

GOVERNMENT OF TAMILNADU

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

**DRAFT SYLLABUS
(III to VI Semester)**



**'K' Scheme
(2007-2008)**

**DIRECTORATE OF TECHNICAL EDUCATION
CHENNAI – 600025**

Proceedings No. 13845/CDC/Y3/2007, Dt. 08.08.07

Syllabus Committee Members

1. ELECTRICAL & ELECTRONICS ENGINEERING
2. Part-time

CONVENOR

Mr. M.R. Sridhar, HOD/Electrical

Govt. Polytechnic College

Nammalwarpet, Purasawalkam Chennai 600 012.

MEMBERS

1.	Mr.G. Nandakishore, HOD/Elect. C.N. Poly. College, Vepery, Chennai – 600 007	2.	Mr.B. Subbaraj, Sr.Lectr./Electl. Tamil Nadu Poly. College, Madurai 625 011.
2.	Mr.Thirunavukarasu, Sr. Lect./Electl. C.N.Poly. College, Vepery, Chennai-7	4.	Mr.V. Ramalingam, Sr. Lect./Electl. Central Polytechnic College, Tharamani, Chennai 600 113
5.	Miss. Marjori Thevdre, M.E. HOD/EEE, IRT Poly. College, Konganthanparai, Thirunelveli 627 007	6.	Mr.G. Natarajan, HOD, S.A. Polytechnic College, Sundara Solavaram, Thiruverkadu Post, Chennai 600 077
7.	Mr.Srinivasan, HOD*Eletctrical, Sri Iyappa Polytechnic College, V.B. Nagar, Aivadgugudi, Eranji Post, Asanur Post. Virudhachalam T.K. Cuddalore Dist 606 305	8.	Mr.M. Vijayaragavan, Sr. Lect. (Retd.) Central Poly College, Tharamani, Chennai 600 113.
9.	Mr.P. Govindasamy, Sr. Lect./Electl. Bhakthavatchalam Poly. College, Kancheepuram 631 552	10.	Prof. N.T. Kumar, Principal (Retd) Dhanalakshmi College of Engineering, Manimangalam, Chennai 601 301
11.	Prof. K.Rajeswaran, HOD (Retd.) Mada Engg. College, Kunrathur, Chennai 600 069\	12.	Mr.B. Murali, Superintending Engineer (Retd.) TNEB now at Dhanalakshmi College of Engineering, Manimangalam, Chennai 601 301

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER SYSTEM (Implemented from 2008 – 2009) K-SCHEME

REGULATIONS

1. Description of the Course

The course for the Diploma in Engineering shall extend over a period of three academic years, consisting of 6 semesters, as detailed below:

I	Semester	July/August	to	December
II	Semester	January	to	May
III	Semester	June	to	November
IV	Semester	December	to	May
V	Semester	June	to	November
VI	Semester	December	to	May

Each Semester will have 16 weeks duration of study.

2. Condition for Admission

Candidates for admission to the Diploma Course shall be required to have passed the S.S.L.C. Examination of the Board of Secondary Education, Tamil Nadu.

or

The Anglo-Indian High School Examination with eligibility for Higher Secondary Course in Tamil Nadu.

Or

The Matriculation examination conducted in Tamil Nadu.

Or

Any other examination recognized as equivalent to the S.S.L.C. examination, by the Board of Secondary Education, Tamil Nadu.

Note: In addition, at the time of admission the candidate will have to satisfy certain minimum requirements, which may be prescribed from time to time, with regard to the marks, in the qualifying examinations.

3. Eligibility for the Award of Diploma

No candidate shall be eligible for the Diploma unless he/she has undergone the prescribed course of study for a period of not less than 3 academic years in an Institution when joined in First Year and two years if joined under Lateral scheme

in the second year, affiliated to the State Board of Technical Education and Training, Tamilnadu and has passed the prescribed examination.

4. **Subject of study and curriculum outline**

The subjects of study shall be in accordance with the syllabus prescribed from time to time, both in theory and practical. The curriculum outline for Full Time (3rd Semester to 6th Semester) is given in **Annexure – I** and for Part Time (3rd Semester to 8th Semester) is given in **Annexure – III**.

5. **Examinations**

Board Examinations in all subjects of all semesters under the scheme of examinations will be conducted at the end of each semester.

The session marks in all the subjects will be awarded on the basis of continuous internal assessment made during the semester concerned. For each subject 25 marks are allotted for internal assessments and 75 marks are allotted for Board Examination.

6. **Continuous Internal Evaluation**

THEORY

It has been decided to introduce continuous internal assessment marks for a total of 25 marks, which are to be distributed as follows:

ATTENDANCE

5 Marks

(Award of marks for attendance will be as per the range given below)

80% - 83%	:	1 Mark
84% - 87%	:	2 Marks
88% - 91%	:	3 Marks
92% - 95%	:	4 Marks
96% - 100%	:	5 Marks

TEST

10 Marks

For each subject three tests should be conducted. Out of three, best of two will be taken for assessment.

ASSIGNMENT

10 Marks

For each subject three Assignments are to be given. Out of which best of two will be taken for 10 marks.

All Test Papers after getting the signature from the students must be kept in the safe custody in the Department for verification and audit. It should be preserved for a Semester for Academic Audit.

PRACTICAL

The internal assessment marks calculation is given as follows:

a.	Attendance	:	5 Marks - Evaluation Pattern same as Theory
b.	Procedure/Observation and tabulation/ Other related Practical Work	:	10 Marks
c.	Result	:	5 Marks
d.	Record writing	:	5 Marks
			----- 25 Marks -----

The Record for every completed exercise should be submitted in the subsequent practical classes and marks should be awarded for 20 for each exercise as per the above allocation.

At the end of the Semester, the average marks of all the exercises should be calculated for 20 marks and the marks awarded for attendance is added to arrive at the internal marks for Practical.

All the mark entries for assignment, Test and attendance should be entered in the Personal Log Book of the staff handling the subject. This is applicable to both Theory and Practical subjects.

7. Scheme of Examinations

The scheme of examinations for Full Time (3rd Semester to 6th Semester) is given in **Annexure – II** and for Part Time (3rd Semester to 8th Semester) is given in **Annexure – IV**.

Equivalent papers for J – Scheme subjects in K – Scheme is given in Annexure - V

8. Criteria for Pass

1. No candidate shall be eligible for the award of Diploma unless he/she has undergone the prescribed course of study successfully in an Institution approved by AICTE and affiliated to the State Board of Technical Education & Training, Tamil Nadu and pass all the subjects prescribed in the syllabus.

2. A candidate shall be declared to have passed the examination in a subject if he/she secures not less than 40% in theory, drawing subjects and 50% in practical subject out of the total prescribed maximum marks including both the session and the Board Examination marks put together, subject to the condition that he/she has to secure at least a minimum of 30 marks out of 75 marks in the Board's Theory/Drawing/Practical Examinations.

9. **Classification of successful candidates**

Classification of candidates who pass out the final examination from April 2010 onwards (joined in first year in 2007-2008) will be done as specified below:

FIRST CLASS WITH HONOURS

A candidate will be declared to have passed in First Class with Honours if he/she secures not less than 75% of the aggregate marks in all semesters put together, except I and II Semester and passes all the above semesters in the First appearance itself and completes all papers including that of I & II Semester within the stipulated period of study 3/3 ½/4years (Full Time/Sandwich/Part-Time) without any break in study.

FIRST CLASS

A candidate will be declared to have passed in First Class if he/she secures not less than 60% of the aggregate marks in all semesters put together, except I and II Semesters and completes all papers including that of I & II Semester within the stipulated period of study 3 / 3 ½ / 4 years (Full Time/Sandwich/Part-Time) without any break in study.

SECOND CLASS

All other successful candidates will be declared to have passed in Second Class.

The above mentioned classification is application for the Sandwich / Part – Time students who pass out Final Examination from October 2010 / April 2011 onwards (both joined in First Year in 2007-2008).

10. **DURATION OF A PERIOD IN THE CLASS TIME TABLE**

The duration of each period of teaching in a day is 1 hour and the total period of instruction hours excluding interval and lunch break in a day should be uniformly maintained as 7 hours corresponding to 7 period of instruction (Theory & Practical).

ANNEXURE – I
ELECTRICAL AND ELECTRONICS ENGINEERING
CURRICULUM OUTLINE (FULL TIME)
(With effect from 2008 - 2009)

III SEMESTER

Sl. No.	Subject code	Subject Name	Theory Hours/ Week	Practical Hours/ Week
1.	EEK 310	Electrical Circuit Theory	6	
2.	EEK 320	Electrical Machines-I	6	
3.	EEK 330	Electronic Devices and Circuits	5	
4.	EEK 340	Electrical Circuits and Machines Practical		6
5.	EEK 350	Electronic Devices and Circuits Practical		6
6.	EEK 360	Workshop Practical		6

IV SEMESTER

Sl. No.	Subject code	Subject Name	Theory Hours/ Week	Practical Hours/ Week
1.	EEK 410	Electrical Machines-II	6	
2.	EEK 420	Measurements and Instrumentation	7	
3.	EEK 430	Analog and Digital Electronics	6	
4.	EEK 440	English Communication Practical		4
5.	EEK 450	Electrical Machines & Instrumentation Practical		6
6.	EEK 460	Analog and Digital Electronics Practical		6

V SEMESTER

Sl. No.	Subject code	Subject Name	Theory Hours/ Week	Practical Hours/ Week
1.	EEK 510	Power System - I	6	
2.	EEK 520	Microprocessor and Microcontroller	5	
3.	EEK 530	Elective Theory-I	6	
	EEK 531	Control of Electrical Machines		
	EEK 532	Programmable Logic Controller		
4.	EEK 540	'C' Programming – Practical		6
5.	EEK 550	Microprocessor and Microcontroller Practical		6
6.	EEK 560	Elective Practical-I		6
	EEK 561	Control of Electrical Machines Practical		
	EEK 562	Programmable Logic Controller Practical		

VI SEMESTER

Sl. No.	Subject code	Subject Name	Theory Hours/ Week	Practical Hours/ Week
1.	EEK 610	Power System - II	5	
2.	EEK 620	Electrical Wiring Estimation and Energy Management	6	
3.	EEK 630	Elective Theory-II	6	
	EEK 631	Power Electronics		
	EEK 632	Computer Hardware & Networking		
4.	EEK 640	CAED Practical		6
5.	EEK 650	Elective Practical-II		6
	EEK 651	Power Electronics Practical		
	EEK 652	Computer Hardware & Networking Practical		
6.	EEK 660	Project Work		6

ANNEXURE – II
ELECTRICAL AND ELECTRONICS ENGINEERING
SCHEME OF EXAMINATION (FULL TIME)
(With effect from 2008 - 2009)

III SEMESTER

Sl.No	Subject Code	Subject Name	Examination Marks			Minimum for pass	Duration Of Exam/ Hours
			Internal Assessment Marks	Board Exam Marks	Total Marks		
1.	EEK 310	Electrical Circuit Theory	25	75	100	40	3
2.	EEK 320	Electrical Machines-I	25	75	100	40	3
3.	EEK 330	Electronic Devices and Circuits	25	75	100	40	3
4.	EEK 340	Electrical Circuits and Machines Practical	25	75	100	50	3
5.	EEK 350	Electronic Devices and Circuits Practical	25	75	100	50	3
6.	EEK 360	Workshop Practical	25	75	100	50	3

IV SEMESTER

Sl.No	Subject Code	Subject Name	Examination Marks			Minimum for pass	Duration Of Exam/ Hours
			Internal Assessment Marks	Board Exam Marks	Total Marks		
1.	EEK 410	Electrical Machines-II	25	75	100	40	3
2.	EEK 420	Measurements and Instrumentation	25	75	100	40	3
3.	EEK 430	Analog and Digital Electronics	25	75	100	40	3
4.	EEK 440	English Communication Practical	25	75	100	50	3
5.	EEK 450	Electrical Machines & Instrumentation Practical	25	75	100	50	3
6.	EEK 460	Analog and Digital Electronics Practical	25	75	100	50	3

V SEMESTER

Sl.No	Subject Code	Subject Name	Examination Marks			Minimum for pass	Duration Of Exam/ Hours
			Internal Assessment Marks	Board Exam Marks	Total Marks		
1.	EEK 510	Power System - I	25	75	100	40	3
2.	EEK 520	Microprocessor and Microcontroller	25	75	100	40	3
3.	EEK 530	Elective Theory-I	25	75	100	40	3
	EEK 531	Control of Electrical Machines					
	EEK 532	Programmable Logic Controller					
4.	EEK 540	'C' Programming – Practical	25	75	100	50	3
5.	EEK 550	Microprocessor and Microcontroller Practical	25	75	100	50	3
6.	EEK 530	Elective Theory-I	25	75	100	50	3

