# **GUJARAT TECHNOLOGICAL UNIVERSITY** BE - SEMESTER-III (New) EXAMINATION – WINTER 2015

### Subject Code:2130305 Subject Name: Analog Circuits-1 Time: 2:30pm to 5:00pm Instructions:

### Date:02/01/2016

## **Total Marks: 70**

14

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

### Q.1 Short Questions

- 1 Why a very small Current exists in a Reverse- Biased diode?
- 2 What is the Output Frequency of a Full-wave Rectifier if the input frequency is 60Hz?
- **3** How can be Biased the two Transistor Junctions for Transistor Amplifier operation?
- 4 What is  $\beta$  of Transistor? What is effect on it with increase in temperature?
- 5 A BJT has a Base Current of 250  $\mu$ A and Emitter Current of 15mA. Determine the Collector Current gain and  $\beta$ .
- 6 What is Bulk Resistance of diode? How to Calculate it?
- 7 Write two advantages of FET compare to BJT.
- **8** List the four Negative Feedback Configurations. Which two configurations are most commonly used?
- **9** A Non-Inverting amplifier has input 50 mV and require o/p is 4V Supply voltage is  $\pm 5$  V. Find the relation between R1 and Rf.
- 10 What is maximum rise of OP-AMP output in 4 sec if Op-amp has Slew Rate of  $0.72 \text{ V/}\mu\text{s}$  and Supply voltage is  $\pm 12\text{V}$ ?
- 11 Op-amp has Slew Rate (SR) =  $0.5 \text{ V/}\mu\text{s}$ , input voltage (Vi) =0.02V, gain of magnitude (A<sub>CL</sub>) = 24. Determine maximum frequency of signal that can be used.
- 12 Write Barkhausen Criterion for Oscillation.
- 13 What is Unity-Gain Bandwidth?
- 14 Draw the Circuit diagram of Positive Biased Series Clipper.
- Q.2 (a) Explain Capacitor-Input filter with Rectifier Circuit.
  - (b) Explain V-I characteristics of Silicon Diode.
  - (c) Explain CB configuration of transistor with input and output characteristics. 07

### OR

- (c) Explain Construction, Operation and Characteristics of JFET. 07
- Q.3 (a) Describe three Open-loop Configuration of OP-AMP. 03
  - (b) Explain Inverting Configuration of OP-AMP adder.
  - (c) Draw Voltage Shunt Feedback configuration of amplifier and Compute **07** Close-loop Voltage Gain and Input Resistance.

#### OR

Q.3 (a) Compute Total Output Offset Voltage and Explain Offset Voltage Null 03 technique for OP-AMP.

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- (b) Write short note on Antilog Amplifier.
- (c) Draw circuit of Differential Amplifier with three OP-AMP and Derive 07 Voltage gain equation.
- **Q.4** (a) Discuss the important Characteristics of the Comparator.
  - (b) Determine output voltage (Vo) for each network as input show in below 04 figure.



(c) Write short note on Differentiator using OP-AMP.

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Q.4 (a) What is the difference between a Basic Comparator and the Schmitt trigger? 03

(b) Determine output voltage (Vo) for each network as input show in below 04 figure.

OR



- (c) Draw and Explain Operation of Sample and Hold circuit.
- **Q.5** (a) What is Window Detector? What is the use of Window Detector?
  - (b) For the Emitter Biased network as shown in below figure, Determine Output 04 current (I<sub>C</sub>) and Output voltage (V<sub>CE</sub>).



- (c) Explain Wien Bridge Oscillator and Design it for the frequency of 900Hz.
  07
  OR
- Q.5 (a) What is Voltage Regulator? What are the types of Voltage Regulator? Give 03 One application of it.
  - (b) Determine output voltage (V<sub>0</sub>) of following circuit network,



- (c) Explain Astable Multivibrator Operation of 555 Timer and Design it for **07** frequency of 1KHz with 70% Duty cycle.
  - +

04