T E Sem VI CBGS
EXTC KT 21061
Integrated Circuits

QP Code : **31228**

(3 Hours) **[Total Marks : 80**

N. B. : (1) Question No. **1** is **compulsory**.
(2) Solve any **three** from remaining **five** questions.
(3) **Figures** to the **right** indicate **full** marks.
(4) Assume suitable data if necessary and mention the same in the answersheet.

1. Solve the following (any **five**) :– **20**
   (a) Compare open loop & closed loop configurations of operational amplifier.
   (b) Draw the diagram of a floating load voltage to current converter and derive the expression for the output current.
   (c) Differentiate between inverting & non-inverting comparators.
   (d) Explain the functional block diagram of timer 555.
   (e) Explain current fold-back protection in voltage regulators.
   (f) Draw the waveforms for the outputs of IC 7490 with respect to the clock when it is used as a bi-quinary decade counter.

2. (a) Draw a neat circuit diagram for an instrumentation amplifier using three op-amps & derive the expression for its gain. Explain how the gain can be varied. **10**
   (b) Draw a neat diagram of a Wien bridge oscillator using op-amp. Derive its frequency of oscillation. What are the values of R & C if its frequency of oscillation = 1 kHz? **10**

3. (a) With the help of a neat diagram & voltage transfer characteristics explain the working of a non-inverting Schmitt trigger. Derive the expressions for the threshold levels & explain how they can be varied. **10**
   (b) Draw the circuit diagram for a square and triangular waveform generator using operation amplifiers. With the help of waveforms at suitable points in the circuit explain its working. Explain how the duty cycle can be varied. **10**

4. (a) Design a voltage regulator using IC 723 to give output voltage of 15 V and output current of 1.5 A. **10**

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(b) With the help of a neat diagram explain how IC LM 317 can be used as a variable voltage regulator. 6

(c) Differentiate between linear regulator & switching regulator. 4

5. (a) Draw the diagram for an astable multivibrator using timer 555. Design the same for a frequency of 5 KHz with duty cycle 70%. Draw the waveforms across the charging capacitor and at the output. 10

(b) With the help of a neat circuit diagram explain the working of universal shift register IC 74194 as a 4 bit, 4 state ring counter with single circulating 'zero'. 10

6. Write short notes on any **four** :– 20

(a) Frequency to voltage converter

(b) Waveform generator XR 2206

(c) Voltage controlled ascillator 566

(d) Synchronous counter 74163

(e) Arithmetic logic unit 74181
