Indra Ganesan
COLLEGE OF ENGINEERING

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
Accredited by NAAC with 'B+' Grade, 2(f) & 12B Status Institution by UGC
IG Valley, Madurai Main Road, Manikandam, Tiruchirappalli - 620012

NAAC DOCUMENTS

QUALITY INDICATOR FRAME WORK

CRITERION – 1

CURRICULAR ASPECTS

SUBMITTED BY

IQAC

INTERNAL QUALITY ASSURANCE CELL

INDRA GANESAN COLLEGE OF ENGINEERING

Criteria 1	Curricular Aspects	100

1.1 Curricular Planning and Implementation (20)

1.1.1 The Institution ensures effective curriculum planning and delivery through a well-planned and documented process including Academic calendar and conduct of continuous internal Assessment

Table of Content

INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India
(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

PREFACE OF THE COURSE FILE

Batch	: **2017-2021**
Academic Year	: **2018-2019 / ODD**
Program	: **ELECTRICAL AND ELECTRONICS ENGINEERING**
Year & Semester	: **2nd Year / 3th Semester**
Course Code	: **EE8301** NBA Course Code: C204
Name of the Course	: **EE8301** –ELECRICAL MACHINES-1
Faculty in-charge	: K.SEETHARAMAN, AP / **EEE**

Signature of the Faculty in-charge

HoD / **EEE**

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 01

INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India

(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SYLLABUS

EE8301 ELECTRICAL MACHINES – I **L T P C**

2 2 0 3

OBJECTIVES:

To impart knowledge on the following Topics

- Magnetic-circuit analysis and introduce magnetic materials
- Constructional details, the principle of operation, prediction of performance, the methods of testing the transformers and three phase transformer connections.
- Working principles of electrical machines using the concepts of electromechanical energy conversion principles and derive expressions for generated voltage and torque developed in all Electrical Machines.
- Working principles of DC machines as Generator types, determination of their no- load/load characteristics, starting and methods of speed control of motors.
- Various losses taking place in D.C. Motor and to study the different testing methods to arrive at their performance.

UNIT I MAGNETIC CIRCUITS AND MAGNETIC MATERIALS **6+6**

Magnetic circuits –Laws governing magnetic circuits - Flux linkage, Inductance and energy – Statically and Dynamically induced EMF - Torque – Properties of magnetic materials, Hysteresis and Eddy Current losses - AC excitation, introduction to permanent magnets- Transformer as a magnetically coupled circuit.

UNIT II TRANSFORMERS **6+6**

Construction – principle of operation – equivalent circuit parameters – phasor diagrams, losses – testing – efficiency and voltage regulation-all day efficiency-Sumpner's test, per unit representation – inrush current - three phase transformers-connections – Scott Connection – Phasing of transformer– parallel operation of three phase transformers-auto transformer – tap changing transformers- tertiary winding.

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

UNIT III ELECTROMECHANICAL ENERGY CONVERSION AND CONCEPTSIN ROTATING MACHINES **6+6**

Energy in magnetic system – Field energy and co energy-force and torque equations – singly and multiply excited magnetic field systems-mmf of distributed windings – Winding Inductances-, magnetic fields in rotating machines – rotating mmf waves – magnetic saturation and leakage fluxes.

UNIT IV DC GENERATORS **6+6**

Construction and components of DC Machine – Principle of operation - Lap and wave windings-EMF equations– circuit model – armature reaction –methods of excitation-commutation - interpoles compensating winding –characteristics of DC generators.

UNIT V DC MOTORS **6+6**

Principle and operations - types of DC Motors – Speed Torque Characteristics of DC Motors- starting and speed control of DC motors –Plugging, dynamic and regenerative braking- testing and efficiency – Retardation test- Swinburne's test and Hopkinson's test - Permanent Magnet DC (PMDC) motors-applications of DC Motor

TOTAL: 60 PERIODS

OUTCOMES:

- Ability to analyze the magnetic-circuits.
- Ability to acquire the knowledge in constructional details of transformers.
- Ability to understand the concepts of electromechanical energy conversion.
- Ability to acquire the knowledge in working principles of DC Generator.
- Ability to acquire the knowledge in working principles of DC Motor
- Ability to acquire the knowledge in various losses taking place in D.C. Machines

TEXT BOOKS:

1. Stephen J. Chapman, 'Electric Machinery Fundamentals'4th edition, McGraw HillEducation Pvt. Ltd, 2010.
2. P.C. Sen'Principles of Electric Machines and Power Electronics' John Wiley & Sons;3rd Edition 2013.
3. Nagrath, I.J. and Kothari.D.P., Electric Machines', McGraw-Hill Education, 2004

REFERENCES

1. Theodore Wildi, "Electrical Machines, Drives, and Power Systems", PearsonEducation., (5th Edition), 2002.
2. B.R. Gupta ,'Fundamental of Electric Machines' New age International Publishers,3rdEdition,Reprint-2015.

