< Sri Krishna Institute of Technology, Bengaluru>

COURSE PLAN

Academic Year 2019-2020

Program:	B E – Electrical & Electronics Engineering
Semester :	1ST
Course Code:	18ELE13
Course Title:	BASIC ELECTRICAL ENGINEERING
Credit / L-T-P:	3/2-2-0
Total Contact Hours:	40
Course Plan Author:	AVINASH S

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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

18ELE13/23 : Basic Electrical Engineering

A. COURSE INFORMATION1. Course Overview

Degree:	BE	Program:	EE
Year / Semester :	1/2	Academic Year:	2018-19
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:

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 generated voltage, emf equation, Concept of winding factor (excluding the derivation and calculation of	13 (5,8)	1. Operation of three phase synchronous generator	L2 Understand

	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.		2. Operation of three phase induction motor	L2 Underst and

3. Course Material

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=MJl_eQHNf-A&list=PL9RcWoqXmzaLTYUdnzKhF4bYug3GjGcEc&index=4	
C2	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	
C3	Single Phase Circuits **https://www.youtube.com/watch?v=UzrisWhvjV0** **https://www.youtube.com/watch?v=RihjG6wbQL4**	
C4	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**	
C5	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**	
C6	Domestic Wiring **https://www.youtube.com/watch?v=Tvh40MFIhCo** **https://www.youtube.com/watch?v=aITb42_NeFA** **https://www.youtube.com/watch?v=G6edCysCxeA**	
C7	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**	
C8	DC motors **https://www.youtube.com/watch?v=1OfLgpFq6Rc&list=PLLQiBbMXygz5Tc0runVq3wQB4sOTkB8It** **https://www.youtube.com/watch?v=D4RFFnzRdkk&list=PLSRCPd4kA2-S2Cu1tYUe5WGmc959y50Xf** **https://www.youtube.com/watch?v=ASnDSEeWADk**	
C9	Three Phase Synchronous Generators **https://www.youtube.com/watch?v=b24jORRoxEc** **https://www.youtube.com/watch?v=Hn3FkCOPuos&list=PLPpCFgQP7QKHog5-n3DFqSxLI_LP-BvXP**	
C10	Three Phase Induction Motors **https://www.youtube.com/watch?v=dZyO5gcWP-o** **https://www.youtube.com/watch?v=XzTncI6OVus** **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						

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

#	COs	Teach. Hours	Concept	Instr Method	Assessment Method	Blooms' Level
18ELE13/ 23.1	Illustrate the series and parallel circuits using electrical circuit laws.	5	Circuit analysis	Lecture	Assignment and seminar and CIA	L3 Apply
18ELE13/	Explain the fundamentals of AC	5	AC	Lecture	Assignment	L3

23.2	using Analytical and Graphical method.		Fundamentals		and seminar and CIA	Apply
18ELE13/ 23.3	Illustrate the electrical loads using Analytical and Graphical method.	7	Single phase system	Lecture	Assignment and seminar and CIA	L3 Apply
18ELE13/ 23.4	Illustrate the 3 phase connection using Analytical and Graphical method.	5	Three phase system	Lecture /	Assignment and seminar and CIA	L3 Apply
18ELE13/ 23.5	Determine the efficiency of single phase transformer.	5	Performance of single phase transformer	Lecture	Assignment and seminar and CIA	L3 Apply
18ELE13/ 23.6	Discuss the concepts of electrical wiring System using hardware module.	5	Wiring and protective devices	Lecture & PPT	Assignment and seminar and CIA	L2 Understand
18ELE13/ 23.7	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
18ELE13/ 23.8	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
18ELE13/ 23.9	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
18ELE13/ 23.10	understand the principle of operation of three phase induction motors using hardware module.	8	Operation of three phase induction motor	Lecture & PPT	Assignment and seminar and CIA	L2 Understand
-	**Total**	56	-	-	-	-

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	CO2	L3
3	To analyses Single phase circuit	CO3	L3
4	To analyses Three phase circuit analysis	CO4	L3
5	For stepping up and stepping down power supply	CO5	L3
6	Electrical Wiring is used in Domestic , commercial buildings and protective devices to protect electrical circuits	CO6	L2
7	DC Power generation for small applications	CO7	L3
8	Fan, blowers, cranes, elevators traction systems	CO8	L2
9	To generate electricity	CO9	L2
10	Irrigation purpose	CO10	L2

Note: Write 1 or 2 applications per CO.

