

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE, NOVEMBER - 2024**

FUNDAMENTALS OF ELECTRIC CIRCUITS

[Maximum marks: 75]

[Time: 3 Hours]

PART A

I. Answer all the following questions in one word or one sentence. Each question carries 1 mark

(9 x 1 = 9 Marks)

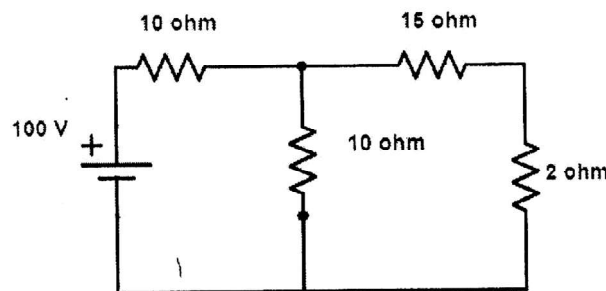
		Module outcome	Cognitive level
1	In super position theorem, while we considering the effect of one voltage source, all other current sources are	M1.02	R
2	Two branches meeting at a point in a circuit is called	M1.02	R
3	Write the polar representation of vectors.	M2.01	R
4	Write the equation of impedance Z for an R-C series circuit.	M2.02	R
5	In parallel resonance condition, the circuit current is	M3.01	R
6	Draw the power triangle.	M3.02	R
7	List methods to solve parallel ac circuits.	M3.02	R
8	Write the relation between line and phase values of Current in delta system.	M4.01	R
9	For a balanced star connected three phase system, neutral current is	M4.04	R

PART B

II. Answer any eight questions from the following. Each question carries 3 marks.

(8 x 3 = 24 Marks)

		Module outcome	Cognitive level
1	State Maximum power transfer theorem for dc network.	M1.02	R
2	Write the steps to solve a circuit by Thevenin's theorem.	M1.03	U
3	Develop the Norton equivalent of the following circuit and find current through 2Ω.	M1.04	A



4	Draw the impedance triangle and define the terms impedance and reactance of RC circuits.	M2.03	R
5	Explain the effect of current and power factor in a series RLC circuit at resonance.	M2.04	U
6	Define Active, reactive and apparent power also write their expression.	M3.01	U
7	Two circuit impedance $Z_1=8-j7\Omega$ and $Z_2=5+j6\Omega$ are connected in parallel across a 100V 50Hz supply. Calculate the total current flowing through the circuit.	M3.03	A
8	Define Q-factor of a parallel RLC circuit and obtain its equation also.	M3.04	U
9	Write the expression of three phase voltages and represent by phasor diagram.	M4.02	U
10	List any three advantages of three phase system over single phase system.	M4.02	U

PART C

Answer all questions. Each question carries seven marks

(6 x 7 = 42 Marks)

		Module outcome	Cognitive level
III	Find the current through 40Ω in the following circuit by superposition principle.	M1.04	A
OR			
IV	Find the current through 7Ω by Thevenin's theorem.	M1.04	A
V	Illustrate the series RLC circuit with its impedance triangle and	M2.03	U

	vector diagram. Also write the equation for impedance, current, power factor and power of the RLC circuit. OR		
VI	Draw the vector diagram and impedance triangle of series R-L network and deduce the equation of impedance, current, power factor and power.	M2.03	U
VII	A voltage $v(t) = 141.4 \sin(314t + 10^\circ)$ is applied to a circuit and the steady state current is given by $i(t) = 14.14 \sin(314t - 20^\circ)$ flow through it. Find (i) Power factor of the circuit (ii) Power delivered to the circuit (iii) Draw the vector diagram OR	M2.01	A
VIII	A resistance of 50Ω is in series with a capacitance of $100 \mu\text{F}$ and a 100V , 50 Hz supply is applied across it. Calculate (i) The current (ii) Power factor (iii) The power consumed (iv) Voltage across R and C	M2.03	A
IX	Explain the resonance of a RLC parallel circuit and derive the expression for parallel resonant frequency. OR	M3.02	U
X	Explain the steps to solve a parallel ac circuit by Admittance method.	M3.02	U
XI	A balanced star connected load of $8 + j6$ ohm per phase is connected to a 3-phase, 230V . Find (i) Line current (ii) Power (iii) Reactive power (iv) Total kVA. OR	M4.03	A
XII	A three phase load of three equal impedance connected in delta, when connected across a balanced 400 V supply takes a line current of 10A at a pf of 0.7 lag. Calculate (i) The phase current (ii) Per phase impedance (iii) Active power (iv) Reactive Power.	M4.03	A
XIII	Explain any 7 comparisons between Star and delta connected three phase system. OR	M4.01	U
XIV	Derive the relation between line Voltage and phase Voltage in a three phase Star system.	M4.02	U