VI SEMESTER

Sl. No	Subject Code	Subject Name	Examination Marks			Minimum for pass	Duration Of Exam/ Hours
			Internal Assessment Marks	Board Exam Marks	Total Marks		
1.	EEK 610	Power System - II	25	75	100	40	3
2.	EEK 620	Electrical Wiring Estimation and Energy Management	25	75	100	40	3
3.	EEK 630	Elective Theory-II	25	75	100	40	3
	EEK 631	Power Electronics					
	EEK 632	Computer Hardware & Networking					
4.	EEK 640	CAED Practical	25	75	100	50	3
5.	EEK 650	Elective Practical-II	25	75	100	50	3
	EEK 651	Power Electronics Practical					
	EEK 652	Computer Hardware & Networking Practical					
6	EEK 660	Project Work	25	75	100	50	3

ANNEXURE – III
ELECTRICAL AND ELECTRONICS ENGINEERING
CURRICULUM OUTLINE (PART TIME)
(With effect from 2008 - 2009)

III SEMESTER

Sl. No.	Subject code	Subject Name	Theory Hours/ Week	Practical Hours/ Week
1.	EEK 310	Electrical Circuit Theory	6	
2.	2005	Engineering graphics	6	
3.	2008	Computer Application Practical		6
4.	EEK 360	Workshop Practical		6

IV SEMESTER

Sl. No.	Subject code	Subject Name	Theory Hours/ Week	Practical Hours/ Week
1.	EEK 320	Electrical Machines-I	6	
2.	EEK 330	Electronic Devices and Circuits	6	
3.	EEK 340	Electrical Circuits and Machines Practical		4
4.	EEK 350	Electronic Devices and Circuits Practical		4
5.	EEK 640	CAED Practical		4

V SEMESTER

Sl. No.	Subject code	Subject Name	Theory Hours/ Week	Practical Hours/ Week
1.	EEK 410	Electrical Machines-II	5	
2.	EEK 420	Measurements and Instrumentation	6	
3.	EEK 430	Analog and Digital Electronics	5	
4.	EEK 450	Electrical Machines & Instrumentation Practical		4
5.	EEK 460	Analog and Digital Electronics Practical		4

VI SEMESTER

Sl. No.	Subject code	Subject Name	Theory Hours/ Week	Practical Hours/ Week
1.	EEK 510	Power System - I	6	
2.	EEK 620	Electrical Wiring Estimation and Energy Management	6	
3.	EEK 440	English Communication Practical		6
4.	EEK 550	'C' Programming – Practical		6

VII SEMESTER

Sl. No.	Subject code	Subject Name	Theory Hours/ Week	Practical Hours/ Week
1.	EEK 520	Microprocessor and Microcontroller	6	
2.	EEK 530	Elective Theory-I	6	
	EEK 531	Control of Electrical Machines		
	EEK 532	Programmable Logic Controller		
3.	EEK 550	Microprocessor & Microcontroller Practical		6
4.	EEK 560	Elective Practical-I		6
	EEK 561	Control of Electrical Machines Practical		
	EEK 562	Programmable Logic Controller Practical		

VIII SEMESTER

Sl. No.	Subject code	Subject Name	Theory Hours/ Week	Practical Hours/ Week
1.	EEK 610	Power System - II	6	
2.	EEK 630	Elective Theory-II	6	
	EEK 631	Power Electronics		
	EEK 632	Computer Hardware & Networking		
3.	EEK 650	Elective Practical-II		6
	EEK 651	Power Electronics Practical		
	EEK 652	Computer Hardware & Networking Practical		
4.	EEK 660	Project Work		6

ANNEXURE – IV
ELECTRICAL AND ELECTRONICS ENGINEERING
SCHEME OF EXAMINATION (PART TIME)
(With effect from 2008 - 2009)

III SEMESTER

Sl.No	Subject Code	Subject Name	Examination Marks			Minimum for pass	Duration Of Exam/ Hours
			Internal Assessment Marks	Board Exam Marks	Total Marks		
1.	EEK 310	Electrical Circuit Theory	25	75	100	40	3
2.	2005	Engineering graphics	25	75	100	40	3
3.	2008	Computer Application Practical	25	75	100	50	3
4.	EEK 360	Workshop Practical	25	75	100	50	3

IV SEMESTER

Sl.No	Subject Code	Subject Name	Examination Marks			Minimum for pass	Duration Of Exam/ Hours
			Internal Assessment Marks	Board Exam Marks	Total Marks		
1.	EEK 320	Electrical Machines-I	25	75	100	40	3
2.	EEK 330	Electronic Devices and Circuits	25	75	100	40	3
3.	EEK 340	Electrical Circuits and Machines Practical	25	75	100	50	3
4.	EEK 350	Electronic Devices and Circuits Practical	25	75	100	50	3
5.	EEK 640	CAED Practical	25	75	100	50	3

V SEMESTER

Sl. No	Subject Code	Subject Name	Examination Marks			Minimum for pass	Duration Of Exam/ Hours
			Internal Assessment Marks	Board Exam Marks	Total Marks		
1.	EEK 410	Electrical Machines-II	25	75	100	40	3
2.	EEK 420	Measurements and Instrumentation	25	75	100	40	3
3.	EEK 430	Analog and Digital Electronics	25	75	100	50	3
4.	EEK 450	Electrical Machines & Instrumentation Practical	25	75	100	50	3
5.	EEK 460	Analog and Digital Electronics Practical	25	75	100	50	3

VI SEMESTER

Sl. No	Subject Code	Subject Name	Examination Marks			Minimum for pass	Duration Of Exam/ Hours
			Internal Assessment Marks	Board Exam Marks	Total Marks		
1.	EEK 510	Power System Engineering	25	75	100	40	3
2.	EEK 620	Electrical Wiring Estimation and Energy Management	25	75	100	40	3
3.	EEK 440	English Communication Practical	25	75	100	50	3
4.	EEK 540	'C' Programming – Practical	25	75	100	50	3

VII SEMESTER

Sl. No	Subject Code	Subject Name	Examination Marks			Minimum for pass	Duration Of Exam/ Hours
			Internal Assessment Marks	Board Exam Marks	Total Marks		
1.	EEK 520	Microprocessor and Microcontroller	25	75	100	40	3
2.	EEK 530 EEK 531 EEK 532	Elective Theory-I a)Control of Electrical Machines b)Programmable Logic Controllers	25	75	100	40	3
3.	EEK 550	Microprocessor & Microcontroller Practical	25	75	100	50	3
4.	EEK 560	Elective Practical-I	25	75	100	50	3
	EEK 561	Control Of Electrical Machines Practical					
	EEK 562	Programmable Logic Controller Practical					

VIII SEMESTER

Sl. No	Subject Code	Subject Name	Examination Marks			Minimum for pass	Duration Of Exam/ Hours
			Internal Assessment Marks	Board Exam Marks	Total Marks		
1.	EEK 610	Distribution & Utilisation	25	75	100	40	3
2.	EEK 630 EEK 631 EEK 632	Elective Theory-II a)Power Electronics b)Computer Hardware & Networking	25	75	100	40	3
3.	EEK 650	Elective Practical-II	25	75	100	50	3
	EEK 651	Power Electronics Practical					
	EEK 652	Computer Hardware & Networking Practical					
4.	EEK 660	Project Work	25	75	100	50	3

ANNEXURE - V

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING EQUIVALENT PAPERS FOR J SCHEME SUBJECTS IN K SCHEME FULL TIME

III SEMESTER

S. No	Subject Code J Scheme	Name of Subject J Scheme	Subject Code K Scheme	Name of Subject K Scheme
01	EEJ310	Electrical Circuit Theory	EEK 310	Electrical Circuit Theory
02	EEJ320	Electrical Machines I	EEK 320	Electrical Machines-I
03	EEJ330	Electronic Devices & Circuits	EEK 330	Electronic Devices & Circuits
04	EEJ340	Electrical Machines Lab I	EEK 340	Electrical Circuits & Machines Practical
05	EEJ350	Electronic Devices & Circuits Lab	EEK 350	Electronic Devices & Circuits Practical
06	EEJ360	MS Office Lab		No Equivalent

IV SEMESTER

S. No	Subject Code J Scheme	Name of Subject J Scheme	Subject Code K Scheme	Name of Subject K Scheme
01	EEJ410	Electrical Machines II	EEK 410	Electrical Machines-II
02	EEJ420	Measurement and Instrumentation	EEK 420	Measurements and Instrumentation
03	EEJ430	Basics of Mechanical Engineering		No Equivalent
04	EEJ440	Electrical Machines Lab II	EEK 450	Electrical Machines and Instrumentation Practical
05	EEJ450	Computer Aided Electrical Drawing Lab	EEK 640	Computer Aided Electrical Drawing Practical
06	EEJ460	Mechanical Engineering Lab	EEK 360	Workshop Practical

V SEMESTER

S. No	Subject Code J Scheme	Name of Subject J Scheme	Subject Code K Scheme	Name of Subject K Scheme
01	EEJ 510	Generation, Transmission and Switch Gear	EEK 510	Power System - I
02	EEJ 520	Analog and Digital Electronics	EEK 430	Analog and Digital Electronics
03	EEJ 530	Elective Theory I	EEK 530	Elective Theory I
	EEJ 531	Programming in C		-- No Equivalent --
	EEJ 532	Control Of Electrical Machines	EEK 531	Control Of Electrical Machines
	EEJ 533	Non Conventional Energy Sources.		-- No Equivalent --
	EEJ 534	Electrical Machine Design		-- No Equivalent --
04	EEJ540	Wiring, Winding and Estimation Lab		-- No Equivalent --
05	EEJ550	Analog and Digital Electronics Lab	EEK 460	Analog and Digital Electronics Practical
06	EEJ560	Elective Practical I	EEK 560	Elective Practical I
	EEJ 561	Programming in C – Lab	EEK 540	'C' Programming – Practical
	EEJ 562	Control Of Electrical Machines Lab	EEK 561	Control of Electrical Machines Practical
	EEJ 563	Non Conventional Energy Sources Lab		-- No Equivalent --
	EEJ 564	Electrical Machine Design Lab		-- No Equivalent --

VI SEMESTER

S. No	Subject Code J Scheme	Name of Subject J Scheme	Subject Code K Scheme	Name of Subject K Scheme
01	EEJ610	Distribution and Utilization	EEK 610	Power System - II
02	EEJ620	Micro controllers	EEK 520	Microprocessor and Microcontroller
03	EEJ 630	Elective Theory II	EEK 630	Elective Theory II
	EEJ 631	Power Electronics	EEK 631	Power Electronics
	EEJ 632	Programmable Logic Controller Including Data Acquisition System (Das)	EEK 532	Programmable Logic Controller
	EEJ 633	Programming In C++		-- No Equivalent --
	EEJ 634	Computer Hardware Servicing		-- No Equivalent --
04	EEJ640	Micro controller Lab	EEK 550	Microprocessor & Microcontroller Practical
05	EEJ650	Elective Practical II	EEK 650	Elective Practical II
	EEJ 651	Power Electronics Lab	EEK 651	Power Electronics
	EEJ 652	Programmable Logic Controller Including Data Acquisition System (Das) Lab	EEK 562	Programmable Logic Controller Practical
	EEJ 653	Programming In C++ Lab		-- No Equivalent --
	EEJ 654	Computer Hardware Servicing Lab		-- No Equivalent --
06	EEJ660	Project Work and Entrepreneurship	EEK 660	Project Work

III SEMESTER

EEK 310 - ELECTRICAL CIRCUIT THEORY

Total No. of Hours / Week	:	6
Total No. of Weeks / Semester	:	16
Total No. of Hours / Semester	:	96

Scheme of Instruction and Examination

Subject Code	Name of Subject	Instruction		Examination		
		Hours / Week	Hours / Semester	Assessment marks		
				Internal	Board Exam	Total
3031	Electrical Circuit Theory	6	96	25	75	100

Topics and Allocation

Unit	TOPIC	TIME (hrs)
I	Electrostatics and D.C. Circuits	16
II	Network Theorems	18
III	Single phase A.C Circuits	18
IV	Three Phase A.C. Circuits and Resonant Circuits	16
V	DC. Transients and Storage Batteries	16
	Revision and Test	12
	Total	96

Objectives

At the end of Unit I – V the student must be able to

- Define the terms electrostatic flux, flux density, flux intensity, electric potential and their units.
- State and explain Coulomb's law of electrostatics.
- State the relationships between the charge, voltage and capacitance

- Obtain an expression for the capacitance of a parallel plate capacitor and calculate its value given the dimensions
- Obtain an expression for the energy stored in capacitor and calculate its value
- Find the equivalent capacitance when the capacitances are connected in series and in parallel
- State the different types of capacitors and to identify them
- Define the basic electrical units such as current, resistance, power, and energy and their units
- Obtain relationships between electrical, mechanical and thermal units and to convert one unit into another
- state Ohm's law and solve problems using Ohm's law
- State Kirchoff's laws and solve problems using Kirchoff's laws
- Explain the effect of temperature on resistance and to calculate the resistance at different temperatures
- Determine the equivalent resistance when resistors are connected in series, in parallel and in series-parallel
- Specifies the effect of connecting resistors in series and in parallel.
- Write mesh equations for given DC networks and solve them
- Write node equations for given DC networks and solve them
- Convert a voltage source into current source and vice versa
- Convert a star network into a delta network and vice versa
- Define and apply superposition theorem to calculate the current / voltage / power in various branches of a DC network
- Define and apply Thevenin's theorem to calculate the current / voltage / power in various branches of a DC network
- Define and apply Norton's theorem to calculate the current / voltage / power in various branches of a DC network
- Define Maximum power transfer theorem and to obtain the condition for Maximum power transfer from source to load in DC circuits.

