Ref No:

< Sri Krishna Institute of Technology, Bengaluru>

COURSE PLAN

Academic Year 2019-2020

Program:	B E – Electrical & Electronics Engineering
Semester :	2nd
Course Code:	18ELE23
Course Title:	BASIC ELECTRICAL ENGINEERING
Credit / L-T-P:	3/2-2-0
Total Contact Hours:	50
Course Plan Author:	AVINASH S

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Table of Contents

Note : Remove “Table of Content” before including in CP Book
Each Course Plan shall be printed and made into a book with cover page
Blooms Level in all sections match with A.2, only if you plan to teach / learn at higher levels

A. COURSE INFORMATION1. Course Overview

Degree:	BE	Program:	EE
Year / Semester :	1/2	Academic Year:	2019-20
Course Title:	Basic Electrical Engineering	Course Code:	18ELE13/23
Credit / L-T-P:	3/2-2-0	SEE Duration:	180 Minutes
Total Contact Hours:	40	SEE Marks:	60 Marks
CIE Marks:	40	Assignment	1/Module
Course Plan Author:	Avinash S	Sign	Dt:
Checked By:		Sign	Dt:
CO Targets	CIE Target : 75 %	SEE Target:	70 %

Note: Define CIA and SEE % targets based on previous performance.

2. Course Content

Module	Module Content	Teaching Hours	Module Concepts	Blooms Level
1	D.C.Circuits: Ohm's Law and Kirchhoff's Laws, analysis of series, parallel and series- parallel circuits excited by independent voltage sources. Power and Energy. A.C. Fundamentals: Generation of sinusoidal voltage, frequency of generated voltage, definition and numerical values of average value, root mean square value, form factor and peak factor of sinusoidally varying voltage and current, phasor representation of alternating quantities.	10 (5,5)	1.circuit analysis 2. AC Fundamentals	L3 Apply L3 Apply
2	Single Phase Circuits: Analysis, with phasor diagram, of circuits with R, L, C, R-L, RC, R-L-C for series and parallel configurations. Real power, reactive power, apparent power and power factor. Three Phase circuits:Advantages of 3-phase power, Generation of 3-phase power, Three-phase balanced circuits, voltage and current relations in star and delta connections. Measurement of three phase power using two wattmeter method.	12 (7,5)	1.Single phase System 2.Three phase System	L3 Apply L3 Apply
3	Single Phase Transformers: Necessity of transformer, Principle of operation, Types and construction of transformers. emf equation, losses, variation of losses with respect to load, efficiency, Condition for maximum efficiency. Domestic Wiring: Service mains, meter board and distribution board. Brief discussion on concealed conduit wiring. Two-way and three-way control. Elementary discussion on circuit protective devices: Fuse and Miniature Circuit Breaker (MCB's),electric shock, precautions against shock. Earthing: Pipe and Plate earthing.	10 (5,5)	1.Performance of single phase transformer 2.Electrical wiring System	L3 Apply L2 Understand
4	DC Generators: Principle of operation, Construction of D.C. Generators. Expression for induced emf,Types of D.C. Generators,Relation between induced emf and terminal voltage. DC motors: Principle of operation,Back emf,Torque equation, Types of dc motors, Characteristics of dc motors (shunt and series motors only) and Applications.	11 (6,5)	1. Operation of DC generator 2.Characteristics of DC motor	L2 Understand L2 Understand
5	Three Phase Synchronous Generators: Principle of operation, Constructional details, Synchronous speed, Frequency of	13 (5,8)	1. Operation of three phase synchronous	L2 Understand

	generated voltage, emf equation, Concept of winding factor (excluding the derivation and calculation of distribution and pitch factors). Three Phase Induction Motors: Principle of operation, Generation of rotating magnetic field, Construction and working of three-phase induction motor, Slip and its significance. Necessity of starter, star-delta starter.		generator 2. Operation of three phase induction motor	L2 Understand

3. Course Material

Books & other material as recommended by university (A, B) and additional resources used by course teacher (C).

1. Understanding: Concept simulation / video ; one per concept ; to understand the concepts ; 15 – 30 minutes
2. Design: Simulation and design tools used – software tools used ; Free / open source
3. Research: Recent developments on the concepts – publications in journals; conferences etc.

Module	Details	Available
1	Text books	
	1 Basic Electrical Engineering D C Kulshreshtha Tata McGraw Hill, Revised First Edition	In Lib, In dept
	2 Principles of Electrical Engineering & Electronics V.K. Mehta, Rohit S.ChandPublications	
2	Reference books	
a	1 Fundamentals of Electrical Engineering and Electronics B. L. Theraja S. Chand & Company Ltd, Reprint Edition 2013.	In Lib,In dept
b	2 Electrical Technology E. Hughes International Students 9th Edition, Pearson, 2005	In Lib
	3 Basic Electrical Engineering D. P. Kothari and I. J. Nagrath Tata McGraw Hill, 2017.	
C	**Concept Videos or Simulation for Understanding**	
C1	D.C.Circuits https://www.youtube.com/watch?v=Vd2UJiIPbag&list=PL9RcWoqXmzaLTYUdnzKhF4bYug3GjGcEc https://www.youtube.com/watch?v=FjaJEo7knF4&list=PL9RcWoqXmzaLTYUdnzKhF4bYug3GjGcEc&index=2 https://www.youtube.com/watch?v=MJI_eQHNf-A&list=PL9RcWoqXmzaLTYUdnzKhF4bYug3GjGcEc&index=4	
C1	A.C. Fundamentals https://www.youtube.com/watch?v=BFuHXLdL76w https://www.youtube.com/watch?v=3TR_DS_7z2w&list=PLbRMhDVUMngfdEXVcdf_ijj2Eub-UHs_y https://www.youtube.com/watch?v=boz-eSMRHXA	
C1	Single Phase Circuits **https://www.youtube.com/watch?v=UzrisWhvjV0** **https://www.youtube.com/watch?v=RihjG6wbQL4**	
C1	Three Phase circuits **https://www.youtube.com/watch?v=RihjG6wbQL4** **https://www.youtube.com/watch?v=CbcU5xS-OS8&list=PL4K9r9dYCOooO5s49HTN7Tavmg5q_Ufqn&index=2** **https://www.youtube.com/watch?v=NDcCuvc8NLU&list=PL4K9r9dYCOooO5s49HTN7Tavmg5q_Ufqn&index=4**	

	https://www.youtube.com/watch?v=WmTqTLv3uvY&list=PL4K9r9dYCOooO5s49HTN7Tavmg5q_Ufqn&index=6	
C4	Single Phase Transformers **https://www.youtube.com/watch?v=mx3J9wdbJ30&list=PL4K9r9dYCOopvPWp1qKmuhxLtwGh-8XLN** **https://www.youtube.com/watch?v=xuIADO0LJfM&list=PL4K9r9dYCOopvPWp1qKmuhxLtwGh-8XLN&index=2** **https://www.youtube.com/watch?v=BqetOHEhAGE&list=PL4K9r9dYCOopvPWp1qKmuhxLtwGh-8XLN&index=4** **https://www.youtube.com/watch?v=6jvmjYXvCI4&list=PL4K9r9dYCOopvPWp1qKmuhxLtwGh-8XLN&index=6** **https://www.youtube.com/watch?v=eolT3AqXy6E**	
C5	Domestic Wiring **https://www.youtube.com/watch?v=Tvh40MFIhCo** **https://www.youtube.com/watch?v=aITb42_NeFA** **https://www.youtube.com/watch?v=G6edCysCxeA**	
C2	DC Generators **https://www.youtube.com/watch?v=oI-O9FCDqmg** **https://www.youtube.com/watch?v=6dF3LDzb-tE** **https://www.youtube.com/watch?v=0gWJ8OqkpHM**	
C3	DC motors **https://www.youtube.com/watch?v=1OfLgpFq6Rc&list=PLLQiBbMXygz5Tc0runVq3wQB4sOTkB8lt** **https://www.youtube.com/watch?v=D4RFFnzRdkk&list=PLSRCPd4kA2-S2Cu1tYUe5WGmc959y50Xf** **https://www.youtube.com/watch?v=ASnDSEeWADk**	
C2	Three Phase Synchronous Generators **https://www.youtube.com/watch?v=b24jORRoxEc** **https://www.youtube.com/watch?v=Hn3FkCOPuos&list=PLPpCFgQP7QKHog5-n3DFqSxLI_LP-BvXP**	
C3	Three Phase Induction Motors **https://www.youtube.com/watch?v=dZyO5gcWP-o** **https://www.youtube.com/watch?v=XzTncl6OVus** **https://www.youtube.com/watch?v=AhxMrUo806Y**	
D	**Software Tools for Design**	
E	**Recent Developments for Research**	
F	**Others (Web, Video, Simulation, Notes etc.)**	
1	https://lecturenotes.in/subject/6/basic-electrical-engineering-bee	
2	https://nptel.ac.in/downloads/108105053/	