3. Articulation Matrix

(CO – PO MAPPING)

-	Course Outcomes	Program Outcomes												
#	COs	PO1	PO2	PO3	PO4	PO5	PO 6	PO7	PO 8	PO9	PO1 0	PO1 1	PO1 2	Level
18ELE13/23 .1	Analysis of series and parallel circuits using circuit laws associated with electrical system.	3	3											L3
18ELE13/23 .2	Analyze the fundamentals of AC using phasor representation and wave forms.	3	3											L3
18ELE13/23 .3	Analyze the electrical quantities of RLC and their combinational circuits using phasor diagram and wave forms.	3	3											L3
18ELE13/23 .4	Analyze the star and delta connections using phasor diagrams.	3	3											L3
18ELE13/23 .5	Determine the efficiency of single phase transformer.	3	3											L3
18ELE13/23 .6	Discuss concepts of electrical wiring, circuit protecting devices and earthing using hardware module.	3	3					1						L2
18ELE13/23 .7	Understand the principle of operation and construction of DC generators using constructional diagram.	3	3											L2
18ELE13/23 .8	understand the principle of operation and construction of DC motors using constructional diagrams and hardware module.	3	3											L2
18ELE13/23 .9	understand the principle of operation and construction of synchronous generator using constructional diagrams.	3	3											L2
18ELE13/23 .10	understand the principle of operation and construction of three phase induction motors using constructional diagrams and hardware module.	3	3											L2
Note: Mention the mapping strength as 1, 2, or 3														

4. Mapping Justification

Mapping		Justification	Mapping Level
CO	**PO**	**-**	**-**
CO1	PO1	Knowledge of series and parallel concepts and electrical laws are required to solve complex Electrical circuits.	L3
CO1	PO2	Students able to analyze complex Electrical circuits.	L3
CO2	PO1	Knowledge requires to identify AC component	L3
CO2	PO2	Students are capable to analyze the AC component.	L3
CO3	PO1	Knowledge requires to identify the different loads.	L3
CO3	PO2	Students are capable to analyze the parameters and behavior of	L3

		different loads.	
CO4	PO1	Knowledge requires to identify the different load connections.	L3
CO4	PO2	Students are capable to analyze the parameters of different connections.	L3
CO5	PO1	Students should have basic knowledge towards application of Transformers	L3
CO5	PO2	Students should identify the classification of transformer and their efficiency	L3
CO6	PO1	Knowledge requires in domestic wiring	L2
CO6	PO2	Students should identify different scheme of wiring installation and safety towards electric shocks.	L2
CO6	PO7	Analyze the selection of wiring scheme and protective devices to maintain a good environment.	L2
CO7	PO1	Students should have knowledge towards application of DC Generators	L3
CO7	PO2	Students should analyze the parameters of different DC generators.	L3
CO8	PO1	Students should have knowledge towards application of DC Motors.	L2
CO8	PO2	Students should analyze the parameters of different DC Motors.	L2
CO9	PO1	Students should have knowledge towards application of Synchronous Generator	L2
CO9	PO2	Students should analyze the performance of different Synchronous Generator	L2
CO10	PO1	Students should have knowledge towards application of Induction Motors	L2
CO10	PO2	Students should analyze the performance of different Induction Motors.	L2

Note: Write justification for each CO-PO mapping.

5. 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

6. Content Beyond Syllabus

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

Note: Anything not covered above is included here.

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,	L3

									CO2,	
2	Single Phase Circuits, Three Phase circuits	12	2	-	-	1	1	2	CO3, CO4	L3
3	Single Phase Transformers, Domestic Wiring	10	-	2	-	1	1	2	CO5, CO6	L2,L3
4	DC Generators, DC motors	11	-	2	-	1	1	2	CO7, C08	L2
5	Three Phase Synchronous Generators, Three Phase Induction Motors	13	-	-	4	1	1	2	CO9, CO10	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	40	CO1, CO2, CO3, CO4	l4
CIA Exam – 2	15	CO5, CO6, CO7, C08	L2, L3
CIA Exam – 3	15	CO9, CO10	L3
Assignment - 1	05	CO1, CO2, CO3, CO4	l4
Assignment - 2	05	CO5, CO6, CO7, C08	L2, L3
Assignment - 3	05	CO9, CO10	L3
Seminar - 1			
Seminar - 2			
Seminar - 3			
Other Activities – define – Slip test		CO1 to Co9	L2, L3, L4 . ..
Final CIA Marks	**20**	**-**	**-**

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.	CO2	L3, L4
b	***Course Schedule***	-	-
Class No	**Module Content Covered**	**CO**	**Level**
1	**D.C.Circuits:** Ohm's Law and Kirchhoff's Laws,	C01	L3
2	analysis of series, parallel and series- parallel circuits excited by independent voltage sources.	C01	L3
3	Power and Energy.	C01	L2
4	**A.C. Fundamentals**		
5	Generation of sinusoidal voltage	CO2	L2
6	frequency of generated voltage	CO2	L2
7	definition and numerical values of average value	CO2	L3
8	root mean square value	CO2	L3