- Define the terms instantaneous values, peak value, average value, effective value, form factor and peak factor of alternating quantities.
- Write the equation of instantaneous value of alternating voltage and alternating current of sinusoidal wave forms
- Identify the instantaneous value and frequency of the sinusoidal alternating quantity from the given expression of instantaneous value
- Derive expressions for the RMS and average values of sinusoidal alternating quantities and compute them
- Calculate the instantaneous values of currents and voltages at different times from the given expression of alternating quantity
- Determine the phase relationships between two alternating quantities from their equations
- Define the terms Reactance, Impedance, Phase angle and power factor of an RLC circuit
- Draw the phasor diagram for RL, RC and RLC series circuit and calculate the current, power and power factor.
- Draw the power triangle, voltage triangle and impedance triangle of series circuit
- Calculate the currents in both the branches of a two branch parallel circuit
- Calculate the total current, power and power factor of a parallel circuit.
- Specify the condition of resonance in series circuit
- Determine the resonant frequency
- Explain the characteristics of a series resonant circuit
- Specify the condition for parallel resonant circuit
- Draw the reactance, impedance, current curves for different frequencies
- Identify the half power frequencies and bandwidth
- Determine the Q factor of resonant circuits
- Compare series resonant circuit and parallel resonant circuit

- State the advantages of 3 phase system over single phase system
- Draw phasor diagram for balanced and unbalanced star and delta connected load and determine the relationships between phase and line quantities
- Draw the circuit for two wattmeters method of power measurement and prove that the sum of two wattmeter readings equals total power
- Calculate line current, phase current, phase voltage and power for star and delta connected loads
- Understand the term steady states and transient at switch ON and switch OFF states
- Explain the transients in RL, RC and RLC circuits when DC voltage is applied
- Explain the transients when a charged capacitor in a RC circuit is discharged
- Explain the construction of lead cell
- Explain the construction of nickel iron cell
- Explain the construction of cadmium cell
- Explain the chemical action during charging and discharging of lead acid, Nickel iron and nickel cadmium cells
- Explain the different methods of charging of batteries
- Explain the applications of storage batteries
- Explain the different maintenance procedure of batteries
- Explain the repair procedure for batteries
- Describe the working of maintenance free batteries
- Describe the indications of fully charged batteries

DETAILED SYLLABUS

Unit I Electrostatics and D.C. Circuits

a) Electrostatics

Electric Flux - Electric Flux Density – Electric field intensity – Electric potential – Coulomb's laws of electrostatics – concept of capacitance – relationship between Voltage, Charge and Capacitance – energy stored in a capacitor – capacitance of parallel plate capacitor – capacitors in series and in parallel – types of capacitors and their applications – Problems in above topics.

b) D.C. Circuits

Basic concepts of current, emf, potential difference, resistivity, temperature coefficient of resistance – Ohm's law – applications of Ohm's law – work, power energy – relationship between electrical, mechanical and thermal units – resistance – series circuits – parallel and series parallel circuits – Kirchoff's laws – Problems in the above topics.

Unit II Network Theorems

Network – Branches – Nodes – Mesh current and Node voltage analysis – Voltage source and Current source transformations - Star and Delta transformations – Thevenin's Theorem - Norton's Theorem, Superposition Theorem and Maximum power transfer theorem. (Problems in D.C Circuits only)

Unit III Single phase A.C Circuits

'J' Operator – rectangular and polar coordinates – Sinusoidal voltage and current – instantaneous, peak, average and effective values – form factor and peak factor (derivations for sine wave) – pure resistive, inductive and capacitive circuits – RL, RC, RLC series circuits – impedance – phase angle – phasor diagram – power and power factor – power triangle – apparent power, active and reactive power – parallel circuits (two branches only) – conductance, susceptance and admittance – problems on all the above topics.

Unit IV Resonant Circuits and Three Phase A.C. Circuits

a) Resonant Circuits

Resonance : Series resonance – Effects of varying inductance and capacitance in series RLC circuit – Selectivity – 'Q' factor - Resonance

Frequency – Bandwidth – Half power frequencies. Parallel resonance – Two branch parallel circuits, Q Factor – Resonance Frequency – Band width – problems.

b) Three Phase A.C. Circuits

Importance of 3 phase circuits – Star, Delta connections – Phase sequence – Balanced load – Relation between voltages, currents of line and phase values in star and delta connection – Problems in balanced loads of star and delta connections – Measurement of 3 phase power using two wattmeter method (Derivation and Problems) – Effects of unbalanced loads in Star and Delta systems

Unit V DC Transients and Storage Batteries

a) DC Transients

DC Transients – RL circuit – RC circuit – RLC circuit – Simple problems

b) Storage Batteries

Classification of cells – Construction, Chemical action and physical changes during charging and discharging of lead acid, nickel iron and nickel cadmium cells – Advantages and disadvantages of nickel ion and nickel cadmium cells over lead acid cell - indication of fully charged and discharged battery – defects and their remedies – capacity - AH efficiency and WH efficiency (no problems) – methods of charging - care and maintenance – applications – maintenance free batteries – lithium cells and mercury cells – Concept of recharged cell.

Text Books :

SI.No.	Name of the Book	Author	Publisher
1	Electric circuit theory	1. Dr. M. Arumugam 2. Dr. N. Premkumaran	Khanna Publishers, New Delhi

Reference Books :

SI.No.	Name of the Book	Author	Publisher
1	Electric Circuits	Joseph Edminister	Schaum Series

EEK 320 ELECTRICAL MACHINES – I

Total No. of Hours / Week : 6

Total No. of Weeks / Semester : 16

Total No. of Hours / Semester : 96

Scheme of Instruction and Examination

Subject	Instruction		Examination		
	Hours / Week	Hours / Semester	Assessment Marks		
ELECTRICAL MACHINES – I	6	96	Internal	Board Exam	Total
			25	75	100

TOPICS AND ALLOCATION

UNIT	TOPIC	TIME (Hrs)
UNIT I	Electromagnetism	16
UNIT II	D.C. Generators	18
UNIT III	D.C. Motors	16
UNIT IV	Transformers	18
UNIT V	Maintenance of machines	16
	Revision and Test	12
	TOTAL	96

OBJECTIVES

On completion of the syllabus the students will be able to

- State Faradays laws of Electromagnetic induction, Lenz’s law, Flemings RH & LH Rules
- Draw the magnetization curve of a specimen about hysteresis and eddy current loss
- Derive Energy stored in magnetic field lifting power of electromagnet units simple problems
- Know the construction, operation of type of DC generators
- Draw the characteristics of O.C.C. for separately excited & self excited D.C. generators, conditions for self excitation

- Solve the problems of emf equation considering lap and wave winding
- Draw Load characteristics of Shunt, Series and compound motor
- Explain Armature reaction
- Explain commutation losses efficiency of AC generators
- Write the application of different types of DC generators
- Explain the principle of operation torque, back emf & speed equation of DC motors
- State types of motors, characteristics and its application of DC motors
- Explain the methods of speed control, losses, efficiency testing (load test, Swinburne's test) with problems
- Why need of starter using 3 point and 4 point starter
- Explain the construction, principle of operation of transformer
- Derive emf equation with problem
- Draw the vector diagram of transformer no-load and on-load with various power factor
- Solve problems in voltage regulation
- Draw equivalent circuit of transformer
- Explain OC and SC test and determine losses and efficiency
- State different connection of 3 phase transformer, parallel operation and load sharing
- Explain causes of sparking, defects in commutator with remedies
- Explain resurfacing of commutator and under cutting mica
- Explain the function and different types of brush holder with staggering of brushes and brush pressure
- Describe the impartment of maintenance and types of maintenance
- What is role of maintenance and safety engineer, causes of accident with prevention
- Explain various types of protective devices for men and machine

DETAILED SYLLABUS

Unit I Electromagnetism (16 Hrs)

Faraday's laws of Electromagnetic induction-- Lenz's law --Fleming's right hand and left hand rule -- types of induced EMF --Magnetic force and torque -- Magnetisation curve - Hysterisis and Eddy current losses -- energy stored in Magnetic field --Lifting power of Electromagnet (Simple problems in all topics)

Unit II DC Generators (18 Hrs)

Principle of operation --Constructional details -- Types of D C Generators -
- EMF equation (simple problems) --Lap and wave winding (No winding diagram) --Different types of excitation – no load characteristics of self excited (shunt & compound) generators -- Load characteristics of self excited (Series ,Shunt & Compound) generators - Critical resistance _ Conditions for self excitation --Armature reaction –Commutation - Causes of voltage drop --Losses -
-Efficiency -- Electrical efficiency -- Maximum efficiency - problems --Applications of D.C. Generators.

Unit III D C Motors (16 Hrs)

Principle of operation -- Torque , Back emf & Speed equations (simple problems) --classification --Characteristics of shunt , series & compound motors --Applications -- Speed control -- Field control and Armature control --Necessity of starter -- 3 point starter , 4 point starter -- Losses and efficiency --Testing (Load test & Swinburne's test)- Simple problems.

Unit IV Transformers (18 Hrs)

Principle of operation -- Constructional details -- EMF equation -- Voltage ratio (simple problems) Phasor diagram of transformers on no load & load (lagging p.f., leading p.f., & UPF) --Equivalent circuit -- Voltage regulation (simple problems) -- Losses & Efficiency --OC & SC tests --Condition for maximum efficiency (simple problems) - All day efficiency (simple problems) -- Principle of auto transformer -- Applications.

Three phase transformers -- Different connections --Parallel operations -- Load sharing -- Conditions for parallel operation --Cooling methods --Protective devices & accessories (Conservator, Breather, Buch-Holz relay & Explosion vent) --Necessity of tap changers --On load & Off load tap changers -- Scott connection -- Tertiary winding (No problems)

Unit V Maintenance of Machines

(16 Hrs)

Causes of sparking in commutator -- Defects in commutator and remedies, under cutting mica -- Resurfacing of commutator -Brushes --Functions and requirements -- Brush holder -- function and different types -- Staggering of brushes -- Brush Pressure -- Defect in DC armature winding -- Growler -- Importance of plant maintenance, preventive maintenance -- Breakdown maintenance -- Production maintenance – Role of maintenance engineer -- Industrial hazard , Causes of accident and their prevention -- Protective devices - - Role of safety engineer -- I.E. Rules on safety – Rule 33 : Earthed terminal consumer premises – Rule 43: Provision applicable to protective equipment - Rule 44: Instruction of restoration of person suffering from electric stock – Rule 48: precautions against leakage before connections – Rule 67 : connection with earth.