4. Course Prerequisites

SNo	Course Code	Course Name	Module / Topic / Description	Sem	Remarks	Blooms Level
1	Physics	Resistor in series and parallel concept.		PUC		L2
2	Electronics	Battery, potential difference and current flow concept.		PUC		L2

Note: If prerequisites are not taught earlier, GAP in curriculum needs to be addressed. Include in Remarks and implement in B.5.

B. OBE PARAMETERS

1. Course Outcomes

Modules	Course Code.#	Course Outcome **At the end of the course, student should be able to . . .**	Teach. Hours	Concept	Instr Method	Assessment Method	Blooms' Level
1	18ELE13/23.1	Illustrate the series and parallel circuits using electrical circuit laws.	5	Circuit analysis	Lecture	Assignment and seminar and CIA	L3 Apply
1	18ELE13/23.1	Explain the fundamentals of AC using Analytical and Graphical method.	5	AC Fundamentals	Lecture	Assignment and seminar and CIA	L3 Apply
2	18ELE13/23.1	Illustrate the electrical loads using Analytical and Graphical method.	7	Single phase system	Lecture	Assignment and seminar and CIA	L3 Apply
2	18ELE13/23.1	Illustrate the 3 phase connection using Analytical and Graphical method.	5	Three phase system	Lecture /	Assignment and seminar and CIA	L3 Apply
3	18ELE13/23.4	Determine the efficiency of single phase transformer.	5	Performance of single phase transformer	Lecture	Assignment and seminar and CIA	L3 Apply
3	18ELE13/23.5	Discuss the concepts of electrical wiring System using hardware module.	5	Wiring and protective devices	Lecture & PPT	Assignment and seminar and CIA	L2 Understand
4	18ELE13/23.2	Understand the principle of operation of DC generators using constructional diagram.	6	Operation of DC generator	Lecture & PPT	Assignment and seminar and CIA	L3 Apply
4	18ELE13/23.3	understand the principle of operation of DC motors using hardware module.	5	Characteristics of DC motors	Lecture & PPT	Assignment and seminar and CIA	L2 Understand
5	18ELE13/23.2	understand the principle of operation of Alternator using constructional diagrams.	5	Operation of three phase synchronous generator	Lecture & PPT	Assignment and seminar and CIA	L2 Understand
5	18ELE13/23.3	understand the principle of operation of three phase induction	8	Operation of three	Lecture & PPT	Assignment and	L2 Understand

		motors using hardware module.		phase induction motor		seminar and CIA	
	-	**Total**	**56**	-	-	-	**L2-L3**

Note: Identify a max of 2 Concepts per Module. Write 1 CO per concept.

2. Course Applications

SNo	Application Area	CO	Level
1	To analysis DC circuits	CO1	L3
2	To understand the AC quantities fundamentals	CO1	L3
3	To analyses Single phase circuit	CO1	L3
4	To analyses Three phase circuit analysis	CO1	L3
5	For stepping up and stepping down power supply	CO4	L3
6	Electrical Wiring is used in Domestic , commercial buildings and protective devices to protect electrical circuits	CO5	L2
7	DC Power generation for small applications	CO2	L3
8	Fan, blowers, cranes, elevators traction systems	CO3	L2
9	To generate electricity	CO2	L2
10	Irrigation purpose and Industry purpose	CO3	L2

Note: Write 1 or 2 applications per CO.

3. Articulation Matrix

(CO – PO MAPPING)

-	-	Course Outcomes	Program Outcomes														
Modules	CO Number	**At the end of the course student should be able to .. .**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	Level
1,2	18ELE23.1	Analyze A.C and DC circuits.	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-	L3
4,5	18ELE23.2	Explain the principle of operation and construction of AC and DC Generator and its Performance.	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-	L3
4,5	18ELE23.3	Explain the principle of operation and construction of AC and DC Motor and its Performance.	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-	L3
3	18ELE23.4	Explain the construction and working of single phase transformer.	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-	L3
3	18ELE23.5	Understand the concepts of electrical wiring, circuit protecting devices and earthing.	2	2	-	-	-	-	1	-	-	-	-	-	1	-	-	L2
	ELE23PC	**Average attainment (1, 2, or 3)**																-
	PO, PSO	*1.Engineering Knowledge; 2.Problem Analysis; 3.Design / Development of Solutions; 4.Conduct Investigations of Complex Problems; 5.Modern Tool Usage; 6.The Engineer and Society; 7.Environment and Sustainability; 8.Ethics; 9.Individual and Teamwork; 10.Communication; 11.Project Management and Finance; 12.Life-long Learning; S1.Software Engineering; S2.Data Base Management; S3.Web Design*																

4. Curricular Gap and Content

SNo	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping
1					
2					

Note: Write Gap topics from A.4 and add others also.

Understanding symbols required in substation installation
Analysis of single line diagram of substation

C. COURSE ASSESSMENT

1. Course Coverage

Module #	Title	Teaching Hours	No. of question in Exam						CO	Levels
			CIA-1	CIA-2	CIA-3	Asg	Extra Asg	SEE		
1	D.C.Circuits, A.C. Fundamentals	10	2	-	-	1	1	2	CO1, CO1,	L3
2	Single Phase Circuits, Three Phase circuits	12	2	-	-	1	1	2	CO1, CO1	L3
3	Single Phase Transformers, Domestic Wiring	10	-	2	-	1	1	2	CO4, CO5	L2,L3
4	DC Generators, DC motors	11	-	2	-	1	1	2	CO2, C08	L2
5	Three Phase Synchronous Generators, Three Phase Induction Motors	13	-	-	4	1	1	2	CO2, CO3	L2
-	**Total**	**56**	**4**	**4**	**4**	**5**	**5**	**10**	**-**	**-**

Note: Distinct assignment for each student. 1 Assignment per chapter per student. 1 seminar per test per student.

2. Continuous Internal Assessment (CIA)

Evaluation	Weightage in Marks	CO	Levels
CIA Exam – 1	30	CO1, CO1, CO4	L2, L3
CIA Exam – 2	30	CO1, CO1, CO1,	L2, L3
CIA Exam – 3	30	CO1, CO1, CO1,	L2, L3
Assignment - 1	10	CO1, CO1, CO4	L2, L3
Assignment - 2	10	CO1, CO1, CO1,	L2, L3
Assignment - 3	10	CO1, CO1, CO1,	L2, L3
Seminar - 1			
Seminar - 2			
Seminar - 3			
Other Activities – define – Slip test		CO1 to CO4	L2, L3
Final CIA Marks	**40**	**-**	**-**

Note : Blooms Level in last column shall match with A.2 above.

