

< Sri Krishna Institute of Technology, Bengaluru>



COURSE PLAN

Academic Year 2019-2020

Program:	B E – Electrical & Electronics Engineering
Semester :	2 nd
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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Checked by



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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

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Copyright ©2017. CAAS. All rights reserved. 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

Mod	Module Content	Teaching	Module	Blooms
ule		Hours	Concepts	Level
	D.C.Circuits: Ohm's Law and Kirchhoff's Laws, analysis of series,		1.circuit	L3
-	parallel and series- parallel	(5,5)	analysis	Apply
	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		2. AC	L3
	value, root mean square value, form factor and peak factor of		Fundamentals	Apply
	sinusoidally varying voltage and current, phasor representation of			
2	alternating quantities.	12	1.Single phase	
	Single Phase Circuits: Analysis, with phasor diagram, of circuits		System	L3
	with R, L, C, R-L, RC, R-L-C for series and parallel configurations.	(7,5)	System	Apply
	Real power, reactive power, apparent power and power factor.			
	Three Phase circuits: Advantages of 3-phase power, Generation of		2.Three phase	è
	3-phase power, Three-phase balanced circuits, voltage and current relations in star and delta connections. Measurement of		System	
				L3
3	three phase power using two wattmeter method.	10	1.Performance	Apply
3	Single Phase Transformers: Necessity of transformer, Principle of operation, Types and construction of transformers. emf equation,		of single phase	
	losses, variation of losses with respect to load, efficiency,		transformer	L3
	Condition for maximum efficiency.			Apply
	Domestic Wiring: Service mains, meter board and distribution			
	board. Brief discussion on concealed conduit wiring. Two-way and		2.Electrical	
	three-way control. Elementary discussion on circuit		wiring System	
				L2 Underst
	1			and
	(MCB's),electric shock, precautions against shock. Earthing: Pipe			and
4	and Plate earthing. DC Generators: Principle of operation, Construction of D.C.	11	1. Operation of	L2
4		(C =)	DC generator	Underst
	Generators. Expression for induced emf, Types of D.C. Generators, Relation between induced emf and terminal voltage.			and
	DC motors: Principle of operation,Back emf,Torque equation,		2.Characteristic	
	Types of dc motors, Characteristics of dc motors (shunt and series		s of DC motor	L2
				Underst
	motors only) and Applications.			and
5	Three Phase Synchronous Generators: Principle of operation,	(0)	1. Operation of	L2 Underst
	Constructional details, Synchronous speed, Frequency of	(5,0)	three phase synchronous	and
			Synchionous	anu

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generated voltage, emf equation, Concept c	f winding factor	generator	
(excluding the derivation and calculation of dist	ibution and pitch		L2
factors).	-	2. Operation of	
Three Phase Induction Motors: Principle of oper	ation, Generation	three phase induction	and
of rotating magnetic field, Construction and v	vorking of three-	motor	
phase induction motor, Slip and its significan	ce. Necessity of		
starter, star-delta starter.	-		

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

<u>3. Research: Recent developments on the concepts – publications in journals; conferences etc.</u>

Mod	Details	Available
ule		Available
	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	
а	1 Fundamentals of Electrical Engineering and Electronics B. L. Theraja S. Chand & Company Ltd, Reprint Edition 2013.	In Lib,In dept
	2 Electrical Technology E. Hughes International Students 9 th Edition, Pearson, 2005	In Lib
	3 Basic Electrical Engineering D. P. Kothari and I. J. Nagrath Tata McGraw Hill, 2017.	
	Concept Videos or Simulation for Understanding	
C1	D.C.Circuits	
	https://www.youtube.com/watch?	
	v=Vd2UJilPbag&list=PL9RcWoqXmzaLTYUdnzKhF4bYug3GjGcEc	
	https://www.youtube.com/watch?	
	v=FjaJEo7knF4&list=PL9RcWogXmzaLTYUdnzKhF4bYug3GjGcEc&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=UzrisWhvjVo	
	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?	
	<u>v=NDcCuvc8NLU&list=PL4K9r9dYCOooO5s49HTN7Tavmg5q_Ufqn&index=</u>	
	4	

