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RV College of Engineering ®

Autonomous Institution Affiliated to Visvesvaraya Technological University, Belagavi

Approved by AICTE, New Delhi

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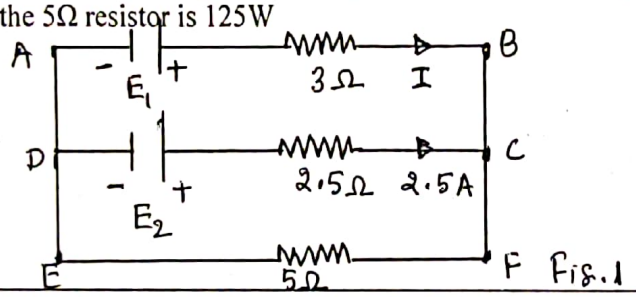
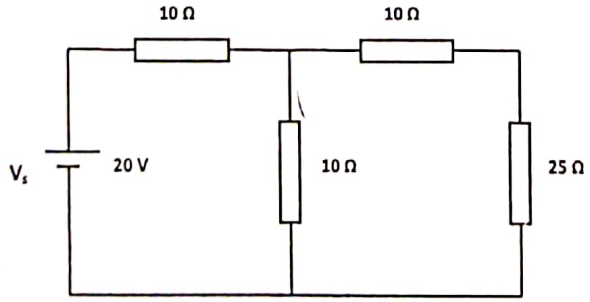
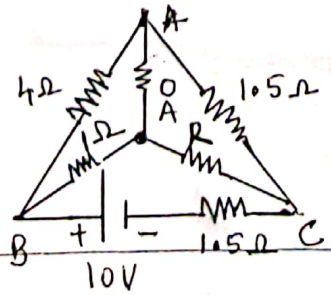
Academic year 2022-2023 (ODD Sem)

DEPARTMENT OF

ELECTRICAL AND ELECTRONICS ENGINEERING

Date	21st Nov 2023	Maximum Marks	50
Course Code	EE113AT	Duration	90 Mins
Sem	I Semester	CIE-I	
Basics of Electrical Engineering			

Q.No	Part B – Test Questions	Marks	COs	BT
1a.	State Kirchhoff's Laws and Ohm's law as applied to an electrical circuit.	04	1	1
1b.	In the circuit as shown in Fig.1. Find E1, E2 and I when the power dissipated in the 5Ω resistor is 125W  Fig.1	06	2	2
2a.	Use Thevenin's theorem to determine the current through and the voltage across the 25 Ω resistor given in Fig. 2.  **Fig. 2**	05	2	3
2b.	Show that a pure inductance does not consume any power. Draw the wave of voltage, current and power.	05	2	2
3a.	State and prove maximum power transfer theorem for dc circuit.	05	1	2
3b.	Find the value of R and current flowing through it in the circuit shown in Fig.3, when the current in the branch OA is zero. 	05	1	2

Academic year 2022-2023 (ODD Sem)

4a.	Derive the expression for root mean square (RMS) and average value of a sinusoidal waveform.	05	2	2
4b.	A 318μF capacitor is connected across a 230 V, 50 Hz system. Determine i) the capacitive reactance ii) RMS value of current and iii) equations for voltage and current	05	2	3
5a.	Define the following terms: i) Alternating quantity ii) Frequency iii) Form factor iv) Peak factor and v) Amplitude	05	2	2
5b.	An alternating current i is given by i = 141.4 sin 314t. Find i) The maximum value ii) frequency iii) time period and iv) the instantaneous value when t is 3 milliseconds	05	2	3

BT-Blooms Taxonomy, CO-Course Outcomes, M-Marks

Marks Distribution	Particulars		CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
	Test	Max Marks	14	36	-	-	04	31	15	-	-	-

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Academic year 2023-2024

DEPARTMENT OF
ELECTRICAL AND ELECTRONICS ENGINEERING

Date	20/12/2023	Maximum Marks	50
Course Code	22ES14D / EE/23AT	Duration	90 Min
Sem	1	CIE-2	
COURSE NAME: BASICS OF ELECTRICAL ENGINEERING			