9	form factor and peak factor of sinusoidally varying voltage and current	CO2	L3
10	phasor representation of alternating quantities.	CO2	L4
c	**Application Areas**	**CO**	**Level**
1	To analysis DC circuits	CO1	L3
2	To understand the AC quantities fundamentals	CO2	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.	CO2	L2
7	Explain average value, R.M.S. value,form factor, peak factor of a sinusoidal waveform.	CO2	L2
8	What is meant by phase angle between two alternating quantities?	CO2	L2
e	**Experiences**	-	-
1		CO1	L2

Module – 2

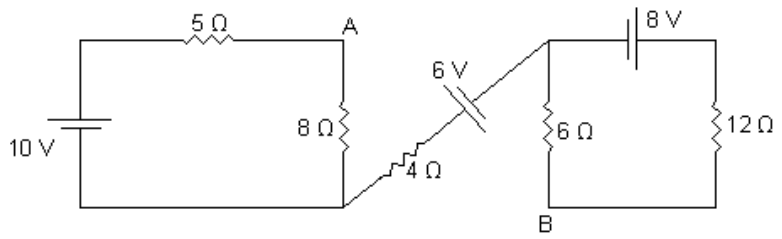
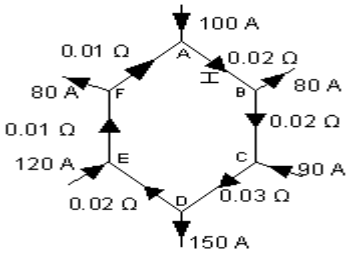
Title:	Divide and Conquer	Appr Time:	10 Hrs
a	***Course Outcomes***	-	**Blooms**
-	The student should be able to:	-	**Level**
1	Illustrate the electrical loads using Analytical and Graphical method.	CO3	L3
2	Illustrate the 3 phase connection using Analytical and Graphical method	CO4	L3
b	***Course Schedule***	-	-
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.	CO3	L3
3	Real power	CO3	L3
4	reactive power	CO3	L3
5	apparent power and power factor.	CO3	L3
6	**Three Phase circuits**		
7	Advantages of 3-phase power	CO4	L2
8	Generation of 3-phase power	CO4	L2
9	Three-phase balanced circuits	CO4	L2
10	voltage and current relations in star and delta connections.	CO4	L3
11	Measurement of three phase power using two wattmeter method.	CO4	L3
c	**Application Areas**	**CO**	**Level**
1	To analyses Single phase circuit	CO3	L2
2	To analyses Three phase circuit analysis	CO4	L2
d	**Review Questions**	-	
1	Show that the average power in an AC circuit is given by P =Vicosφ.	CO3	L2
2	What is meant by power factor in AC circuits? What is its significance?	CO3	L2
3	Distinguish between lagging and leading power factors in AC	CO3	L2

	circuits.		
4	Establish the relationship between voltage and current in a R-L-C series circuit. Draw the phasor diagram.	CO3	L2
5	Show that the average power consumed in a pure capacitance is zero.	CO3	L2
6	Show that in a three-phase star-connected system, the line voltage is √3 times the phase voltage.	CO3	L2
7	When do we say that the system of an ac three-phase voltage is balanced three-phase system?	CO3	L2
8	Derive an expression for power in a three-phase balanced circuit.	CO4	L3
9	List out the advantages of three-phase systems.	CO4	L3
10	With relevant diagrams show that two wattmeters are enough to measure three-phase power.	CO4	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.	CO2	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	CO2	L3	5
3	a	Obtain the relationship between line and phase values of voltage and current in a three balanced star connected scheme.	CO4	L4	7
	b	List the advantages of 3 phase system over single phase system.	CO4	L2	4
	c	Estimate the power factor in each of the following cases of two wattmeter method of measuring three phase power.	CO4	L3	4

		(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.			
		OR			
4	a	Show that in a three phase, balanced circuit, two wattmeters are sufficient to measure the total three phase power.	CO4	L4	7
	b	Compare Shell type and Core type transformer.	CO5	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.	CO5	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:	5 / 10	Time:	90 – 120 minutes
Course:	Basic Electrical Engineering						
Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.							

SNo	USN	Assignment Description	Marks	CO	Level
1	IKT18EE001	State and explain Kirchhoff's laws.	5	CO1	L2
2	IKT18EE001	State ohm's law. Mention its limitations.	5	CO1	L3
3	IKT18EE002	b. State and explain Kirchoff s current law and Kirchoff s voltage law.		CO3	L4
4	IKT18EE002	2 a. Define dynamically induced emf and statically induced emf with examples.	5	CO1	L2
5	IKT18EE003	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	CO4	L4
6	IKT18EE003	A circuit of two parallel resistors having resistance of 20ohm and 30ohm respectively, connected in series with 150ohm. 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	L2
7	IKT18EE004	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
8	IKT18EE004	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	CO3	L4
9	IKT18EE005	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	IKT18EE005	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	5	CO1	L2