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

Signature of the HoD/EEE

INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India
(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Lecture Schedule

Degree/Program: **B.E / EEE**
Duration: **2018 - 2019**
Course code &Name: **EE8301** –ELECRICAL MACHINES-1
Semester: **III**
Faculty: **Mr.K.Seetharaman, AP / EEE**

AIM:

To impart knowledge about the configuration of the electrical Machines .

OBJECTIVES:

To impart knowledge on the following Topics

- Magnetic-circuit analysis and introduce magnetic materials
- Constructional details, the principle of operation, prediction of performance, the methods of testing the transformers and three phase transformer connections.
- Working principles of electrical machines using the concepts of electromechanical energy conversion principles and derive expressions for generated voltage and torque developed in all Electrical Machines.
- Working principles of DC machines as Generator types, determination of their no-load/load characteristics, starting and methods of speed control of motors.
- Various losses taking place in D.C. Motor and to study the different testing methods to arrive at their performance.

PREREQUISITES: Circuit theory, Electron Devices and Circuits.

COURSE OUTCOMES:

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C204.1	Ability to analyze the magnetic-circuits.	1,2,3,4	1,2
C204.2	Ability to acquire the knowledge in constructional details of transformers.	1,2,3,4	1,2
C204.3	Ability to understand the concepts of electromechanical energy conversion.	1,2,3,4	1,2
C204.4	Ability to acquire the knowledge in working principles of DC Generator.	1,2,3,4	1,2
C204.5	Ability to acquire the knowledge in working principles of DC Motor	1,2,3,4	1,2
C204.6	Ability to acquire the knowledge in various losses taking place in D.C. Machines	1,2,3,4	1,2

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012

S.No	Date	Period	Topics to be Covered	Book & Page. No.
UNIT -I - MAGNETIC CIRCUITS AND MAGNETIC MATERIALS periods :12				Target
1	02.07.2018	3	Magnetic circuits	T1,R1
2	03.07.2018	2	Laws governing magnetic circuits	T1,R1
3	04.07.2018	5	Problems on series Magnetic circuits	T1,R1
4	05.07.2018	4	Problems on parallel Magnetic circuits	
5	06.07.2018	1	Flux Linkage, Inductance and Energy	T1,R1
6	09.07.2018	3	Problems on Inductance	T1,R1
7	10.07.2018	2	Statically and Dynamically induced EMF	T1,R1
8	11.07.2018	5	Problems on Self and Mutual Inductance	T1,R1
9	12.07.2018	4	Properties of magnetic materials	T1,R1
10	13.07.2018	1	Hysteresis and Eddy Current losses	T1,R1
11	13.07.2018	3	Introduction to permanent magnets	T1,T3
12	14.07.2018	3	Ac Excitation	T1,T3
13	14.07.2018	4	Transformer as a magnetically coupled circuit.	T1,T3
UNIT II - TRANSFORMERS Target periods :12				
14	19.07.2018	4	Construction & principle of operation	T1,R1
15	20.07.2018	1	Equivalent circuit parameters	T1,R1
16	21.07.2018	2	No load and Load condition- phasor diagrams	T1,R1
17	23.07.2018	3	Losses, efficiency, voltage regulation and all day efficiency	T1,R1
18	24.07.2018	2	Testing of transformer- Load test, OC & SC test	T1,R1
19	25.07.2018	5	Sumpner's test	T1,R1
20	26.07.2018	4	Per unit representation and inrush current	T1,R1
21	27.07.2018	1	Three phase transformers and its connections	T1,R1
22	28.07.2018	5	Parallel operation of three phase transformers	T1,R1
23	30.07.2018	3	Auto transformer	T1,R1
24	31.07.2018	2	Tap changing transformers- tertiary winding.	T1,R1
25	01.08.2018	5	Problems on transformer	T1,T3
26	02.08.2018	4	Revision	T1,T3
UNIT III - ELECTROMECHANICAL ENERGY CONVERSION AND CONCEPTSIN ROTATING MACHINES				

