

- (v) CMRR of an ideal op-amp is
 (a) 1 (b) ∞ (c) 10 (d) 0.
- (vi) The output voltage (V_o) of the given circuit (Fig.1) is
 (a) 14.3V (b) 14.1V (c) 14V (d) 14.7V.

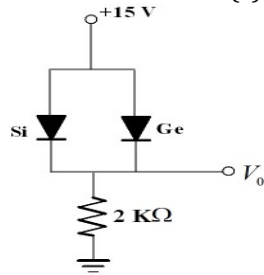


Fig.1

- (vii) Adding an emitter resistor to a common-emitter amplifier causes
 (a) the voltage gain to increase and the input resistance to decrease
 (b) the voltage gain to decrease and the input resistance to increase
 (c) the current gain to increase and the output resistance to decrease
 (d) the current gain to decrease and the output resistance to increase.
- (viii) Compensation techniques, for maintaining a stable dc operating point in a transistor circuit, use
 (a) resistors in biasing circuit that provide negative feedback
 (b) coupling capacitors to provide stability
 (c) temperature sensitive device to offset the temperature variations in transistor parameters
 (d) feed forward compensation to cause pole-zero cancellation.
- (ix) Colpitts and Hartley oscillators belong to a general class of oscillators that use _____ feedback.
 (a) voltage-shunt (b) voltage-series
 (c) current-series (d) current-shunt.
- (x) Hysteresis is desirable in Schmitt-trigger, because
 (a) energy is to be stored/discharged in parasitic capacitances
 (b) effects of temperature would be compensated
 (c) devices in the circuit should be allowed time for saturation and desaturation
 (d) it would prevent noise from causing false triggering.

Group - B

2. (a) Draw the circuit diagram of a full wave bridge rectifier v capacitor filter and explain its operation with waveforms.
 (b) Draw the transfer characteristic of the given circuit (Fig.2) who is sinusoidal with peak to peak value being 9V.

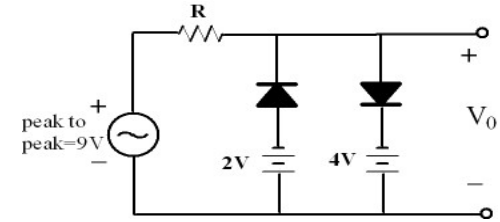


Fig. 2

8 + 4

3. (a) What are the reasons behind the lower cut-off frequency response of a RC coupled CE amplifier connected w ac source having internal resistance R_s ?
 (b) Derive the expression to determine lower cut-off frequency o coupled CE amplifier connected with an ac source having in resistance R_s ?
 (c) What is the advantage of direct coupled amplifier over RC co amplifier?

3 + 7 + 1

Group - C

4. (a) Derive an expression for the maximum conversion efficiency class-B push-pull amplifier.
 (b) What do you mean by thermal runaway of a transistor? Explain.
5. (a) In an emitter bias circuit, establish that output curre independent of the current gain " β ".
 (b) What are the reasons for shifting the operating point of a tran in an amplifier circuit?
 (c) Op-amp with negative feedback have stable but less gain and bandwidth — Justify.

8 + 4

5 + 2 + 1

Group - D

6. (a) Analyze the given circuit (Fig.3) with neat sketch of input and output waveforms and transfer characteristics.
 (b) The following circuit is known as “regenerative comparator” – why?

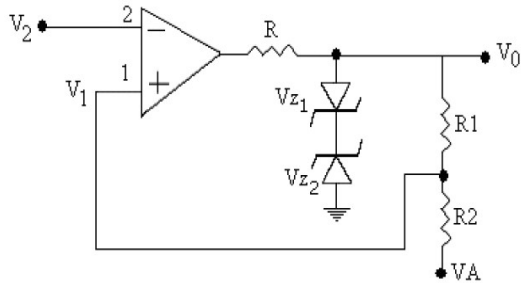


Fig.3

9 + 3 = 12

7. (a) Write a short note on any *three* of the following.
 (i) Inverting amplifier
 (ii) Instrumentation amplifier
 (iii) Closed loop comparator
 (iv) Darlington pair.

(3 × 4) = 12

Group - E

8. (a) Design a circuit using op-amp to solve the given equations
 $2x + 5y = 9$
 $3x + 4y = 5$.
 (b) With a neat circuit diagram explain the working principle of Wien Bridge Oscillator.
9. (a) Give a neat circuit diagram for IC555 timer connected as an astable multi-vibrator and describe its operation.
 (c) What do you mean by zero crossing detector? Explain the operation with circuit diagram and draw Input - output waveforms.

6 + 6 = 12

7 + 5 = 12

**ANALOG ELECTRONICS
 (AEIE 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 any 5 (five) from Group B to E, taking at least one 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 × 1 = 10**
- (i) RC coupled amplifier have
 (a) both upper and lower cut-off frequency
 (b) no upper and lower cut-off frequency
 (c) only lower cut-off frequency
 (d) only upper cut-off frequency.
- (ii) In an op-amp, the input offset current is defined as
 (a) the input current needed to make the output voltage zero
 (b) the difference between the input bias current and the current drawn from the power supply by the op-amp
 (c) the difference between the input currents drawn by the two opamp input terminals
 (d) the difference between the input currents at a particular temperature and the input currents at room temperature.
- (iii) The pick inverse voltage across the diodes in a full-wave rectifier made with two diodes and a centre-tapped transformer is _____ that in a bridge rectifier.
 (a) equal to (b) double (c) half (d) not related to.
- (iv) BJT operates in the cut-off region when
 (a) both the junctions are forward biased
 (b) both the junctions are reversed biased
 (c) both the junctions are shorted
 (d) both the junctions are opened.