		inductance, (ii) The emf induced, (iii) The energy stored when a current s reversed in 0.01 sec.			
11	IKT18EE006	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	IKT18EE006	Three similar coils each having resistance of 1Oohm 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	IKT18EE007	Mention the advantages of three phase system over single phase system.	5	CO1	L2
14	IKT18EE007		5	CO4	L4
15	IKT18EE008	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	IKT18EE008	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	IKT18EE009	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	CO2	L2
18	IKT18EE009	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	CO3	L2
19	IKT18EE010	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	CO3	L4
20	IKT18EE010	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	IKT18EE011	State and explain Kirchhoff's laws.	5	CO1	L2
22	IKT18EE011	State ohm's law. Mention its limitations.	5	CO1	L2
23	IKT18EE012	b. State and explain Kirchoff s current law and Kirchoff s voltage law.	5	CO1	L2
24	IKT18EE012	2 a. Define dynamically induced emf and statically induced emf with examples.	5	CO3	L2
25	IKT18EE013	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	IKT18EE013	A circuit of two parallel resistors having resistance of 20ohm and 30ohm respectively, connected in series with 150ohm. 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	L2
27	IKT18EE014	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	CO3	L2

28	IKT18EE014	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	IKT18EE015	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	IKT18EE015	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	CO3	L2
31	IKT18EE016	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	CO3	L2
32	IKT18EE016	Three similar coils each having resistance of 1Oohm 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	CO3	L2
33	IKT18EE017	Mention the advantages of three phase system over single phase system.	5	CO2	L4
34	IKT18EE017		5	CO1	L2
35	IKT18EE018	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	IKT18EE018	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	CO3	L2
37	IKT18EE019	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	CO3	L2
38	IKT18EE019	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	IKT18EE020	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	CO3	L2
40	IKT18EE020	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.	CO5	L3
2	Discuss the concepts of electrical wiring System using hardware module.	CO6	L2
b	***Course Schedule***		
Class No	**Module Content Covered**	**CO**	**Level**
1	**Single Phase Transformers**		
2	Necessity of transformer	CO5	L2
3	Principle of operation	CO5	L2
4	Types and construction of transformers.	CO5	L2
5	emf equation	CO5	L3
6	losses, variation of losses with respect to load	CO5	L3
7	efficiency, Condition for maximum efficiency.	CO5	L3
8	**Domestic Wiring**		
9	Service mains, meter board and distribution board.	CO6	L2
10	Brief discussion on concealed conduit wiring.	CO6	L2
11	Two-way and three-way control.	CO6	L2
12	Elementary discussion on circuit protective devices: Fuse and Miniature Circuit Breaker (MCB's)	CO6	L2
13	electric shock, precautions against shock.	CO6	L2
14	Earthing: Pipe and Plate earthing.	CO6	L2
c	**Application Areas**	**CO**	**Level**
1	For stepping up and stepping down power supply	CO5	L3
2	Electrical Wiring is used in Domestic , commercial buildings and protective devices to protect electrical circuits	CO6	L3
d	**Review Questions**		
1	Explain wit a neat sketch the construction of a core type single phase transformer.	CO5	L2
2	Explain wit a neat sketch the construction of a shell type single phase transformer.	CO5	L2
3	Explain why the core of a transformer is laminated?	CO5	L2
4	State why silicon steel is selected for the core of a transformer?	CO5	L4
5	Explain the principle of operation of a transformer.	CO5	L4
6	Derive the EMF equation of a transformer from fundamentals.	CO6	L4
7	What is domestic wiring?	CO6	L4
8	Give the wiring diagram for the two-way control of a lamp and explain.	CO6	L4
9	What is earthing? Why is it necessary? Explain its performance.	CO6	L4
10	What do you understand by electric shock? What are the causes of electric shock?	CO6	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	CO7	L2

	constructional diagram.		
2	understand the principle of operation of DC motors using hardware module.	CO8	L2
b	***Course Schedule***		
Class No	**Module Content Covered**	**CO**	**Level**
1	**DC Generators:**	CO7	L2
2	Principle of operation,	CO7	L2
3	Construction of D.C. Generators.	CO7	L2
4	Expression for induced emf	CO7	L2
5	Types of D.C. Generators,	CO7	L2
6	Relation between induced emf and terminal voltage.	CO7	L2
7	**DC motors:**		
8	Principle of operation	CO8	L2
9	Back emf	CO8	L2
10	Torque equation,	CO8	L2
11	Types of dc motors,	CO8	L2
12	Characteristics of dc motors (shunt and series motors only) and Applications.	CO8	L2
c	**Application Areas**	**CO**	**Level**
1	DC Power generation for small applications	CO8	L3
2	Fan, blowers, cranes, elevators traction systems	CO7	L3
d	**Review Questions**	-	-
1	Explain the principle of operation of DC generators.	CO7	L2
2	Explain the construction of DC genrator.	CO7	L2
3	With usual notations derive an expression for the induced EMF of a DC generator.	CO7	L2
4	What is back emf? Explain its significance.	CO8	L3
5	What are the various types of DC motors? Give their circuit representations.	CO8	L2
6	Explain the principle of operation of DC motors.	CO8	L2
7	Derive an expression for the torque developed by a DC motor.	CO8	L2
8	Draw and explain torque versus speed characteristics of a DC shunt and DC series motors.	CO8	L3
9	Draw and explain torque versus armature current characteristics of a DC shunt and DC series motors.	CO8	L2
10	Why is a starter needed for DC motors? Explain in brief.	CO8	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	CO5	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	CO5	L3
		OR			