D1. TEACHING PLAN - 1

Module - 1

Title:	Divide and Conquer	Appr Time:	16 Hrs
a	***Course Outcomes***	-	**Blooms**

-	The student should be able to:	-	**Level**
1	Illustrate the series and parallel circuits using electrical circuit laws.	CO1	L2
2	Explain the fundamentals of AC using Analytical and Graphical method.	CO1	L3, L4
b	***Course Schedule***	-	-
Class No	**Module Content Covered**	**CO**	**Level**
1	**D.C.Circuits:** Ohm's Law and Kirchhoff's Laws,	CO1	L3
2	analysis of series, parallel and series- parallel circuits excited by independent voltage sources.	CO1	L3
3	Power and Energy.	CO1	L2
4	**A.C. Fundamentals**		
5	Generation of sinusoidal voltage	CO1	L2
6	frequency of generated voltage	CO1	L2
7	definition and numerical values of average value	CO1	L3
8	root mean square value	CO1	L3
9	form factor and peak factor of sinusoidally varying voltage and current	CO1	L3
10	phasor representation of alternating quantities.	CO1	L4
c	**Application Areas**	**CO**	**Level**
1	To analysis DC circuits	CO1	L3
2	To understand the AC quantities fundamentals	CO1	L3
d	**Review Questions**	-	-
1	Define magnetic field, magnetic flux mmf.	CO1	L2
2	Define reluctance, permeability, magnertising force	CO1	L2
3	State and explain KCL and KVL as applied to DC circuits.	CO1	L2
4	State and explain ohms law. What are its limitation?	CO1	L2
5	Explain electrical work, power, energy.	CO1	L2
6	Explain series and parallel connection of two resistors.	CO1	L2
7	Explain average value, R.M.S. value,form factor, peak factor of a sinusoidal waveform.	CO1	L2
8	What is meant by phase angle between two alternating quantities?	CO1	L2
e	**Experiences**	-	-
1		CO1	L2

Module – 2

Title:	Divide and Conquer	Appr Time:	10 Hrs
a	***Course Outcomes***	-	**Blooms**
-	The student should be able to:	-	**Level**
1	Illustrate the electrical loads using Analytical and Graphical method.	CO1	L3
2	Illustrate the 3 phase connection using Analytical and Graphical method	CO1	L3
b	***Course Schedule***	-	-
Class No	**Module Content Covered**	**CO**	**Level**
1	**Single Phase Circuits**		
2	Analysis with phasor diagram of circuits with R, L, C, R-L, RC, R-L-C for series and parallel configurations.	CO1	L3
3	Real power	CO1	L3
4	reactive power	CO1	L3
5	apparent power and power factor.	CO1	L3

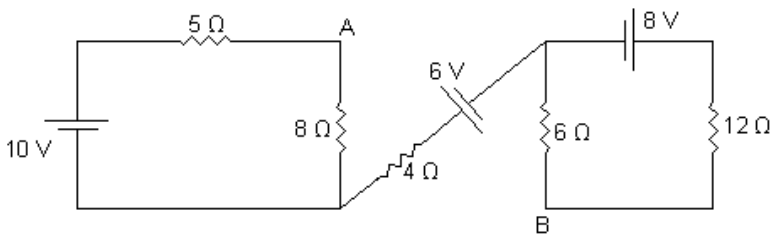
6	**Three Phase circuits**		
7	Advantages of 3-phase power	CO1	L2
8	Generation of 3-phase power	CO1	L2
9	Three-phase balanced circuits	CO1	L2
10	voltage and current relations in star and delta connections.	CO1	L3
11	Measurement of three phase power using two wattmeter method.	CO1	L3
c	**Application Areas**	**CO**	**Level**
1	To analyses Single phase circuit	CO1	L2
2	To analyses Three phase circuit analysis	CO1	L2
d	**Review Questions**	-	
1	Show that the average power in an AC circuit is given by P =Vicosφ.	CO1	L2
2	What is meant by power factor in AC circuits? What is its significance?	CO1	L2
3	Distinguish between lagging and leading power factors in AC circuits.	CO1	L2
4	Establish the relationship between voltage and current in a R-L-C series circuit. Draw the phasor diagram.	CO1	L2
5	Show that the average power consumed in a pure capacitance is zero.	CO1	L2
6	Show that in a three-phase star-connected system, the line voltage is √3 times the phase voltage.	CO1	L2
7	When do we say that the system of an ac three-phase voltage is balanced three-phase system?	CO1	L2
8	Derive an expression for power in a three-phase balanced circuit.	CO1	L3
9	List out the advantages of three-phase systems.	CO1	L3
10	With relevant diagrams show that two wattmeters are enough to measure three-phase power.	CO1	L3
e	**Experiences**	-	-
1		CO1	L2

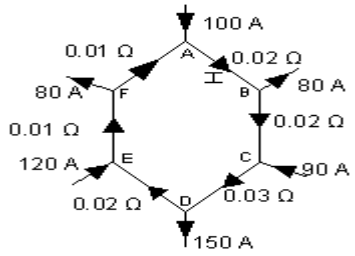
E1. CIA EXAM – 1

a. Model Question Paper - 1

Crs Code:	18ELE13/23	Sem:	1/2	Marks:	15	Time:	75 minutes

Course: Basic Electrical Engineering

-	-	**Note: Answer any 3 questions, each carry equal marks.**	**Marks**	**CO**	**Level**
1	a	State Ohm's law and its limitations.	CO1	L2	5
	b	Find the potential difference between the points A & B. 	CO1	L3	5
	c	State and explain the Kirchhoff's laws.	CO1	L2	5
		OR			
2	a	Define RMS value of alternating current. Obtain the relationship between RMS and maximum value of alternating current.	CO1	L2	5
	b	Find the currents in the various branches of the given network	CO1	L3	5

					
	c	A sinusoidal alternating current is represented by i 30sin30t, find (I) maximum value (ii) current when t 0.002 sec (iii) RMS value of the current	CO1	L3	5
3	a	Obtain the relationship between line and phase values of voltage and current in a three balanced star connected scheme.	CO1	L4	7
	b	List the advantages of 3 phase system over single phase system.	CO1	L2	4
	c	Estimate the power factor in each of the following cases of two wattmeter method of measuring three phase power. (i) Wattmeter readings are equal (ii) Wattmeter readings are equal and opposite (iii) Wattmeter readings are in the ratio 1:2 (iv) one Wattmeter reads zero.	CO1	L3	4
		OR			
4	a	Show that in a three phase, balanced circuit, two wattmeters are sufficient to measure the total three phase power.	CO1	L4	7
	b	Compare Shell type and Core type transformer.	CO4	L2	4
	c	A 600KVA transformer has an efficiency of 92% at full load unity power factor and at half load 0.9 power factor. Determine its efficiency at 75% of full load, 0.9 power factor.	CO4	L3	4

b. Assignment -1

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions							
Crs Code:	18ELE13/23	Sem:	1/2	Marks:	10	Time:	90 – 120 minutes
Course:	Basic Electrical Engineering						
Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.							

SNo		Assignment Description	Marks	CO	Level
1		State and explain Kirchhoff's laws.	5	CO1	L2
2		State ohm's law. Mention its limitations.	5	CO1	L3
3		b. State and explain Kirchoff s current law and Kirchoff s voltage law.		CO1	L4
4		2 a. Define dynamically induced emf and statically induced emf with examples.	5	CO1	L2
5		A coil consists of 600 turns and a current of 10 A in the coil gives rise to a magnetic flux of 1 mWb. Calculate: (i) self inductance, (ii) The emf induced, (iii) The energy stored when a current s reversed in 0.01 sec.	5	CO1	L4
6		A circuit of two parallel resistors having resistance of 20ohm and 30ohm respectively, connected in series with 150ohm. lf the current through 150hm resistor is 3.A., find (i) current in 20ohm and 30ohm resistors, (ii) voltage across whole circuit (iii) The total power and power consumed in all resistors.	5	CO1	L2
7		Two coils, X of 12000 turns and Y f 15000 turns, lie in parallel planes so that 45% of the flux produced by coil X links coil Y. A current of 5 A in X produces 0.05Wb while the same current in	5	CO1	L2

