B.E Semester: 3 Mechanical Engineering

Subject Name: Electrical Machines & Electronics (MA305-N)

A. Course Objective:
• To present a problem oriented introductory knowledge of Electrical Machines.
• Tofocusonthestudyofelectromechanicalenergyconversion&differentpartsofelectricalmachine.
• To address the under lying concepts & methods behind Electrical Engineering machines.
• To focus on electronic devices and circuits.
• To present application oriented approach to the students in the field of electronic circuits.

B. Teaching / Examination Scheme:

Teaching Scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract.	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
2	0	2	4	3	3	70	30	20	30	150

C. Detailed Syllabus:

Unit No.	Details
1	Generators D.C. Generators Types, Working principle, Construction, E.M.F. equation, Characteristic, Application, Losses & Efficiency, A.C. Generators: Construction& Types, E.M.F. equation, Voltage Regulation, Losses & Efficiency.
2	D.C Motors Types, Principle of operation, Torque equation, Characteristics of shunt, series and compound motor, Need of Starter and Types, Methods of speed control, Losses and Efficiency.3-Phaseinductionmotor:Construction, Production of Rotating magnetic field, Principle of operation, Speed and Slip, Rotor current , Power Flow diagram, Relations between rotor input, copper losses and Output, Torque Equation, Torque-Slip Characteristics, Losses and Efficiency and Types, Methods of Speed control. Single phase induction motor: Working Principle of Single Phase Induction Motor, Construction & Types.
3	Transformers: Construction of Three phase and single phase transformers, Working principle, Types of transformers based on construction, Transformer on no- load and load, Voltage Regulation, Open circuit and Short circuit test and their applications, Losses & Efficiency.

4	Logic Gates, Transistor and OP-AMP Circuits: Basic logic circuits: Logic gates (AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR and their truth tables), Laws of Boolean algebra, De Morgan's theorem, Transistor configuration, Common Emitter amplifier, Multistage amplifier, Symbol and pin diagram of IC 741 OPAMP, OPAMP circuits – Inverting, Non-inverting, Differential, Comparator.

Total hours (Theory):32
Total hours (Practical)32
Total hours:64

D. Lesson Planning:

Sr. No.	Date/Week	Unit	Weight age	Topic No
1	1st ,2nd ,3rd	Unit 1	20%	1
2	4th .5th ,6,7th , 8th ,9th	Unit 2	40%	2
3	10th . 11th . 12th	Unit 3	20%	3
4	13th , 14th ,15th ,16th	Unit 4	20%	4

E. Instructional Method & Pedagogy

1	At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
2	Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weight age should be given to all topics while teaching and conduction of all examinations.
3	Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
4	One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
5	Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
6	Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.
7	The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.

F. List of Practical:

1	Constructional study of D.C. Machine Parts
2	To obtain the magnetization characteristic of a separately excited D.C Generator
3	To Obtain Internal and External characteristic of D.C Shunt Generator.

4	To obtain Internal and External characteristics of a D.C. Series generator.
5	To obtain External and Internal characteristics of a D.C. compound generator
6	Study construction and working principle of the d.c. motor Starter.
7	To perform the speed control of D.C shunt Motor by (i) Field Control Method (ii) Armature Control Method
8	Constructional study of 1-Phase Transformer.
9	Constructional study of 3-Phase Induction Motor.
10	To study the working principle & construction of an Alternator.
11	To Verify the Truth Table of Various Types of Logic Gates.

G. Students Learning Outcomes:

1	The student can be acquired the basic knowledge of energy conversion principle and electrical machine thus being prepared to pursue any area of engineering spectrum in depth as desired.
2	The students will be able to effectively employ electrical systems and lead the exploration of new applications and techniques for their use.

H. Text Books & Reference Books:

1	Electrical Machines. By Nagarath & Kothari, TMH Publications
2	Electrical Technology Vol II. B. L. Theraja,S .Chand Publications
3	Performance and Design of A.C. machines by M. G. Say
4	Electrical Machines by J. B. Gupta, Kataria Pub.
5	Principles of Electronics by V. K. Mehta