Text Book:

Sl.No.	Name of the Book	Author	Publisher
1.	A Course in Electrical Engineering (Volume -2)	B.L. Theraja	S. Chand & Co., New Delhi

Reference Book:

Sl.No.	Name of the Book	Author	Publisher
1.	Electrical Technology	Edward Hughes	English Language Book Society, Longman, England
2.	Operation & Maintenance Electrical Equipment	B.V.S. Rao	Media Promoters & Publishers Pvt. Ltd., Bombay
3.	Electrical Technology	J.B. Gupta	S.K. Kataria and Sons, New Delhi

EEK 330- ELECTRONIC DEVICES AND CIRCUITS

Total No. of Hours / Week : 5
Total No. of Weeks / Semester : 16
Total No. of Hours / Semester : 80

Scheme of Instruction and Examination

SUBJECT	INSTRUCTION		EXAMINATION		
ELECTRONIC DEVICES AND CIRCUITS	Hours / Week	Hours / Semester	Assessment Marks		
	5	80	Internal	Board Exam	Total
			25	75	100

Topics and Allocation

<u>UNIT</u>	<u>TOPIC</u>	<u>TIME(HRS)</u>
<u>1</u>	Components and Diodes	14
<u>2</u>	Bipolar Junction Transistor	14
<u>3</u>	Transistor oscillators and FET and UJT	14
<u>4</u>	SCR, DIAC, TRIAC, MOSFET and IGBT	14
<u>5</u>	Opto Electronics Devices and Waveshaping Circuits	14
	<u>Revision and test</u>	10
	<u>Total</u>	80

OBJECTIVES

On completion of the following units of syllabus contents, the students must be able to :

- Familiarize various passive and active components
- Study the working principle of PN junction diode and transistor
- Understand the working principle of different types of rectifiers
- Understand the different transistor configurations
- Differentiate various types of amplifiers
- Study the performance of special devices like UJT, FET
- Study the performance of different transistor oscillators
- Study the performance of SCR, DIAC, and TRIAC
- Study the performance of MOSFET and IGBT
- Know the construction and working principle of optoelectronic devices
- Study the performance of solar cell
- Explain the concept of wave shaping circuits
- Study the working principle of clippers and clampers

DETAILED SYLLABUS

Unit - I

Components and Diodes

Components – Electronic components – Passive components – Resistors – Fixed and variable – Colour coding – Uses – Capacitors – Fixed and Variable – Uses. Inductors – Fixed and Variable – Factors affecting the inductance – Applications – Switch – Switch function – Types – On/Off – Push to ON – Push to Off – SPST – SPDT – Relay (Construction details not required), Limit Switch.

Diodes – Semiconductors – PN Junction diode – Forward and Reverse bias characteristics – Specifications – Zener diode – Construction & working principle – Characteristics – Zener break down – Avalanche break down – Zener diode as a voltage regulator – Applications – Specifications.

Rectifier – Introduction – Classification of Rectifiers – Half Wave Rectifier – Full Wave Rectifier – Bridge Rectifier – Efficiency – Ripple factor – Applications – Filters – C, LC and PI Filters.

Unit – II

Bipolar Junction Transistor

Transistor – Transistor as an amplifier – Transistor Biasing – Fixed bias, Collector base bias, Self bias – CB, CE, CC Configurations – Characteristics – Comparison between three configurations in terms of input impedance, output impedance, current gain, voltage gain - RC coupled amplifier – Load characteristic analysis – Emitter follower and its applications – Negative feed back – Transistor as a switch.

Unit – III

Transistor oscillators and FET and UJT

Transistor Oscillator – Classifications – Condition for Oscillation (Barkhausen criterion) – General form of LC Oscillator – Hartley Oscillator – Colpitts Oscillator – RC Phase shift Oscillator, Crystal oscillator.

Field Effect Transistor– Construction – Working principle of FET – Difference between FET and BJT – Characteristics of FET – Specifications – FET amplifier (Common source Amplifier), FET as CHOPPER.

UJT – Construction – Equivalent circuit – Operation – characteristics – UJT as a relaxation oscillator

Unit – IV

SCR, DIAC, TRIAC, MOSFET and IGBT

SCR – Introduction – Working – Two transistor analogy of SCR – VI characteristics – SCR as a Switch, Controlled rectifier – Specifications.

DIAC – Construction – Working – Characteristics – Diac as bi-directional switch.

TRIAC – Basic working principle – Characteristics – Speed control of fan using Diac and Triac

MOSFET – Construction – Characteristics – MOSFET as a Switch – CMOS basic concept

IGBT – Basic principle – IGBT as a Switch.

Unit – V

Opto Electronics Devices and Waveshaping Circuits

LDR, LED, 7 segment LED, LCD, Opto coupler, Opto interrupter – Infrared transmitter and Receiver – Laser diode (simple treatment) – Solar cell – Avalanche Photodiode – Photo transistor.

Diode clipper – Types – clamper circuits using diode – Voltage doubler, Astable, Monostable and Bistable operations using Transistor.

Text books:

- | | | |
|-----------------------------|---|------------|
| 1. Principle of Electronics | - | V.K. Mehta |
|-----------------------------|---|------------|

Reference Books:

- | | | |
|-------------------------------------|---|--|
| 1. Electronics principles | - | Malvino
Tata McGraw Publication |
| 2. Electronics Devices and Circuits | - | Allen Mottershed
Tata McGraw – Hill Publication |
| 3. Electronics Devices and Circuits | - | Jacob
Millman and Halkies
Tata McGraw – Hill Publication |
| 4. Optical Fiber Communication | - | Gerd Keiser. |

EEK 340 ELECTRICAL CIRCUITS AND MACHINES PRACTICAL

Total No. of Hours / Week : 6
Total No. of Weeks / Semester : 16
Total No. of Hours / Semester : 96

Scheme of Instruction and Examination

Subject	Instruction		Examination		
ELECTRICAL CIRCUITS AND MACHINES PRACTICAL	Hours / Week	Hours / Semester	Assessment Marks		
	6	96	Internal	Board Exam	Total
			25	75	100

OBJECTIVES

On completion of the exercises listed below, the students will be able to

- Connect all the circuits as per the circuit diagrams.
- Construct and verify Superposition Theorem, Thevenin's Theorem and Maximum Power Transfer Theorem.
- Measure the given power by using 3 Ammeter method and 3 voltmeter method.
- Construct RLC series resonance circuit and draw the resonance curve.

- Draw the external and internal characteristics of shunt generator and series generator
- Draw the load characteristics of shunt motor, series motor and compound motor
- Predetermine the efficiency of DC machine by conducting Swinburne's test
- Draw the equivalent circuit of a single phase transformer by conducting O.C. & S.C. test.
- Predetermine the efficiency and regulation of a single phase transformer.
- Conduct a load test on a single phase transformer and find the efficiency and regulation.
- Conduct a load test on a three phase transformer and find the efficiency and regulation.
- Find the correct polarity of a single phase transformer to be operated in parallel and find the load sharing.

LIST OF EXPERIMENTS

CIRCUITS :

1. Verification of super position theorem with two different DC voltages for a common load
2. Verification of Thevenin's theorem with a DC supply
3. Measurement of power
 - a) 3 Ammeter method
 - b) 3 Voltmeter method
4. Verification of maximum power transfer theorem
5. Construct RLC circuit for series resonance and draw the frequency versus impedance curve.

MACHINES :

6. No load and load characteristics of self excited DC shunt generator
7. Load characteristics of self excited DC series generator
8. Load test on a DC shunt motor
9. Load test on a DC series motor
10. Load test on a DC compound motor
11. Predetermine the efficiency of a DC machine by Swinburne's test
12. Equivalent circuit of a single phase transformer by conducting open circuit and short circuit test.
13. Predetermination of the efficiency and regulation of a single phase transformer
14. Load test on a single phase transformer
15. Load test on a three phase transformer
16. Parallel operation of two similar single phase transformers

NOTE FOR EXAMINERS :

Questions for Board Practical Examination should be set as follows.

For every two experiments on MACHINES one experiment on CIRCUITS should be selected for each session of practical examination.

EEK350 ELECTRONIC DEVICES AND CIRCUITS PRACTICAL

Total No. of Hours / Week : 6
Total No. of Weeks / Semester : 16
Total No. of Hours / Semester : 96

Scheme of Instruction and Examination:

Subject	Instruction		Examination		
	Hours / Week	Hours / Semester	Assessment Marks		
ELECTRONIC DEVICES AND CIRCUITS PRACTICAL	6	96	Internal	Board Exam	Total
			25	75	100

OBJECTIVES

On completion of the Exercises listed below, the students must be able to learn about

- Connecting all the circuits as per the circuit diagrams.
- Obtain the V I characteristics of diode, Zener diode, transistor, JFET, SCR, DIAC, TRIAC, IGBT,UJT and optoelectronic devices.
- Construct Half wave Rectifier, Full Wave Rectifier circuits and trace the input, output Waveforms.
- Construct and test the performance of oscillators and voltage regulator circuits.

LIST OF EXPERIMENTS

1. Conduct an experiment to obtain forward, reverse characteristics of semiconductor diode; Determine its cut in voltage.
2. Conduct an experiment to obtain forward and reverse characteristics of zener diode, determine its cut-in voltage and break down voltage.
3. Conduct an experiment to obtain drain characteristics of JFET at constant gate voltage.

4. Conduct an experiment to obtain transfer characteristics of JFET at constant drain voltage.
5. Obtain V I Characteristics of SCR at different gate currents.
6. Obtain V I Characteristics of DIAC and find out break over voltage.
7. Obtain V I Characteristics of given TRIAC at different gate currents.
8. Obtain V I Characteristics of LDR under various illumination levels at constant supply voltage.
9. Obtain V I Characteristics of LED.
10. Conduct an experiment to obtain input, output characteristics of the given transistor under CE Configuration.
11. Conduct an experiment to obtain input/output characteristics of the transistor in CB Configuration.
12. Conduct an experiment to obtain output and transfer characteristics of IGBT.
13. Construct Half wave rectifier and full wave rectifier circuits using diodes and observe input, output waveforms with and without filter.
14. Construct a Bridge rectifier circuit and observe input, output waveforms with and without filter.
15. Obtain V.I Characteristics of UJT and mark peak voltage and valley voltage.
16. Construct and test UJT relaxation oscillator circuit, and observe waveforms.
17. Construct and test IC voltage regulator using IC 78XX; Determine load regulation and line regulation.
18. Construct and test Zener diode voltage regulator.

IV SEMESTER

EEK 410 ELECTRICAL MACHINES – II

Total No. of Hours / Week : 6
Total No. of Weeks / Semester : 16
Total No. of Hours / Semester : 96

Scheme of Instruction and Examination

Subject	Instruction		Examination		
	ELECTRICAL MACHINES – II	Hours / Week	Hours / Semester	Assessment Marks	
6		96	Internal	Board Exam	Total
			25	75	100

TOPICS AND ALLOCATION

UNIT	TOPIC	TIME(Hrs)
UNIT I	ALTERNATOR PRINCIPLE AND CONSTRUCTION	18
UNIT II	ALTERNATOR PERFORMANCE AND TESTING	18
UNIT III	SYNCHRONOUS MOTOR AND SINGLE PHASE MOTORS	18
UNIT IV	THREE PHASE INDUCTION MOTOR	16
UNIT V	MAINTENANCE OF INDUCTION MOTORS AND STARTERS	12
	Revision, Test	14
	Total	96

OBJECTIVES

At the end of each unit the student must be able to

- Explain the working principle and constructional details of alternator.
- Classify the armature windings and to differentiate between full pitch and short pitch windings.
- Describe the different cooling methods of alternator and to state the merits of hydrogen cooling.
- Explain the method of obtaining open circuit & short circuit characteristics and load characteristic curves of alternator.
- To define regulation of alternator and terms Effective Resistance, Synchronous Reactance & Synchronous Impedance.
- Describe Armature Reaction in Single phase and three phase alternators for various p.f. loads and to determine the regulation by Synchronous Impedance and M.M.F. methods.

- To explain the procedure by synchronizing the alternator by dark, bright and dark and bright method and synchroscope methods.
- To explain the operation of 3 ϕ I.M. – rotating magnetic field and its construction.
- Explain Slip-Torque Characteristics of I.M. and to draw equivalent circuit.
- Explain the circuit and working of D.O.L. starter, Star-Delta Starter, Rotor Resistance Starter and Autotransformer Starter.
- Explain Crawling & Cogging of I.M.
- Describe the principle, construction and working of Split Phase Motor, Capacitor Motor, Shaded Pole Motor, Repulsion Motor.
- Explain the principle of operation of Synchronous Motor and to understand about hunting and its prevention.
- To differentiate between Synchronous Motor and 3 ϕ I.M. and to state its applications.
- Classify any two types of ratings of Induction Motor.
- Explain the necessity for alignment and drying out of Induction Motor and the procedures followed.
- To state the factors to be considered in the selection of starters, common troubles and their remedies.
- To explain Static balancing, Degreasing and Vacuum Impregnation of I.M.