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	v=WmTqTLv3uvY&list=PL4K9r9dYCOooO5s49HTN7Tavmg5q_Ufqn&index=	
	<u>6</u>	
C4		
	https://www.youtube.com/watch?	
	v=mx3J9wdbJ30&list=PL4K9r9dYCOopvPWp1qKmuhxLtwGh-8XLN	
	https://www.youtube.com/watch?	
	<u>v=xuIADOoLJfM&list=PL4K9r9dYCOopvPWp1qKmuhxLtwGh-</u> 8XLN&index=2	
	https://www.youtube.com/watch?	
	v=BqetOHEhAGE&list=PL4K9r9dYCOopvPWp1qKmuhxLtwGh-	
	8XLN&index=4	
	https://www.youtube.com/watch?	
	<u>v=6jvmjYXvCl4&list=PL4KgrgdYCOopvPWp1qKmuhxLtwGh-</u>	
	8XLN&index=6	
	https://www.youtube.com/watch?v=eolT3AqXy6E	
05	Domestic Wiring	
	https://www.youtube.com/watch?v=Tvh40MFlhCo	
	https://www.youtube.com/watch?v=aITb42_NeFA https://www.youtube.com/watch?v=G6edCysCxeA	
C2	DC Generators	
	https://www.youtube.com/watch?v=ol-OgFCDgmg	
	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	
<u> </u>	https://www.youtube.com/watch?v=ASnDSEeWADk	
02	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=XzTncl60Vus	
	https://www.youtube.com/watch?v=AhxMrUo806Y	
D	Software Tools for Design	
-	De seut Develou monte fou Desseuch	
E	Recent Developments for Research	
F	Others (Web, Video, Simulation, Notes etc.)	
	https://lecturenotes.in/subject/6/basic-electrical-engineering-bee	
2	https://nptel.ac.in/downloads/108105053/	
<u> </u>	https://https://https//	

4. Course Prerequisites

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

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B. OBE PARAMETERS

1. Course Outcomes

Modules		Course Outcome At the end of the course, student should be able to	Teac h. Hours		Instr Method	Assessmen t Method	Blooms' Level
1	18ELE13 /23.1	Illustrate the series and parallel circuits using electrical circuit laws.	5	Circuit analysis	Lecture	Assignmen t and seminar and CIA	L3 Apply
1	18ELE13 /23.1	Explain the fundamentals of AC using Analytical and Graphical method.	1	AC Fundament als	Lecture	Assignmen t and seminar and CIA	L3 Apply
2	18ELE13 /23.1	Illustrate the electrical loads using Analytical and Graphical method.	7	Single phase system	Lecture	Assignmen t and seminar and CIA	L3 Apply
2	18ELE13 /23.1	Illustrate the 3 phase connection using Analytical and Graphical method.	1	Three phase system	Lecture /	Assignmen t and seminar and CIA	L3 Apply
3	100.1	Determine the efficiency of single phase transformer.	5	Performanc e of single phase transformer	Lecture	Assignmen t and seminar and CIA	L3 Apply
3	1	Discuss the concepts of electrical wiring System using hardware module.		Wiring and protective devices	Lecture & PPT	Assignmen t and seminar and CIA	L2 Understand
4		Understand the principle of operation of DC generators using constructional diagram.		Operation of DC generator	Lecture & PPT	Assignmen t and seminar and CIA	L3 Apply
4	18ELE13 /23.3	understand the principle of operation of DC motors using hardware module.		Characterist ics of DC motors	Lecture & PPT	Assignmen t and seminar and CIA	L2 Understand
5	18ELE13 /23.2	understand the principle of operation of Alternator using constructional diagrams.		Operation of three phase synchronou s generator	Lecture & PPT	Assignmen t and seminar and CIA	Understand
5		understand the principle of operation of three phase induction		Operation of three	Lecture & PPT	Assignmen t and	L2 Understand

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	motors	s using hardware module.	sing hardware module. phase						

-	Total	56	-	-	-	L2-L3
			motor		CIA	
			induction		and	
1	notors using naroware module.		priase		Serrinai	

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
	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
1	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
Noto	V/rite 1 or 2 applications par CO		

Note: Write 1 or 2 applications per CO.

3. Articulation Matrix

(CO – PO MAPPING)

-	-	Course Outcomes					Pro	ogr	am	Ου	itco	pme	s	_			_	
Mod ules	CO Num ber	At the end of the course student should be able to	PO1	PO 2	PO 3		PO 5		PO 7	PO 8						PS O2	PSO3	Lev el
	18EL E23.1	Analyze A.C and DC circuits.	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-	L3
4,5	E23.	Explain the principle of operation and construction of AC and DC Generator and its Performance.		3	-	-	-	-	-	-	-	-	-	-	2	-	-	L3
4,5	E23.	Explain the principle of operation and construction of AC and DC Motor and its Performance.	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-	L3
3	E23.	Explain the construction and working of single phase transformer.	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-	L3
3	E23.	Understand the concepts of electrical wiring, circuit protecting devices and earthing.	2	2	-	-	-	-	1	-	-	-	-	-	1	-	-	L2
	ELE2 3PC	Average attainment (1, 2, or 3)																-
	PO, 1.Engineering Knowledge; 2.Problem Analysis; 3.Design / Development of Solutions; 4.Conduct PSO 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																	

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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 a	lso.						
Under	Understanding symbols required in substation installation								
Analys	Analysis of single line diagram of substation								

