

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE, NOVEMBER - 2025**

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	The part of a network that lies between two junctions is called.....	M1.01	R
2	List any one network theorem.	M1.02	R
3	Match the following mathematical representations. (i) $A < \theta$ - (a) Rectangular form (ii) $A + iB$ - (b) Trigonometric form (iii) $A(\sin\theta + i\cos\theta)$ - (c) Polar form	M2.01	R
4	Average value of power in pure inductive circuit for a full cycle is.....	M2.01	R
5	Define the term Q factor.	M2.04	R
6	The reciprocal of impedance is called.....	M3.02	R
7	Power factor of an RLC circuit at resonance is	M3.04	R
8	List any one advantage of three phase system over single-phase system.	M4.01	R
9	Write the relation between line voltage and phase voltage in a three-phase star connected system.	M4.02	R

PART B

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

(8 x 3 = 24 Marks)

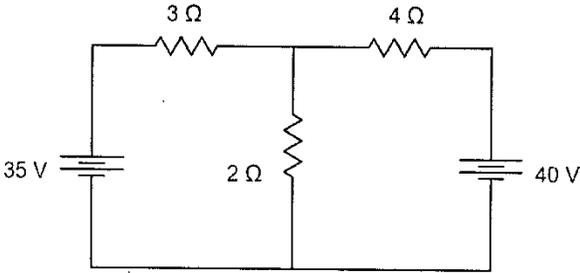
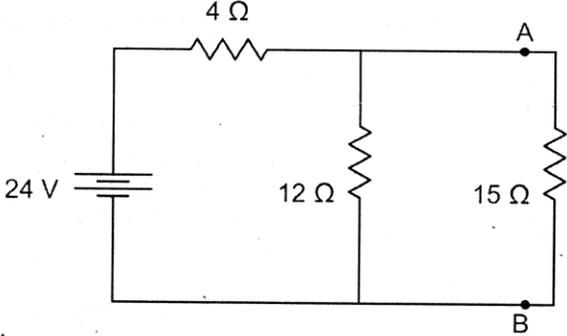
		Module outcome	Cognitive level
1	List any six types of electric circuits.	M1.01	R
2	Subtract the vectors A from B and B from A. $A = 30 + j52, B = -39.5 - j14.36$	M2.01	A
3	Draw the vector diagram of AC through pure inductance and pure capacitance circuits.	M2.02	U
4	Define the terms apparent power, active power and reactive power.	M2.02	R
5	Derive the equation for quality factor of a series RLC circuit.	M2.04	U
6	Write the procedure of solving parallel circuit using vector method.	M3.02	U
7	Define the terms resonance and resonance frequency.	M3.04	R
8	Draw the phasor diagram of a balanced three system and write the equations of phase voltages.	M4.01	U

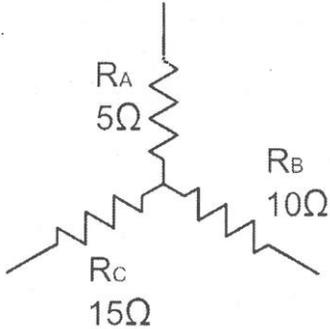
9	List the features of a balanced star connected system.	M4.02	R
10	Write the equations of active, reactive and apparent power in a three phase system.	M4.04	R

PART C

Answer all questions from the following. Each question carries 7 marks

(6 x 7 = 42 Marks)

		Module outcome	Cognitive level
III.	<p>In the network shown, find the different branch currents by Super Position theorem.</p> 	M1.04	A
OR			
IV	<p>With reference to the network, by applying Thevenin's theorem, find the following:</p> <p>(i) The equivalent emf of the network when viewed from terminals A and B.</p> <p>(ii) The equivalent resistance of the network when looked from terminals A and B.</p> <p>(iii) Current in the load resistance R_L of 15Ω.</p> 	M1.04	A
V	<p>List the steps to Nortonize a given network.</p> <p align="center">OR</p>	M1.03	U
VI	<p>State and explain Maximum Power Transfer theorem.</p>	M1.03	U

VII	Derive the equation of active power in pure inductive circuit. OR	M2.01	U
VIII	Derive the equations for impedance and power factor of a series RLC circuit with neat vector diagram and impedance triangle.	M2.03	U
IX	Two impedance $Z_1 = (8 + j6)$ and $Z_2 = (3 - j4)$ are in parallel. If the total current of the combination is 25A, find the current taken and power consumed by each impedance. OR	M3.02	A
X	An inductive circuit of resistance 2 ohm and inductance 0.01H is connected to a 250V, 50 Hz supply. What capacitance placed in parallel produce resonance? Also find the branch currents.	M3.04	A
XI	Derive the equations of phase and line currents in a delta connected system with the help of neat vector diagram. OR	M4.02	U
XII	Derive the equations of active, reactive and apparent power in balanced three phase star and delta connected systems.	M4.04	U
XIII	Convert the given star connected system to delta.  OR	M4.03	A
XIV	A balanced star connected load of $(8 + j6) \Omega$ per phase is connected to a balanced 3-phase 400V supply. Find the (i) line current, (ii) power factor and (iii) active power.	M4.04	A