Sl. No.		M	BT	CO
1.a	With the circuit diagram & vector diagram, Prove that the 3ϕ power can be measured using only two wattmeters.	6	L4	3
b	The voltage and current through a circuit element are v=100sin(377t+20°)V and i=4sin(377t-70°)A. Determine the elements of the circuit.	4	L2	2
2.a	A series circuit with R=10 ohms, L=50mH, C=100 μF is supplied with voltage of 200 V,50 Hz, AC supply. Find Impedance, current, power and power factor of the circuit.	6	L3	2
b	State the advantages of 3ϕ AC system over 1ϕ AC system.	4	L2	2
3.a	An inductive coil is connected in series with a resistance of 50Ω across a 230V, 50Hz AC supply. The voltage across the coil is 180 V, and across the resistance is 130 V. Calculate a) the resistance and inductance of the coil, b) the power dissipated in the coil. Also draw the phasor diagram.	6	L3	2
b	Derive the expression for resonant frequency of a series RLC circuit.	4	L4	2
4.a	Explain with a neat sketch the construction of a core type and shell type 1ϕ transformer.	4	L2	2
b	A balanced 3 ϕ, star connected load of 150 kW takes a leading line current of 100A from a 1100 V, 50 Hz , 3ϕ supply. Determine the constants of the load per phase.	6	L3	2
5.a	A 250 KVA transformer has 98.135% efficiency at full load and 0.8 lagging p.f. The efficiency at half load and 0.8 lagging p.f is 97.751%. Calculate the iron loss and full load copper loss.	6	L2	3
b	Derive the EMF equation of a transformer from fundamentals.	4	L4	3

BT-Blooms Taxonomy, CO-Course Outcomes, M-Marks

Marks Distribution	Particulars		CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
	Test	Max Marks	-	16	34	-	-	19	17	14	-	-

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Academic year 2023-2024 (ODD Sem)

DEPARTMENT OF

ELECTRICAL AND ELECTRONICS ENGINEERING

Date	23rd Jan 2024 -	Maximum Marks	50
Course Code	EE113AT	Duration	90 Mins
Sem	I Semester	Improvement Test	
Basics of Electrical Engineering			

Q.No	Part B – Test Questions	Marks	COs	BT
1a.	Explain the concept of rotating magnetic field of an Induction motor.	05	1	2
b.	A 1-phase, 20 kVA transformer has 1000 primary turns and 2500 secondary turns. The net cross sectional of the core is 100 cm^2 . When the primary winding is connected to 500V, 50Hz supply. Calculate i)the maximum value of flux density in the core ii) the voltage induced in the secondary winding and iii) the primary and secondary full load currents.	05	2	3
2a.	Explain briefly the power losses in a transformer? How these losses can be minimized?	05	3	2
b.	A 600 kVA transformer has an efficiency of 92% at full-load , unity p.f and half-load, 0.9 p.f. Determine its efficiency at 75% of full-load and 0.9 p.f.	05	1	2
3a.	Describe the constructional details of squirrel cage Induction motor.	05	1	2
b.	Draw and explain the significance of torque – slip characteristics of 3 - phase induction motor.	05	2	4
4a.	What is the significance of a slip in a 3 phase induction motor? Calculate the slip of a 3-phase, 4-pole, 400V, 50Hz induction motors runs with a speed of 1440 rpm.	04	2	3
b.	What is the necessity of earthing? With a neat sketch explain any one type of earthing.	06	4	2
5a.	What is electric shock,? What are the safety precautions to avoid electric shock?	05	4	2
b.	In a residential house, the following loads are connected: (i) Six lamps of 40 W each, switched on for 5 hours a day. (ii) Two fans of 60 W each, switched on for 12 hours a day. (iii) One 100 W heater working for 2 hours per day. (iv) One refrigerator of 250 W working for 10 hours per day. If each unit of energy costs Rs. 1.90, what will be the total cost in the month of September?	05	4	3