DETAILED SYLLABUS

UNIT – I ALTERNATOR PRINCIPLE & CONSTRUCTION (18 Hrs)

Basic Principle & Requirements of alternator – Rotating Field System & Rotating Armature System – Advantages of Rotating Field (Stationary Armature) System – Types of Rotor – Salient Pole rotor – Non Salient pole rotor – Construction – Salient Pole – Non Salient Pole – Turbo alternator – Brushless alternator – Types of armature windings(No winding diagram) – Single layer – Double layer – Lap & Concentric winding – Integral slot winding – Fractional Slot

winding – Phase spread – Pitch Factor – Distribution factor – Effect of Pitch factor on EMF – Advantages of chorded pitch winding – Effect of pitch factor on harmonics – Methods of obtaining Sine wave in salient pole & non salient pole alternators – EMF equation of alternators(Simple problems) – Cooling of alternators – Different methods – Hydrogen Cooling & its Merits.

UNIT – II ALTERNATOR PERFORMANCE & TESTING (18 Hrs)

Alternator on No load – Effective Armature resistance – Leakage reactance – Reactance due to armature reaction – Synchronous reactance – Synchronous impedance – Causes for Voltage drop in alternators (Simple problems) – Vector diagram of alternators on load (for lag, lead and unity power factors) – Voltage regulation (Definition & Simple problems) – Open circuit & Short circuit test – Determination of regulation by direct load test – Pre-determination of Regulation by EMF method, MMF method, ZPF method – Parallel operation of alternators – Necessity of Synchronization – Advantages – Methods – Dark lamp method – Bright Lamp method – Synchroscope method – Synchronizing current, Synchronizing power, Synchronizing torque – Effect of change in excitation of alternators in parallel – Load sharing of two alternators (Simple problems)

UNIT – III SYNCHRONOUS MOTOR & SINGLE PHASE MOTORS (18 Hrs)

Synchronous Motor Basic theory – Reasons for not self starting – Different methods of starting Synchronous motor – Vector diagram on No load (Simple problems) – “V” Curve and inverted “V” curve for different excitation at constant input power – Effect of change in excitation – Power factor improvement using Synchronous motor (Simple problems) Hunting – Applications of Synchronous Motors – Comparison between Synchronous motor & Three phase induction motor – Single Phase Induction Motor – Double Field Revolving theory for Single phase Induction Motor – Construction, Principle of working & applications of Split

Phase motors, Capacitor type motors, Shaded pole motor, Universal motor, Repulsion motor, reluctance Motor – Special motors : Stepper motor, Servo Motor (AC & DC) and PMDC motor (Permanent Magnet DC Motor operated on AC Supply)

UNIT – IV THREE PHASE INDUCTION MOTOR (16 Hrs)

Rotating magnetic field produced by 2 phase and 3 phase system – Principle of operation of 3 phase induction motor – Construction – Slip and slip frequency – comparison between cage and slip ring induction motors – development of Phasor diagram of three phase induction motor – expression for torque in synchronous watts – Slip-torque characteristics – Stable and unstable region – No load test and blocked rotor test – development of approximate equivalent circuit – problems on the above topics – circle diagram – Determination of maximum torque, slip etc., (no problems) – starting torque and starting current expression – relationship between starting torque and full load torque (No Problems) – Speed control by injected E.M.F. method, pole changing method, rotor resistance method and cascading method – Starters for induction motor – direct on line starter, rotor resistance starter – auto transformer starter – star delta starter – Crawling, Cogging in induction motor – Double cage motor – Linear induction motor – Scharge Motor – Construction, Working principle and application – Induction Generator (Principle of operation only).

UNIT – V MAINTENANCE OF INDUCTION MOTORS AND STARTERS (12 Hrs)

BIS publication dealing with the code of practice of Induction Motors and Starters – Classification of cage motor – continuous rating and intermittent rating – specifications of motors – selecting the cable rating – important factors which influence the selection of starters for induction motor – common troubles and their remedies for induction motor starters – Single phase prevention using current operated relay – Commissioning – points to be followed – Common

induction motor troubles and their remedies – Causes of noise and vibration – Care of bearings – Static balancing – Degreasing – Vacuum impregnation – Varnishing – drying out process – Effect of unbalanced supply on the performance of induction motor – periodical maintenance – points to be remembered.

Text Book :

S.No.	Name of the Book	Author	Publisher
1.	Electrical Machines	S.K.Bhattacharya, Principal, TTTI, Chandigar	Tata McGraw Hill Publishing Company, New Delhi.
2.	Operation and Maintenance of Electrical Machines	B.V.S. Rao	Khanna Publishers, New Delhi.

Reference Books:

1.	A text book of Electrical Technology	1. B.L. Theraja 2. A.L. Theraja	S.Chand &Co Publisher, New Delhi 55
2.	Electrical Technology	Edward Hughes	Addision – Wesley International Student Edition
3.	Performance & Design of AC Machines	MG Say	CBS Publication, New Delhi

EEK 420 MEASUREMENTS AND INSTRUMENTATION

Total No. of Hours / Week : 7

Total No. of Weeks / Semester : 16

Total No. of Hours / Semester : 112

Scheme of Instruction and Examination

Subject	Instruction		Examination		
	Hours / Week	Hours / Semester	Assessment Marks		
MEASUREMENTS AND INSTRUMENTATION	7	112	Internal	Board Exam	Total
			25	75	100

Topics and Allocation

UNIT	TOPIC	TIME (Hrs.)
UNIT I	Classification and characteristics of instruments	20
UNIT II	Measurement of voltage, current and resistance.	20
UNIT III	Measurement of power and energy	20
UNIT IV	Special instruments and bridges	20
UNIT V	Transducers and industrial instrumentation	20
	Revision, Test	12
	Total	112

Objectives :

On completion of the following units of syllabus contents, the students must

be able to

- classify the measuring instruments based on the principle of operation
- classify the instruments based on the quantity being measured
- explain the various operating forces in the instruments
- explain the construction and working principle of Moving Coil meters
- explain the construction and working principle of Moving Iron meters

- solve simple problems in the extension of meter ranges
- explain the use of Current and Potential Transformers
- Give the block schematic of CRO
- explain the working of various units in the CRO
- measure the phase and frequency using CRO
- list the applications of CRO
- Give the block diagram for digital storage oscilloscope
- Explain the principle of working of Digital storage oscilloscope
- Explain the construction and principle of working of dynamometer type wattmeter
- Explain the construction and principle of working of induction type energy meter
- Explain the use of RSS meter
- Give the circuits for measurement of power and energy using CT and PT
- Explain the calibration process for energy meter
- Explain the construction and principle of operation of Synchroscope
- Explain the construction and principle of operation of vibrating reed type frequency meter
- Explain the construction and principle of operation of Weston type frequency meter
- Explain the principle of operation of Digital Multimeter with block diagram
- Explain the working principle of Wheatstone Bridge
- Explain the working principle of Andeson Bridge
- Explain the working principle of Schering Bridge
- Classify the transducers
- Explain the construction and principle of operation of various transducers
- Explain the measurement of strain using wheatstone bridge
- Explain the measurement of strain using wheatstone bridge
- Explain the measurement of temperature using thermocouple
- Explain the measurement of temperature using thermistor

Unit I - Classification and characteristics of instruments

General – definition of measurement – functions of measurement system (Indicating, recording and controlling functions) - Applications of measurement systems- classification – absolute and secondary instruments – indicating, recording and integrating instruments, Analog and Digital -Definition of true value, accuracy , precision, percentage static error and correction , instrument efficiency. Principle of operation - effects used in instruments- Operating forces – deflecting, controlling and damping forces – construction details- moving system - types of supports- balancing - torque weight ratio control systems (spring control and gravity control) – damping systems – Magnets –pointers and scales.

Unit II- Measurement of voltage, current and resistance

Types of instruments – Construction, working and derivation of torque equation of moving coil, moving iron, dynamometer type and induction type(shaded pole construction) instruments - extension of instrument ranges – shunt and multiplier (calculation and requirements, Simple Problems), Tong Tester, current transformer and potential transformer (No derivations, working principle only) Measurement of resistance –ohm meter (series and shunt type), multimeter megger and Earth tester - Cathode Ray Oscilloscope – CRT- constructional parts - Electron Gun - Deflection Plate - Fluorescent Screen - Glass envelope – Base – Time Base Generators - block diagram of a general purpose CRO, Basic CRO circuits and controls – vertical deflection system - horizontal deflection system types of sweeps - synchronization – Blanking – Intensity Modulation – positioning control – focus control – intensity control – calibration circuit – astigmatism –Measurement of Phase and frequency – Applications of CRO. Introduction to Digital Storage Oscilloscope – Dual trace CRO.

Unit III- Measurement of power and energy

Types of wattmeter - Construction and operation of dynamometer type wattmeter & LPF wattmeter – 3 phase two element wattmeter - Construction and working of induction type single phase energy meter – friction compensation - creep and prevention – Errors and adjustments in energy meters- 3 phase energy meter (connection circuit only) - Testing of energy meter with RSS meter - Measurement of power and energy using CT and PT (Circuit only) – Construction and working of single phase dynamometer type power factor meter. Introduction to Digital Energy meter – calibration of Energy meter.

Unit IV- Special instruments and bridges

Merz price maximum demand indicator - Trivector meter - Synchroscope - Construction and working of Weston type - Phase sequence indicator – construction and working of rotating type - Frequency meter – mechanical resonance (vibrating reed type) and Weston type frequency meters – digital frequency meter (simplified composite block diagram) -XY recorder –Block diagram and applications - Electronic Multimeter – Digital Multimeter - Bridges - Wheatstone Bridge – Basic form of AC bridge – Anderson and Schering bridge for measurement of Inductance and capacitance (No derivation – Formula only)

Unit V- Transducers and industrial instrumentation

(Qualitative treatment only)

Transducers – Definition -Electrical transducers - Classification of electrical transducers based upon principle of transduction –Construction and principle of working of Strain gauge – LVDT – RVDT – Piezo electric – thermo couples – Thermistors – Proximity sensors – Inductive and Capacitive types – Introduction to digital encoding transducers .

Industrial instrumentation

Measurement of strain using wheatstone bridge – measurement of pressure using inductive transducer – measurement of angular velocity using DC Tachometer generator – Measurement of temperature - Construction and application of Metal Resistance Thermometer – Thermocouple – See beck effect – basic circuit – Simple application – Thermistor – construction – types – application Thermistor – Radiation pyrometer. – measurement of flow using electromagnetic flow meter – measurement of thickness using ultrasonic vibrations – measurement of pH value using a pH cell – Measurement of radiation using Geiger Muller tube.

Text Book :

Sl.No.	Name of the Book	Author	Publisher
1	A course in electrical and electronic measurements and instrumentation	1. A.K.Sawhney 2. Puneet Sawhney	Dhanpat Rai & Co., (P) Ltd., New Delhi.

Reference Books :

1	Electronic Instrumentation	HS Kalsi	1. Tata McGraw Hill Publishing Co., New Delhi 2. Learning Materials Centre, ISTE, New Delhi 16.
2	Modern Electronic Instrumentation and Measurement techniques	Albert D.Helfrick William David Cooper	Prentice-Hall of India (P) Ltd., New Delhi
3	Electronics and Instrumentation	1. Dr.S.K.Battachariya 2. Dr.Renu Vig	S.K.Kataria & Sons, New Delhi 6.
4	A course in electrical and electronic measurements and instrumentation	Umesh Sinha	Satya Prakashan, New Delhi

EEK 430 – ANALOG AND DIGITAL ELECTRONICS

Total No. of Hours / Week :6
Total No. of Weeks / Semester : 16
Total No. of Hours / Semester : 96

Scheme of Instruction and Examination

Subject	Instruction		Examination		
	Hours / Week	Hours / Semester	Assessment Marks		
ANALOG AND DIGITAL ELECTRONICS	6	96	Internal	Board Exam	Total
			25	75	100

Topics and Allocation

UNIT	TOPIC	TIME (Hrs.)
UNIT I	Linear ICs: Op-amps, Timers and their applications	18
UNIT II	Boolean Algebra	16
UNIT III	Combinational Logic	16
UNIT IV	Sequential Logic	18
UNIT V	D/A, A/D and Memory	16
	Revision, Test	12
	Total	96

Unit – 1 : Linear ICs: Op-amps, Timers and their applications

Operational amplifier – Ideal Op.Amp – Block diagram and characteristics – (Minus input follows Plus input and No current through Minus and Plus input) – Op-amp parameters – CMRR – Slew rate – Virtual ground – Applications of op-amp – Inverting amplifier – Summing amplifier – Non inverting amplifier – Voltage follower – Comparator – Zero crossing detector – Integrator – Differentiator – Op.Amp Specifications.