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

			Target Periods :12	
27	07.08.2018	2	Energy in magnetic system	T1,R1
28	08.08.2018	5	Field energy and coenergy	T1,R1
29	09.08.2018	4	Force and torque equations	
30	10.08.2018	1	Singly excited magnetic field systems	T1,R1
31	11.08.2018	3	Multiply excited magnetic field systems	T1,R1
33	13.08.2018	3	Problems	T1,R1
34	14.08.2018	2	Mmf of distributed windings	T1,R1
35	16.08.2018	4	Winding inductances	T1,R1
36	17.08.2018	1	Magnetic fields in rotating machines	T1,R1
37	20.08.2018	3	Rotating mmf waves	T1,R1
38	21.08.2018	2	Magnetic saturation and leakage fluxes.	T1,R1
39	22.08.2018	5	Problems	T1,R1
			UNIT IV - DC GENERATORS **Target Periods :12**	
40	31.08.2018	1	Construction and components of DC Machine	T1,R1
41	01.09.2018	2	Principle of operation	T1,R1
42	03.09.2018	3	EMF equations, Lap and wave windings	T1,R1
43	04.09.2018	2	Problems	T1,R1
44	05.09.2018	5	Methods of excitation and its circuit model	T1,R1
45	06.09.2018	4	Problems	T1,R1
46	07.09.2018	1	Armature reaction	T1,R1
47	08.09.2018	5	Commutation and interpoles	T1,R1
48	10.09.2018	3	Problems	T1,R1
49	11.09.2018	2	Compensating winding	T1,R1
50	12.09.2018	4	Characteristics of DC generators.	T1,R1
51	12.09.2018	5	Problems	T1,R1
			UNIT V - DC MOTORS **Target Periods:12**	
52	19.09.2018	5	Principle and Operations	T1,R1
53	20.09.2018	4	Types of DC Motors	T1,R1
54	24.09.2018	3	Speed Torque Characteristics of DC Motors	T1,R1
55	25.09.2018	2	Speed Torque Characteristics of DC Motors	T1,R1
56	25.09.2018	3	Plugging, Dynamic and Regenerative Braking	T1,R1
57	26.09.2018	4	Testing and Efficiency	T1,R1
58	26.09.2018	5	Retardation Test	T1,R1
59	27.09.2018	1	Swinburne"s Test , Hopkinson"s Test	T1,R1
60	27.09.2018	5	Permanent Magnet DC (PMDC) Motors	T1,R1
61	28.09.2018	3	Applications of DC Motor.	T1,R1
62	28.09.2018	4	Problems	T1,R1
63	29.09.2018	3	Problems	T1,R1
			Content Beyond the Syllabus	
64	29.09.2018	4	DC Motor applications in Industries	Material

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

Book Reference - Text Books

Sl.No	Title of the Book	Author	Publisher	Year
1	Electric Machinery Fundamentals	Stephen J. Chapman	McGraw Hill Education Pvt. Ltd,	2010
2	Principles of Electric Machines and Power Electronics	P.C. Sen	John Wiley & Sons	2013
3	Electric Machines	Nagrath, I.J. and Kothari.D.P	McGraw-Hill Education	**2004**

Book Reference - Reference

Sl.No	Title of the Book	Author	Publisher	Year
1	Electrical Machines, Drives, and Power Systems	Theodore Wildi	PearsonEducation.	2002
2	Fundamental of Electric Machines	B.R. Gupta	New age International Publishers	2015.
3	Electric Machinery	Fitzgerald. A.E., Charles Kingsely Jr, Stephen D.Umans	McGraw Hill Books Company	2003

Signature of the Faculty in-charge

HoD / EEE

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India
(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Identification of Curricular Gap & Content Beyond Syllabus(CBS)

Name of the Faculty : **Mr.K.Seetharaman**, AP / EEE
Course Code & Name: EE8301 –ELECRICAL MACHINES-1
Degree & Program: B.E. /EEE **Semester & Section: III / A** **Academic Year: 2018 -2019/ODD**