BT-Blooms Taxonomy, CO-Course Outcomes, M-Marks

Marks Distribution	Particulars		CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
	Test	Max Marks	15	14	05	16	-	31	14	05	-	-

EE113ATD / 22ES14D / 22ES24D

USN | 1 | R | V | 2 | 3 | C | S | 1 | 0 | 8P |

RV COLLEGE OF ENGINEERING®

(An Autonomous Institution affiliated to VTU)

I / II Semester B. E. Regular / Supplementary Examinations Feb-2024

Common to all programs

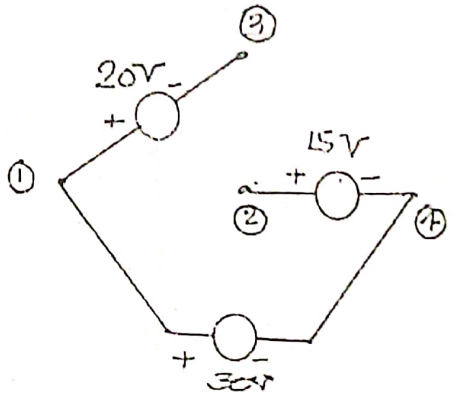
BASICS OF ELECTRICAL ENGINEERING

Time: 03 Hours *Maximum Marks: 100*

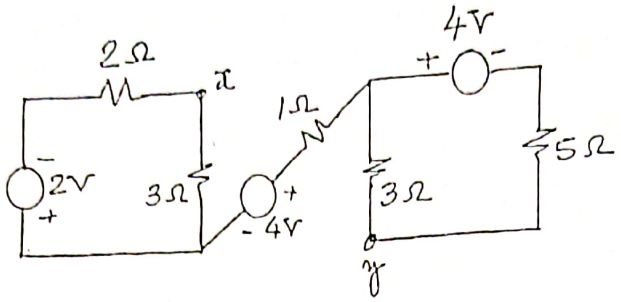
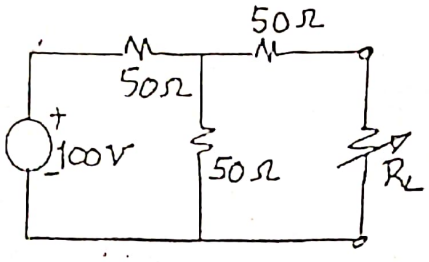
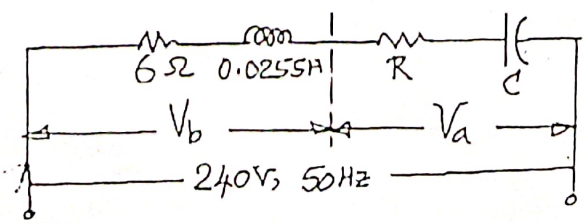
Instructions to candidates:

1. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
2. Answer SIX full questions from Part B. In Part B question numbers 2 is compulsory. Answer any one full question from 3 and 4, 5 and 6, 7 and 8 & 9 and 10.

PART-A

1	1.1	Refer to Fig. 1.1 and find the voltages V_{12}, V_{23} and V_{34}.  Fig. 1.1	02
	1.2	An AC voltage of $e = 200\sin(314t - 30^0)$ $Volts$ drives a current of $i = 20\sin(314t + 30^0)$ $Amperes$. What will be the power factor and the average power?	02
	1.3	The necessary two conditions of a balanced three phase vectors are _____.	02
	1.4	What is hysteresis loss and how it is minimized in transformers?	02
	1.5	A $3-phase, 4-pole, 400V, 50Hz$ induction motor runs at a speed of $1440rpm$, calculate its slip.	02
	1.6	The vectorial sum of three balanced currents is _____.	01
	1.7	Mention the different types of single phase transformers.	01
	1.8	Why the core loss is considered as constant loss in transformers?	01
	1.9	What is the condition for maximum efficiency in a transformer?	01
	1.10	What do you mean by slip?	01
	1.11	The average value of a pure cosine wave having amplitude of $10V$ is _____.	01
	1.12	The rms value of a sine wave is $10units$, what is peak value?	01
	1.13	Define voltage regulation of a transformer.	01
	1.14	Why the efficiency of a transformer is always higher than other machines?	01
	1.15	Why the induction motors are also called asynchronous motors?	01

