BRAINWARE UNIVERSITY

Term End Examination 2023
Programme – B.Tech.(ECE)-2019
Course Name – Analog Circuits
Course Code - PCC-EC402
(Semester IV)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) If the positive terminal of the battery is connected to the anode of the diode, then it is known as

a) Forward biased b) Reverse biased
c) Equilibrium d) Schottky barrier

(ii) When a forward bias is applied to a diode, the electrons enter to which region of the diode?

a) P-region b) N-region
c) P-n junction d) Metal side

(iii) The current in the diode is contributed by

a) majority carriers only b) minority carriers only
c) both majority and minority carriers d) none of these

(iv) Which of the following is true about the resistance of a Zener diode?

a) It has an incremental resistance b) It has dynamic resistance
c) The value of the resistance is the inverse of the slope of the i-v characteristics of the Zener diode d) All of these

(v) Which of the following can be used in series with a Zener diode so that combination has almost zero temperature coefficient?

a) Diode b) Resistor
c) Transistor d) MOSFET

(vi) In Zener diode, for currents greater than the knee current, the V-I curve is almost

a) Almost a straight line parallel to y-axis b) Almost a straight line parallel to x-axis
c) Equally inclined to both the axes with a positive slope d) Equally inclined to both the axes with a negative slope

(vii) With both bases grounded, the only offset that produces an error is the

a) Input offset current
b) Input bias current
c) Input offset voltage
d) Beta

(viii) What usually controls the open-loop cutoff frequency of an op amp?

a) Stray-wiring capacitance
b) Base-emitter capacitance
c) Collector-base capacitance
d) Compensating capacitance

(ix) What will be the voltage drop across the source resistance of differential amplifier when connected in open loop configuration?

a) Zero
b) Infinity
c) One
d) Greater than one

(x) Determine the output voltage for the non-inverting amplifier input voltage 37μVpp sinewave. Assume that the output is a 741.

a) -7.44 Vpp sinewave
b) 74 Vpp sinewave
c) 7.4Vpp sinewave
d) 0.7 Vpp sinewave

(xi) What happen if any positive input signal is applied to open-loop configuration?

a) Output reaches saturation level
b) Output voltage swing's peak to peak
c) Output will be a sine waveform
d) Output will be a non-sinusoidal waveform

(xii) Which of the following is a combination of inverting and non-inverting amplifier?

a) Differential amplifier with one op-amp
b) Differential amplifier with two op-amps
c) Differential amplifier with three op-amps
d) Differential amplifier with four op-amps

(xiii) Compute the output voltage if the input voltage is reduced to zero in differential amplifier with one op-amp?

a) Inverted Voltage
b) Same as the input voltage
c) Amplified inverted voltage
d) Cannot be determined

(xiv) Which of the following is a method to model a diode's forward characteristics?

a) Iteration method
b) Graphical method
c) Constant-voltage drop model
d) All of these

(xv) How many junctions does a diode consist of?

a) 0
b) 1
c) 2
d) 3

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Draw the necessary circuit diagram and express the expression of voltage gain from an OPAMP being used as a non-inverting amplifier. (3)
3. Draw the circuit diagram of a differential amplifier using an OPAMP and express an expression for the output voltage. (3)
4. What is the slew rate? Explain virtual ground concept of an Op-Amp. (3)
5. Explain the operation of a phase-shift oscillator with the help of a circuit diagram. (3)
6. Develop the theory of action of an OPAMP as an integrator. Draw the circuit diagram of a practical integrator. (3)

OR

Explain the use of an OPAMP as a non- inverting amplifier. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Explain Hartly oscillator and derive the equation for oscillation? (5)
8. Draw the symbol of OPAMP and explain the characteristics of ideal OPAMP. (5)
9. Write a short note on virtual ground. (5)
10. Explain the use of an OPAMP as a summing amplifier. (5)

11. *Develop the use of an OPAMP as a differential amplifier.* (5)

12. *Explain the action of Zener diodes, illustrating both avalanche breakdown and Zener break down.* (5)

OR

With respect to CB output characteristics of a transistor, explain the active, saturation and the cut-off region (5)

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