2	a	With reasoning, for a transformer, show that The transformer can be considered as ideal.	5	CO5	L2
	b	Derive the condition for which the efficiency of a transformer is maximum.	10	CO5	L2
	c	Explain two way control of lamps with truth table and connection diagram.		CO6	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	CO8	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	CO8	L3
		OR			
4	a	Derive EMF equation of DC generator.	7	CO7	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	CO7	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	USN	Assignment Description	Marks	CO	Level
1	IKT18EE001	Derive EMF equation of transformer.	5	CO6	L2
2	IKT18EE001	Derive the condition for which the efficiency of a transformer is maximum	5	CO6	L3
3	IKT18EE002	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		CO6	L4
4	IKT18EE002	Explain two way control of lamps with truth table and connection diagram.	5	CO7	L3
5	IKT18EE003		5	CO6	L2
6	IKT18EE003	Derive EMF equation of DC generator.	5	CO5	L3
7	IKT18EE004	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?		CO6	L4
8	IKT18EE004	Sketch torque versus armature current and speed versus armature current characteristics of a D.C. shunt motor and mention its application	5	CO6	L3
9	IKT18EE005	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	CO5	L2
10	IKT18EE005	Derive EMF equation of transformer.	5	CO7	L3
11	IKT18EE006	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		CO7	L4

		efficiency at (i) 75% load 0.9 pf, (ii) 50% load 0.8 pf, (iii) 25% load 0.6 pf			
12	IKT18EE006	With reasoning, for a transformer, show that The transformer can be considered as ideal.	5	CO5	L3
13	IKT18EE007	Derive the condition for which the efficiency of a transformer is maximum.	5	CO5	L2
14	IKT18EE007	Explain two way control of lamps with truth table and connection diagram.	5	CO5	L3
15	IKT18EE008	Sketch torque versus armature current and speed versus armature current characteristics of a D.C. shunt motor and mention its applications.		CO6	L4
16	IKT18EE008	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	CO6	L3
17	IKT18EE009	Derive EMF equation of DC generator.	5	CO6	L2
18	IKT18EE009	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	CO6	L3
19	IKT18EE010	With reasoning, for a transformer, show that The transformer can be considered as ideal.		CO6	L4
20	IKT18EE010	Derive EMF equation of transformer.	5	CO6	L3
21	IKT18EE011	Derive the condition for which the efficiency of a transformer is maximum	5	CO6	L2
22	IKT18EE011	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	CO7	L3
23	IKT18EE012	Explain two way control of lamps with truth table and connection diagram.		CO7	L4
24	IKT18EE012		5	CO6	L3
25	IKT18EE013	Derive EMF equation of DC generator.	5	CO5	L2
26	IKT18EE013	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	CO6	L3
27	IKT18EE014	Sketch torque versus armature current and speed versus armature current characteristics of a D.C. shunt motor and mention its application		CO5	L4
28	IKT18EE014	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	CO7	L3
29	IKT18EE015	Derive EMF equation of transformer.	5	CO7	L3
30	IKT18EE015	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	CO7	L2
31	IKT18EE016	With reasoning, for a transformer, show that The transformer can be considered as ideal.		CO7	L3