I. Mapping of Course Outcomes with POs & PSOs.(before CBS)

Table.1 Mapping of COs, C, PSOs with POs - before CBS.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C204.1	3	2	1	-	-	-	-	-	-	-	-	-	2	-
C204.2	3	2	1	2	-	-	-	-	-	-	-	-	2	-
C204.3	3	2	1	-	-	-	-	-	-	-	-	-	2	-
C204.4	3	2	1	-	-	-	-	-	-	-	-	-	2	-
C204.5	3	2	1	2	-	-	-	-	-	-	-	-	2	-
C204.6	3	2	1	-	-	-	-	-	-	-	-	-	2	-
C204	3	2	1	1	-	-	-	-	-	-	-	-	2	-

II. Identification of content beyond syllabus.

Table.2 Identification of content beyond syllabus

Details of Content Beyond Syllabus(CBS) added	POs strengthened/ vacant filled	CO/Unit
DC Motor applications in Industries	PO5(2) Vacant filled	C204.5 / IV

III. Mapping of Course Outcomes with POs & PSOs. (After CBS)

Table.3 Mapping of COs, C, PSOs with POs- after CBS.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C204.1	3	2	1	-	2	-	-	-	-	-	-	-	2	-
C204.2	3	2	1	2	2	-	-	-	-	-	-	-	2	-
C204.3	3	2	1	-	2	-	-	-	-	-	-	-	2	-
C204.4	3	2	1	-	2	-	-	-	-	-	-	-	2	-
C204.5	3	2	1	2	2	-	-	-	-	-	-	-	2	-
C204.6	3	2	1	-	2	-	-	-	-	-	-	-	2	-
C204	3	2	1	1	2	-	-	-	-	-	-	-	2	-

K. Seetharaman

Signature of the Faculty

G. Malathi

HoD/EEE

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012

INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India
(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Identification of Curricular Gap & Content Beyond Syllabus (CBS)

MATERIAL

Name of the Faculty : **Mr.K.Seetharaman**, AP / EEE
Course Code & Name: EE8301 –ELECRICAL MACHINES-1
Degree & Program: B.E. /EEE **Semester & Section: III / A** **Academic Year: 2018 -2019/ODD**

TOPIC: DC Motor applications in Industries

INTRODUCTION

Types of DC motors

- Permanent Magnet DC Motor (PMDC Motor)
- Separately Excited DC Motor
- Self Excited DC Motor
- Shunt Wound DC Motor
- Series Wound DC Motor
- Compound Wound DC Motor
- Short shunt DC Motor
- Long shunt DC Motor
- Differential Compound DC Motor

Application of DC Series motor

DC series motor is suitable for both high and low power drives, for fixed and variable speed electric drives. This type of motor has simple construction. Also, it is easy for design and maintenance.

Because of its high starting torque, this motor uses in the cheap toys and automotive applications such as,

- Cranes
- Air compressor
- Lifts
- Elevators
- Winching system
- Electric traction
- Hair drier

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

- Vacuum cleaner and in speed regulation application
- power tools
- Sewing machine
- Electric footing

Application of DC Shunt motor

We all know that Dc shunt motor provides the constant speed. This type of motor mostly uses in the constant speed application from no load to full load. The applications are,

- Wiper
- Automatic windscreen
- Drills
- Conveyors
- Fans
- Boring mills
- Shapers
- Blowers
- Spinning and weighing machine
- Centrifugal pumps

Application of Permanent Magnet DC motor

The permanent magnet DC motor is the special type of motor where we use a permanent magnet to create the required magnetic field. As this motor does not need to control the speed, it uses in the applications like,

- Washer
- Windshield wiper
- Automobiles as a starter motor
- Personal computer disc drives
- Toys
- Wheelchairs
- Blowers in heater and air conditioners.

Application of Compound DC motor

As we discussed, there are two types of Compound DC motor. One is Differential and other is Cumulative compound motor. The differential compound motor has poor torque characteristics because the motor increases the speed with increase in load. so this motor is not suitable for any practical application.

On the other hand, the cumulative compound motor has high starting torque characteristic. Also, it has good speed regulation at high speed so it uses in,

- Presses
- Electric shovels
- Reciprocating machine
- Conveyors
- Stamping machine

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

- Elevators Compressors
- Rolling mills
- Heavy planners

Application of Brushless DC motor

As the brushless motor does not have any brushes, it has high efficiency, high speed and electronic control. Mostly this motor uses in the,

- Hand held power tools
- Consumer electronics
- Heating and ventilation
- for small cooling fans
- Transport
- Vehicles ranging from aircrafts to automobiles
- For gramophone record in direct drive turntables
- In computer peripherals like disk drives, printers etc

Signature of the Faculty

HoD/EEE

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India
(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Assignment Question Paper

