

# GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-V (OLD) EXAMINATION – WINTER 2018

**Subject Code:151003**

**Date: 27/11/2018**

**Subject Name: Integrated Circuits And Applications**

**Time: 10:30 AM TO 01:00 PM**

**Total Marks: 70**

**Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

**MARKS**

- |            |     |  |           |
|------------|-----|--|-----------|
| <b>Q.1</b> | (a) | Explain the internal block diagram of OP-AMP in detail with the function of each block.  | <b>07</b> |
|            | (b) | Which type of feedback is used in inverting op-amp? Derive exact expressions for voltage gain, input resistance, output resistance and bandwidth for inverting op-amp.   | <b>07</b> |
| <b>Q.2</b> | (a) | Explain following terms related to op-amp:<br>1. CMRR, 2. PSRR, 3. Slew Rate, 4. Input offset current, 5. Input offset voltage.  | <b>07</b> |
|            | (b) | Explain the concept of virtual ground in OP-AMP and why open loop op-amp configurations are not used in linear application?  | <b>07</b> |
| <b>OR</b>  |     |  |           |
|            | (b) | Explain application of op-amp (Inverting configuration) as summing, Scaling and averaging circuit.   | <b>07</b> |
| <b>Q.3</b> | (a) | Draw and derivation the output voltage in term of input voltage of basic integrator using an op-amp. What are the Problems associated with this configuration? How they are overcome?  | <b>07</b> |
|            | (b) | Explain Schmitt trigger circuit along with circuit diagram and necessary waveforms. State its advantages and applications.   | <b>07</b> |
| <b>OR</b>  |     |  |           |
| <b>Q.3</b> | (a) | Explain triangular wave generator circuit.   | <b>07</b> |
|            | (b) | Analyze second order butterworth High Pass filter. Draw its frequency response and state design procedure.   | <b>07</b> |
| <b>Q.4</b> | (a) | Draw and explain Monostable multivibrator using 555 timer IC.  | <b>07</b> |
|            | (b) | Draw the circuit diagram of monostable multivibrator using IC 555. Calculate the component values if the controlled door should remain open for 15 secs after a trigger signal is received. The DC voltage available is 10V. | <b>07</b> |
| <b>OR</b>  |     |  |           |
| <b>Q.4</b> | (a) | Explain operation of Astable multivibrator using IC 555.   | <b>07</b> |
|            | (b) | Design an astable multivibrator for an output frequency of 5 KHz and duty cycle 40%. Consider $C=0.047 \mu F$ .  | <b>07</b> |
| <b>Q.5</b> | (a) | What are the different types of voltage regulators? Discuss LM317 based adjustable voltage regulator. Indicate bypass capacitors to improve transient response and protective diodes in the connection diagram.              | <b>07</b> |
|            | (b) | State the applications of operational transconductance amplifier and explain any one with necessary circuit and derivation   | <b>07</b> |

**OR**

- Q.5** (a) Draw block diagram of basic PLL and explain operation of each of the blocks. **07**
- (b) What do you understand by precision rectifier circuit? Illustrate op-amp based full-wave rectifier circuit with its complete functionality. **07**

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