C. COURSE ASSESSMENT

1. Course Coverage

Mod	Title	Teaching			f quest		Exam		CO	Levels
ule		Hours	CIA-1	CIA-2	CIA-3	Asg	Extra	SEE		
#							Asg			
1	D.C.Circuits, A.C. Fundamentals	10	2	-	-	1	1	2	CO1,	L3
									CO1,	
2	Single Phase Circuits, Three Phase	12	2	-	-	1	1	2	CO1,	L3
	circuits								CO1	
3	Single Phase Transformers,	10	-	2	-	1	1	2	CO4,	L2,L3
	Domestic Wiring								CO5	
4	DC Generators, DC motors	11	-	2	-	1	1	2	CO2,	L2
									C08	
5	Three Phase Synchronous		-	-	4	1	1	2	CO2,	L2
	Generators, Three Phase Induction								CO3	
	Motors									
-	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	СО	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 –		CO1 to CO4	L2, L3
Slip test			
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

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	Title. Course plan	raye. y	7 20
pyright ©2 –	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	-	-
lass N	o Module Content Covered	СО	Level
1	D.C.Circuits: Ohm's Law and Kirchhoff's Laws,	C01	L3
2	analysis of series, parallel and series- parallel	C01	L3
	circuits excited by independent voltage sources.		
3	Power and Energy.	C01	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
с	Application Areas	со	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
е	Experiences	-	-
1		CO1	L2

Module – 2

Title:	Divide and Conquer	Appr	10 Hrs
		Time:	
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	CO1	L3
	series and parallel configurations.		
3	Real power	CO1	L3
4	reactive power	CO1	L3
5	apparent power and power factor.	CO1	L3

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6 T	hree Phase ci	rcuits			

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
с	Application Areas	СО	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 =Vicos ϕ .	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	CO1	L2
	circuit. Draw the phasor diagram.		
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 $\sqrt{3}$	CO1	L2
	times the phase voltage.		
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
е	Experiences	_	_
1		CO1	L2

E1. CIA EXAM – 1

a. Model Question Paper - 1

Crs	Code	18ELE13/2Sem: 1/2 Marks: 15 Time: 75	minutes	ninutes		
Cou	rse:	Basic Electrical Engineering				
-	-	Note: Answer any 3 questions, each carry equal marks.	Marks	CO	Level	
1	а	State Ohm's law and its limitations.	CO1	L2	5	
	b	Find the potential difference between the points A & B.	CO1	L3		
					5	
	С	State and explain the Kirchhoff's laws.	CO1	L2	5	
		OR				
2	а	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	

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		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		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
	С	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		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
		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.

			Igninent to be		Assignmer		ons				
Crs C	ode:	18ELE13 /23	Sem:	1/2	Marks:	10	Time:	90 - 120) – 120 minutes		
Cours	se:	Basic El	lectrical Engine	eering			·				
Note:	Each	student	to answer 2-3	assignmen	its. Each as	signmen	t carries equal m	ark.			
SNo				Assig	nment Des	scription		Marks	СО	Level	
1			State and exp	lain Kirchho	off's laws.			5	CO1	L2	
2			State ohm's la	w. Mention	its limitation	ons.		5	CO1	L3	
3	b. State and explain Kirchoff s current law and Kirchoff s voltage law.				S	CO1	L4				
4	2 a. Define dynamically induced emf and statically induced emf with examples.				ed 5	CO1	L2				
5					5 a	CO1	L4				
6	A circuit of two parallel resistors having resistance of 200hm and 300hm respectively, connected in series with 1500hm. It the current through 150hm resistor is 3.A., find (i) current in 200hm and 300hm resistors, (ii) voltage across whole circuit (iii			lf in	CO1	L2					
7	The total power and power consumed in all resistors.Two coils, X of 12000 turns and Y f 15000 turns, lie in parallel5planes so that 45% of the flux produced by coil X links coil Y. A5current of 5 A in X produces 0.05Wb while the same current in5					CO1	L2				

