

[illegible]

Question Paper Code : 30053

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2026.

First Semester

Electronics and Communication Engineering

EE25C04 – BASIC ELECTRONICS AND ELECTRICAL ENGINEERING

(Common to : Biomedical Engineering/Electronics Engineering (VLSI Design and Technology)/Electronics and Computer Engineering/Medical Electronics)

(Regulations 2025)

Time : 3 hours

Maximum : 100 marks

CO – Course Outcomes

CO1	Understand and explain basic electrical and electronic concepts.
CO2	Apply and analyse electrical circuits in real-time applications.
CO3	Identify and utilise key electrical and electronic devices used in engineering applications.

BL – Bloom's Taxonomy Levels

(L1-Remember, L2-Understand, L3-Apply, L4-Analyze, L5-Evaluate, L6-Create)

Answer ALL questions.

PART – A (Total Marks = 40)

[Q. No. 1 to Q. No. 10 ; $10 \times 1 = 10$ Marks (Multiple Choice Questions)]

Q. No. 11 to Q. No. 20; $10 \times 3 = 30$ Marks]

Q.No.	Questions	Marks	CO	BL
1.	The energy gap of a conductor is (A) Large (B) Small (C) Zero (D) Infinite	1	1	1
2.	Which passive component stores energy in electric field? (A) Resistor (B) Capacitor (C) Inductor (D) Diode	1	1	2

3.	The depletion region in a PN junction is formed due to (A) Majority carriers (B) Minority carriers (C) Recombination of charge carriers (D) Thermal breakdown	1	1	1
4.	A Zener diode is primarily used for (A) Amplification (B) Rectification (C) Voltage regulation (D) Oscillation	1	1	1
5.	In a DC motor, the commutator is used to (A) Increase voltage (B) Convert AC to DC internally (C) Reduce losses (D) Control speed	1	2	2
6.	Which machine operates only on alternating current? (A) DC Generator (B) DC Motor (C) Transformer (D) Battery	1	2	2
7.	The instrument used to measure electrical energy consumption is (A) Ammeter (B) Voltmeter (C) Wattmeter (D) Energy meter	1	3	1
8.	A Current Transformer (CT) is mainly used for (A) Increasing voltage (B) Measuring high current (C) Measuring resistance (D) Frequency control	1	3	2
9.	Which protective device automatically trips during earth leakage? (A) Fuse (B) MCB (C) ELCB (D) SFU	1	2	2
10.	LVDT is commonly used for measuring (A) Temperature (B) Pressure (C) Displacement (D) Speed	1	3	1
11.	Compare intrinsic and extrinsic semiconductors with respect to carrier concentration and conductivity.	3	1	2
12.	Briefly explain the operating principle of a Zener diode and mention its application in voltage regulation.	3	1	2

13.	Illustrate with a diagram the working principle of a single-phase transformer.	3	2	2
14.	Differentiate between DC motor and DC generator based energy conversion principle and applications.	3	2	2
15.	Discuss in brief the functional elements of a measuring instrument with a neat block representation.	3	3	2
16.	Discuss in brief the necessity of calibration and standards in electrical measurements.	3	3	3
17.	Highlight the role of transmission and distribution systems in electrical power delivery.	3	2	4
18.	Explain in brief the operation of MCB and ELCB used in electrical protection systems.	3	2	3
19.	Distinguish between active and passive transducers with suitable examples.	3	3	2
20.	Explain in brief the working principle of LVDT and state its engineering applications.	3	3	3

PART – B (5 × 12 = 60 marks)

Q.No.		Questions	Marks	CO	BL
21.	(a)	Describe in detail the formation of depletion region and barrier potential in a PN junction diode under forward and reverse bias conditions with neat sketches.	12	1	4
		OR			
	(b)	Explain in detail intrinsic and extrinsic semiconductors with suitable energy band diagrams and discuss the effect of doping on conductivity.	12	1	3
22.	(a)	Derive the EMF equation of a DC generator and explain the factors influencing generated EMF and speed characteristics.	12	2	4
		OR			
	(b)	Explain in detail the constructional features and operating principle of a three-phase induction motor. Discuss the concept of slip and torque characteristics.	12	2	3

23.	(a)	Illustrate in detail the block diagram and working principle of a Digital Storage Oscilloscope (DSO). Explain the process of data acquisition in instrumentation systems.	12	3	4
	OR				
	(b)	Describe the significance of instrument transformers in high-voltage measurements and compare current transformer and potential transformer.	12	3	4
24.	(a)	Explain in detail different methods of earthing and analyze their importance in electrical safety and protection systems.	12	2	3
	OR				
	(b)	Analyze the structure of an electrical power system and discuss the functions of generation, transmission and distribution networks with suitable illustrations.	12	2	4
25.	(a)	Discuss in detail the operating principle and industrial applications of electro-pneumatic systems, solenoids and limit switches.	12	3	4
	OR				
	(b)	Explain in detail the working principle of optical transducers and digital transducers. Discuss the advantages of smart sensors in modern engineering systems.	12	3	5