32	IKT18EE016	Derive the condition for which the efficiency of a transformer is maximum.	5	CO7	L4
33	IKT18EE017	Explain two way control of lamps with truth table and connection diagram.	5	CO7	L3
34	IKT18EE017	Sketch torque versus armature current and speed versus armature current characteristics of a D.C. shunt motor and mention its applications.	5	CO7	L2
35	IKT18EE018	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.		CO8	L3
36	IKT18EE018	Derive EMF equation of DC generator.	5	CO7	L4
37	IKT18EE019	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	CO7	L3
38	IKT18EE019	With reasoning, for a transformer, show that The transformer can be considered as ideal.	5	CO6	L2
39	IKT18EE020	Derive the condition for which the efficiency of a transformer is maximum.		CO7	L3
40	IKT18EE020	Explain two way control of lamps with truth table and connection diagram.	5	CO5	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.	CO9	L2
2	understand the principle of operation of three phase induction motors using hardware module.	CO10	L2
b	***Course Schedule***		
Class No	**Module Content Covered**	**CO**	**Level**
1	**Three Phase Synchronous Generators:**	CO9	L2
2	Principle of operation	CO9	L2
3	Constructional details	CO9	L2
4	Synchronous speed	CO9	L2
5	Frequency of generated voltage	CO9	L2
6	emf equation	CO9	L2
7	Concept of winding factor (excluding the derivation and calculation of distribution and pitch factors).	CO9	L2
8	**Three Phase Induction Motors:**	CO10	L2
9	Principle of operation	CO10	L2
10	Generation of rotating magnetic field	CO10	L2
11	Construction and working of three-phase induction motor	CO10	L2
12	Slip and its significance.	CO10	L2
13	Necessity of starter	CO10	L2
14	star-delta starter.	CO10	L2

c	**Application Areas**	**CO**	**Level**
1	To generate electricity	CO9	L2
2	Irrigation purpose	CO10	L2
d	**Review Questions**	-	-
1	Explain the constructional features of a salient pole alternators.	CO9	L2
2	Distinguish between salient and non-salient pole alternators.	CO9	L2
3	Starting from basic principles, develop an expression for the emf induced in an alternator.	CO9	L2
4	Explain the constructional features of a non-salient pole alternators.	CO9	L2
5	Explain the construction of squirrel cage induction motor.	CO10	L2
6	Explain the difference in squirrel cage and phase wound induction motor.	CO10	L2
7	Explain the principle of operation of an induction motor.	CO10	L2
8	Why induction motor require a starter?	CO10	L2
9	What is slip in an induction motor? Explain why slip is never zero in an induction motor?	CO10	L2
10	Explain the construction of phase wound induction motor.	CO10	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	CO9	L2
	b	Define slip. Derive an expression for frequency of rotor current.	10	CO10	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	CO9	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	CO10	L3
3	a	Show that a three phase winding when excited by a three phase supply establishes a rotating magnetic field.	5	CO9	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	CO10	L3
		OR			
4	a	With neat sketches, explain the construction of salient pole alternator	7	CO9	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	CO10	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	USN	Assignment Description	Marks	CO	Level
1	IKT18EE001	Show that a three phase winding when excited by a three phase supply establishes a rotating magnetic field.	5	CO9	L2
2	IKT18EE001	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	CO9	L3
3	IKT18EE002	With neat sketches, explain the construction of salient pole alternator.		CO9	L2
4	IKT18EE002	Define slip. Derive an expression for frequency of rotor current.	5	CO10	L3
5	IKT18EE003	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	CO9	L2
6	IKT18EE003	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	CO9	L2
7	IKT18EE004	Show that a three phase winding when excited by a three phase supply establishes a rotating magnetic field.	5	CO9	L2
8	IKT18EE004	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	CO9	L2
9	IKT18EE005	With neat sketches, explain the construction of salient pole alternator	5	CO9	L2
10	IKT18EE005	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	CO9	L2
11	IKT18EE006	Show that a three phase winding when excited by a three phase supply establishes a rotating magnetic field.	5	CO10	L3
12	IKT18EE006	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	CO9	L2
13	IKT18EE007	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	CO9	L2

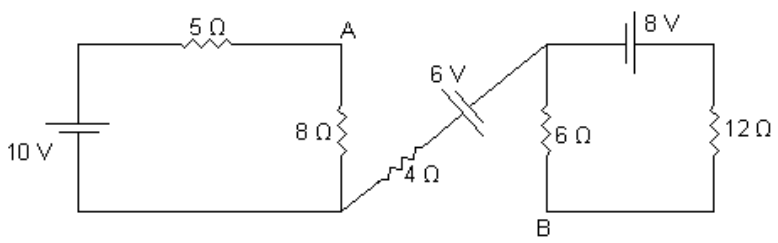
14	IKT18EE007	With neat sketches, explain the construction of salient pole alternator	5	CO9	L2
15	IKT18EE008	Discuss the variation in rotor emf frequency of three phase induction motor as the load changes. Derive any formula used to substantiate the variation.	5	CO9	L2
16	IKT18EE008	If a 6 pole induction 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	CO9	L2
17	IKT18EE009	With neat sketches, explain the construction of salient pole alternator.	5	CO10	L3
18	IKT18EE009	Define slip. Derive an expression for frequency of rotor current.	5	CO9	L2
19	IKT18EE010	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	CO10	L3
20	IKT18EE010	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	CO9	L2
21	IKT18EE011	Show that a three phase winding when excited by a three phase supply establishes a rotating magnetic field.	5	CO10	L3
22	IKT18EE011	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	CO9	L2
23	IKT18EE012	With neat sketches, explain the construction of salient pole alternator.	5	CO9	L2
24	IKT18EE012	Define slip. Derive an expression for frequency of rotor current.	5	CO9	L2
25	IKT18EE013	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	CO9	L2
26	IKT18EE013	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	CO9	L2
27	IKT18EE014	Show that a three phase winding when excited by a three phase supply establishes a rotating magnetic field.	5	CO9	L2
28	IKT18EE014	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	CO9	L2
29	IKT18EE015	With neat sketches, explain the construction of salient pole alternator	5	CO9	L2
30	IKT18EE015	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	CO9	L2
31	IKT18EE016	Show that a three phase winding when excited by a three	5	CO9	L2