Assignment – 03			Date of Issue:	13.08.2018	Marks	10
Course code	EE8301	Course Title	ELECTRICAL MACHINES -1			
Year	II	Semester/Section	III	Date of Submission:	23.08.2018	

Q.No	Questions	CO
1	Explain the constructional and working principle of DC machine with its necessary emf equations.	C204.4
2	Explain the Armature Reaction in a D.C generator?	C204.4

Name and Signature of the Faculty

Incharge HoD/EEE

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India
(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

Assignment Answer Sheet

Name of the Student: Hariharan E

AU Register Number: 811221105012

Assignment – 01				Date of Issue:	13.08.2018	Marks	10
Course code	EE8301	Course Title	ELECTRICAL MACHINES -1				
Year	II	Semester/Section	III	Date of Submission:	23.08.2018		

Q.No	Questions	CO
1	Explain the constructional and working principle of DC machine with its necessary emf equations.	C204.4
2	Explain the Armature Reaction in a D.C generator?	C204.4

Mark Allocation

Rubrics	Marks Allocated	Marks obtained
Content Quality	6	5
Presentation Quality	2	1
Timely submission	2	1
Total marks	10	07

K. Sathadevi
Name and Signature of the Faculty

G. Malathi
Incharge HoD/EEE

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

Register Number: | | | | | | | | | | | | |

INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India

(Approved by AICTE, New Delhi and affiliated to Anna University, Chennai)

Internal Assessment Exam - III		**Date/Session**	**08/03/23 AN**	**Marks**	**50**
Course code	**EE8301**	**Course Title**	**ELECTRICAL MACHINES – I**		
Regulation	**2017**	**Duration**	**90 minutes**	**Academic Year**	**2018-19**
Year	**2ND**	**Semester**	**III**	**Department**	**EEE**

COURSE OUTCOMES

CO1:	Ability to analyze the magnetic-circuits.
CO2:	Ability to acquire the knowledge in constructional details of transformers.
CO3:	Ability to understand the concepts of electromechanical energy conversion.
CO4:	Ability to acquire the knowledge in working principles of DC Generator.
CO5:	Ability to acquire the knowledge in working principles of DC Motor
CO6:	Ability to acquire the knowledge in various losses taking place in D.C. Machines

Q.No.	Question	CO	BTS
	PART A		
	(Answer all the Questions 10 x 2 = 20 Marks)		
1	What will happen to the speed of a DC motor when its flux approaches zero?	CO4	K2
2	Mention the effects of differential compounding and cumulatively compound on the performance of DC Compound motor	CO4	K1
3	Compare lap and wave windings?	CO4	K4
4	What is the use of Inter poles in D.C machine?	CO4	K2
5	Write the E.M.F equation of generator?	CO4	K2
6	Classify the different types of DC Generators based on method of excitation?	CO5	K5
7	What are the methods to improve commutation?	CO5	K4
8	State the applications of DC Generator.	CO5	K1
9	Define back pitch and front pitch.	CO5	K1
10	Explain the significance of back emf in a DC Motor?	CO5	K2
	PART B		
	(Answer all the Questions 2 x 10 = 20 Marks)		
11a	Explain the constructional and working principle of DC machine with its necessary emf equations.	CO4	K2
	OR		
11b	Explain the Armature Reaction in a D.C generator?	CO4	K2
12a	Explain in detail about the characteristics of DC motor with neat diagram.	CO5	K3
	OR		
12b	Describe the process of commutation in D.C machine?	CO5	K3
	PART C		
	(Answer all the Questions 1 x 10 = 10 Marks)		
13a	A separately excited generator when running at 1000 r.p.m supplied 200A at 125V.What will be the load current when the speed drops to 800r.p.m. If I f is unchanged? Given that armature resistance= 0.04 ohm and brus drop = 2 v .Derive the necessary equations?	CO4	K2
	OR		
13b	A 4 pole lap wound shunt generator supplies 60 lamps of 100 watts , 240 V each; the field and armature resistances are 55ohm and 0.18ohm respectively .If the brush drop is 1V for each brush.Find (i) Armature current (ii) current per path Generated emf (iv) power out put of DC machines	CO4	K3

