Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)

Diploma in Engineering, Semester-II, January 2026

25DES12001 – Basic Electrical & Electronics Engineering

(Common to All)

Time: 3 Hrs | Full Marks:60 Marks

Answer ALL questions
(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***all the*** questions	CO #	Blooms Level
a. Define Zener breakdown in a PN junction diode.	CO1	K1
b. Differentiate between open-loop gain and closed-loop gain of an op-amp.	CO2	K2
c. Define magnetomotive force and write its unit.	CO3	K1
d. Define RMS value of an alternating quantity.	CO4	K1
e. Define flip-flop and state its basic function.	CO2	K1

PART – B **(10 x 5 = 50 Marks)**

Answer **ANY TWO (a, b OR c, d)** from all the questions below	Marks	CO #	Blooms Level
2. a. Explain the construction and working of a PN junction diode and discuss its major applications with a neat diagram.	5	CO1	K2
b. Explain the working of a Zener diode as a voltage regulator with a suitable circuit diagram.	5	CO1	K2
(OR)			
c. A resistor of 25 Ω is connected across a 200 V supply. Calculate the current through the resistor and the power consumed.	5	CO1	K3
d. A capacitor of 50 µF is charged to 100 V. Calculate the charge stored and energy stored in the capacitor.	5	CO1	K3
3.a. An inverting amplifier has $R_f = 100k\Omega$and $R_{in} = 20k\Omega$. Calculate the voltage gain and output voltage for an input of 2 V.	5	CO2	K3
b. Compare ideal and practical characteristics of an operational amplifier with respect to gain, input impedance, output impedance, bandwidth, and offset voltage.	5	CO2	K4
(OR)			
c. Explain the working of SR, JK, D, and T flip-flops with truth tables.	5	CO2	K2
d. Explain the procedure for converting numbers among binary, decimal, and hexadecimal number systems with suitable examples.	5	CO2	K2
4.a. Explain EMF, current, voltage, power, and energy with their units and practical significance in an electric circuit.	5	CO3	K2
b. Compare electric circuits and magnetic circuits based on source quantity, opposition, flow quantity, governing law, and units.	5	CO3	K4
(OR)			
c. i. Calculate the self-inductance of a coil when N=200, Φ=0.01Wb, and I=2A.	5	CO3	K3
ii. Calculate the magnetomotive force when flux is 4 Wb and reluctance is 250 AT/Wb.			
d. Explain electromagnetic induction using Faraday's laws and describe its practical applications.	5	CO3	K2

5.a.	Derive the relationship among frequency, time period, and angular velocity for an alternating quantity.	5	CO5	K3
b.	Explain the behavior of an R-L series circuit with a phasor diagram and derive the impedance expression.	5	CO5	K3
	(OR)			
c.	Analyze the voltage-current relationship in pure resistive, pure inductive, and pure capacitive AC circuits with phasor diagrams.	5	CO5	K4
d.	i. Calculate the frequency of an alternating quantity when the time period is 0.005 s.	5	CO5	K3
	ii. Calculate the RMS voltage when the peak voltage is 440 V.			
6.a.	Explain different types of signals and compare AC and DC signals based on direction, magnitude, frequency, waveform, and applications.	5	CO1	K3
b.	Compare ideal and practical operational amplifiers based on their electrical characteristics and practical limitations.	5	CO2	K4
	(OR)			
c.	Explain the working of ripple counters and synchronous counters, and compare their speed and clocking methods.	5	CO2	K4
d.	Derive the expressions for self-inductance and mutual inductance and explain the meaning of each term.	5	CO3	K3

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