#### B.TECH/ECE/3<sup>RD</sup> SEM/ECEN 2101 (BACKLOG)/2019

Group – E

- 8. (a) What is the difference between voltage and power amplifier? Classify the power amplifiers with respect to the biasing points.
  - (b) Derive the efficiency of class A power amplifier.
  - (c) What is cross over distortion and how it can be overcome?

(3 + 2) + 5 + 2 = 12

- 9. (a) What is 555 timer? Draw the circuit diagram of a monostable multivibrator and calculate time of unstable state for one cycle.
  - (b) The timer IC 555 is used as an astable multivibrator. It is desired to have square-wave output with 50% duty cycle of 1 kHz. The timing capacitor is of .01  $\mu$ F. Find the values of resistors required and draw the circuit.

(2 + 2 + 3) + 5 = 12

## B.TECH/ECE/3<sup>RD</sup> SEM/ECEN 2101 (BACKLOG)/2019

# ANALOG ELECTRONIC CIRCUITS (ECEN 2101)

Time Allotted : 3 hrs

Full Marks: 70

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and <u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> from each group.

Candidates are required to give answer in their own words as far as practicable.

## Group – A (Multiple Choice Type Questions)

- 1. Choose the correct alternative for the following:  $10 \times 1 = 10$ 
  - (i) The input/output impedance of a transresistance amplifier, with negative feedback,

(a) increases/decreases	(b) decreases/increases
(c) increases/increases	(d) decreases/decreases.

- (ii) Placing a bypass capacitor, in common-emitter configuration, is necessary to
  (a) achieve a stable Q point
  (b) prevent thermal runway
  (c) prevent the fall of mid-band voltage gain (d) none of (a), (b) and (c).
- (iii) A circuit that removes positive or negative parts of waveform is called
  (a) Clipper
  (b) Limiter
  (c) Clamper
  (d) none of (a), (b) and (c).
- (iv) In a bipolar junction transistor the base region is made very thin so that
  (a) recombination in base region is minimum
  (b) electric field gradient in base is high
  (c) base can be easily fabricated
  (d) base can be easily biased.
- (v) An integrator circuit is basically a

  (a) low-pass filter
  (b) band-pass filter

  (c) high-pass filter
  (d) none of the (a), (b) and (c).
- (vi) Maximum efficiency of class A power amplifier is
  (a) 50%
  (b) 100%
  (c) 25%
  (d) 78.5%
- (vii) The cross-over distortion is observed in which type of amplifier's operation?
   (a) Class A
   (b) Class B

(a) Class A	(b) Class B
(c) Class C	(d) Class AB.

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- (viii) A Schmitt trigger uses(a) negative feedback(c) positive feedback
- (ix) The 555 timer IC consists of(a) SR flip-flop(c) D flip-flop
- (x) An ideal op-amp is an ideal
  (a) current controlled current source
  (b) voltage controlled voltage source
  (c) voltage controlled current source
  (d) current controlled current source.

Group – B

- 2. (a) What is thermal runway and how can it be controlled?
  - (b) What is a load line? Explain the concept of Q-point.
  - (c) In a collector base biased circuit indicated in Fig.1, a transistor with  $\beta$  = 50 is used. Supply voltage V<sub>cc</sub> = 12 V, V<sub>BE</sub> = 0.7 V, the collector resistance R<sub>c</sub> = 1 k $\Omega$ . The bias is obtained by connecting 50 k $\Omega$  resistor from collector to base. Find Q point and stability factor.



(b) compensating capacitors

(d) pull up resistors.

(b) JK flip-flop

(d) T flip-flop.

3 + (1 + 2) + 6 = 12

- 3. (a) Draw the hybrid parameter model of a bipolar junction transistor. Define the four hybrid parmeters.
  - (b) Calculate the value of resistances  $R_1 \& R_2$  to bias a transistor as shown in Fig.2. Assume  $V_{cc} = 20 V, V_{CEQ} = 6 V, S = 6,$  $I_{cQ} = 0.6 \text{ mA}, R_c = 1 k\Omega, \beta = 150.$



(2 + 5) + 5 = 12

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Group – C

- 4. (a) State Barkhausen criterion and explain the conditions that must be satisfied for a feedback amplifier to produce steady oscillations.
  - (b) Sketch the circuit diagram of a Colpitts oscillator. Calculate the frequency of the oscillation and the condition for sustained oscillation.

4 + 8 = 12

- 5. (a) Draw the circuit diagram of single stage R-C coupled amplifier. Discuss the frequency response curve of R-C coupled amplifier. Why does the gain fall off at low and high frequencies?
  - (b) A single stage amplifier has a gain of 60. The collector load  $R_c = 500 \Omega$  and the input impedance is  $1 k\Omega$ , calculate the overall voltage gain when two stages are cascaded through R-C coupling.

(2+3+3)+4=12

# Group – D

- 6. (a) Mention different types of differential amplifier. Draw the circuit of dual input balanced output differential amplifier.
  - (b) Draw the block schematic of an op-amp and explain the function of each block.
  - (c) What is the range of the voltage gain adjustment in the Fig.3?



- (1 + 3) + 5 + 3 = 12
- 7. (a) Explain with the help of a neat circuit diagram how an op amp is used to obtain logarithm of a signal, preventing variation due to temperature.
  - (b) Write a short note on Instrumentation amplifier. Derive the expression for its output voltage.

5 + 7 = 12