K. Sathasivam

Course Faculty

G Malathi

HoD

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

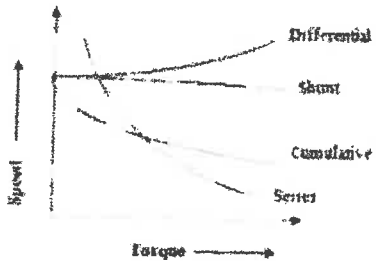
Register Number: | | | | | | | | | | |

INDRA GANESAN COLLEGE OF ENGINEERING

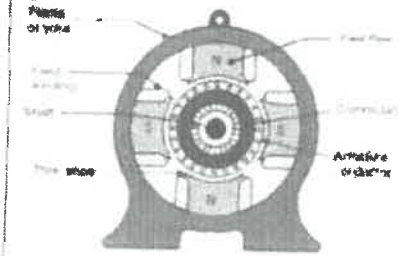
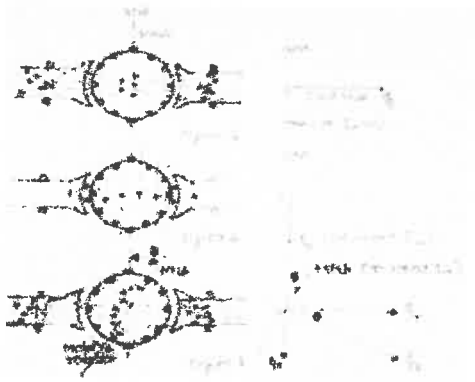
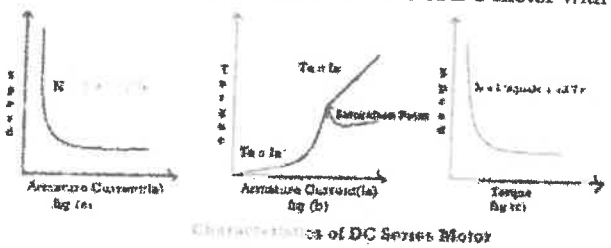
IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India

(Approved by AICTE, New Delhi and affiliated to Anna University, Chennai)

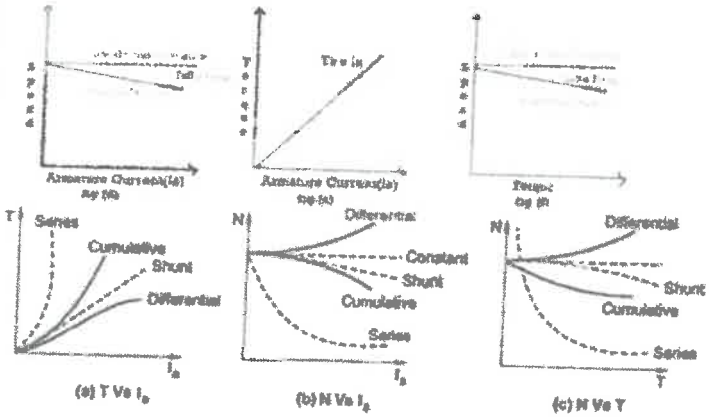
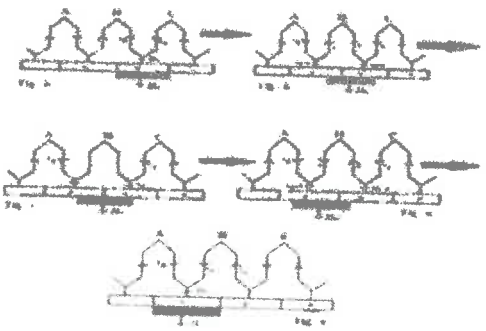
	Internal Assessment Exam - III		**Date/Session**	**15/09/18 AN**	**Marks**	**50**
Course code	**EE8301**	**Course Title**	**ELECTRICAL MACHINES – I**		
Regulation	**2018**	**Duration**	**90 minutes**	**Academic Year**	**2018-19**
Year	**2ND**	**Semester**	**III**	**Department**	**EEE**