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	Y pro the produ	oduces 0.075Wb. Calculate (a) the mutual inductance, (b) coupling coefficient, and (c) the percentage of flux uced by coil Y and linking with coil X.			
8	that t other Whe throu mutu curre	toroidal solenoids are wound around the same form so the magnetic field of one passes through the turns of the r. Solenoid 1 has 700 turns and solenoid 2 has 400 turns. In the current in solenoid 1 is 6.52 A, the average flux ligh each turn of solenoid 2 is 0.0320 Wb. (a) What is the lial inductance of the pair of solenoids? (b) When the ent in solenoid 2 is 2.54 A, what is the average flux through turn of solenoid 1.	5	CO1	L4
9	a res acros powe	V battery with an internal resistance of 5 Ω is connected to istor of x ohms. If an additional 6 Ω resistor is connected as the battery, find the value of x so that the external er supplied by the battery remains the same.	5	CO1	L2
10	gives induc curre	il consists of 600 turns and a current of 10 A in the coil is rise to a magnetic flux of I mWb. Calculate: (i) self ctance, (ii) The emf induced, (iii) The energy stored when a ent s reversed in 0.01 sec.	5	CO1	L2
11	that t powe	the help of a circuit diagram and vector diagram, show two wattmeters are sufficient to measure total power and er factor in a balanced three phase circuit.	5	CO1	L2
12	react phase	e similar coils each having resistance of 100hm and ance of 80hm are connected in star, across 400 V, 3 e supply. Determine (i) line current, (ii) total power, (iii) ng of each of two wattmeter connected to measure er.	5	CO1	L2
13		ion the advantages of three phase system over single e system.	5	CO1	L2
14			5	CO1	L4
15	secti Find limits unifo	cuit has 1000 turns enclosing a magnetic circuit 20cm ² in on, with 4A the flux density is 1.0T and with 9A it is 1.4T. the mean value of the inductance between these current and the induced electromotive force if the current fell rmly from9A to 4A in 0.05sec. Also determine the energy d at the end of0.05sec.	5	CO1	L2
16	A thr delta A at	ee phase load of three equal impedances connected in across a balanced 400V supply, takes a line current of 10 a power factor of0.7 lagging. Calculate: i) the phase ent, ii) the total power, iii) the total reactive volt amperes.	5	CO1	L2
17	that t	the help of a circuit diagram and vector diagram, show two wattmeters are sufficient to measure total power and er factor in a balanced three phase circuit.	5	CO1	L2
18	delta A at curre	ee phase load of three equal impedances connected in across a balanced 400V supply, takes a line current of 10 a power factor of 0.7 lagging. Calculate:i) the phase ent, ii) the total power, iii) the total reactive volt amperes.	5	CO1	L2
19	curre circu	ternating voltage (80+j60)V is applied to a circuit and the ent flowing is (-4+jlO)A. Find: (i) the impedance of the it, (ii) the phase angle, (iii) power consumed.	5	CO1	L4
20	conn is pov	/o impedances $z_1 = (10 + j15)$ ohm and $Z_2 = (6 - j8)$ ohm are ected in parallel. If the total current supplied is 15A, what wer taken by each branch?	5	CO1	L2
21		and explain Kirchhoff's laws.	5	CO1	L2
22		ohm's law. Mention its limitations.	5	CO1	L2
23		ate and explain Kirchoff s current law and Kirchoff s ge law.	5	CO1	L2

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24		2 a. [Define dynamically induced emf and statically induced	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 200hm and 300hm respectively, connected in series with 1500hm. If the current through 150hm resistor is 3.A., find (i) current in 200hm and 300hm 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 100hm and reactance of 80hm 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

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

D2. TEACHING PLAN - 2

Module – 3

Title:	Divide and Conquer	Appr	16 Hrs
		Time:	
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
с	Application Areas	со	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

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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	CO5	L4
	electric shock?		
е	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	СО	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
С	Application Areas	со	Level
1	DC Power generation for small applications	CO3	Level L3
2	Fan, blowers, cranes, elevators traction systems	CO3	L3 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

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shunt and DC series motors.							
10	V/lev is a starte	r readed for DC reators? Evaluin in brief	<u> </u>				

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

E2. CIA EXAM – 2

a. Model Question Paper - 2

Crs Code		e: 18ELE13/Sem: 1/2 Marks: 30 Time: 75 r 23					75 minute	S			
Cour			trical Engine	ering			1				
-	-		wer any 2 qu		h carry equ	al marks.		Marks	СО	Level	
1			equation of	6	CO4	L2					
		500/1000	he maximum efficiency at full load and Upf of a single phase, 25 kV A, 00/1000 V, 50 Hz transformer is 98%. Determine the efficiency at (i) 75% bad 0.9 pf, (ii) 50% load 0.8 pf, (iii) 25% load 0.6 pf								
			OR								
2	-		With reasoning, for a transformer, show that The transformer can be considered as ideal.								
	b	Derive the	m. 10	CO4	L2						
		Explain tw diagram.	on	CO5	L2						
3			rque versus aracteristics o						CO3	L2	
	-	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	
					OR						
4	а	Derive EM	equation of	DC general	tor.			7	CO2	L2	
	-	flux per p connected	D.C. generation bole of 0.068 and runs at n to produce	5 Wb. Wha 1000 rpm? '	it will be e What must	emf_generat be the spee	ed if it is l d at which if	ар	CO2	L3	

b. Assignment – 2

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

				Model /	Assignment	Questions				
Crs C	ode:	ode: 18ELE13/Sem: 1/2 Marks: 10 Time: 9					90 - 120	90 – 120 minutes		
		23								
Cours	se:	Basic Ele	ctrical Engin	eering						
Note:	Each	student to	o answer 2-3	assignmen	ts. Each ass	ignment car	ries equal m	ark.		
SNo	No Assignment Description								СО	Level
1	Derive EMF equation of transformer.						5	CO5	L2	
2		Derive the condition for which the efficiency of a transformer is maximum						er 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 an connection diagram.							nd 5	CO2	L3

