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. Current series feed back amplifier is also called as ..... (CO1) 1

(a) VCVS

(b) VCCS

(c) CCCS

(d) CSVS

1-b. In the power amplifier the efficiency .....from class A to class C mode. (CO1) 1

(a) increases

(b) drecreases

(c) constant

(d) None of these

1-c. A noninverting closed-loop op-amp circuit has a voltage gain factor.. (CO2) 1

(a) Less than one

(b) Greater than equal to one

(c) of zero

(d) equal to one

1-d. Ideal Op-amp has ..... open loop gain. (CO2) 1

(a) Infinite

(b) Zero

(c) 100

(d) None of these

1-e. The voltage drop across super diode is ..... (CO3) 1

(a) 0 V

(b) infinite

(c) 0.3 V

(d) 0.6 V

1-f. The differentiator output for 1V pure DC input is ..... (CO3) 1

(a) 1

(b) infinite

(c) -1

(d) zero

1-g. Which among the following components is /are not involved in the feedback network configuration of LC oscillators? (CO4) 1

(a) Inductor

(b) Capacitor

(c) Resistor

(d) All of the above

1-h. Clapp oscillator is an _____ (CO4) 1

(a) LC oscillator

(b) RC oscillator

(c) RL oscillator

(d) Relaxation oscillator

1-i. To design a differential amplifier a designer needs (CO5) 1

(a) Transistor

(b) Resistor

(c) Power supply

(d) All of the above

1-j. What type of amplifier commonly used at the output stage of op-amps? 1

(a) differential amplifier

(b) cascade-amplifier

(c) Class B Push-Pull power amplifier

(d) darlington stage amplifier

2. Attempt all parts:-

2.a. Draw and compare the frequency response of single and multistage amplifiers. (CO1) 2

2.b. List the four basic building blocks of an op-amp. (CO2) 2

2.c. What do you mean by passive and active filters? (CO3) 2

2.d. Write the Barkhausen criterion for oscillator. (CO4) 2

2.e. Write the three characteristics of current mirrors. (CO5) 2

SECTION B **30**

3. Answer any <u>five</u> of the following:-

3-a. Explain the frequency response of CS amplifier. (CO1) 6

3-b. Compare the negative feedback amplifiers with respect to input and output resistances. (CO1) 6

3-c. Define the AC and DC parameters of Op-amp. (CO2) 6

3-d. Explain the significance of virtual short and virtual ground concepts in Op-amp. (CO2) 6

3.e. Derive the expression for output voltage of an integrator circuit and also write its applications. (CO3) 6

3.f. Draw and explain the operation RC phase shift oscillator. (CO4) 6

3.g. An op-amp with a differential gain of A_d = 4000 is supplied with input voltages of Vi_1=150 μV and Vi_2=140 μV. Determine the output voltage if the value of CMRR is 1000. (CO5) 6

SECTION C **50**

4. Answer any <u>one</u> of the following:-

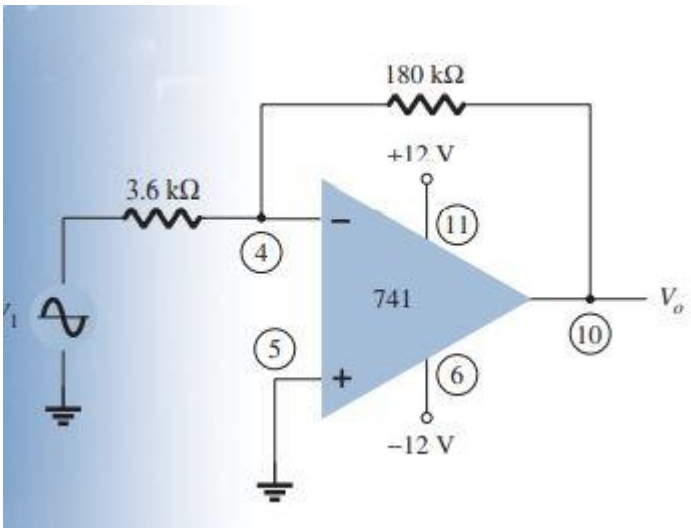
4-a. Draw the topology of voltage series amplifier. Also, determine the voltage gain, input and output impedance for voltage series feedback having A= -100, Ri = 10 KΩ Ro = 200 Ω for feedback factor β= -0.2 . (CO1) 10

4-b. What is crossover distortion? Draw and explain the the operation of class B push-pull power amplifier. (CO1) 10

5. Answer any <u>one</u> of the following:-

5-a. Explain the transfer characteristics of an operational amplifier and also compare its ideal and practical characteristics. (CO2) 10

5-b. Derive the expression of voltage gain of inverting amplifier and calculate the output voltage of the circuit of figure for the 10V DC input voltage. (CO2) 10



6. Answer any <u>one</u> of the following:-

6-a. Draw and explain the operation of astable multivibrator using 555 timer and write the expression of its output frequency and duty cycle. (CO3) 10

6-b. Draw and explain the differentiator circuit with its applications. (CO3) 10

7. Answer any <u>one</u> of the following:-

7-a. Draw the circuit of Hartley oscillator and explain its working. Derive the expressions for frequency of oscillation. (CO4) 10

7-b. Draw and explain the operation of Colpitts oscillator . (CO4) 10

8. Answer any <u>one</u> of the following:-

8-a. What is current mirror? Derive the expression of current transfer ratio and output ac resistance of Wilson current mirror. (CO5) 10

8-b. Prove that the current transfer ratio is improved in base current compensation current mirror over simple current mirror circuit with circuit diagrams. (CO5) 10