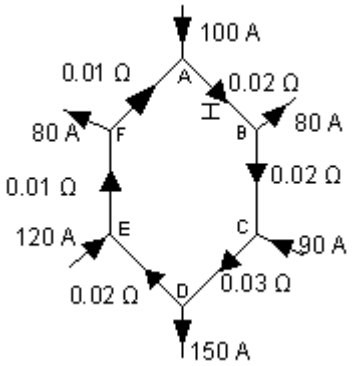
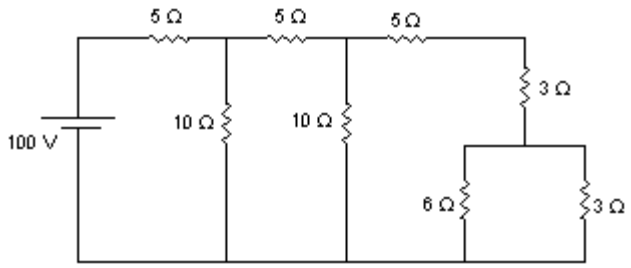
		phase supply establishes a rotating magnetic field.			
32	IKT18EE016	A 6 pole alternator runs at 1000 rpm, and supplies power to a 4 pole, 3 phase induction motor. The frequency of rotor of induction motor is 2 Hz. Determine the slip and speed of the motor. Also, determine the slip at no load of the induction motor, if the difference between the synchronous speed and no load speed is 10 rpm.	5	CO9	L2
33	IKT18EE017	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	CO9	L2
34	IKT18EE017	With neat sketches, explain the construction of salient pole alternator	5	CO9	L2
35	IKT18EE018	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	CO9	L2
36	IKT18EE018	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	IKT18EE019	With neat sketches, explain the construction of salient pole alternator.	5	CO9	L2
38	IKT18EE019	Define slip. Derive an expression for frequency of rotor current.	5	CO10	L3
39	IKT18EE020	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	CO9	L2
40	IKT18EE020	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	CO9	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	CO2	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	CO2	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	CO2	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	CO3	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	CO3	L3
		OR			
-	a	Mention the advantages of three phase system over single phase system.	5	CO3	
	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	CO4	L3
3	a	Derive EMF equation of transformer.	7	CO5	
	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	CO5	
	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	CO7	
	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	CO7	
	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	CO8	L3
5	a	Show that a three phase winding when excited by a three phase supply establishes a rotating magnetic field.	8	CO9	
	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.	5	CO10	L3
	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	CO9	
	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	CO2	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	5	CO1	2017

		induced, (iii) The energy stored when a current s reversed in 0.01 sec.			
	5	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	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	CO3	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	CO4	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	CO3	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	CO3	2017
				CO4	2017
3	1	Derive EMF equation of transformer.	5	CO5	2017
	2	Derive the condition for which the efficiency of a transformer is maximum	7	CO5	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	CO5	2017
	4	Explain two way control of lamps with truth table and connection diagram.	5	CO6	2017
					2017
4	1	Derive EMF equation of DC generator.	5	CO7	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	CO7	2017
	3	Sketch torque versus armature current and speed versus armature current characteristics of a D.C. shunt motor and mention its application	7	CO8	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	CO8	2017
					2017
5	1	With neat sketches, explain the construction of salient pole alternator.	5	CO9	2017
	2	Define slip. Derive an expression for frequency of rotor current.	5	CO10	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	CO9	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	CO10	2017