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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

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Copyrigh	t ©2017. cA	n	gener nust	rated if it is lap connected and runs at 1000 rpm? What be the speed at which it is to be driven to produce the emf if it is wave connected?			
27		a	armat	ch torque versus armature current and speed versus ture current characteristics of a D.C. shunt motor and ion its application		CO4	L4
28		A C W O S	A 20 condu vindii ohm.	00V, 4 pole, lap wound DC shunt motor has 800 uctors on its armature. The resistance of the armature ng is 0.5 ohm and that of the shunt field winding is 200 The motor takes 21A and flux/pole is 30 mWb. Find d and gross torque developed in the	5	CO2	L3
29		C	Derive	e EMF equation of transformer.	5	CO2	L3
30		T 2 e	The n 25 kV	naximum efficiency at full load and Upf of a single phase, A, 500/1000 V, 50 Hz transformer is 98%. Determine the ency at (i) 75% load 0.9 pf, (ii) 50% load 0.8 pf, (iii) 25% load	5	CO2	L2
31				reasoning, for a transformer, show that The transformer be considered as ideal.		CO2	L3
32				e the condition for which the efficiency of a transformer ximum.	5	CO2	L4
33				in two way control of lamps with truth table and ection diagram.	5	CO2	L3
34		a	armat	th torque versus armature current and speed versus ture current characteristics of a D.C. shunt motor and ion its applications.	5	CO2	L2
35		C W O S	condu vindi ohm.	NOV, 4 pole, lap wound DC shunt motor has 800 uctors on its armature. The resistance of the armature ng is 0.5 ohm and that of the shunt field winding is 200 The motor takes 21A and flux/pole is 30mWb. Find d and gross torque developed in the r.		CO3	L3
36		C	Derive	e EMF equation of DC generator.	5	CO2	L4
37		A h g n s	An 8 nas lu gener nust same	pole D.C. generator has 500 armature conductors and useful flux per pole of 0.065 Wb. What will be emf rated if it is lap connected and runs at 1000 rpm? What be the speed at which it is to be driven to produce the emf if it is wave connected?	5	CO2	L3
38		с	an b	reasoning, for a transformer, show that The transformer be considered as ideal.	5	CO5	L2
39		is	s max	e the condition for which the efficiency of a transformer ximum.		CO2	L3
40				in two way control of lamps with truth table and ection diagram.	5	CO4	L4

D3. TEACHING PLAN - 3

Module – 5

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

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opyrigni ©201	/. CAAS. All rights reserved.		
b	Course Schedule		
Class No	Module Content Covered	СО	Leve
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 To generate electricity	CO 2	Leve
1 2	Irrigation purpose	CO2 CO3	L2
2	ingation purpose	03	LZ
d	Review Questions	-	-
1	Explain the constructional features of a salient pole alternators.		10
•		CO2	L2
2	Distinguish between salient and non-salient pole alternators.	CO2 CO2	L2 L2
3			
	Distinguish between salient and non-salient pole alternators. Starting from basic principles, develop an expression for the emf induced in an alternator. Explain the constructional features of a non-salient pole alternators.	CO2 CO2 CO2	L2
3	Distinguish between salient and non-salient pole alternators. Starting from basic principles, develop an expression for the emf induced in an alternator. Explain the constructional features of a non-salient pole alternators. Explain the construction of squirrel cage induction motor.	CO2 CO2 CO2 CO3	L2 L2 L2 L2
3	Distinguish between salient and non-salient pole alternators. Starting from basic principles, develop an expression for the emf induced in an alternator. Explain the constructional features of a non-salient pole alternators. Explain the construction of squirrel cage induction motor. Explain the difference in squirrel cage and phase wound induction motor.	CO2 CO2 CO2 CO3 CO3	L2 L2 L2 L2 L2 L2
3 4 5 6 7	Distinguish between salient and non-salient pole alternators. Starting from basic principles, develop an expression for the emf induced in an alternator. Explain the constructional features of a non-salient pole alternators. Explain the construction of squirrel cage induction motor. Explain the difference in squirrel cage and phase wound induction motor. Explain the principle of operation of an induction motor.	CO2 CO2 CO2 CO3 CO3 CO3	L2 L2 L2 L2 L2 L2 L2
3 4 5 6 7 8	Distinguish between salient and non-salient pole alternators. Starting from basic principles, develop an expression for the emf induced in an alternator. Explain the constructional features of a non-salient pole alternators. Explain the construction of squirrel cage induction motor. Explain the difference in squirrel cage and phase wound induction motor. Explain the principle of operation of an induction motor. Why induction motor require a starter?	CO2 CO2 CO3 CO3 CO3 CO3 CO3	L2 L2 L2 L2 L2 L2 L2 L2 L2
3 4 5 6 7	Distinguish between salient and non-salient pole alternators. Starting from basic principles, develop an expression for the emf induced in an alternator. Explain the constructional features of a non-salient pole alternators. Explain the construction of squirrel cage induction motor. Explain the difference in squirrel cage and phase wound induction motor. Explain the principle of operation of an induction motor. Why induction motor require a starter? What is slip in an induction motor? Explain why slip is never zero in an induction motor?	CO2 CO2 CO3 CO3 CO3 CO3 CO3 CO3	L2 L2 L2 L2 L2 L2 L2 L2 L2 L2
3 4 5 6 7 8	Distinguish between salient and non-salient pole alternators. Starting from basic principles, develop an expression for the emf induced in an alternator. Explain the constructional features of a non-salient pole alternators. Explain the construction of squirrel cage induction motor. Explain the difference in squirrel cage and phase wound induction motor. Explain the principle of operation of an induction motor. Why induction motor require a starter? What is slip in an induction motor? Explain why slip is never zero in an	CO2 CO2 CO3 CO3 CO3 CO3 CO3	L2 L2 L2 L2 L2 L2 L2 L2 L2
3 4 5 6 7 8 9	Distinguish between salient and non-salient pole alternators. Starting from basic principles, develop an expression for the emf induced in an alternator. Explain the constructional features of a non-salient pole alternators. Explain the construction of squirrel cage induction motor. Explain the difference in squirrel cage and phase wound induction motor. Explain the principle of operation of an induction motor. Why induction motor require a starter? What is slip in an induction motor? Explain why slip is never zero in an induction motor?	CO2 CO2 CO3 CO3 CO3 CO3 CO3 CO3	L2 L2 L2 L2 L2 L2 L2 L2 L2 L2