		Y produces 0.075Wb. Calculate (a) the mutual inductance, (b) the coupling coefficient, and (c) the percentage of flux produced by coil Y and linking with coil X.			
8		Two toroidal solenoids are wound around the same form so that the magnetic field of one passes through the turns of the other. Solenoid 1 has 700 turns and solenoid 2 has 400 turns. When the current in solenoid 1 is 6.52 A, the average flux through each turn of solenoid 2 is 0.0320 Wb. (a) What is the mutual inductance of the pair of solenoids? (b) When the current in solenoid 2 is 2.54 A, what is the average flux through each turn of solenoid 1.	5	CO1	L4
9		A 20V battery with an internal resistance of 5 Ω is connected to a resistor of x ohms. If an additional 6 Ω resistor is connected across the battery, find the value of x so that the external power supplied by the battery remains the same.	5	CO1	L2
10		A coil consists of 600 turns and a current of 10 A in the coil gives rise to a magnetic flux of I mWb. Calculate: (i) self inductance, (ii) The emf induced, (iii) The energy stored when a current s reversed in 0.01 sec.	5	CO1	L2
11		With the help of a circuit diagram and vector diagram, show that two wattmeters are sufficient to measure total power and power factor in a balanced three phase circuit.	5	CO1	L2
12		Three similar coils each having resistance of 10ohm and reactance of 8ohm are connected in star, across 400 V, 3 phase supply. Determine (i) line current, (ii) total power, (iii) reading of each of two wattmeter connected to measure power.	5	CO1	L2
13		Mention the advantages of three phase system over single phase system.	5	CO1	L2
14			5	CO1	L4
15		A circuit has 1000 turns enclosing a magnetic circuit 20cm^{2}in section, with 4A the flux density is 1.0T and with 9A it is 1.4T. Find the mean value of the inductance between these current limits and the induced electromotive force if the current fell uniformly from9A to 4A in 0.05sec. Also determine the energy stored at the end of0.05sec.	5	CO1	L2
16		A three phase load of three equal impedances connected in delta across a balanced 400V supply, takes a line current of 10 A at a power factor of0.7 lagging. Calculate: i) the phase current, ii) the total power, iii) the total reactive volt amperes.	5	CO1	L2
17		With the help of a circuit diagram and vector diagram, show that two wattmeters are sufficient to measure total power and power factor in a balanced three phase circuit.	5	CO1	L2
18		A three phase load of three equal impedances connected in delta across a balanced 400V supply, takes a line current of 10 A at a power factor of0.7 lagging. Calculate:i) the phase current, ii) the total power, iii) the total reactive volt amperes.	5	CO1	L2
19		An alternating voltage (80+j60)V is applied to a circuit and the current flowing is (-4+jlO)A. Find: (i) the impedance of the circuit, (ii) the phase angle, (iii) power consumed.	5	CO1	L4
20		c. Two impedances Z_1 =(10 + j15)ohm and Z_2 = (6- j8)ohm are connected in parallel. If the total current supplied is 15A, what is power taken by each branch?	5	CO1	L2
21		State and explain Kirchhoff's laws.	5	CO1	L2
22		State ohm's law. Mention its limitations.	5	CO1	L2
23		b. State and explain Kirchoff s current law and Kirchoff s voltage law.	5	CO1	L2

24		2 a. Define dynamically induced emf and statically induced emf with examples.	5	CO1	L2
25		A coil consists of 600 turns and a current of 10 A in the coil gives rise to a magnetic flux of 1 mWb. Calculate: (i) self inductance, (ii) The emf induced, (iii) The energy stored when a current s reversed in 0.01 sec.	5	CO1	L2
26		A circuit of two parallel resistors having resistance of 20ohm and 30ohm respectively, connected in series with 150ohm. If the current through 15ohm resistor is 3.A., find (i) current in 20ohm and 30ohm resistors, (ii) voltage across whole circuit (iii) The total power and power consumed in all resistors.	5	CO1	L2
27		Two coils, X of 12000 turns and Y f 15000 turns, lie in parallel planes so that 45% of the flux produced by coil X links coil Y. A current of 5 A in X produces 0.05Wb while the same current in Y produces 0.075Wb. Calculate (a) the mutual inductance, (b) the coupling coefficient, and (c) the percentage of flux produced by coil Y and linking with coil X.	5	CO1	L2
28		Two toroidal solenoids are wound around the same form so that the magnetic field of one passes through the turns of the other. Solenoid 1 has 700 turns and solenoid 2 has 400 turns. When the current in solenoid 1 is 6.52 A, the average flux through each turn of solenoid 2 is 0.0320 Wb. (a) What is the mutual inductance of the pair of solenoids? (b) When the current in solenoid 2 is 2.54 A, what is the average flux through each turn of solenoid 1.	5	CO1	L2
29		A 20V battery with an internal resistance of 5 Ω is connected to a resistor of x ohms. If an additional 6 Ω resistor is connected across the battery, find the value of x so that the external power supplied by the battery remains the same.	5	CO1	L2
30		A coil consists of 600 turns and a current of 10 A in the coil gives rise to a magnetic flux of I mWb. Calculate: (i) self inductance, (ii) The emf induced, (iii) The energy stored when a current s reversed in 0.01 sec.	5	CO1	L2
31		With the help of a circuit diagram and vector diagram, show that two wattmeters are sufficient to measure total power and power factor in a balanced three phase circuit.	5	CO1	L2
32		Three similar coils each having resistance of 10ohm and reactance of 8ohm are connected in star, across 400 V, 3 phase supply. Determine (i) line current, (ii) total power, (iii) reading of each of two wattmeter connected to measure power.	5	CO1	L2
33		Mention the advantages of three phase system over single phase system.	5	CO1	L4
34			5	CO1	L2
35		A circuit has 1000 turns enclosing a magnetic circuit 20cm^{2}in section, with 4A the flux density is 1.0T and with 9A it is 1.4T. Find the mean value of the inductance between these current limits and the induced electromotive force if the current fell uniformly from9A to 4A in 0.05sec. Also determine the energy stored at the end of0.05sec.	5	CO1	L2
36		A three phase load of three equal impedances connected in delta across a balanced 400V supply, takes a line current of 10 A at a power factor of0.7 lagging. Calculate: i) the phase current, ii) the total power, iii) the total reactive volt amperes.	5	CO1	L2
37		With the help of a circuit diagram and vector diagram, show that two wattmeters are sufficient to measure total power and power factor in a balanced three phase circuit.	5	CO1	L2

38		A three phase load of three equal impedances connected in delta across a balanced 400V supply, takes a line current of 10 A at a power factor of0.7 lagging. Calculate:i) the phase current, ii) the total power, iii) the total reactive volt amperes.	5	CO1	L2
39		An alternating voltage (80+j60)V is applied to a circuit and the current flowing is (-4+jlO)A. Find: (i) the impedance of the circuit, (ii) the phase angle, (iii) power consumed.	5	CO1	L2
40		c. Two impedances z_1 =(10 + j15)ohm and Z_2 = (6- j8)ohm are connected in parallel. If the total current supplied is 15A, what is power taken by each branch?	5	CO1	L2

D2. TEACHING PLAN - 2

Module – 3

Title:	Divide and Conquer	Appr Time:	16 Hrs
a	***Course Outcomes***	-	**Blooms**
-	The student should be able to:	-	**Level**
1	Determine the efficiency of single phase transformer.	CO4	L3
2	Discuss the concepts of electrical wiring System using hardware module.	CO5	L2
b	***Course Schedule***		
Class No	**Module Content Covered**	**CO**	**Level**
1	**Single Phase Transformers**		
2	Necessity of transformer	CO4	L2
3	Principle of operation	CO4	L2
4	Types and construction of transformers.	CO4	L2
5	emf equation	CO4	L3
6	losses, variation of losses with respect to load	CO4	L3
7	efficiency, Condition for maximum efficiency.	CO4	L3
8	**Domestic Wiring**		
9	Service mains, meter board and distribution board.	CO5	L2
10	Brief discussion on concealed conduit wiring.	CO5	L2
11	Two-way and three-way control.	CO5	L2
12	Elementary discussion on circuit protective devices: Fuse and Miniature Circuit Breaker (MCB's)	CO5	L2
13	electric shock, precautions against shock.	CO5	L2
14	Earthing: Pipe and Plate earthing.	CO5	L2
c	**Application Areas**	**CO**	**Level**
1	For stepping up and stepping down power supply	CO4	L3
2	Electrical Wiring is used in Domestic , commercial buildings and protective devices to protect electrical circuits	CO5	L3
d	**Review Questions**		
1	Explain wit a neat sketch the construction of a core type single phase transformer.	CO4	L2
2	Explain wit a neat sketch the construction of a shell type single phase transformer.	CO4	L2
3	Explain why the core of a transformer is laminated?	CO4	L2
4	State why silicon steel is selected for the core of a transformer?	CO4	L4
5	Explain the principle of operation of a transformer.	CO4	L4
6	Derive the EMF equation of a transformer from fundamentals.	CO5	L4