555 Timer – Functional Block diagram – Astable, Monostable and Schmitt Trigger – Sequence timer. IC voltage regulator – 3 pin IC regulators – 78 xx, 79 xx, LM 317.

Unit – 2 : Boolean Algebra

Number systems – Decimal – Binary – Octal – Hexadecimal – BCD – Conversion from one number system to other – Boolean Algebra – Basic laws and Demorgan's Theorems – Logic gates – OR – AND – NOT – NOR – NAND – EX-OR Symbols, Truth table and Boolean expression – Realization of gates using universal gates NAND, and NOR – Problems using 2, 3, and 4 variables – Boolean expression for outputs – Simplification of Boolean expression using karnaugh map (upto 4 variable)- Constructing logic circuits for the Boolean expressions.

Unit – 3 : Combinational Logic

Arithmetic circuits – Binary addition – Binary Subtraction – 1's complement and 2's complement – Signed binary numbers – Half adder – Full adder – Half subtractor – Full subtractor – Parity Generator and checker – Digital comparator – Arithmetic Logic Unit – Decoder – 3 to 8 decoder – BCD to seven segment decoder – Encoder – Multiplexer – Demultiplexer – Digital Logic families – TTL – CMOS – LS series – Fan in – Fan out – Propagation delay – Noise immunity for the above families.

Unit – 4 : Sequential Logic

Flip-flops – RS – D – T – JK – Master Slave Flip Flops – Edge triggered FF – Asynchronous Binary Counter – Decade counter – Mod n counter – Up Down Counter – Presetable counter – Ring counter – Johnson counter – Synchronous counter – State diagram – Shift register – 4 bit shift register – Serial in Serial out – Serial in Parallel out – Parallel in serial out.

Unit – 5 : D/A, A/D and Memory

D/A Converter – Basic concepts – Weighted Resistor D/A converter – R-2R Ladder D/A converter – Specification of DAC IC
Sampling and quantization – Analog to digital conversion using Ramp method – Successive approximation method – Dual slope method, simultaneous method

voltage to frequency converter – Frequency to voltage converter specification of A/D converter.

Memory – Static Memory – Dynamic Memory – Static Memory organization in terms of address lines, control lines and data lines – Expanding memory (say 8k to 16k) – SDRAM – DDR RAM.

Text Book:

NAME OF THE BOOK	AUTHOR	PUBLISHER
Modern Digital Electronics	R.P. Jain	TMH 2003.

Reference books:

Sl.no	NAME OF THE BOOK	AUTHOR	PUBLISHER
1.	Digital Principles and applications	Albert Paul Malvino and Donold P. Leach	TMH – 1991.
2.	Digital Electronics	Roger L. Tokheim Macmillan	McGraw – Hill – 1994.
3.	Digital Electronics An introduction to theory and practice	William H.Goth Mann	PHI 1998.
4.	Electronic devices, Applications and Integrated Circuits	Satnam P.Mathur and others	Umesh Publications – 1982.

EEK440 - ENGLISH COMMUNICATION PRACTICAL

(Common to all Branches)

Curriculum Outline

The course on English Communication Practical will enable the learners develop their Communication skills in English, especially at a time when the Info-Tech Explosion on one side and the search for Communicational Exploration on the other have been taking the contemporary world by leaps and bounds.

Keeping in view the career requirements of the students at Diploma level, the course on English Communication Practical has been designed in such a way that it will enable the learners acquire the much needed proficiency in the art of Communication and this will go a long way in shaping and fine tuning the future career of the students.

Objectives:

- To equip the learners with effective speaking and listening skills in English
- To make them realize the communication potential of English language
- To infuse in their minds the much-needed and all the more important 'CONFIDENCE'
- To facilitate them to acquire a fairly acceptable skill in pronunciation
- To train them to use language effectively to face interviews, group discussions and public speaking
- To enable them to prepare their resume, curriculum vitae etc.,
- To promote ethical values and inculcate organizational behaviour...
- For achieving the objectives identified above, the following skills are to be developed to enhance the communicative potential of the students.

The Skills are:

- I. Listening
- II. Reading and Pronunciation
- III. Speaking and Presentation
- IV. Writing

SCHEME OF INSTRUCTION AND EXAMINATION

Subject	INSTRUCTION		EXAMINATION			Duration
	Hours/Week	Hours/Semester	Marks			
English communication practical	6	96	Internal Assessment	Board Examination	Total	3 Hrs.
			25	75	100	

TOPICS AND ALLOCATION

UNIT	INSTRUCTION	TIME (Hrs)
I	Listening	12
II	Reading	12
III	Speaking	14
IV	Writing	8
V	Professional Ethics & Organizational Behaviour	8
VI	Project Report Writing (Outline)	2
	Revision and Tests	8
	TOTAL	64

DETAILED SYLLABUS

UNIT I LISTENING

Listening to pre-recorded short episodes, conversations, passages, stories, (hard copy of the material and cassettes) news bulletin, speeches by famous personalities – Listening for general and specific information etc.,

NOTE: The exercises given to the students must be recorded in the Record Notebook.

UNIT II READING

Reading aloud – by students individually - reading rhymes – proverbs – passages on various topics of interest – Newspaper reading – Reading humorous passages – Anecdotes – Stories – tricky sounds (conditioners) –

Reading manuals – Reading individual sentences with articulation, pronunciation, Tones, Punctuation, pauses etc...- Reading the titles of popular books, movies and poems.

NOTE: All the exercises given in Reading skills should be written in the Record Notebook.

UNIT III SPEAKING

- i. Self-introduction – introducing one self, one’s family – one’s friends and relatives, one’s language – one’s country etc...
- ii. Welcome Address, Vote of thanks
- iii. Extempore speeches.
- iv. Short speech on simple topics on simpler themes for about one minute.
- v. Role play – Group Discussion – Debate – Seminars – Machine Descriptions (depending upon branches) – Compering – Interviewing others by Asking Questions – Interview Techniques – Conversational Practice – Telephonic Conversation – Telephonic Interviews – How to establish conversation / dialogues – Entry Attempts/Admissions.

NOTE: Items taught in the Speaking skill should be written in the Record Notebook.

UNIT IV WRITING

- i. Writing Resume, preparing Curriculum Vitae.
- ii. Converting newspaper headlines into sentences.
- iii. Formation of Sentences – Using the table of Sentence-making and producing multiple sentences.
- iv. Framing Questions for the responses given
- v. Tips for better performance in interviews.
- vi. Describing Objects
- vii. Describing Situations.

NOTE: All the above topics must be taught to the students providing sufficient models and exercises and everything must be recorded in the Record Notebook.

UNIT V PROFESSIONAL ETHICS & ORGANIZATIONAL BEHAVIOUR:

Different kinds of Ethics – Ethics in different fields – Engineering Ethics – Senses of Engineering Ethics – Moral Values – Integrity & Loyalty – Work Ethics – Respect for others and authority – Empathy – Caring and Sharing – Honesty – Courage and Commitment – Valuing Time – Co-operation & Teamwork – Safety and Risk – Right Action – Professional ideals and virtues – Individual's Ambition – Conflict Resolution – Self-Confidence – Customs and Manners – General Behaviour – Etiquettes to be followed – Professional Responsibility – Accountability – Leadership Qualities – Effective Communication skills.

UNIT VI PROJECT REPORT WRITING (Outline):

Significant features of Project Report Writing – Organization – Presentation – Use of Impersonal Passives – Acknowledgements.

REFERENCES

UNIT I LISTENING:

Cassette with books:

- 1) Spoken English for you – Level I & Level II by Radha Krishna Pillai – Emerald Publishers.
- 2) Activity Sheets to be prepared.
- 3) BBC – Lingophone with Hard copy.
- 4) World Great Speeches – Book – Balaji's – Famous Speeches.

UNIT II READING:

- 1) Short story Books (Indian Writing – Panchathantra)
- 2) Reading Illustrated Books (Gokulam – Wisdom – Chandamama – Amarchitrakatha) must be subscribed.

UNIT III SPEAKING:

Books / materials related to speaking skill.

UNIT IV WRITING:

- 1) Internet Browsing and collecting information for C.V.
- 2) Book materials / Cassettes for writing skill.
- 3) Guided composition in English Language Teaching – Alexander L.G. Longman, 1971.
- 4) The Language Laboratory and Language Learning – Dahim Longman, London, 1967.

PROFESSIONAL ETHICS

REFERENCE BOOKS

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York 1996.
2. Charles D. Fleddermann, "Engineering Ethics", Pearson Education / Prentice Hall, New Jersey, 2004.
3. Charles E. Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics" – Concepts and Cases", Wordsworth Thompson Learning, United States, 2000.
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for scientists and Engineers", Oxford University Press, Oxford, 2001.
5. G.E. Moore, "Elements of Ethics", Temple University Press, Philadelphia, 1991.
6. J.D. Mabbott, Hutchinson, "An Introduction to Ethics" Hutchinson University Library, London, 1969.
7. May Mothersill, "Ethics", The MacMillan, New York, 1965.
8. Raymond Bradley and Stephen Duguid, "Environmental Ethics", Vol I & II, Simon Fraser University, Canada 1989.
9. Kevin W. Bowyer, "Ethics and Computing – Living Responsibility in a computerized World", IEEE Computer Society Press, California, 1996.
10. Jayashree Suresh and B.S. Raghavan, "Professional Ethics", S.Chand & Company Ltd., New Delhi, 2005
11. James V. McGlynn, Jules J. Toner, "Modern Ethical Theories", The Bruce Publishing Company, Milwaukee, 1962.

ENGLISH COMMUNICATION PRACTICAL

(Common to all branches)

LABORATORY REQUIREMENT

1. An echo-free room.
2. Public Address System
3. A pair of collar microphones with amplifiers and speakers
4. Headphone units – 30 Nos. with one control unit with a facility to play and record in cassettes.
5. Colour Television (minimum size – 61”)
6. DVD/VCD Player with Home Theatre speakers
7. Clip Chart, white board.
8. Necessary furniture's and comfortable chairs

ENGLISH COMMUNICATION PRACTICAL

(Common to all branches)

GUIDELINES

UNIT I LISTENING

a. The students must have been trained on a minimum of 10 Passages / stories / speeches / episodes / news bulletin (about 200-250 words each) and **all other topics given in the syllabus** during their course of study.

In the examination a passage shall be played back for about 5 minutes from a pre-recorded cassette followed by 5 questions. Students may be allowed to take notes while listening and they shall answer the questions in writing and assessment shall be made depending upon their performance.

b. The students must have been trained on a minimum of 10 dialogues during their course of study.

In the examination a dialogue (face-to-face conversation) running for about 5 minutes shall be played back from a pre-recorded cassette (either Video or Audio) followed by 5 questions. The students may be allowed to take notes while listening and they shall answer the questions in writing. Assessment shall be made depending upon the performance of the students.

UNIT II READING

The Students should have been trained to read out / articulate at least 200 different types of sentences. They should also be trained to pronounce 200 words (monosyllabic, by-syllabic, tri-syllabic and polysyllabic words) and all other topics given in the syllabus. The words and sentences are to be chosen in such a way that the tongue is articulating the sounds in the manner peculiar to the English Language. The students should also be trained to read aloud newspaper headings, proverbs, rhymes, poems, (use of) minimal pairs and other items identified in the syllabus.

The students should also be exposed to 44 sounds in English language and their symbols with examples. However questions need not be asked in this in the end examinations.

UNIT III SPEAKING

The students should have been trained on a minimum of 10 topics / role play / group discussion / debate / seminar and **other topics given in the syllabus**. The students must also be trained to introduce themselves and others. Each student must speak at least 10 sentences. The students must be given guidelines for making their presentation / speech effective.

UNIT IV WRITING

The students should be thoroughly trained in **all the items identified in the syllabus** under writing.

