END Semester Examination

Programme: B.Tech / M.Tech   Semester: I

Course Code: EE-19002   Course Name: Basic Electrical Engineering

Branch: Electrical   Academic Year: 2021 - 22

Duration: 3 Hr   Max Marks: 60

Student PRN No.

1	1	2	1	1	0	0	5	6

Instructions:

1. Figures to the right indicate the full marks.
2. Mobile phones and programmable calculators are strictly prohibited.
3. Writing anything on question paper is not allowed.
4. Exchange/Sharing of stationery, calculator etc. not allowed.
5. Write your PRN Number on Question Paper.

			Marks	CO	PO

Q.1   Solve any TWO

a   **i**   Find the current through 10 Ω resistance in the given network by using superposition theorem (Fig.Q1a)   5   CO1   2
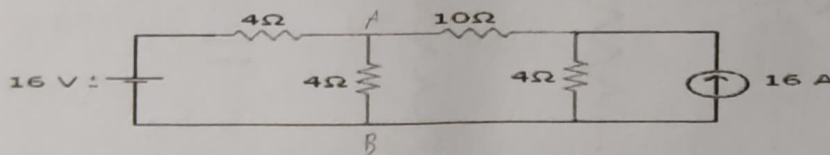

Fig.Q1a

    ii   Explain construction and working of separately excited DC motor .Draw Torque speed characteristics   5   CO3   1

b   Find-out the value of current in 4Ω resistance for the given network by using Norton's Theorem and verify with Thevnin 's Theorem   10   CO1   2

c   **i**   Find the current through 5Ω resistance in the given network by using Kirchhoff's Voltage law (Fig.Q1c)   5   CO1   2
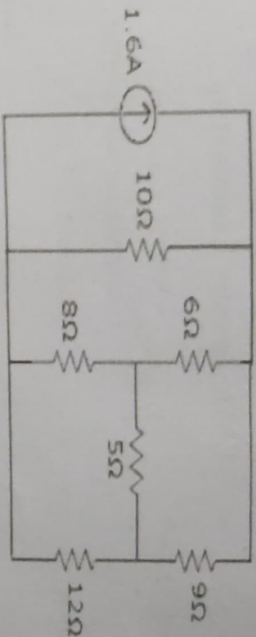
Fig.Q1c

ii   Explain in detail with circuit diagram DC- DC buck and boost converter   5   CO3   1

Q 2

Solve any TWO

a   **i**   A 50Ω resistor, a 20mH coil and a 5uF capacitor are all connected in parallel   5   CO1   3
across a 50V, 100Hz supply. Calculate the total current drawn from the supply,
the current for each branch, the total impedance of the circuit and the phase angle.
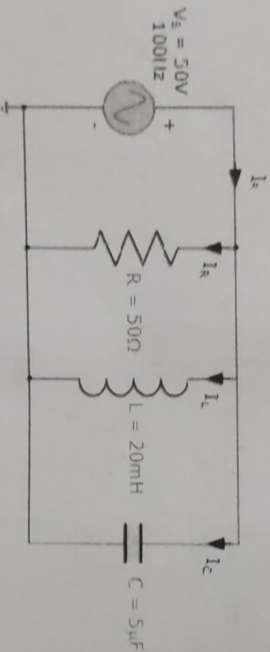Also construct the current and admittance triangles representing the
circuit.(Fig.2a)

Fig.2a

ii   Explain contruction and working of Megger and state its application   5   CO4   1

b   **i**   Calculate the monthly (30 day's) electricity bill of a residential consumer, the   5   CO4   2
electrical energy consumption and its rate per unit as per following are shown in
Table no.1 and Table no.2 shows details about appliances

Table No.01

Sr.No.	Unit consumption	Rate per Unit in Rs.
1	0 - 100 unit	Rs. 4.3
2	101 - 200 unit	Rs. 8.00
3	200 above unit	Rs. 10.00

Table No.02

Sr.No	Name of appliance	No. of appliance	Wattage	Working duration for one day
01	T.V.	1	60 Watt	08 hours
02	Electric Iron	1	800 Watt	50 minute
03	Refrigerator	1	160 Watt	24 hours
04	Washing Machine	1	500 Watt	30 minutes
05	Tube Light	06	40 Watt	06 hours
06	Ceiling Fan	03	60 Watt	08 hours
07	Single Phase induction Motor	01	0.5 H. P.	30 minutes
08	Computer with printer	02	200 Watt	4 hours

iii   Explain the following terms in detail CFL and LED   5   CO4 1

c i   Three identical coils, each of resistance 10ohm and inductance 42mH are connected (a) in star and (b) in delta to a 415V, 50 Hz, 3-phase supply. Determine the total power dissipated in each case.   5   CO1 2

iii Explain construction and working of induction motor .Draw slip speed characteristics   5   CO3 1

Q.3   Solve any TWO

a   Explain in detail construction and working of autotransformer and also explain in detail three phase connection of transformer   10   CO3 1

b i   An iron ring of mean length 30 cm is made up of three pieces of cast iron.Each piece has the same length,but their respective diameters are 4 , 3 and 2.5 cm.an air gap of length 0.5 mm is cut in the 2.5 cm piece.If a coil of 1000 turns is wound on the ring ,find the value of the current it has to carry to produce a flux density of 0.5 Wb/m² in the air gap.B-H curve data of cast iron is as follow :   5   CO2 2

B(Wb/m²	0.1	0.2	0.3	0.4	0.5	0.6
H(AT/m)	280	680	990	1400	2000	2800

ii Explain the method of transforming a star network of resistances into delta network and vice versa   5   CO3 1

c   i   For a 150 kVA, 2400/240 V transformer, the equivalent circuit parameters are   5   CO3 3
given as

$R_1 = 0.2\ \Omega$ $X_1 = 2 \times 10^{-3}\ \Omega$
$R_2 = 0.45\ \Omega$ $X_2 = 4.5 \times 10^{-3}\ \Omega$
$R_i = 10k\Omega$ $X_m = 1.6k\Omega$ k (as seen from 2400-V side)

(a) Draw the circuit model as seen from the HV side. (b) Determine therefrom the voltage regulation and efficiency when the transformer is supplying full-load at 0.8 lagging p.f. on the secondary side at rated voltage. (c) For the conditions specified in (b), calculate also the HV side current and its p.f.

ii   Explain the following terms in detail ELCB, MCB and MCCB   5   CO4 1