7	What is domestic wiring?	CO5	L4
8	Give the wiring diagram for the two-way control of a lamp and explain.	CO5	L4
9	What is earthing? Why is it necessary? Explain its performance.	CO5	L4
10	What do you understand by electric shock? What are the causes of electric shock?	CO5	L4
e	**Experiences**	-	-
1			

Module – 4

Title:	Divide and Conquer	Appr Time:	16 Hrs
a	***Course Outcomes***	-	**Blooms**
-	The student should be able to:	-	**Level**
1	Understand the principle of operation of DC generators using constructional diagram.	CO2	L2
2	understand the principle of operation of DC motors using hardware module.	CO3	L2
b	***Course Schedule***		
Class No	**Module Content Covered**	**CO**	**Level**
1	**DC Generators:**	CO2	L2
2	Principle of operation,	CO2	L2
3	Construction of D.C. Generators.	CO2	L2
4	Expression for induced emf	CO2	L2
5	Types of D.C. Generators,	CO2	L2
6	Relation between induced emf and terminal voltage.	CO2	L2
7	**DC motors:**		
8	Principle of operation	CO3	L2
9	Back emf	CO3	L2
10	Torque equation,	CO3	L2
11	Types of dc motors,	CO3	L2
12	Characteristics of dc motors (shunt and series motors only) and Applications.	CO3	L2
c	**Application Areas**	**CO**	**Level**
1	DC Power generation for small applications	CO3	L3
2	Fan, blowers, cranes, elevators traction systems	CO2	L3
d	**Review Questions**	-	-
1	Explain the principle of operation of DC generators.	CO2	L2
2	Explain the construction of DC genrator.	CO2	L2
3	With usual notations derive an expression for the induced EMF of a DC generator.	CO2	L2
4	What is back emf? Explain its significance.	CO3	L3
5	What are the various types of DC motors? Give their circuit representations.	CO3	L2
6	Explain the principle of operation of DC motors.	CO3	L2
7	Derive an expression for the torque developed by a DC motor.	CO3	L2
8	Draw and explain torque versus speed characteristics of a DC shunt and DC series motors.	CO3	L3
9	Draw and explain torque versus armature current characteristics of a DC	CO3	L2

	shunt and DC series motors.		
10	Why is a starter needed for DC motors? Explain in brief.	CO3	L3
e	**Experiences**	-	-
1			

E2. CIA EXAM – 2

a. Model Question Paper - 2

Crs Code:	18ELE13/23	Sem:	1/2	Marks:	30	Time:	75 minutes
Course:	Basic Electrical Engineering						

-	-	**Note: Answer any 2 questions, each carry equal marks.**	**Marks**	**CO**	**Level**
1	a	Derive EMF equation of transformer.	6	CO4	L2
	b	The maximum efficiency at full load and Upf of a single phase, 25 kV A, 500/1000 V, 50 Hz transformer is 98%. Determine the efficiency at (i) 75% load 0.9 pf, (ii) 50% load 0.8 pf, (iii) 25% load 0.6 pf	9	CO4	L3
		OR			
2	a	With reasoning, for a transformer, show that The transformer can be considered as ideal.	5	CO4	L2
	b	Derive the condition for which the efficiency of a transformer is maximum.	10	CO4	L2
	c	Explain two way control of lamps with truth table and connection diagram.		CO5	L2
3	a	Sketch torque versus armature current and speed versus armature current characteristics of a D.C. shunt motor and mention its applications.	3	CO3	L2
	b	A 200V, 4 pole, lap wound DC shunt motor has 800 conductors on its armature. The resistance of the armature winding is 0.5 ohm and that of the shunt field winding is 200 ohm. The motor takes 21A and flux/pole is 30mWb. Find speed and gross torque developed in the motor.	8	CO3	L3
		OR			
4	a	Derive EMF equation of DC generator.	7	CO2	L2
	b	An 8 pole D.C. generator has 500 armature conductors and has useful flux per pole of 0.065 Wb. What will be emf generated if it is lap connected and runs at 1000 rpm? What must be the speed at which it is to be driven to produce the same emf if it is wave connected?	8	CO2	L3

b. Assignment – 2

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions

Crs Code:	18ELE13/23	Sem:	1/2	Marks:	10	Time:	90 – 120 minutes
Course:	Basic Electrical Engineering						

Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.

SNo		Assignment Description	Marks	CO	Level
1		Derive EMF equation of transformer.	5	CO5	L2
2		Derive the condition for which the efficiency of a transformer is maximum	5	CO5	L3
3		b. The maximum efficiency at full load and Upf of a single phase, 25 kV A, 500/1000 V, 50 Hz transformer is 98%. Determine the efficiency at (i) 75% load 0.9 pf, (ii) 50% load 0.8 pf, (iii) 25% lo_ad 0.6 pf		CO5	L4
4		Explain two way control of lamps with truth table and connection diagram.	5	CO2	L3

5			5	CO5	L2
6		Derive EMF equation of DC generator.	5	CO4	L3
7		An 8 pole D.C. generator has 500 armature conductors and has useful flux per pole of 0.065 Wb. What will be emf generated if it is lap connected and runs at 1000 rpm? What must be the speed at which it is to be driven to produce the same emf if it is wave connected?		CO5	L4
8		Sketch torque versus armature current and speed versus armature current characteristics of a D.C. shunt motor and mention its application	5	CO5	L3
9		A 200V, 4 pole, lap wound DC shunt motor has 800 conductors on its armature. The resistance of the armature winding is 0.5 ohm and that of the shunt field winding is 200 ohm. The motor takes 21A and flux/pole is 30 mWb. Find speed and gross torque developed in the motor.	5	CO4	L2
10		Derive EMF equation of transformer.	5	CO2	L3
11		The maximum efficiency at full load and Upf of a single phase, 25 kV A, 500/1000 V, 50 Hz transformer is 98%. Determine the efficiency at (i) 75% load 0.9 pf, (ii) 50% load 0.8 pf, (iii) 25% load 0.6 pf		CO2	L4
12		With reasoning, for a transformer, show that The transformer can be considered as ideal.	5	CO4	L3
13		Derive the condition for which the efficiency of a transformer is maximum.	5	CO4	L2
14		Explain two way control of lamps with truth table and connection diagram.	5	CO4	L3
15		Sketch torque versus armature current and speed versus armature current characteristics of a D.C. shunt motor and mention its applications.		CO5	L4
16		A 200V, 4 pole, lap wound DC shunt motor has 800 conductors on its armature. The resistance of the armature winding is 0.5 ohm and that of the shunt field winding is 200 ohm. The motor takes 21A and flux/pole is 30mWb. Find speed and gross torque developed in the motor.	5	CO5	L3
17		Derive EMF equation of DC generator.	5	CO5	L2
18		An 8 pole D.C. generator has 500 armature conductors and has useful flux per pole of 0.065 Wb. What will be emf generated if it is lap connected and runs at 1000 rpm? What must be the speed at which it is to be driven to produce the same emf if it is wave connected?	5	CO5	L3
19		With reasoning, for a transformer, show that The transformer can be considered as ideal.		CO5	L4
20		Derive EMF equation of transformer.	5	CO5	L3
21		Derive the condition for which the efficiency of a transformer is maximum	5	CO5	L2
22		b. The maximum efficiency at full load and Upf of a single phase, 25 kV A, 500/1000 V, 50 Hz transformer is 98%. Determine the efficiency at (i) 75% load 0.9 pf, (ii) 50% load 0.8 pf, (iii) 25% lo_ad 0.6 pf	5	CO2	L3
23		Explain two way control of lamps with truth table and connection diagram.		CO2	L4
24			5	CO5	L3
25		Derive EMF equation of DC generator.	5	CO4	L2
26		An 8 pole D.C. generator has 500 armature conductors and has useful flux per pole of 0.065 Wb. What will be emf	5	CO5	L3