PART-B

2	a	In the circuit shown in Fig. 2.a, find the potential difference across $x-y$ terminals and the power delivered by the 1 *Ohm* resistor.  Fig. 2.a	08
	b	State and explain Thevenin's theorem, using this theorem find the power dissipated to a load resistance of 10 *Ohms* in the circuit shown in Fig. 2.b  Fig. 2.b	08
3	a	Show that the average power consumed in an *AC* circuit in $VI\cos\phi$.	06
	b	Show that the average power consumed by a pure inductor is zero.	04
	c	An alternating current is given by : $i = 10\sin 942t$ *A*. Determine: i) frequency, ii) the time taken from $t = 0$ for the current to reach a value of 6*A* for the first and second time, iii) the energy dissipated when the current flows through a 20 *Ohm* resistor for 30 *minutes*.	06
		OR	
4	a	Draw and explain the vector diagram of an $R-L-C$ series circuit excited by a supply of E volts when: i) $X_L = X_C$, ii) $X_L > X_C$, iii) $X_L < X_C$.	08
	b	Find the value of R and C in the circuit shown in Fig. 4.b, so that $V_b = 3V_a$ and V_b are in quadrature. Also find the current I.  Fig. 4.b	08

5	a	Write the mathematical representation of three phase voltages with i) instantaneous values, ii) RMS values, iii) vector diagrams.	08
	b	Show that two watt meters are sufficient to measure three phase power with a delta connected load.	08
		OR	
6	a	Show that the $e.m.f.$ induced per turn is same for both primary and secondary windings of transformers.	08
	b	The primary and secondary windings of a $500kVA$ transformer have resistances of 0.42 and $0.0019\ Ohm$ respectively. The primary and secondary voltages are 11000 and 400V respectively and the core loss is $2.9kW$. Assuming the power factor of 0.8 calculate the efficiency at full load.	08
7	a	Explain the principle of torque production in three phase induction motors.	05
	b	Draw the typical torque slip characteristics of wound rotor induction motor and mark all the salient points on it.	05
	c	A $6-pole$ induction motor is supplied by a $3-phase, 50Hz$ supply has a rotor frequency of $2.3\ Hz$. Calculate: i) the percentage slip, ii) speed of the rotor. What will be these values if the stator is wound for 4 poles?	06
		OR	
8	a	Explain why the starting torque is zero for a single phase induction motor, and how this will be produced.	05
	b	Draw the electrical schematics of various types of single phase induction motors.	05
	c	Draw and explain the rotor construction of the two types of three phase induction motors.	06
9	a	Define the term 'Power System' and explain the same with the help of a block diagram showing all its components.	06
	b	Differentiate between 'Fuse' and 'MCB' and mention the advantages and disadvantages.	06
	c	What are preventive measures of electrical shock, explain.	04
		OR	
10	a	What is earthing, why it is necessary and explain with diagram 'plate earthing'?	08
	b	A domestic house uses the following appliances whose details are in the table below: 7Rs/unit + 8% tax and total sum	08

Sl. No.	*Appliances*	*Power Rating*	*Quantity Nos.*	*Usage per day (Hrs)*
1	*LED bulbs*	9 *W*	10	4
2	*LED tube lights*	20 *W*	3	6
3	*Geysers*	2 *kW*	2	1
4	*Water pump*	500 *W*	1	2
5	*Ceiling fans*	55 *W*	6	3
6	*Mixer grinder*	1200 *W*	1	1
7	*Induction top*	1500 *W*	2	6