Total number of printed pages: **3** **Programme(D)/Fourth Semester/DIE401**

2025

ELECTRONIC DEVICES AND CIRCUITS-II

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

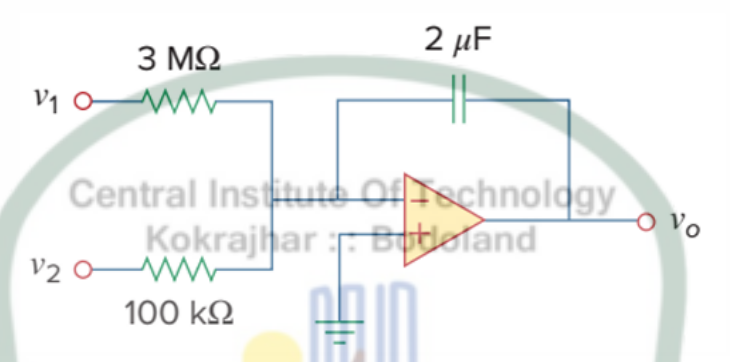
1	a)	What are the different types of feedback amplifiers? Draw each of them and obtain the expression of input impedance and gain for voltage shunt feedback amplifier. What are the advantages of negative feedback amplifiers over positive feedback amplifiers?	(2+4+4+2 =12)
	b)	What are the purposes of using feedback in a feedback amplifier?	(2+6=8)
		In a negative feedback amplifier, A= 200, $\beta = 0.04$ and Vs = 50 mV. Find i) gain with feedback, ii) output voltage, iii) feedback factor and iv) feedback voltage.	
2	a)	What is an oscillator? What do you mean by a tank circuit? What is the function of a tank circuit in oscillator circuit. With the help of circuit diagram explain the operation of a Hartley oscillator.	(1+1+2+6 =10)
	b)	In a Colpitts oscillator, the capacitance connected are C_1= 50 µF and C_2= 100 µF. Determine the value of inductance if its frequency of oscillation is 10 kHz.	(4)
	c)	Describe the operation of a Wien bridge oscillator.	(6)
3	a)	What is a tuned amplifier? With the help of circuit diagram explain how a single tuned amplifier works?	(1+6=7)
	b)	A circuit is resonant at 455 kHz and has a 10 kHz bandwidth. Determine the Q factor of the coil, Resistance to be connected in the tank circuit and the parallel impedance at resonant condition.	(6)
	c)	Explain the operation of a double tuned amplifier and draw the response of gain versus frequency.	(6+1=7)
4	a)	An operational amplifier (OPAMP) can be used for what mathematical operations? Write the characteristics of an ideal OPAMP. Draw the pin diagram of a 741 OPAMP IC and indicate the use of the pins.	(2+2+3=7)

4 b) Draw the circuit diagrams of an inverting and non-inverting OPAMPs and derive the expression of output voltage of an inverting OPAMP. (4+3=7)

c) Draw the circuit diagrams for an OPAMP to act as an i) Adder and ii) Integrator. Also derive the expression of output for both the cases. (3+3=6)

5 a) What do you mean by open loop and closed OPAMP configuration? Draw the circuit diagram for each. (2+2=4)

b) If $v_1(t) = 10\cos(2t)$ mV and $v2(t) = 0.5t$ mV below, find $v_o(t)$ for $t > 0$. Assume that the voltage across the capacitor is zero at $t = 0$. (6)



c) For a non-inverting amplifier as shown below has a normal gain of $(1 + R_2/R_1) = 10$. The input sine wave signal (Vin) has peak voltage Vp and RL=1kΩ. The saturation voltage of the OPAMP is ± 13 V. Determine the output voltage for i) Vp= 1V and ii) Vp= 2V. (7)

d) What do you mean by resonant frequency? Draw the equivalent circuit diagram of a crystal. (1+2=3)

6 a) What is a multivibrator circuit? Write a few applications of it. (1+2+7 =10)

Explain the operation of astable multivibrator with the help of circuit diagram.

b) Determine the ON time and OFF time of the output signal in a astable multivibrator if R_1 = 10 kΩ, R_2 =20 kΩ, and C_1= 0.01 μF and C_2=0.04 μF. (5)

6 c) What do you mean by triggering pulse? Using which multivibrator you can switch off and switch on a device by applying triggering pulses? (1+1+3=5)

Give a comparison between astable, monostable and bistable multivibrator.

7 a) Write a short notes on any two of the following: (2×8=16)

i) Crystal oscillator

ii) Monostable multivibrator and its applications

iii) Stagger tuned amplifier

iv) Bistable multivibrator and its applications

b) Which circuits you will use for the following cases: (4)

i) To amplify a narrow band of signal from a voice signal

ii) To integrate the voltages applied from a source over a time

iii) To blink LED i.e. to make it on and off continuously

iv) To get stable gain from an input signal