. Content to Course Outcomes

1. TLPA Parameters

Table 1: TLPA – Example Course

Module-#	Course Content or Syllabus (Split module content into 2 parts which have similar concepts)	Content Teaching Hours	Blooms' Learning Levels for Content	Final Blooms' Level	Identified Action Verbs for Learning	Instruction Methods for Learning	Assessment Methods to Measure Learning
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*
1	Ohm's Law and Kirchhoff's Laws, analysis of series, parallel and series- parallel circuits excited by independent voltage sources. Power and Energy.	5	L2 L3	L3	Apply	Lecture	Assignment and seminar and CIA
1	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.	5	L2 L3	L3	Apply	Lecture	Assignment and seminar and CIA
2	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.	7	L2 L3	L3	Apply	Lecture	Assignment and seminar and CIA
2	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.	5	L2 L3	L3	Apply	Lecture	Assignment and seminar and CIA
3	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.	5	L2 L3	L3	Apply	Lecture	Assignment and seminar and CIA
3	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.	5	L2	L2	Understand	Lecture & PPT	Assignment and seminar and CIA
4	Principle of operation, Construction of D.C. Generators. Expression for induced emf,Types of D.C. Generators,Relation between induced emf and terminal voltage.	6	L2	L2	Understand	Lecture & PPT	Assignment and seminar and CIA
4	Principle of operation,Back emf,Torque equation, Types of dc motors, Characteristics of dc motors (shunt and series motors only) and Applications.	5	L2	L2	Understand	Lecture & PPT	Assignment and seminar and CIA
5	Principle of operation, Constructional	5	L2			Lecture	Assignment

	details, Synchronous speed, Frequency of generated voltage, emf equation, Concept of winding factor (excluding the derivation and calculation of distribution and pitch factors).			L2	Understand	& PPT	and seminar and CIA
5	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.	8	L2	L2	Understand	Lecture & PPT	Assignment and seminar and CIA

2. Concepts and Outcomes:

Table 2: Concept to Outcome – Example Course

Module-#	Learning or Outcome from study of the Content or Syllabus	Identified Concepts from Content	Final Concept	Concept Justification (What all Learning Happened from the study of Content / Syllabus. A short word for learning or outcome)	CO Components (1.Action Verb, 2.Knowledge, 3.Condition / Methodology, 4.Benchmark)	Course Outcome **Student Should be able to ...**
A	*I*	*J*	*K*	*L*	*M*	*N*
1	Ohm's law, KVL and KCL laws. Series and parallel circuits. Current and voltage source. Voltage and current division.	Electrical Laws. Electrical Circuits.	Circuit Analysis	Voltage and Current in the circuits	- Illustrate - series and parallel circuits - electrical circuit laws.	Illustrate the series and parallel circuits using electrical circuit laws.
1	Generation of single phase voltage. Definitions. AC Waveform Phasor diagram	Numerical analysis of AC signals AC Fundamentals	AC Fundamentals	Generation of AC and its Representation	- Explain - fundamentals of AC - Analytical and Graphical method.	Explain the fundamentals of AC using Analytical and Graphical method.
2	Behavior of series and parallel circuits of R,L, C and their combinations. active, reactive and apparent power	AC loads. RLC. Power triangle. Single phase System	Single phase System	Function of RLC in electrical circuits.	- Illustrate - electrical loads - Analytical and Graphical method.	Illustrate the electrical loads using Analytical and Graphical method.

2	Generation of 3 phase voltage. Advantages of 3 phase. Connections in 3 phase circuits. Measurement of 3 phase power.	Three phase System	Three phase System	Generation and its connections.	- Illustrate - 3 phase connection - Analytical and Graphical method.	Illustrate the 3 phase connection using Analytical and Graphical method.
3	Working principle of transformer. Types of transformer. Losses and Efficiency of transformer.	Performance of single phase transformer	Performance of single phase transformer	Efficiency of single phase transformer	- Determine - Efficiency of single phase transformer	Determine the efficiency of single phase transformer.
3	Electrical wiring installation. Types of wiring. Two way and three way. Protective devices. Electrical shocks and their precautions.	Wiring and protective devices Electrical wiring System	Electrical wiring System	Wiring and protective devices	- Design - concepts of electrical wiring System - hardware module.	Discuss the concepts of electrical wiring System using hardware module.
4	Construction of DC generator. Working principle. Types of DC generators.	Operation of DC generator	Operation of DC generator	Construction and working of DC Generator.	- Understand - principle of operation of DC generators - constructional diagram	Understand the principle of operation of DC generators using constructional diagram.
4	Construction of DC motor. Working principle. Types of DC motor. Back EMF and their significance. Characteristics.	Operation of DC Motor. Characteristics of DC motor.	Characteristics of DC motors	Construction and working of DC Motor.	- understand - principle of operation of DC motors - hardware module	understand the principle of operation of DC motors using hardware module.
5	Construction. Working principle. Comparison of Rotors. Winding	Operation of 3 phase synchronous generator.	Operation of three phase synchronous generator	Construction and working of 3 phase Alternator.	- understand - principle of operation of Alternator - constructional diagrams	understand the principle of operation of Alternator using constructional diagrams.

	factor, Synchronous Speed					
5	Operation of 3 Phase IM. Concept of RMF. Different types of rotor. Staters.	Operation of three phase induction motor.	Operation of three phase induction motor	Construction and working of 3 phase Induction Motor.	- understand - principle of operation of three phase induction motors - hardware module	understand the principle of operation of three phase induction motors using hardware module.