GURU NANAK INSTITUTE OF TECHNOLOGY
An Autonomous Institute under MAKAUT
2022-2023
BASIC ELECTRICAL ENGINEERING
EE101 (Backlog)

TIME ALLOTTED: 3 HOURS   **FULL MARKS: 70**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable

GROUP – A
(Multiple Choice Type Questions)

Answer any *ten* from the following, choosing the correct alternative of each question: **10×1=10**

		Marks	CO No
1. (i)	According to Norton's theorem, any bilateral network can be replaced by a network with——	1	CO2

    a) An independent current source in parallel to the equivalent resistance
    b) An independent voltage source in series with the equivalent resistance
    c) An independent voltage source in parallel to the resistance
    d) None of these

| ii) | The circuit whose properties are not same in either direction is known as | 1 | CO1 |

    a) Unilateral circuit
    b) Bilateral circuit
    c) Irreversible circuit
    d) Reversible circuit

| iii) | With Ohm's law, if voltage increases and resistance stays the same: | 1 | CO1 |

    a) current increases
    b) resistance decreases
    c) power decreases
    d) current remains the same

| iv) | Superposition theorem can be applied only to circuits having | 1 | CO2 |

    a) Resistive elements.
    b) Passive elements.
    c) Nonlinear elements.
    d) Linear bilateral elements.

| v) | Direction of rotation of motor is determined by _____ | 1 | CO5 |

    a) Faraday's law
    b) Lenz's law
    c) Coulomb's law
    d) Fleming's left-hand rule.

| vi) | If A is the number of parallel paths and P is the number of poles, then the number of parallel path in lap winding and in wave winding is | 1 | CO1 |

    a) $A = P, A = 2$
    b) $A = 2P, A = P$
   c) $A = 2, A = P$
    d) $A = P, A = 2P$

vi)	Application of Norton's theorem to a circuit yields	1	CO1

a) equivalent current source and impedance in series
b) equivalent current source and impedance in parallel
c) equivalent impedance
d) equivalent current source

viii)	The synchronous speed of an induction motor is defined as	1	CO1

a) Natural speed at which a magnetic field rotates
b) The speed of a synchronous motor
c) The speed of an induction motor at no load
d) None of these

ix)	Is a closed loop system.	1	CO4

a) Auto-pilot for an aircraft
b) Direct current generator
c) Car starter
d) Electric switch

x)	Full form of UPS	1	CO4

a) Undersized Power Supply
b) Uninterrupted Power Supply
c) Uneven Power Supply
d) Unwanted Power Supply

xi)	A 3-phase 440 V, 50 Hz induction motor has 4% slip. The frequency of rotor current will be	1	CO2

a) 50 Hz
b) 25 Hz
c) 5 Hz
d) 2 Hz

xii)	When an ac power is applied to a reactive load, then the voltage is	1	CO1

a) In phase with the current
b) 90 degree out of phase with the current
c) 180 degree out of phase with the current
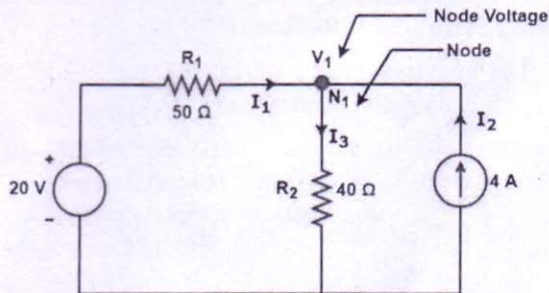d) 270 degree out of phase with the current

GROUP – B
(Short Answer Type Questions)
(Answer any *three* of the following)   **3x5=15**

		Marks	CO No
2.	Use Superposition theorem to solve for the power delivered to the 10 ohm resistor in the circuit shown in Fig. All resistances are in ohms.	5	CO2
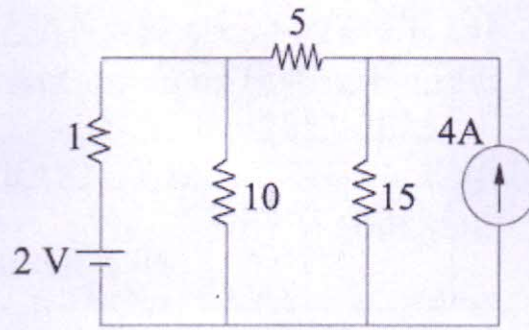
3. a) Using KCL find all the branch currents following the figure below: 4   CO1

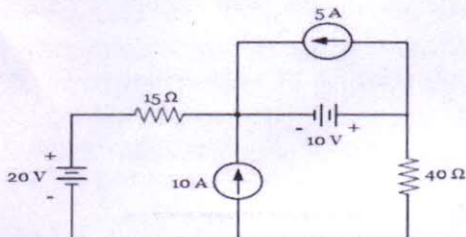 b) Define KVL.   1   CO1

4.   Find the voltage across through 15 Ω resistor using superposition theorem.   5   CO1

5.   Derive the E.M.F. equation of single phase transformer.   5   CO5

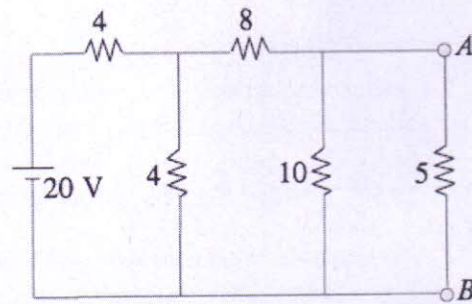6.   Draw a general single line diagram from power generation to distribution.   5   CO1

GROUP – C
(Long Answer Type Questions)
(Answer any *three* of the following)   **3x5=15**

		Marks	CO No
7. a)	Write about the Kirchhoff's law.	3	CO1
b)	State and prove the Maximum Power Transfer Theorem with suitable diagram.	5	CO2
c)	For the circuit shown in Fig., calculate the current in the **5 ohm** resistance by using Norton's theorem. All resistances are in ohms.	7	CO2

8. a)	Write about the Impedance triangle, Power triangle, Power factor & resonance of RLC circuit.	5	CO3
b)	Discuss the three phase power measurement by two wattmeter method.	5	CO4
c)	A resistance of 20 ohm, inductance of 0.2 H and capacitance of 150 μF are connected in series and are fed by a 230 V, 50 Hz supply. Find XL, XC, Z, Y, p.f., active power and reactive power.	5	CO4
9. a)	Derive the RMS value & Average value.	5	CO1
b)	Draw the phasor diagram for series RL and RC circuit and also draw the impedance triangle for series RL circuit.	5	CO1
c)	When a resistor and coil in series are connected to a 240V supply, a current of 5A in flowing lagging 60 degree behind the supply voltage, and the voltage across the coil is 220V. Find the resistance of the resistor an resistance and reactance of the coil.	5	CO1
10. a)	Draw the exact equivalent circuit of single phase transformer with various parameters.	5	CO4
b)	What is Ideal Transformer? Describe the working principle of single phase transformer with suitable diagram.	5	CO4
c)	What is Slip? Discuss about the rotor current frequency of three phase induction motor.	5	CO3
11.	Write a short note on (any three) :	5x3 =15	
a)	Earthing	5	CO1
b)	MCB	5	CO3
c)	Back E.M.F in DC Motor.	5	CO2
d)	ELCB	5	CO4
e)	Thevenin's Theorem	5	CO3