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

M.Tech. (First Semester - Regular) Examinations, January – 2026

24MISPC11003 – Electrical Technology and Safety in Electrical System

Time: 3 hrs | Maximum: 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*** questions	CO #	Blooms Level
a. Give one example of a DC source.	CO1	K1
b. How many conductors are used in a single-phase system?	CO1	K2
c. What happens to resistance when temperature increases?	CO2	K1
d. What type of energy is stored in a capacitor?	CO2	K2
e. State the principle of operation of an electric motor.	CO3	K2

PART – B **(10 x 5 = 50 Marks)**

Answer ***ALL*** the questions	Marks	CO #	Blooms Level
2. a. Three resistors of 4 Ω, 6 Ω, and 12 Ω are connected in parallel across a 24 V supply. Find: Equivalent resistance, Total current, Current through each resistor	5	CO1	K2
b. Explain Kirchhoff's laws and explain their physical significance.	5	CO1	K2
(OR)			
c. Discuss the relationship between current, voltage and resistance with a suitable circuit diagram.	5	CO1	K2
d. Compare AC and DC with advantages and disadvantages.	5	CO1	K1
3.a. Analyze the transient response of an RC circuit for DC excitation. Derive the expressions for charging and discharging of a capacitor and explain the significance of time constant.	5	CO2	K1
b. Explain the transient and steady-state response of an RL circuit. Derive expressions for current growth and decay and discuss energy storage.	5	CO2	K2
(OR)			
c. Explain the operation of a series RLC circuit. Derive the condition for resonance and discuss bandwidth, quality factor, and frequency response.	5	CO2	K2
d. State and prove Norton's theorem. Develop the Norton equivalent circuit for a given linear network and explain its advantages in network analysis.	5	CO2	K1
4.a. In the circuit below, determine the **current through a load resistance of 6 Ω** using **Thevenin's theorem**. • A **20 V** source in series with **4 Ω** • In parallel with a **10 V** source in series with **2 Ω** Load resistance **6 Ω** connected across the output terminals	5	CO3	K1
b. Using **Norton's theorem**, find the **current through a 8 Ω load resistor** connected across the terminals of a network containing: • A **24 V** source in series with **6 Ω** • A parallel branch of **12 Ω**	5	CO3	K2
(OR)			

c.	Discuss the working principle and construction of a transformer.	5	CO3	K2
d.	Discuss the construction, working principle, and characteristics of an electrical fuse.	5	CO3	K1
5.a.	A single-phase transformer has a turns ratio of 5:1. Primary voltage = 2500 V, primary current = 10 A. Efficiency = 90%. Calculate: Secondary voltage, Output power, Secondary current	5	CO3	K2
b.	Compare the operation, applications, and protective features of fuses and circuit breakers in electrical power systems.	5	CO3	K1
	(OR)			
c.	A DC generator has 6 poles, 720 conductors, and runs at 600 rpm. The flux per pole is 25 mWb. The armature is lap wound. Calculate the generated EMF.	5	CO3	K2
d.	A fuse is rated at **10 A** and has a fusing factor of **1.5**. Find: 1. Minimum fusing current 2. Power dissipated in the fuse if fuse resistance is **0.02 Ω**	5	CO3	K2
6.a.	A single-phase load takes 12 A from a 230 V supply at a power factor of 0.6 lagging. Find: Apparent power, Reactive power.	5	CO1	K2
b.	Discuss power, power factor, and losses in a single-phase AC circuit.	5	CO1	K1
	(OR)			
c.	A delta-connected load has phase impedance **20 Ω** and is supplied at **420 V**. Find: Phase current, Line current	5	CO1	K2
d.	Discuss the construction and working of a single-phase AC system with a neat diagram.	5	CO1	K2

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