		generated if it is lap connected and runs at 1000 rpm? What must be the speed at which it is to be driven to produce the same emf if it is wave connected?			
27		Sketch torque versus armature current and speed versus armature current characteristics of a D.C. shunt motor and mention its application		CO4	L4
28		A 200V, 4 pole, lap wound DC shunt motor has 800 conductors on its armature. The resistance of the armature winding is 0.5 ohm and that of the shunt field winding is 200 ohm. The motor takes 21A and flux/pole is 30 mWb. Find speed and gross torque developed in the motor.	5	CO2	L3
29		Derive EMF equation of transformer.	5	CO2	L3
30		The maximum efficiency at full load and Upf of a single phase, 25 kV A, 500/1000 V, 50 Hz transformer is 98%. Determine the efficiency at (i) 75% load 0.9 pf, (ii) 50% load 0.8 pf, (iii) 25% load 0.6 pf	5	CO2	L2
31		With reasoning, for a transformer, show that The transformer can be considered as ideal.		CO2	L3
32		Derive the condition for which the efficiency of a transformer is maximum.	5	CO2	L4
33		Explain two way control of lamps with truth table and connection diagram.	5	CO2	L3
34		Sketch torque versus armature current and speed versus armature current characteristics of a D.C. shunt motor and mention its applications.	5	CO2	L2
35		A 200V, 4 pole, lap wound DC shunt motor has 800 conductors on its armature. The resistance of the armature winding is 0.5 ohm and that of the shunt field winding is 200 ohm. The motor takes 21A and flux/pole is 30mWb. Find speed and gross torque developed in the motor.		CO3	L3
36		Derive EMF equation of DC generator.	5	CO2	L4
37		An 8 pole D.C. generator has 500 armature conductors and has useful flux per pole of 0.065 Wb. What will be emf generated if it is lap connected and runs at 1000 rpm? What must be the speed at which it is to be driven to produce the same emf if it is wave connected?	5	CO2	L3
38		With reasoning, for a transformer, show that The transformer can be considered as ideal.	5	CO5	L2
39		Derive the condition for which the efficiency of a transformer is maximum.		CO2	L3
40		Explain two way control of lamps with truth table and connection diagram.	5	CO4	L4

D3. TEACHING PLAN - 3

Module – 5

Title:	Divide and Conquer	Appr Time:	16 Hrs
a	***Course Outcomes***	-	**Blooms**
-	The student should be able to:	-	**Level**
1	understand the principle of operation of Alternator using constructional diagrams.	CO2	L2
2	understand the principle of operation of three phase induction motors using hardware module.	CO3	L2

b	***Course Schedule***		
Class No	**Module Content Covered**	**CO**	**Level**
1	**Three Phase Synchronous Generators:**	CO2	L2
2	Principle of operation	CO2	L2
3	Constructional details	CO2	L2
4	Synchronous speed	CO2	L2
5	Frequency of generated voltage	CO2	L2
6	emf equation	CO2	L2
7	Concept of winding factor (excluding the derivation and calculation of distribution and pitch factors).	CO2	L2
8	**Three Phase Induction Motors:**	CO3	L2
9	Principle of operation	CO3	L2
10	Generation of rotating magnetic field	CO3	L2
11	Construction and working of three-phase induction motor	CO3	L2
12	Slip and its significance.	CO3	L2
13	Necessity of starter	CO3	L2
14	star-delta starter.	CO3	L2
c	**Application Areas**	**CO**	**Level**
1	To generate electricity	CO2	L2
2	Irrigation purpose	CO3	L2
d	**Review Questions**	-	-
1	Explain the constructional features of a salient pole alternators.	CO2	L2
2	Distinguish between salient and non-salient pole alternators.	CO2	L2
3	Starting from basic principles, develop an expression for the emf induced in an alternator.	CO2	L2
4	Explain the constructional features of a non-salient pole alternators.	CO2	L2
5	Explain the construction of squirrel cage induction motor.	CO3	L2
6	Explain the difference in squirrel cage and phase wound induction motor.	CO3	L2
7	Explain the principle of operation of an induction motor.	CO3	L2
8	Why induction motor require a starter?	CO3	L2
9	What is slip in an induction motor? Explain why slip is never zero in an induction motor?	CO3	L2
10	Explain the construction of phase wound induction motor.	CO3	L2
e	**Experiences**	-	-
1			L2

E3. CIA EXAM – 3

a. Model Question Paper - 3

Crs Code:	18ELE13/23	Sem:	1/2	Marks:	30	Time:	75 minutes
Course:	Basic Electrical Engineering						

-	-	**Note: Answer any 2 questions, each carry equal marks.**	**Marks**	**CO**	**Level**
1	a	With neat sketches, explain the construction of salient pole alternator.	5	CO2	L2
	b	Define slip. Derive an expression for frequency of rotor current.	10	CO3	L3
2	a	If a 6 pole induction motor supplied from a three phase 50 Hz supply has a rotor frequency 2.3 Hz, calculate (i) the percentage slip, (ii) the speed of the motor	7	CO2	L2

	b	A three phase 6 pole 50 Hz induction motor has a slip of 1 % at no load and 3% at full load. Determine: i) Synchronous speed, .(ii) No load speed, (iii) Full-load speed, (iv) Frequency of rotor current at stand still, (v) Frequency of rotor current at full-load.	8	CO3	L3
3	a	Show that a three phase winding when excited by a three phase supply establishes a rotating magnetic field.	5	CO2	L2
	b	Show that a three phase winding when excited by a three phase supply establishes a rotating magnetic field.A 2 pole 3phase alternator running at 3000 rpm has 42 slots with 2 conductors per slot. Calculate the flux per pole, required to generate a line voltage of 2300 V. Assume Kd = 0.952 and K p = 0.956. The armature is star connected.	10	CO3	L3
		OR			
4	a	With neat sketches, explain the construction of salient pole alternator	7	CO2	L2
	b	A 6 pole alternator runs at 1000 rpm, and supplies power to a 4 pole, 3 phase induction motor. The frequency of rotor of induction motor is 2 Hz. Determine the slip and speed of the motor. Also, determine the slip at no load of the induction motor, if the difference between the synchronous speed and no load speed is 10 rpm.	8	CO3	L3

b. Assignment – 3

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions							
Crs Code:	18ELE13/23	Sem:	1/2	Marks:	10	Time:	90 – 120 minutes
Course:	Basic Electrical Engineering						

Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.

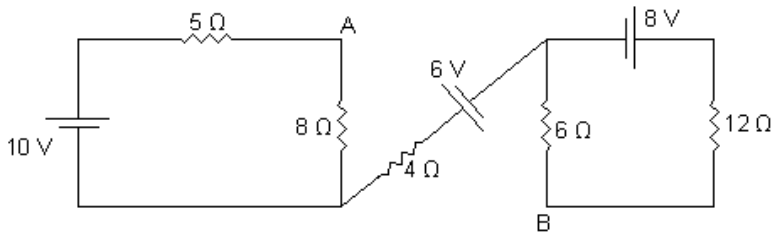
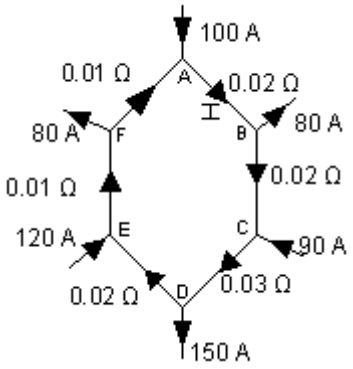
SNo		Assignment Description	Marks	CO	Level
1		Show that a three phase winding when excited by a three phase supply establishes a rotating magnetic field.	5	CO2	L2
2		A 6 pole alternator runs at 1000 rpm, and supplies power to a 4 pole, 3 phase induction motor. The frequency of rotor of induction motor is 2 Hz. Determine the slip and speed of the motor. Also, determine the slip at no load of the induction motor, if the difference between the synchronous speed and no load speed is 10 rpm.	5	CO2	L3
3		With neat sketches, explain the construction of salient pole alternator.		CO2	L2
4		Define slip. Derive an expression for frequency of rotor current.	5	CO3	L3
5		If a 6 pole induction motor supplied from a three phase 50 Hz supply has a rotor frequency 2.3 Hz, calculate (i) the percentage slip, (ii) the speed of the motor	5	CO2	L2
6		A three phase 6 pole 50 Hz induction motor has a slip of 1 % at no load and 3% at full load. Determine: i) Synchronous speed, . (ii) No load speed, (iii) Full-load speed, (iv) Frequency of rotor current at stand still, (v) Frequency of rotor current at full-load.	5	CO2	L2
7		Show that a three phase winding when excited by a three phase supply establishes a rotating magnetic field.	5	CO2	L2
8		Show that a three phase winding when excited by a three phase supply establishes a rotating magnetic field.A 2 pole 3phase alternator running at 3000 rpm has 42 slots with 2 conductors per slot. Calculate the flux per pole, required to generate a line voltage of 2300 V. Assume Kd = 0.952 and K p = 0.956. The armature is star connected.	5	CO2	L2