Q.No.	Question	CO	BTS
	PART A **(Answer all the Questions 10 x 2 = 20 Marks)**		
1	What will happen to the speed of a DC motor when its flux approaches zero? In DC motor, the relation of speed and flux is given by Naϕ1 from the equation Eb=ϕZNP/60A, when other things remain constant. Now if flux is approaches to zero then the speed will be approached to infinity.	CO1	K2
2	Mention the effects of differential compounding and cumulatively compound on the performance of DC Compound motor  Differential compound motor are rarely used due to its poor Torque speed characteristics. The machine can be operated at constant speed on medium load. But at very high load / torque the speed is very high to damage the moto	CO1	K1
3	Compare lap and wave windings? In lap winding, the coil end is allied to the nearby commutator section, while in the wave winding the armature end coil is located within the commutator section which is located separately. The lap winding emf is less when compared with wave winding.	CO1	K2
4	What is the use of Inter poles in D.C machine? Interpoles in DC machine has basically two functions: Automatic neutralization of cross magnetization due to armature reaction. To counter and cancel reactance voltage in the coil undergoing commutation	CO1	K1
5	Write the E.M.F equation of generator? When this generator coil is rotated through one-fourth of a revolution, the magnetic flux Φm changes from its maximum to zero, inducing an emf. Faraday's law of induction is used to find the emf induced: $e=-Nd\Phi mdt$	CO3	K1
6	Classify the different types of DC Generators based on method of excitation? DC generators are mainly categorised into three types based on the field excitation methods. They are Permanent Magnet DC generator, Separately Excited DC generator, and Self-Excited DC generator.	CO1	K5
7	What are the methods to improve commutation? There are three main methods of Improving commutation or obtaining sparkles Commutation. These are Resistance Commutation and Voltage Commutation and Compensating Winding.	CO2	K4
8	State the applications of DC Generator.	CO1	K1

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

	They are used to charge batteries, and also to provide excitation to alternators. DC generators are also used in arc welding that requires voltage drop and constant current. Hostels, lodges, offices, and other buildings use DC generators to generate power.		
9	Define back pitch and front pitch. Back pitch YB the distance between the top and bottom coil sides of a coil measured around the back of armature is called back pitch. Front pitch YF the distance between the two coil sides connected to the same commutator segment is called front pitch	CO1	K1
10	Explain the significance of back emf in a DC Motor? The back EMF in a DC motor makes it a self-regulating machine, which means it makes the motor to draw a sufficient amount of armature current to develop the torque required by the mechanical load.	CO1	K1
	PART B **(Answer all the Questions 2 x 10 = 20 Marks)**		
11a	Explain the constructional and working principle of DC machine with its necessary emf equations. 	CO1	K2
	OR		
11b	Explain the Armature Reaction in a D.C generator? 	CO1	K2
12a	Explain in detail about the characteristics of DC motor with neat diagram.  Characteristics of DC Series Motor	CO4	K3

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

	 Characteristics of dc compound motor		
	OR		
12b	Describe the process of commutation in D.C machine? 	CO4	K3
	PART C **(Answer all the Questions 1 x 10 = 10 Marks)**		
13a	A separately excited generator when running at 1000 r.p.m supplied 200A at 125V.What will be the load current when the speed drops to 800r.p.m. If I f is unchanged? Given that armature resistance= 0.04 ohm and brus drop = 2 v .Derive the necessary equations?	CO3	K2
	OR		
13b	A 4 pole lap wound shunt generator supplies 60 lamps of 100 watts , 240 V each; the field and armature resistances are 55ohm and 0.18ohm respectively .If the brush drop is 1V for each brush.Find (i) Armature current (ii) current per path Generated emf (iv) power out put of DC machines	CO3	K3

K. Sathadevi

Course Faculty

G. Malathi

HoD

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

INDRA GANESAN COLLEGE OF ENGINEERING

IG VALLEY, MANIDANDAM, TIRUCHIRAPPALLI – 620 012

EPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

ACADEMIC YEAR 2018 – 2019 (ODD SEMESTER)

STUDENTS MARK STATEMENT- CO BASED

CYCLE TEST-III

SUBJECT CODE &TITLE: EE8301&ELECTRICAL MACHINES – I

YEAR/SEM: II/III **MONTH & YEAR: 2018**

S.NO	REG NO	STUDENT NAME	CO4 (30)	CO5 (20)	TOTAL (50)
1.	811218105001	Arun praveen raj A	22	12	34
2.	811218105002	Hariharan M	20	12	32
3.	811218105003	Inbaraj A	23	12	35
4.	811218105004	Jeya stephen S	20	10	30
5.	811218105005	Manikandan N	10	10	20
6.	811218105006	Padmanaban A	15	12	27
7.	811218105007	Sasikumar R	24	13	37
8.	811218105008	Sivakumar P	21	17	38
9.	811218105009	Veera ragavan A	18	18	36
10.	811218105010	Yuvaraj S	29	19	48

