an 8-bit DAC that produces 1.0V for a digital input of 00110010? (8) CO5

- 5c) Determine the range over which output voltage can be varied in LM317 regulator if  $R_1$  is  $240\text{ }\Omega$  and  $R_2$  is  $4.7\text{ K}\Omega$  potentiometer. Assume  $I_{\text{adj}}=100\text{ }\mu\text{A}$ . Draw and explain the circuit diagram of the regulator. (8) CO5

**OR**

- 5d) Draw the circuit diagram and explain current to voltage convertor. Derive the equation to prove that it is working as I to V convertor. (8) CO5

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