Printed Page:- 04 **Subject Code:- AEC0402**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
B. Tech
SEM: IV - THEORY EXAMINATION (2023 - 2024)
Subject: Analog Circuit

Time: 3 Hours **Max. Marks: 100**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* ***three Sections -A, B, & C.*** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION-A 20

1. Attempt all parts:-

1-a. The unwanted characteristics of amplifier output apart from the desired output is collectively termed as _____(CO1) 1

(a) Inefficiency
(b) Damage
(c) Fault
(d) Distortion

1-b. The distortion is..... in the negative feedback amplifier. (CO1) 1

(a) constant
(b) increses
(c) decreases
(d) increases or decreases

1-c. In the common-mode …….. (CO2) 1

(a) both inputs are grounded
(b) the outputs are connected together
(c) an identical signal appears on both inputs
(d) the output signals are in-phase

1-d. For an Op-amp with negative feedback, the output is ….. (CO2) 1

(a) equal to the input
(b) increased

(c) feed back to the inverting input.

(d) feed back to the noninverting input

1-e. Which of the following type of flip-flop is used in 555IC? (CO3) 1

(a) SR

(b) D

(c) T

(d) JK

1-f. Which of the following mode of multi-vibrator does not require trigger to shift to other state? (CO3) 1

(a) Astable

(b) Monostable

(c) Bistable

(d) None of the mentioned

1-g. How many RC sections in RC phase shift oscillator? (CO4) 1

(a) one

(b) three

(c) two

(d) four

1-h. Which of the following is not an example of non-sinusoidal oscillator? (CO4) 1

(a) Sawtooth Generators

(b) UJT relaxation oscillator

(c) Multivibrator

(d) Colpitts oscillator

1-i. The compliance voltage is related to.....(CO5) 1

(a) oscillators

(b) current mirrors

(c) amplifiers

(d) Power amplifiers

1-j. A widlar current source is used (CO5) 1

(a) to get low value of current

(b) to get high value of CMRR

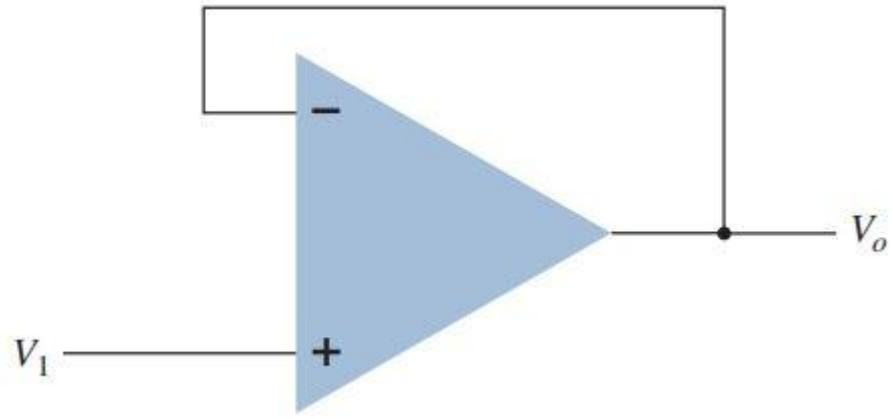
(c) to get low voltage of gain

(d) to get high value of Output

2. Attempt all parts:-

2.a. Write the value of conduction angle of class AB and class C power amplifiers. CO1 2

2.b. What output voltage results in the circuit of figure for $V_1 = 50$ V ? CO2 2



2.c.	Draw the circuit diagram of full-wave precision rectifier. CO3	2
2.d.	Write the Barkhausen criterion for sustained oscillations. (CO4)	2
2.e.	Write the characteristics of current mirrors. (CO5)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Draw and explain the frequency response of CE amplifier. (CO1)	6
3-b.	Discuss the crossover distortion in class B power amplifier and explain how it can be removed. (CO1).	6
3-c.	Write the advantages of voltage follower with circuit diagram. (CO2)	6
3-d.	Compare ideal and practical parameters of Op-amp. (CO2)	6
3.e.	Draw and explain the integrator circuit with input output waveforms and also write its applications. (CO3)	6
3.f.	Compare RC and LC oscillators in details. (CO4)	6
3.g.	Explain the Wilson current mirror and derive the expression of current transfer ratio. (CO5)	6