<20	20-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
-	2	7	1	-	-	-	-	-

Total No.of Candidates Present	**10**
Total No.of Candidates Absent	**NIL**
Total No.of Students Pass	**9**
Total No. of Students Fail	**1**
Percentage of Pass	**90**

K. Sivakumar G. Malathi

STAFF INCHARGE **HoD/EEE**

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

INDRA GANESAN COLLEGE OF ENGINEERING,
IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu - 620 012, India
(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai)

DEPARTMENT OF

ROOT CAUSE ANALYSIS

Name of the Faculty:
Degree & Program: BE & TEE
IA Test : 2
Target :

Course Code & Name : EE 8501 - Electrical Machines I
Semester & Section : II / A
University Exam/Month & Year:
Achieved :

S.NO	REG	NAME OF THE STUDENT	CAUSES FOR FAILURE	SIGNATURE OF THE STUDENT WITH DATE	CORRECTIVE ACTION TAKEN	PREVENTIVE ACTION TAKEN
					Instructed to	Assignment

Signature of the Faculty

Signature of the HoD

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India
(Approved by AICTE, New Delhi. Affiliated to Anna University, Chennai-25)

IQAC Academic Audit Form

ACADEMIC YEAR: 2018-2019 SEMESTER III

Name of Department: CSE Year / Sem / Sec: II No. of Students Registered: 10

Details of Examination: Test-1

S.No	Course Code	List of Reg.No Verified	Course Log Book Verified (Y / N)	Course File Verified (Y / N)	No of students Attended	No of Absentees	No of Failures	Pass %	Remarks
			Y	Y	8	2	1	75%	Retest
			Y	Y	7	3	NIL	100%	—
			Y	Y	10	NIL	NIL	100%	—
			Y	Y	10	NIL	NIL	100%	—
			Y	Y	7	3	2	71%	Retest
			Y	Y	8	2	NIL	100%	—

Verified by

External Member Name and Signature: Dr. Kannan

Internal Member Name and Signature: Mr. O. Karthikeyan

Instructed to conduct Retest for failure Students

G. Malathi
HoD/ EEE

IQAC Co-ordinator

Principal

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

INDRA GANESAN COLLEGE OF ENGINEERING

(Approved by AICTE, New Delhi and affiliated to Anna University, Chennai)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS

ENGINEERING CONTENTS OF COURSE FILE

(to be pasted on the inner side of the file-front side)

1. Preface of the course file*
2. Vision, Mission, PEOs, POs, PSOs, Blooms taxonomy*
3. Subject handlers of yesteryears*
4. Timetable/Workload of the staff– Distribution of teaching load – Roles and Responsibilities*
5. Syllabus signed by HoD*
6. Lecture Schedule with Websites for reference – Course outcomes, mapping, CBS, (at least five) *
7. Course Committee meeting with Course co-ordinator and minutes* (Common Courses only)
8. Identification of Curricular gap and Content Beyond the syllabus*
9. Self study topics-Journal /Conference papers published in the above subject (recent-at least 2)*
10. Nominal Roll- 3 copies-(a).For test mark entry. (b).for Assignment entry. (c). for tutorial mark entry*
11. AU Question papers (at least 5)*
12. Unit wise Q&A-Objective type questions-20 questions in each unit with answers*
13. PPT Material, Course Material-Unit wise*
14. Assignment question paper with COs, POs & PSOs mapping and sample answer sheet (at least 3)*&
15. Tutorial Question paper with COs, POs & PSOs mapping and answer key(minimum 3 questions per unit, 15 questions per course)*&
16. Class Test / IA- Test question paper, Key with Sample answer paper (at least 3) - each IA test, CTs*&
17. Retest question paper –sample*&
18. Root Cause Analysis, CAP, Follow up action*&
19. AU Web portal entry sheet*&
20. Content beyond the syllabus proof*&$
21. Student feedback on faculty *&$
22. Course end survey*&$
23. Internal Assessment sheet*&$
24. AU question paper with students feedback*&$
25. Discrepancy of the question paper and correspondence, if any*&$
26. AU grade sheet*&$@
27. CO – PO & PSO attainment sheet*&$@
28. Any other documents not listed –specify and enclose*&

Note:

1. This file should be prepared and signed by HoD/EEE, within one week before the commencement of the classes (Marked as *)
2. This file should be submitted for verification, after each internal assessment test (*&)
3. This file should be submitted for verification, within two weeks, after the last working day (*&$)
4. Final submission within one week after the publication of AU results. (*&$@)

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.