E3. CIA EXAM – 3

a. Model Question Paper - 3

Crs	Code:	2: 18ELE13/Sem: 1/2 Marks: 30 Time: 75 r						75 minute	minutes			
		23										
Cou	rse:	Basic Elect	rical Engine	ering								
-	-	Note: Ansv	te: Answer any 2 questions, each carry equal marks. Marks CO Level									
1	a	With neat s	sketches, ex	olain the cor	nstruction o	f salient po	ole alternator.	5	CO2	L2		
	b	Define slip.	10	CO3	L3							
2		f 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 he motor							CO2	L2		

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	b	A three phase	6 pole 50 Hz induction motor has a slip of 1 % at no load	8	CO3	L3
		and 3% at full l	bad. Determine: i) Synchronous speed, .(ii) No load speed,			
		(iii) Full-load s	peed, (iv) Frequency of rotor current at stand still, (v)			

		(iii) Full-load speed, (iv) Frequency of rotor current at stand still, (v)			
		Frequency of rotor current at full-load.			
3	а	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.

				0	del Assignmer		ions				
Crs Co	ode:	18ELE13 23	/Sem:	1/2	Marks:	10	Tin	ne:	90 - 120	minute	S
Cours	se:	Basic Ele	ectrical Engi	neering							
	Each	student t	o answer 2-	3 assignn	nents. Each as	signmer	nt carries	equal ma	ark.		
SNo					signment Des				Marks	со	Level
1					hase winding shes a rotating			by a thre	e 5	CO2	L2
2		i	4 pole, 3 p induction m motor. Also	hase indu otor is 2 , determi e differend	ans at 1000 rpi action motor. Hz. Determine ne the slip at ce between th om.	The free the slip no loa	quency and sp d of the	of rotor of eed of th inductio	of e n	CO2	L3
3		ė	alternator.		explain the c					CO2	L2
4			Define slip. current.	Derive	an expressio	n for f	requency	y of roto	or 5	CO3	L3
5			supply has	a rotor	motor supplied r frequency le speed of the	2.3 Hz,				CO2	L2
6			no load and (ii) No load :	3% at full speed, (iii	50 Hz induction l load. Determ) Full-load spe , (v) Frequen	ine: i) Sy eed, (iv)	nchrono Frequen	us speed cy of roto	pr	CO2	L2
7					hase winding shes a rotating			by a thre	e 5	CO2	L2
8			phase supp 3phase alte conductors generate a l	ly establ rnator ru per slot. ine voltag	hase winding ishes a rotatir nning at 3000 Calculate the ge of 2300 V. A is star connect	ng magr D rpm h flux pe Assume	netic fiel 1as 42 sl 9r pole, r	d.A 2 pol ots with equired t	e 2 0	CO2	L2

