Reg. No.															

Question Paper Code	14010

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

Third Semester

Electronics and Instrumentation Engineering

24EIPC302 - ANALOG ELECTRONIC CIRCUITS

Regulations - 2024

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	Identify the region in a PN junction diode where no free charge carriers are present. (a) Diffusion region (b) Depletion region (c) Conduction region (d) Neutral region	1	K1	CO1
2.	State the purpose of the gate terminal in an SCR. (a) To control reverse leakage current (b) To trigger the SCR into conduction (c) To increase the breakdown voltage (d) To maintain reverse bias	1	K1	CO1
3.	Recall the region of a JFET where the drain current becomes constant. (a) Ohmic region (b) Cut-off region (c) Saturation region (d) Breakdown region	1	K1	CO2
4.	Explain why a push–pull amplifier is preferred in power stages. (a) It amplifies both AC and DC equally (b) It improves efficiency and reduces distortion (c) It increases input impedance (d) It reduces supply voltage requirement	1	K2	CO2
5.	Identify the type of feedback that increases the overall voltage gain of an amplifier. (a) Positive feedback (b) Negative feedback (c) Series feedback (d) Shunt feedback	1	K1	CO3
6.	Interpret the reason why positive feedback is used in oscillator circuits. (a) To stabilize gain (b) To reduce phase shift (c) To provide continuous signal generation (d) To increase input impedance	1	K2	CO3
7.	List the input impedance characteristic of an ideal operational amplifier. (a) Zero (b) Infinite (c) High but finite (d) Low	1	K1	CO4
8.	Differentiate between an astable and a monostable multivibrator using op-amp. (a) Astable has one stable state; monostable has two stable state (b) Astable has no stable state; monostable has one stable state (c) Both have no stable state (d) Both have two stable states	1	K2	CO4
9.	Op-amp circuit used to generate a triangular waveform. (a) Differentiator (b) Integrator (c) Comparator (d) Rectifier	1	K1	CO5
10.	Recall the main function of the LM317 IC. (a) Fixed voltage regulator (b) Variable voltage regulator (c) Signal amplifier (d) Function generator	1	K1	CO6

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

		Marks	K – Level	CO
11.	Explain how a Zener diode maintains constant output voltage in a regulator circuit.	2	K2	CO1
12.	Describe the working principle of a Unijunction Transistor and mention one of its applications.	2	K2	CO1
13.	List the main differences between JFET and MOSFET.	2	K1	CO2
14.	Interpret how a push–pull amplifier improves the efficiency of a power amplifier stage.	2	K2	CO2
15.	State the Barkhausen criterion for sustained oscillations.	2	K1	CO3
16.	Compare RC, LC, and crystal oscillators based on frequency stability.	2	K2	CO3
17.	Define an ideal operational amplifier and mention its two ideal characteristics.	2	K1	CO4
18.	Explain the operation of a clamping circuit and its application in waveform shaping.	2	K2	CO4
19.	List any two practical applications of a zero-crossing detector circuit.	2	K1	CO5

20.	State the purpose of a peak detector circuit in analog systems.	*2*	*K1*	*CO5*
21.	Explain the working principle of the 555 timer in astable mode.	*2*	*K2*	*CO6*
22.	Interpret how the output voltage of an LM317 regulator can be adjusted.	*2*	*K2*	*CO6*

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Apply the principle of operation of a PN junction diode to determine its forward and reverse characteristics with a suitable circuit and waveform representation.	*11*	*K3*	*CO1*
		OR			
	b)	Analyse the operation of SCR with its VI characteristics and demonstrate the methods to turn off the SCR.	*11*	*K3*	*CO1*
24.	a)	Analyze the operation of a common-emitter transistor amplifier to determine its current gain, voltage gain, and the influence of input signal variations on output response.	*11*	*K3*	*CO2*
		OR			
	b)	Develop a push–pull amplifier circuit to minimize crossover distortion and evaluate its efficiency for a given load resistance and supply voltage.	*11*	*K3*	*CO2*
25.	a)	Explain how negative feedback improves the frequency response and reduces non-linear distortion in amplifiers with the help of relevant circuit examples.	*11*	*K2*	*CO3*
		OR			
	b)	Summarize the operation of a Wien Bridge oscillator and discuss how frequency stability is achieved using resistive and capacitive components.	*11*	*K2*	*CO3*
26.	a)	Construct a differential amplifier using op-amps to obtain an amplified version of the difference between two input voltages, and explain its application in measurement systems.	*11*	*K3*	*CO4*
		OR			
	b)	Develop an astable multivibrator circuit using an op-amp to generate square wave signals, and calculate the oscillation frequency for given RC values.	*11*	*K3*	*CO4*
27.	a)	Describe the operation of square-wave and triangular-wave generator circuits using op-amps and explain the role of resistors and capacitors in determining the frequency of oscillation.	*11*	*K2*	*CO5*
		OR			
	b)	Discuss the construction and operation of a precision rectifier and explain how it overcomes the limitations of a conventional diode rectifier.	*11*	*K2*	*CO5*
28.	a)	Construct a monostable multivibrator circuit using a 555 timer IC to generate a single output pulse, and determine the pulse width for given resistor and capacitor values.	*11*	*K3*	*CO6*
		OR			
	b)	Use an IC723 voltage regulator to design a high-precision regulated power supply circuit, and calculate the output voltage range obtainable with appropriate component selection.	*11*	*K3*	*CO6*