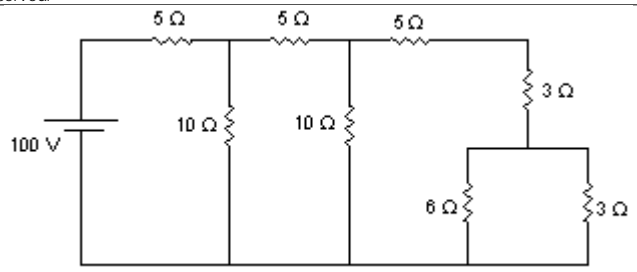
9		With neat sketches, explain the construction of salient pole alternator	5	CO2	L2
10		A 6 pole alternator runs at 1000 rpm, and supplies power to a 4 pole, 3 phase induction motor. The frequency of rotor of induction motor is 2 Hz. Determine the slip and speed of the motor. Also, determine the slip at no load of the induction motor, if the difference between the synchronous speed and no load speed is 10 rpm.	5	CO2	L2
11		Show that a three phase winding when excited by a three phase supply establishes a rotating magnetic field.	5	CO3	L3
12		A 6 pole alternator runs at 1000 rpm, and supplies power to a 4 pole, 3 phase induction motor. The frequency of rotor of induction motor is 2 Hz. Determine the slip and speed of the motor. Also, determine the slip at no load of the induction motor, if the difference between the synchronous speed and no load speed is 10 rpm.	5	CO2	L2
13		A 2 pole 3phase alternator running at 3000 rpm has 42 slots with 2 conductors per slot. Calculate the flux per pole, required to generate a line voltage of 2300 V. Assume Kd = 0.952 and K p = 0.956. The armature is star connected.	5	CO2	L2
14		With neat sketches, explain the construction of salient pole alternator	5	CO2	L2
15		Discuss the variation in rotor emf frequency of three phase induction motor as the load changes. Derive any formula used to substantiate the variation.	5	CO2	L2
16		If a 6 pole induction motor supplied from a three phase 50 Hz supply has a rotor frequency 2.3 Hz, calculate (i) the percentage slip, (ii) the speed of the motor.	5	CO2	L2
17		With neat sketches, explain the construction of salient pole alternator.	5	CO3	L3
18		Define slip. Derive an expression for frequency of rotor current.	5	CO2	L2
19		If a 6 pole induction motor supplied from a three phase 50 Hz supply has a rotor frequency 2.3 Hz, calculate (i) the percentage slip, (ii) the speed of the motor	5	CO3	L3
20		A three phase 6 pole 50 Hz induction motor has a slip of 1 % at no load and 3% at full load. Determine: i) Synchronous speed, . (ii) No load speed, (iii) Full-load speed, (iv) Frequency of rotor current at stand still, (v) Frequency of rotor current at full-load.	5	CO2	L2
21		Show that a three phase winding when excited by a three phase supply establishes a rotating magnetic field.	5	CO3	L3
22		A 6 pole alternator runs at 1000 rpm, and supplies power to a 4 pole, 3 phase induction motor. The frequency of rotor of induction motor is 2 Hz. Determine the slip and speed of the motor. Also, determine the slip at no load of the induction motor, if the difference between the synchronous speed and no load speed is 10 rpm.	5	CO2	L2
23		With neat sketches, explain the construction of salient pole alternator.	5	CO2	L2
24		Define slip. Derive an expression for frequency of rotor current.	5	CO2	L2
25		If a 6 pole induction motor supplied from a three phase 50 Hz supply has a rotor frequency 2.3 Hz, calculate (i) the percentage slip, (ii) the speed of the motor	5	CO2	L2
26		A three phase 6 pole 50 Hz induction motor has a slip of 1 % at	5	CO2	L2

		no load and 3% at full load. Determine: i) Synchronous speed, . (ii) No load speed, (iii) Full-load speed, (iv) Frequency of rotor current at stand still, (v) Frequency of rotor current at full-load.			
27		Show that a three phase winding when excited by a three phase supply establishes a rotating magnetic field.	5	CO2	L2
28		Show that a three phase winding when excited by a three phase supply establishes a rotating magnetic field.A 2 pole 3phase alternator running at 3000 rpm has 42 slots with 2 conductors per slot. Calculate the flux per pole, required to generate a line voltage of 2300 V. Assume Kd = 0.952 and K p = 0.956. The armature is star connected.	5	CO2	L2
29		With neat sketches, explain the construction of salient pole alternator	5	CO2	L2
30		A 6 pole alternator runs at 1000 rpm, and supplies power to a 4 pole, 3 phase induction motor. The frequency of rotor of induction motor is 2 Hz. Determine the slip and speed of the motor. Also, determine the slip at no load of the induction motor, if the difference between the synchronous speed and no load speed is 10 rpm.	5	CO2	L2
31		Show that a three phase winding when excited by a three phase supply establishes a rotating magnetic field.	5	CO2	L2
32		A 6 pole alternator runs at 1000 rpm, and supplies power to a 4 pole, 3 phase induction motor. The frequency of rotor of induction motor is 2 Hz. Determine the slip and speed of the motor. Also, determine the slip at no load of the induction motor, if the difference between the synchronous speed and no load speed is 10 rpm.	5	CO2	L2
33		A 2 pole 3phase alternator running at 3000 rpm has 42 slots with 2 conductors per slot. Calculate the flux per pole, required to generate a line voltage of 2300 V. Assume Kd = 0.952 and K p = 0.956. The armature is star connected.	5	CO2	L2
34		With neat sketches, explain the construction of salient pole alternator	5	CO2	L2
35		Discuss the variation in rotor emf frequency of three phase induction motor as the load changes. Derive any formula used to substantiate the variation.	5	CO2	L2
36		If a 6 pole induction motor supplied from a three phase 50 Hz supply has a rotor frequency 2.3 Hz, calculate (i) the percentage slip, (ii) the speed of the motor.	5		L2
37		With neat sketches, explain the construction of salient pole alternator.	5	CO2	L2
38		Define slip. Derive an expression for frequency of rotor current.	5	CO3	L3
39		If a 6 pole induction motor supplied from a three phase 50 Hz supply has a rotor frequency 2.3 Hz, calculate (i) the percentage slip, (ii) the speed of the motor	5	CO2	L2
40		A three phase 6 pole 50 Hz induction motor has a slip of 1 % at no load and 3% at full load. Determine: i) Synchronous speed, . (ii) No load speed, (iii) Full-load speed, (iv) Frequency of rotor current at stand still, (v) Frequency of rotor current at full-load.	5	CO2	L2