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9	alterr		5	CO2	L2			
10	4 pol induc moto moto no lo	pole alternator runs at 1000 rpm, and supplies power to a le, 3 phase induction motor. The frequency of rotor of option motor is 2 Hz. Determine the slip and speed of the or. Also, determine the slip at no load of the induction or, if the difference between the synchronous speed and ad speed is 10 rpm.	5	CO2	L2			
11		/ that a three phase winding when excited by a three e supply establishes a rotating magnetic field.	5	CO3	L3			
12	4 pol induc moto moto	pole alternator runs at 1000 rpm, and supplies power to a le, 3 phase induction motor. The frequency of rotor of ction motor is 2 Hz. Determine the slip and speed of the rr. Also, determine the slip at no load of the induction rr, if the difference between the synchronous speed and ad speed is 10 rpm.	5	CO2	L2			
13	A 2 p with requi 0.952	oole 3phase alternator running at 3000 rpm has 42 slots 2 conductors per slot. Calculate the flux per pole, red to generate a line voltage of 2300 V. Assume Kd =	5	CO2	L2			
14		neat sketches, explain the construction of salient pole	5	CO2	L2			
15	induc	uss the variation in rotor emf frequency of three phase ction motor as the load changes. Derive any formula used bstantiate the variation.	5	CO2	L2			
16	supp	pole induction motor supplied from a three phase 50 Hz ly has a rotor frequency 2.3 Hz, calculate (i) the entage slip, (ii) the speed of the motor.	5	CO2	L2			
17		neat sketches, explain the construction of salient pole	5	CO3	L3			
18	Defin curre	e slip. Derive an expression for frequency of rotor nt.	5	CO2	L2			
19	lf a 6 supp	pole induction motor supplied from a three phase 50 Hz ly has a rotor frequency 2.3 Hz, calculate (i) the entage slip, (ii) the speed of the motor	5	CO3	L3			
20	A thre no lo (ii) No	ee phase 6 pole 50 Hz induction motor has a slip of 1 % at ad and 3% at full load. Determine: i) Synchronous speed, . o load speed, (iii) Full-load speed, (iv) Frequency of rotor nt at stand still, (v) Frequency of rotor current at full-	5	CO2	L2			
21	Show	/ that a three phase winding when excited by a three e supply establishes a rotating magnetic field.	5	CO3	L3			
22	A 6 p 4 pol induc moto moto	pole alternator runs at 1000 rpm, and supplies power to a le, 3 phase induction motor. The frequency of rotor of ction motor is 2 Hz. Determine the slip and speed of the r. Also, determine the slip at no load of the induction r, if the difference between the synchronous speed and ad speed is 10 rpm.	5	CO2	L2			
23		neat sketches, explain the construction of salient pole	5	CO2	L2			
24	Defin curre	e slip. Derive an expression for frequency of rotor nt.	5	CO2	L2			

25

26

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

A three phase 6 pole 50 Hz induction motor has a slip of 1 % at

5

5

CO2

CO2

L2

L2

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	no lı (ii) N	oad and 3% at full load. Determine: i) Synchronous speed, . No load speed, (iii) Full-load speed, (iv) Frequency of rotor rent at stand still, (v) Frequency of rotor current at full-			
27	Sho	w that a three phase winding when excited by a three se supply establishes a rotating magnetic field.	5	CO2	L2
28	Sho pha 3ph con gen	w that a three phase winding when excited by a three se supply establishes a rotating magnetic field. A 2 pole ase alternator running at 3000 rpm has 42 slots with 2 ductors per slot. Calculate the flux per pole, required to erate a line voltage of 2300 V. Assume Kd = 0.952 and K p 956. The armature is star connected.	5	CO2	L2
29	With	n neat sketches, explain the construction of salient pole rnator	5	CO2	L2
30	4 po indu mot mot	pole alternator runs at 1000 rpm, and supplies power to a ole, 3 phase induction motor. The frequency of rotor of action motor is 2 Hz. Determine the slip and speed of the cor. Also, determine the slip at no load of the induction cor, if the difference between the synchronous speed and oad speed is 10 rpm.	5	CO2	L2
31		w that a three phase winding when excited by a three se supply establishes a rotating magnetic field.	5	CO2	L2
32	4 pe indu mot mot	pole alternator runs at 1000 rpm, and supplies power to a ole, 3 phase induction motor. The frequency of rotor of action motor is 2 Hz. Determine the slip and speed of the cor. Also, determine the slip at no load of the induction cor, if the difference between the synchronous speed and oad speed is 10 rpm.	5	CO2	L2
33	A 2 with requ 0.95	pole 3phase alternator running at 3000 rpm has 42 slots 2 conductors per slot. Calculate the flux per pole, uired to generate a line voltage of 2300 V. Assume Kd = 52 and = 0.956. The armature is star connected.	5	CO2	L2
34	With	n neat sketches, explain the construction of salient pole rnator	5	CO2	L2
35	indu	cuss the variation in rotor emf frequency of three phase action motor as the load changes. Derive any formula used ubstantiate the variation.	5	CO2	L2
36	sup	6 pole induction motor supplied from a three phase 50 Hz ply has a rotor frequency 2.3 Hz, calculate (i) the centage slip, (ii) the speed of the motor.	5		L2
37	With	n neat sketches, explain the construction of salient pole rnator.	5	CO2	L2
38	curr		5	CO3	L3
39	sup	6 pole induction motor supplied from a three phase 50 Hz ply has a rotor frequency 2.3 Hz, calculate (i) the centage slip, (ii) the speed of the motor	5	CO2	L2
40	A th no l (ii) N	rree phase 6 pole 50 Hz induction motor has a slip of 1 % at oad and 3% at full load. Determine: i) Synchronous speed, Io load speed, (iii) Full-load speed, (iv) Frequency of rotor rent at stand still, (v) Frequency of rotor current at full-	5	CO2	L2

load.

