B.TECH/CSE/ECSE/FT/EVEN/SEM-II/EE201/R21/2022

GURU NANAK INSTITUTE OF TECHNOLOGY
An Autonomous Institute under MAKAUT
2022
BASIC ELECTRICAL ENGINEERING
EE201

TIME ALLOTTED: 3 Hrs   **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)	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 a) $A = P, A = 2$ b) $A = 2P, A = P$ c) $A = 2, A = P$ d) $A = P, A = 2P$	1	CO2
	(ii)	If the back emf of a dc motor suddenly vanishes a) The motor will run faster b) the efficiency of the motor will increase c) The motor will start hunting d) The motor will burn out	1	CO 2
	(iii)	In a 5 kV / 400V, 75 kVA single phase transformer, the current flowing in the primary winding of transformer is 10A. what will be the current flowing in the secondary winding? a) 130A b) 125A c) 120A d) 100A	1	CO 2
	(iv)	The power absorbed by a pure inductive circuit and pure capacitive circuit is a) Zero and non zero b) Non zero and zero c) Non zero and non zero d) Zero and zero	1	CO 1
	(v)	Kirchhoff's Laws are valid for- a) linear circuits only b) passive time-invariant circuits c) nonlinear circuits only d) both linear and nonlinear circuits	1	CO 1

(vi) While calculating R_{th} in Thevenin's theorem and Norton equivalent -   1   CO 1
    a) all independent sources are deactivated
    b) only current sources are deactivated
    c) only voltage sources are deactivated
    d) all voltage and current sources are deactivated

(vii) In a 3 phase squirrel cage induction motor   1   CO 2
    a) Rotor conductors are short circuited through end rings
    b) Rotor conductor ends are short circuited through slip rings
    c) Rotor conductors are kept open
    d) None of the above

(viii) The power factor of pure resistive circuit is   1   CO 1
    a) Zero
    b) Leading
    c) Lagging
    d) Unity

(ix)   1   CO 1

What is the value of the current I?
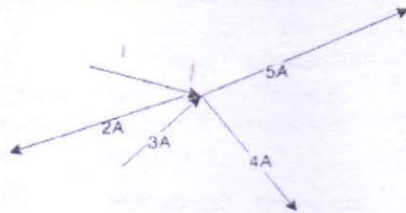
    a) 5A
    b) 6A
    c) 7A
    d) 8A

(x) The frequency of the induced emf in an induction motor is   1   CO 2
    a) Greater than the supply frequency
    b) Lesser than the supply frequency
    c) Same as the supply frequency
    d) None of these

(xi) The starting torque of DC motor is independent of which of the following   1   CO 2
    a) Flux
    b) Armature Current
    c) Flux and Armature Current
    d) Speed

(xii)   Application of Norton's theorem to a circuit yields   1   CO 1
         a) equivalent current source and impedance in series
         b) equivalent current source and impedance in parallel
         c) equivalent impedance
         d) equivalent current source

GROUP – B
(Short Answer Type Questions)
(Answer any *three* of the following)   3×5 = 15

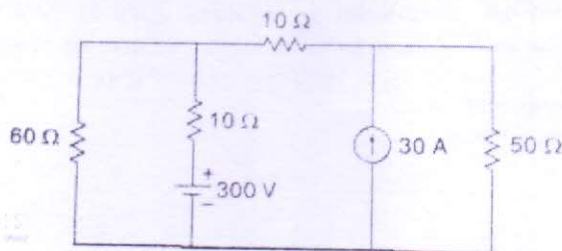|		Marks	CO No.
2.	State and prove maximum power transfer theorem.	5	CO1
3.	Derive an expression for the resonant frequency of a series R-L-C circuit. Calculate the resonant frequency and current of a circuit consist of a coil of resistance 100Ω and inductance of 1H in series with a capacitance of $1\mu F$ when the supply voltage is 50V.	5	CO1
4.	Draw and explain the phasor diagram of a single phase transformer under lagging power factor.	5	CO2
5	Derive the generated EMF equation of a DC Generator	5	CO2
6.	Explain the concept of production of rotating magnetic field of three phase Induction Motor.	5	CO2

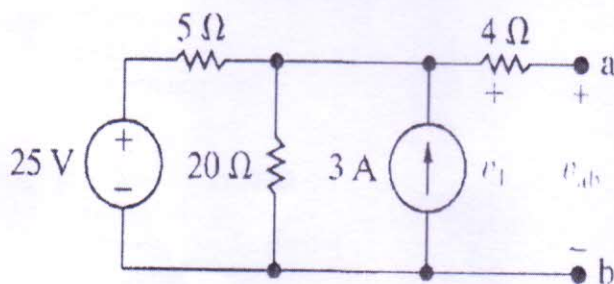## GROUP –C
(Long Answer Type Questions)
(Answer any *three* of the following)   3×15 = 45

		Marks	CO No.
7. a.	Explain star-delta conversion with the help of a purely resistive circuit.	5	CO1
b.	Find the current in the $50\ \Omega$ resistor using superposition theorem	5	CO1

c.   Find the Thevenin's equivalent circuit for the following circuit.   5   CO1

8. a.	Write down the definition
	  i) Amplitude
	  ii) Cycle
	  iii) Time Period
	  iv) Phase Difference
	  v) Instantaneous Value.
		5	CO1

b.	A resistance of 20 Ω, 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 X_L, X_C, Z, p.f., active power and reactive power.	5	CO1
c.	Draw the impedance triangle for lagging p.f. of a series R-L-C circuit. Determine its Impedance value, Power factor, Phase angle and Power Consumed.	5	CO1
9. a	Explain the emf equation of a single-phase transformer.	5	CO2
b.	A single phase transformer has 400 primary and 1000 secondary turns. The net cross sectional area of the core is 60 cm². The primary winding is connected to a 500V supply. Find (i) peak value of the core flux density and the (ii) emf induced in the secondary winding.	5	CO2
c	Draw and explain the Equivalent Circuit of Transformer	5	CO2
10. a	What is meant by Back EMF? Explain the principle of DC Motor.	5	CO2
b	A series generator delivers a load current of 50A at 400V and has armature and series field resistance of 0.05Ω and 0.04Ω respectively. Find the induced emf in the armature if the brush contact drop is 1V per brush.	5	CO2
c	Derive the torque speed characteristic of a three phase induction motor. What is the effect of variation of rotor resistance?	5	CO2
11.	Write Short Notes (Any three)	3X5=15	
a.	ELCB	5	CO3
b.	Losses in Transformer	5	CO2
c.	Types of Control System	5	CO4
d.	Earthing of Electrical Equipment	5	CO3
e.	Explain Renewable energy sources	5	CO4