F. EXAM PREPARATION

1. University Model Question Paper

Course:	Basic Electrical Engineering					Month / Year	May /2018	
Crs Code:	18ELE13/23	Sem:	1/2	Marks:	100	Time:	180 minutes	
-	**Note**	Answer all FIVE full questions. All questions carry equal marks.				**Marks**	**CO**	**Level**
1	a	State Ohm's law and its limitations.				5	CO1	L2
	b	Find the potential difference between the points A & B. 					5	CO1	L3
	c	State and explain the Kirchhoff's laws.					5	CO1	L2
	d	Define RMS value of alternating current. Obtain the relationship between RMS and maximum value of alternating current.					5	CO1	L2
		OR							
-	a	Find the currents in the various branches of the given network 					5	CO1	L2
	b	A sinusoidal alternating current is represented by i 30sin30t, find (I) maximum value (ii) current when t 0.002 sec (iii) RMS value of the current					4	CO1	L3
	c	In the circuit shown in fig. 2.c, determine (i) the R_{eq} (ii) the total current (iii) The voltage across 6Ω resistor.					4	CO1	L3

					
	d	With neat diagrams explain the generation of single phase voltage.	7	CO1	L2
2	a	With the help of a circuit diagram and vector diagram, show that two wattmeters are sufficient to measure total power and power factor in a balanced three phase circuit.	8	C03	L4
	b	Three similar coils each having resistance of 10ohm and reactance of 8ohm are connected in star, across 400 V, 3 phase supply. Determine (i) line current, (ii) total power, (iii) reading of each of two wattmeter connected to measure power.	5	C03	L3
		OR			
-	a	Mention the advantages of three phase system over single phase system.	5	CO1	
	b	A three phase load of three equal impedances connected in delta across a balanced 400V supply, takes a line current of 10 A at a power factor of0.7 lagging. Calculate: i) the phase current, ii) the total power, iii) the total reactive volt amperes.	5	CO1	L3
3	a	Derive EMF equation of transformer.	7	CO4	
	b	b. The maximum efficiency at full load and Upf of a single phase, 25 kV A, 500/1000 V, 50 Hz transformer is 98%. Determine the efficiency at (i) 75% load 0.9 pf, (ii) 50% load 0.8 pf, (iii) 25% load 0.6 pf	5		L3
	c	With reasoning, for a transformer, show that The transformer can be considered as ideal.	5		
		OR			
-	a	Derive the condition for which the efficiency of a transformer is maximum.	6	CO4	
	b	Explain two way control of lamps with truth table and connection diagram.	5		
4	a	Sketch torque versus armature current and speed versus armature current characteristics of a D.C. shunt motor and mention its applications.	7	CO2	
	b	A 200V, 4 pole, lap wound DC shunt motor has 800 conductors on its armature. The resistance of the armature winding is 0.5 ohm and that of the shunt field winding is 200 ohm. The motor takes 21A and flux/pole is 30mWb. Find speed and gross torque developed in the motor.	5		L3
		OR			
-	a	Derive EMF equation of DC generator.	5	CO2	
	b	An 8 pole D.C. generator has 500 armature conductors and has useful flux per pole of 0.065 Wb. What will be emf generated if it is lap connected and runs at 1000 rpm? What must be the speed at which it is to be driven to produce the same emf if it is wave connected?	5	CO3	L3
5	a	Show that a three phase winding when excited by a three phase supply establishes a rotating magnetic field.	8	CO2	
	b	A 6 pole alternator runs at 1000 rpm, and supplies power to a 4 pole, 3 phase induction motor. The frequency of rotor of induction motor is 2 Hz.	5	CO3	L3

		Determine the slip and speed of the motor. Also, determine the slip at no load of the induction motor, if the difference between the synchronous speed and no load speed is 10 rpm.			
	c	A 2 pole 3phase alternator running at 3000 rpm has 42 slots with 2 conductors per slot. Calculate the flux per pole, required to generate a line voltage of 2300 V. Assume Kd = 0.952 and K p = 0.956. The armature is star connected.	5		L3
		OR			
	a	With neat sketches, explain the construction of salient pole alternator	5	CO2	
	b	Discuss the variation in rotor emf frequency of three phase induction motor as the load changes. Derive any formula used to substantiate the variation.	5		
	c	If a 6 pole induction motor supplied from a three phase 50 Hz supply has a rotor frequency 2.3 Hz, calculate (i) the percentage slip, (ii) the speed of the motor.	5		L3

2. SEE Important Questions

Course:	Basic Electrical Engineering					Month / Year	AUG /2018	
Crs Code:	18ELE13/23	Sem:	1/2	Marks:	100	Time:	180 minutes	
	Note	Answer all FIVE full questions. All questions carry equal marks.				-	-	
Module	Qno.	Important Question				**Marks**	**CO**	**Year**
1	1	State ohm's law. Mention its limitations.				5	CO1	2017
	2	b. State and explain Kirchoff s current law and Kirchoff s voltage law.				5	CO1	2017
	3	2 a. Define dynamically induced emf and statically induced emf with examples.				5	CO1	2017
	4	A coil consists of 600 turns and a current of 10 A in the coil gives rise to a magnetic flux of 1 mWb. Calculate: (i) self inductance, (ii) The emf induced, (iii) The energy stored when a current s reversed in 0.01 sec.				5	CO1	2017
	5	A circuit of two parallel resistors having resistance of 20ohm and 30ohm respectively, connected in series with 150hm. lf the current through 15ohm resistor is 3.A., find (i) current in 20ohm and 30ohm resistors, (ii) voltage across whole circuit (iii) The total power and power consumed in all resistors.				5	CO1	2017
							CO1	2017
2	1	With the help of a circuit diagram and vector diagram, show that two wattmeters are sufficient to measure total power and power factor in a balanced three phase circuit.				7	CO1	2017
	2	A three phase load of three equal impedances connected in delta across a balanced 400V supply, takes a line current of 10 A at a power factor of0.7 lagging. Calculate:i) the phase current, ii) the total power, iii) the total reactive volt amperes.				5	CO1	2017
	3	An alternating voltage (80+j60)V is applied to a circuit and the current flowing is (-4+jlO)A. Find: (i) the impedance of the circuit, (ii) the phase angle, (iii) power consumed.				7	CO1	2017
	4	c. Two impedances Z_1 =(10 + j15)ohm and Z_2 = (6- j8)ohm are connected in parallel. If the total current supplied is 15A, what is power taken by each branch?				6	CO1	2017
							CO1	2017
3	1	Derive EMF equation of transformer.				5	CO4	2017
	2	Derive the condition for which the efficiency of a transformer is maximum				7	CO4	2017
	3	b. The maximum efficiency at full load and Upf of a single phase, 25 kV A, 500/1000 V, 50 Hz transformer is 98%. Determine the efficiency at (i) 75% load 0.9 pf, (ii) 50% load 0.8 pf, (iii) 25% lo_ad 0.6 pf				5	CO4	2017

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	4	Explain two way control of lamps with truth table and connection diagram.	5	CO5	2017
					2017
4	1	Derive EMF equation of DC generator.	5	CO2	2017
	2	An 8 pole D.C. generator has 500 armature conductors and has useful flux per pole of 0.065 Wb. What will be emf generated if it is lap connected and runs at 1000 rpm? What must be the speed at which it is to be driven to produce the same emf if it is wave connected?	6	CO2	2017
	3	Sketch torque versus armature current and speed versus armature current characteristics of a D.C. shunt motor and mention its application	7	CO3	2017
	4	A 200V, 4 pole, lap wound DC shunt motor has 800 conductors on its armature. The resistance of the armature winding is 0.5 ohm and that of the shunt field winding is 200 ohm. The motor takes 21A and flux/pole is 30 mWb. Find speed and gross torque developed in the motor.	5	CO3	2017
					2017
5	1	With neat sketches, explain the construction of salient pole alternator.	5	CO2	2017
	2	Define slip. Derive an expression for frequency of rotor current.	5	CO3	2017
	3	If a 6 pole induction motor supplied from a three phase 50 Hz supply has a rotor frequency 2.3 Hz, calculate (i) the percentage slip, (ii) the speed of the motor	5	CO2	2017
	4	A three phase 6 pole 50 Hz induction motor has a slip of 1 % at no load and 3% at full load. Determine: i) Synchronous speed, .(ii) No load speed, (iii) Full-load speed, (iv) Frequency of rotor current at stand still, (v) Frequency of rotor current at full-load.	5	CO3	2017

. Content to Course Outcomes