UNIT V PROFESSIONAL ETHICS & ORGANIZATIONAL BEHAVIOUR

Around 50 questions dealing with PROFESSIONAL ETHICS & ORGANIZATIONAL BEHAVIOUR are given in the syllabus. In the examination the students will be given 15 questions (selected out of 50 questions) and they have to write short answers to any 10 questions. This carries 20 marks.

Teachers are requested to refer the reference books given in the syllabus and help the students to find out the answers for all the 50 questions.

UNIT VI PROJECT REPORT WRITING (Outline)

Elaborate guidelines must be given to the students as to how to write a Project Report. They must be exposed to the salient features in writing the Project Report. The students will be expected to submit **outline of a Project Report** relevant to their branches of study in a separate folder and this will be assessed at the time of End Examination and marks will be awarded accordingly.

ENGLISH COMMUNICATION PRACTICAL
(Common to all branches)
SCHEME OF EXAMINATION

END EXAMINATION (75 Marks)

1) End examination will be conducted for duration of 3 Hrs. covering all the six units identified in the syllabus.

2) The examination should be conducted in such a manner that there must be enough evidence regarding the performance of the students and the distribution of marks for the academic audit.

INTERNAL ASSESSMENT (25 Marks)

1) Students will maintain a 150-page Record Notebook for all the activities done in the English Communication Lab., for which 20 marks will be allotted.

2) 5 marks will be awarded for attendance.

Annexure: A statement of allocation of marks.

Time and Marks Allocation for each unit:

GROUP	UNIT	TIME	MARKS ALLOTTED
GROUP A (Written Test)	PROFESSIONAL ETHICS AND ORGANIZATIONAL BEHAVIOUR (UNIT V)	30 Minutes	10
	WRITING (UNIT IV)	45 minutes	10
	LISTENING (UNIT I)	45 minutes	15
GROUP B	READING (UNIT II)	30 minutes	10
	SPEAKING (UNIT III)	30 minutes	20
GROUP C (Report Submission)	PROJECT REPORT WRITING (UNIT VI)		10

GROUP A

1. PROFESSIONAL ETHICS & ORGANIZATIONAL BEHAVIOUR (20

Marks)

The students will be asked to write brief answers, for any 10 questions out of 15 questions. The examiners will select the questions from the question bank given in the syllabus. Each question carries 2 marks. It will be a written practical.

Annexure: A question bank of 50 questions.

2. WRITING (5 + 5 = 10 Marks)

Out of 7 items identified in the syllabus under **Writing skills**, the students are required to answer for any two items out of four (i.e. 2 out of 4 questions). Each item carries 5 marks. There must be different questions for different batches.

3. LISTENING (5 + 5 = 10 Marks)

The students will be assessed on --

a) Auditory Comprehension (5 marks)

A pre-recorded cassette on short episodes / passages / stories / news bulletin / speeches by famous personalities (not exceeding 5 min.) will be played back only once. The Students are required to listen to this play-back with utmost attention.

After that, a sheet of paper containing 5 questions on the topic (that was played back to the students) with adequate space under each question (for the students to write the answers) will be supplied. The students are expected to write the answers in the space provided for each question.

Time for this exercise for the response of the students will be approximately 10 minutes.

b) Audio Visual Comprehension (5 marks)

A face - to - face conversation (not exceeding 5 minutes) will be played through a video or audio system (only once). The students are required to listen to this conversation with full attention.

After that, a sheet of paper containing 5 questions on this exercise shall be given with adequate space under each question for the students to write the answer. Fill in the blanks type of questions may also be given to assess the **Listening skills** of the students. Time to be taken by the students for this exercise will be approximately 10 minutes.

The selection of topics such as short episodes/passages/stories/news bulletins /speeches / dialogues etc... is left to the discretion of the internal and external examiners.

GROUP B

1. READING (5 + 5 = 10 Marks)

a) Each student will have to read aloud a passage of about 200 words. (5 Marks)

b) The Students will also be required to read individual sentences, rhymes, poems, newspaper headings, proverbs (use of) minimal pairs etc... (5 Marks)

NOTE: While reading, the students will be assessed based on their performance in pronunciation, articulation, intonation, punctuation, pauses etc...

The examiner needs to have as many passages / exercises as required, proportionate to the number of batches. The passage / exercises will be the same one to all the students of a particular batch. But it should not be repeated for other batches, there should be different passages / exercises for different batches.

2. SPEAKING (15 Marks)

a) Introducing one self / Introducing others and **all the other topics given in the syllabus** 5 Marks.

b) Short speech on simple topics on simpler themes for about 2 minutes – 5 Marks.

c) Assessing the performance of the students on any of the topics given in the syllabus in sub division V under **Speaking skills**. – 5 Marks.

NOTE: The topics identified in the syllabus for Presentation (Speaking skills) need to be written individually one by one by the examiners in separate papers or in separate cards.

The students will be allowed to choose a topic through lot system. They are expected to speak on the topic chosen by them for at least 2 minutes. The selection of the topics is left to the discretion of the examiner.

NOTE: Reading and Speaking:

For assessing the performance of the students in Reading and Speaking skills in the End Examination, each batch of students may be divided into two groups (if there are 30 students in a batch, they may be divided into 15 + 15) and both groups may be assessed simultaneously, one group by the external examiner (for **Reading skills**) and another by the internal examiner (for **Speaking skills**) and then vice versa. This process will enable the examiners to complete the practical on time i.e., in 3 Hrs. duration.

GROUP C

PROJECT REPORT WRITING (10 Marks)

The students will be expected to submit an **outline of a Project Report** relevant to their branches of study in a separate folder and this will be assessed at the time of End Examination and marks will be awarded accordingly.

PROFESSIONAL ETHICS & ORGANIZATIONAL BEHAVIOUR

QUESTION BANK

- 1) What do we understand by ethics?
- 2) What are the universally accepted ethical principles?
- 3) What is meant by engineering ethics?
- 4) What is the need for engineering ethics?
- 5) Define work ethics.
- 6) What is integrity?
- 7) 'Commitment' – what does it mean?
- 8) What do you mean by empathy?
- 9) What is professional ethics?
- 10) What is the similarity between ethics and morals?
- 11) What are the responsibilities of engineers?
- 12) What are the rights of the engineers?
- 13) What are codes of conduct?
- 14) Explain briefly the importance of ethics in engineering profession.
- 15) How can an engineer orient himself towards his ethical responsibilities?
- 16) What are the priorities of an engineer in a situation wherein which conflicting values are involved?
- 17) How can an engineer implement ethics of his profession in a multi-cultural/multi-national environment?
- 18) What are the professional obligations of an engineer?
- 19) What should be the ethics that an engineer should adhere to in both pre and post employment scenarios?
- 20) What is the ethical way of handling retrenchment?
- 21) What are the various aspects of empathy?
- 22) What are the salient features of commitment?
- 23) What is team-work?
- 24) What do you mean by profession and professionalism?
- 25) What is meant by accountability?

- 26) What is environmental ethics?
- 27) What is computer ethics?
- 28) Define the term 'morals'.
- 29) What do you mean by 'values'?
- 30) What are the main qualities of work ethics?
- 31) What is altruism?
- 32) What is sharing?
- 33) What is caring?
- 34) What is honesty?
- 35) What is courage?
- 36) What is meant by valuing time?
- 37) What is co-operation?
- 38) What are the objectives of co-operation?
- 39) What is meant by commitment?
- 40) In what way the effective communication skills shape the careers of an engineer?
- 41) What is self-confidence?
- 42) What is morality and etiquette?
- 43) What are the different models of engineering ethics?
- 44) What are the most fundamental moral principles?
- 45) What are the moral responsibilities of an employee towards his employer?
- 46) What are the moral responsibilities of an employer towards his employees?
- 47) What are the moral responsibilities of an organization towards community?
- 48) What are the advantages of team-work?
- 49) What is loyalty?
- 50) What do you mean by professional rights?

Example Questions for Writing Skill

Staff Member may prepare similar type of questions for Class works & Examinations

WRITING

1. Your friend has asked for your advice for buying a birthday present. Write a letter to him/her suggesting which points he/she one should keep in mind like interest, age, need etc. while buying a birthday present. You are Shanty /Shanta of 1048 D, Gulabi Bagh, Delhi.

2. Children like to spend their pocket money on their favourite food items like chips, kurkures, hot dog, pizza and cold drinks. But they don't know that these things cause harm to their health. Write a paragraph describing the harmful effects of fast and junk food. Mention the health and other related problems caused by it in about 50 words.

3. You have to take part in a debate on the theme 'Examinations affect Teaching and Learning in schools' Write down your arguments in favour or against the motion in about 125 to 150 words

4. Recently you attended a fair of Eco clubs at Bal Bhawan where the students from different schools displayed eco friendly materials and ways to protect our earth through different models and charts. Write a report in about the fair in about 50-60 words.

5. Your cousin is a brilliant student but he is not keeping good health because he avoids homemade food and is very fond of eating outside. Write a letter telling him/her about the harmful effects of junk food and advising him/her how to maintain good health in not more than 100 words. You are Arpil/Arpita of C-8 Lawrence Road, Delhi.

6. Write a letter to the Principal of your school requesting him/her to introduce inter house activities like quiz programmes, debates, recitation, essay-writing, painting and sports explaining how it may be beneficial for all-round development of their personality. You are Vineet/Vineeta, the head boy/girl of New Modern School, Amritsar.

7. You don't approve of the ways of people as they waste a lot of water in different activities. Even the taps in schools are not closed properly, thereby, wasting the valuable water due to negligence and carelessness. You wish to spread awareness among students about it. Write down your views appealing students of your school to

conserve water and to save it for future in an article for school magazine in about 50-60 words.

8. You recently visited the 'World Book Fair' organized at "Near your Locality" and found it quite an enriching experience. Write a report in about 50-60 words so as to encourage other students to visit it.

ENGLISH COMMUNICATION PRACTICAL
(Common to all branches)
MODEL QUESTION PAPER

TIME : 3 Hrs

Max.Marks : 100

GROUP A

Answer any ten of the following:-

(
10 x 2
= 20)

- 1) What is team work?
- 2) 'Commitment' – What does it mean?
- 3) What is code of conduct?
- 4) How can an engineer orient himself towards his ethical responsibilities?
- 5) What are the professional obligations of an engineer?
- 6) What is the ethical way of handling retrenchment?
- 7) What are the rights of the engineers?
- 8) What is environmental ethics?
- 9) What is sharing?
- 10) What are the objectives of co-operation?
- 11) What is morality and etiquette?
- 12) What is loyalty?
- 13) What are the moral responsibilities of an employee towards his employer?
- 14) What do you mean by professional rights?
- 15) What is altruism?

(2 x 5 = 10)

I

- 1) Imagine you are applying for a job. Write a resume for the same.
- 2) Religious extremism, matter of concern : PM

(2 x 5 = 10)

II

- 1) A short story to be played back (audio cassette).
- 2) A face to face communication to be played back
(visual/audio)

GROUP B

(2 x 5 = 10)

- 1) Read the following passage aloud -
A passage with tricky sounds to be given.
- 2) Read the following a loud -
A conversational passage to be given.

(3 x 5 = 15)

I

- 1) Introduce yourself
- 2) Short speech - A religious fair
- 3) Any one of the topics given in the syllabus in sub-division v
under **speaking skills**

GROUP C

10

Project Report – writing

The students will be expected to submit an **outline of a Project Report** relevant to their branches of study in a separate folder and this will be assessed at the time of End Examination.

ENGLISH COMMUNICATION PRACTICAL

Allocation & Statement of Marks

Duration : 3 Hrs.

Max. Marks : 100

Communication Lab.								Total
GROUP A			GROUP B		GROUP C			
PE & OB	Writing	Listening	Reading	Speaking	Project Report Writing	Record	Attendance	
(20)	(10)	(10)	(10)	(15)	(10)	(20)	(5)	(100)

EEK 450 ELECTRICAL MACHINES AND INSTRUMENTATION PRACTICAL

Total No. of Hours / Week : 6

Total No. of Weeks / Semester : 16

Total No. of Hours / Semester : 96

Scheme of Instruction and Examination:

Subject	Instruction		Examination		
ELECTRICAL MACHINES AND INSTRUMENTATION PRACTICAL	Hours / Week	Hours / Semester	Assessment Marks		
	6	96	Internal	Board Exam	Total
			25	75	100

OBJECTIVES

ELECTRICAL MACHINES LAB

Student must be able to

- Run the alternator and to determine the regulation by synchronous impedance method.
- Determine the load characteristic of Single Phase and 3 Phase alternator.
- Run and synchronize two alternator by lamp & synchroscope method.
- Determine “V” and inverted “V” curve of 3 phase synchronous motor.
- Run and conduct load test on Single Phase I.M., 3 Phase Cage I.M. and Slipring I.M.
- To draw equivalent circuit and circle diagram of an IM, by conducting No load & Blocked rotor test.