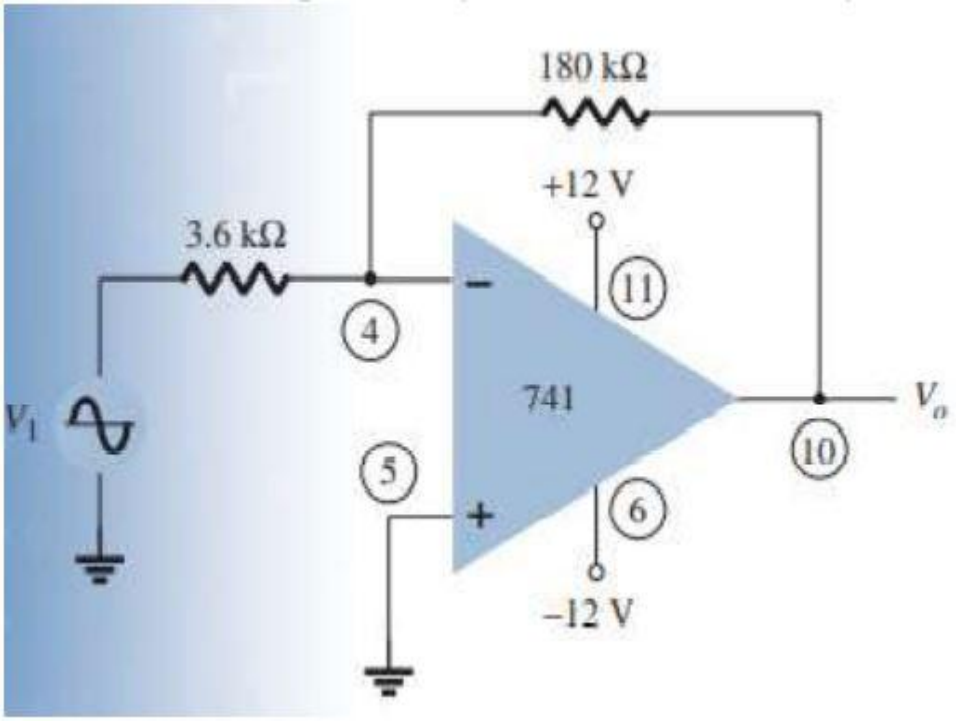
SECTION-C 50

4. Answer any one of the following:-

4-a.	Derive the expression of lower and upper cutoff frequencies of n-stage amplifier (multistage amplifier) in terms of single stage amplifier. (CO1)	10
4-b.	With block diagram explain the advantages and disadvantages of negative feedback amplifier. (CO1)	10

5. Answer any one of the following:-

5-a.	What is virtual ground? Discuss in details the ac parameters of Op-amp. (CO2)	10
5-b.	Derive the expression of output voltage of a non-inverting amplier. Also, calculate the output voltage for the circuit of Figure for an input of V_i = 3.5 Vrms. (CO2)	10



6. Answer any one of the following:-

6-a. What is active filters. Derive the expression of cutoff frequency of 2nd order low pass Butterworth filter with circuit diagram. (CO3) 10

6-b. Design an astable multi-vibrator using 555 timer for generating a rectangular waveform of frequency of 2 KHz and 60%duty cycle, use Vcc = 12 V. (CO3) 10

7. Answer any one of the following:-

7-a. Draw the circuit diagram of a Colpitts Oscillator and explain the principle of operation. (CO4) 10

7-b. With a neat diagram explain about Wien Bridge oscillator & derive the expression for frequency of oscillation. (CO4) 10

8. Answer any one of the following:-

8-a. In dual input balanced output differential amplifier, transistor Q_1 and Q_2 are biased at I_{CQ} = 200μA and each transistor has $\beta=1000$. The differential amplifier is to be designed for A_d = 180 and CMRR= 80dB. Calculate the values of R_C, R_E, R_{id} and R_{ic}. 10

8-b. Draw and derive the expression of current transfer ratio of modified current mirror. (CO5) 10