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F. EXAM PREPARATION

1. University Model Question Paper

Cοι	Course: Basic Electrical Engineering Month / Year				
Crs	Code:	18ELE13/23 Sem: 1/2 Marks: 100 Time:			/2018 ninutes
-		Answer all FIVE full questions. All questions carry equal marks.	Marks	CO	Level
1	а	State Ohm's law and its limitations.	5	CO1	L2
	b	Find the potential difference between the points A & B.	5	CO1	L3
		State and explain the Kirchhoff's laws.	5	CO1	L2
	d	Define RMS value of alternating current. Obtain the relationship betwee RMS and maximum value of alternating current.	n 5	CO1	L2
	а	OR Find the currents in the various branches of the given network	5	CO1	L2
		100 A 0.01 Ω 80 A 0.01 Ω 100 A 0.02 Ω 0.02 Ω 120 A 0.02 Ω 120 A 150 A			
		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
		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

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		- 100 '				
	d	With neat diag	rams explain the generation of single phase voltage.	7	CO1	L2
2	a	wattmeters are	of a circuit diagram and vector diagram, show that two e sufficient to measure total power and power factor in a e phase circuit.	8	Co3	L4
	b	Three similar 80hm are coni line current, (coils each having resistance of 10ohm and reactance of nected in star, across 400 V, 3 phase supply. Determine (i) iii) total power, (iii) reading of each of two wattmeter neasure power. OR	5	Co3	L3
-		Mention the a system.	advantages of three phase system over single phase	5	CO1	
		A three phase a balanced 40	load of three equal impedances connected in delta across IOV supply, takes a line current of 10 A at a power factor Calculate: i) the phase current, ii) the total power, iii) the rolt amperes.	5	CO1	L3
3	а	Derive FMF ea	uation of transformer.	7	CO4	
5		b. The maximu 500/1000 V, 5	im efficiency at full load and Upf of a single phase, 25 kV A, 0 Hz transformer is 98%. Determine the efficiency at (i) 75% 50% load 0.8 pf, (iii) 25% load 0.6 pf	5		L3
	С	With reasoning considered as	g, for a transformer, show that The transformer can be ideal.	5		
			OR			
-		maximum.	ondition for which the efficiency of a transformer is	6	CO4	
	b	Explain two v diagram.	way control of lamps with truth table and connection	5		
4	а	Sketch torque current charac	e versus armature current and speed versus armature teristics of a D.C. shunt motor and mention its applications.	7	CO2	
		A 200V, 4 pole armature. The the shunt field	e, lap wound DC shunt motor has 800 conductors on its resistance of the armature winding is 0.5 ohm and that of winding is 200 ohm. The motor takes 21A and flux/pole is speed and gross torque developed in the	5		L3
		Dariu a EME	OR		CO2	
_	b	An 8 pole D.C flux per pole connected and	uation of DC generator. . generator has 500 armature conductors and has useful of 0.065 Wb. What will be emf generated if it is lap d runs at 1000 rpm? What must be the speed at which it is produce the same emf if it is wave connected?	<u>5</u> 5	CO2 CO3	L3
5		establishes a r	ree phase winding when excited by a three phase supply otating magnetic field.	8	CO2	
	b		nator runs at 1000 rpm, and supplies power to a 4 pole, 3 on motor. The frequency of rotor of induction motor is 2 Hz.	5	CO3	L3

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		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.			
	С	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.			L3
		OR			
	а	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		
	С	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

Cour	rse:	Basic Electrical Engineering Month	/ Year	AUG /	2018
Crs (Code:	18ELE13/23 Sem: 1/2 Marks: 100 Time:		180 mi	nutes
	Note	Answer all FIVE full questions. All questions carry equal marks.	-	-	
Mo dul e	Qno.	Important Question	Marks	со	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.		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 200hm and 300hm respectively, connected in series with 1500hm. If the current through 150hm resistor is 3.A., find (i) current in 200hm and 300hm resistors, (ii voltage across whole circuit (iii) The total power and power consumed ir all resistors.		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.		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 of 0.7 lagging. Calculate:i) the phase current, ii) the total power, iii) the total reactive volt amperes.	-	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.		CO1	2017
	4	c. Two impedances $z_1 = (10 + j_{15})$ ohm and $Z_2 = (6 - j_8)$ ohm are connected ir parallel. If the total current supplied is 15A, what is power taken by each branch?		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		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