

**B.TECH**  
**(SEM IV) THEORY EXAMINATION 2022-23**  
**ANALOG ELECTRONICS**

Time: 3 Hours

Total Marks: 100

**Note:** Attempt all Sections. If require any missing data; then choose suitably.

**SECTION A**

**1. Attempt all questions in brief. 2 x 10 = 20**

- (a) What do you understand by DC and AC analysis.
- (b) Define stability factor for a biasing scheme.
- (c) Define the efficiency of power amplifiers.
- (d) If differential mode gain of a differential amplifier is 1000 and common mode gain is 10, calculate the CMRR in decibel for it.
- (e) If open loop gain of an amplifier is 2000 and feedback factor of the system is .02, calculate the closed loop gain for negative feedback
- (f) Explain the concept of virtual short in operational amplifier.
- (g) List the properties of an ideal operational amplifier.
- (h) Define frequency stability in oscillators.
- (i) Differentiate between Comparator and Schmitt Trigger.
- (j) What is meant by Filter.

**SECTION B**

**2. Attempt any three of the following: 10x3=30**

- (a) Describe emitter follower. Derive expression for input & output resistance.
- (b) Discuss the advantages of negative feedback in detail with explanation.
- (c) Explain the working of a tank circuit. Also derive the frequency of oscillation and condition of gain to get sustained oscillations for Colpitts oscillator.
- (d) Describe following application of Op-amp
  - (i) Precision rectifier
  - (ii) Phase Changer
  - (iii) Averaging
  - (iv) Non-inverting summer
- (e) What is Super Diode? Describe the working of full wave precision rectifier giving its transfer characteristic.

**SECTION C**

**3. Attempt any one part of the following: 10x1=10**

- (a) Define stability factor. What is meant by transistor-biasing. Describe voltage divider bias circuits.
- (b) Describe MOSFET internal capacitances. Draw the high frequency equivalent circuit model for the MOSFET.

**4. Attempt any one part of the following: 10x1=10**

- (a) Describe an amplifier using shunt – series feedback, derive the expression for the output resistance with feedback and show that due to negative feedback, the output resistance reduces below its value without feedback.
- (b) Describe Class B operation giving its circuit and transfer characteristics curve. Also obtain its power conversion efficiency.

**5. Attempt any one part of the following: 10x1=10**

- (a) Describe the operation of RC phase shift oscillator giving its neat diagram. Also derive expressions for its frequency of operation and gain for the sustained oscillations.
- (b) With neat diagram explain the generation of square wave using Op-amp and calculate its total time period.

**6. Attempt any one part of the following: 10x1=10**

- (a) What are the desirable characteristics of current mirror circuits. Draw the simple BJT current mirror and obtain the expression for current transfer ratio using matched transistors.
- (b) Describe the operation giving circuit of BJT differential amplifier. Obtain expression for input differential resistance and differential voltage gain.

**7. Attempt any one part of the following: 10x1=10**

- (a) What is a Filter circuit. Give classification of filter circuit on the basis its frequency response. Design a second order High Pass Filter to provide a Cut-off frequency of 1 kHz and Pass band gain of 2
- (b) Define the following with reference to filter :
  - (i) Pass Band
  - (ii) Stop Band
  - (iii) Roll-off rate
  - (iv) Cut-off frequency