INSTRUMENTATION LAB

1. Determine the armature and shunt field resistance in DC Machine using Wheatstone bridge method.
2. To determine the unknown inductance and capacitance by using Anderson bridge, Schering bridge methods respectively.
3. Calibrate the given Wattmeter, Single Phase energy meter and 3 Phase energy meter.
4. Measure the earth resistance using earth tester kit.
5. Measurement of displacement using LVDT.
6. Calibrate the load cell.

LIST OF EXPERIMENTS:

ELECTRICAL MACHINES :

1. Predetermination of regulation of alternator by synchronous impedance method.
2. Load Test on single Phase alternator.
3. Load Test on three Phase Alternator.
4. Synchronising of two alternators by lamp & synchroscope method.
5. Determination of 'V' Curve and inverted 'V' curves of a three phase synchronous motor.
6. Conduct load test on a single phase induction motor and plot
 - a. Load Vs efficiency
 - b. Load Vs Powerfactor
 - c. Torque Vs Slip characteristic curves.
7. Conduct load test on three phase induction motor and plot
 - d. Load Vs Efficiency
 - e. Load Vs P.f.
 - f. Torque Vs Slip characteristic curves.
8. Conduct load test on 3 phase slipping Induction motor and plot

- a) Output Vs efficiency
 - b) Output Vs Torque
 - c) Output Vs slip Characteristics.
 - d) Output Vs Line Current
 - e) Output Vs P.F
9. Draw the equivalent circuit of a 3 phase Induction motor by conducting No load and Blocked rotor test.
10. Draw the circle diagram for 3 phase Induction Motor by conducting suitable Tests.

INSTRUMENTATION :

1. Find the armature and shunt field resistance in a DC machine by wheatstone bridge method.
2. Find the value of unknown inductance by Anderson bridge method.
3. Find the value of unknown capacitance by using Schering bridge method.
4. Calibration of Wattmeter.
5. Calibration of single phase energy meter.
6. Calibration of 3 phase energy meter.
7. To measure the earth resistance by using earth tester kit.
8. Displacement measurement using LVDT.
9. Calibration of load Cell.

NOTE FOR EXAMINERS :

Questions for Board Practical Examination should be set as follows.

For every one experiment on MACHINES one experiment on INSTRUMENTATION should be selected for each session of practical examination.

EEK 460 ANALOG AND DIGITAL ELECTRONICS PRACTICAL

Total No. of Hours / Week : 6
 Total No. of Weeks / Semester : 16
 Total No. of Hours / Semester : 96

Scheme of Instruction and Examination

Subject	Instruction		Examination		
ANALOG AND DIGITAL ELECTRONICS PRACTICAL	Hours / Week	Hours / Semester	Assessment Marks		
	6	96	Internal	Board Exam	Total
			25	75	100

LIST OF EXPERIMENTS

1. Construct and test a) Inverting Amplifier and b) Non-inverting amplifier using Op. Amp.
2. Construct and test a) Scale changer circuit b) Summer circuit using Op. Amp.
3. Construct and test a) Differentiator circuit b) Integrator circuit using Op. Amp.
4. Construct and test a) Astable Multivibrator using IC 555 and test its performance.
5. Construct and test a) Monostable Multivibrator using IC 555 and test its performance.
6. Verify the truth table for the following gates AND, OR, NOT, NAND, NOR, EX-OR USING 74XX Ics.
7. Construct other gates using NAND gates.
8. Construct a Half Adder using 7408, 7432, 7486, Ics and verify its truth table.
9. Construct Full Adder and verify the truth table using 74XX Ics.
10. Construct Half Subtractor and verify its truth table using 74XX Ics.
11. Construct Full Subtractor and verify its truth table using 74XX Ics.
12. Construct and verify the truth table of RS, D and JK FFs.

13. Construct a 4 bit BCD counter using 7473 lcs and observe the output waveform.
14. Construct a Decade counter using 7473 lcs and observe the output waveform.
15. Construct and verify the performance of a 1 digit counter using 7490, 7447, 7475 and seven segment LEDs.
16. Construct a 4 bit weighted Resistor D/A converter and test its performance.
17. Construct a 4 bit r-2R Ladder D/A converter and test its performance.
18. Verify the operation of ADC.

V SEMESTER

EEK 510 POWER SYSTEM - I

Total No. of Hours / Week : 6
Total No. of Weeks / Semester : 16
Total No. of Hours / Semester : 96

Scheme of Instruction and Examination

SUBJECT	INSTRUCTION		EXAMINATION		
POWER SYSTEM - I	Hours / Week	Hours / Semester	Assessment Marks		
	6	96	Internal	Board Exam	Total
			25	75	100

Topics and Allocation

UNIT	TOPIC	TIME (HRS.)
UNIT I	Generation of electrical Power	16
UNIT II	AC transmission and HVDC transmission	18
UNIT III	Line insulators and underground cables.	16
UNIT IV	Circuit breakers and Fuses	18
UNIT V	Protective relays and Earthing	16
	Revision, Test	12
	Total	96

Objectives :

On completion of the following units of syllabus contents, the students must be able to

- give schematic diagram to Hydel, Thermal, Diesel, Nuclear, Gas and pumped
- storage power plants.
- explain the principle of operation of Hydel, Thermal, Diesel, Nuclear, Gas and pumped storage power plants.
- compare the various power plants in terms of performance and advantages

- define important terms associated with power plants
- explain the basic principles of non-conventional energy sources
- explain the energy conservation approach
- explain the lay-out scheme for combined cycle power generation.
- explain the principles of energy audit
- give the layout of AC power supply scheme
- state and explain Kelvin's law
- state the economic choice of conductor size and transmission voltage
- explain the various types of line supports
- calculate the sag at the time of erection
- explain the effect of wind and ice formation over OH lines
- explain the effect of capacitance and inductance in transmission lines
- define regulation and efficiency of transmission lines
- explain the use of static capacitors in power factor improvement
- explain the effect of lightning
- give the layout scheme for HVDC transmission
- compare the different types of HVDC systems
- state the advantages and disadvantages of HVDC system
- explain the constructional details of different types of line insulators
- state the causes of insulation failure
- explain the string efficiency and methods to improve it
- explain the phenomenon of corona
- explain the methods for reducing corona
- state the advantages of UG cables
- classify the cables based on voltage rating
- explain the constructional details of various types of cables
- explain the cable laying methods
- explain the grading techniques of cables
- explain the test for fault location in cables
- explain the essential components of a switch gear system

- explain the constructional and working principles of different types of circuit breakers
- state the important terms associated with Circuit Breakers
- explain the use of PTs and CTs in a power system
- explain the maintenance schedule for the circuit breakers
- state the desirable characteristics of fuses
- state the important terms associated with fuses
- explain the principle of working of different types of fuses
- explain the fundamental requirements of protective relaying
- explain the constructional details and principle of working of different types of relays
- give the block schematic for various types of static relays
- explain the working principle for various types of static relays
- state the advantages of earthing
- explain the various types of earthing

DETAILED SYLLABUS

UNIT I :- GENERATION OF ELECTRICAL POWER

16 Hrs

Conventional methods of power generations – Schematic arrangement and choice of site for hydel, thermal, diesel, nuclear, gas – pumped storage schemes – comparison of these power plants. Principle of MHD power generation and advantages

Grid or interconnected system – merits of interconnected systems – load transfer through inter connector – load-dispatching centre.

Load curves – Maximum Demand – Demand Factor – Plant Factor – Significance of Load Factor and Diversity Factor – Load sharing between base load and peak load plants. causes of low power factor – economics of power factor improvement Basic principle and applications of Solar, wind, geo thermal, ocean and tidal energy sources.

Introduction to energy conservation – need for conservation – energy conservation approach – measures in transmission and distribution, industries, agriculture sectors and homes

Co-generation – combined cycle power generation – lay out scheme and principle of operation.

Principles of energy audit – economics – preliminary audit – detailed audit.

UNIT II:- AC TRANSMISSION & HVDC TRANSMISSION

18 Hrs.

AC transmission :

Typical lay out of AC power supply scheme – comparison of various systems power transmission. Elements of a transmission line – economic choice of conductor size – Kelvin's law – its limitations – economic choice of transmission voltage. Over Head lines – conductor materials and their properties. Line supports – various types of supports and their applications – spacing between conductors – length of span - Sag in over head lines – calculations of sag at the time of erection – when the supports are at equal levels and at unequal levels – problems – effect of wind and ice loading over the line. Transmission Line constants – effect of line capacitance and inductance in transmission lines – transposition of transmission lines – skin effect – ferranti effect. Classification Over Head Transmission Lines - short transmission lines –

voltage regulation & transmission efficiency – effect of load and power factor on regulation and efficiency - power factor improvement using static capacitor – advantages.

Protection against over voltage – causes of over voltage – harmful effects of lightning, protection against lightning.

HVDC transmission :

Lay out scheme and principle of operation for High voltage DC transmission – Types of DC link – monopolar, bipolar and homopolar (schematic diagram only) – parallel operation of DC link with AC network – advantages and disadvantages of HVDC transmission comparison between Constant Current and Constant voltage HVDC systems.

UNIT III: LINE INSULATORS, UNDERGROUND CABLES

16 Hrs

Line Insulators :-

Types of line insulators – pin, suspension, strain and shackle insulators – causes of insulation failure – testing of insulators – potential distribution over suspension insulator string – string efficiency – methods of improving string efficiency – problems.

Corona – corona formation – disadvantages & advantages – factors affecting corona – methods of reducing corona effect.

Underground cables :-

Advantages of cables – various parts of a three conductor UG cable – properties of insulating materials used in cables – classification of cables based on voltage rating – cables for three phase service – Belted cable – Screened Cable – Pressure Cables. Laying of Cables – direct laying – draw in system – solid system – their advantages and disadvantages. Grading of cables – capacitance grading, inter-sheath grading (no derivation & problems). Cable Faults – OC, SC and earth faults – Murray Loop test for fault location.

UNIT IV : CIRCUIT BREAKERS AND FUSES

18 Hrs

Switchgear – essential features of switchgear – faults in a power system (definition only)

Circuit Breakers :-

Operating principle – arc phenomenon – arc extinction – arc voltage – recovery voltage – re-striking voltage.

Classification of Circuit Breakers– construction, working principle, merits & demerits of Oil circuit breaker, air blast circuit breaker, SF₆ circuit breaker and vacuum circuit breaker. – types of circuit breaker contacts – Tulip, Finger, Butt contacts – use of instrument transformers in a power system. Problems of circuit interruption – rate of rise of re-striking voltage, current chopping, capacitive current breaking – resistance switching. Circuit Breaker ratings – Breaking capacity, making capacity, short time rating. Auto-reclosing in circuit breakers. Maintenance schedule for circuit breakers.

DC breaking : Problems of DC breaking – construction and working principle of light duty DC air break circuit breaker – schematic for HVDC circuit breaker – producing current zero.

Fuses : Desirable characteristics – important terms – current rating of fuse elements – fusing current, fusing factor, prospective current, cut-off current, pre-arcing time, arcing time, total operating time, breaking capacity. LV fuses – re-wirable fuse, HRC cartridge fuse, HRC fuse with tripping device. HV fuses – cartridge type, liquid type and metal clad fuse.

UNIT V : PROTECTIVE RELAYS AND EARTHING

16 Hrs.

Protective relays :

Fundamental requirements of protective relaying primary and back-up protection. Relay timing – instantaneous relay – inverse time relay. Functional relay types – construction, principle of operation and applications of induction type over current relay, induction type reverse power relay, earth leakage relay, distance relay, differential relay and Translay system

Static Relays : Basic elements of a static relay – block schematic and operating principle of microprocessor based protective relays – Current, impedance, directional, reactance and mho relays.

Grounding or Earthing :

Equipment grounding – system grounding – neutral grounding – advantages of neutral grounding – solid grounding, Resistance grounding, Reactance grounding and Resonant grounding – voltage transformer earthing – grounding transformer.

Text Book :

Sl.No.	Name of the Book	Author	Publisher
1	Principles of Power Systems	VK. Mehta.	Reprint 2007 S.Chand & Co., New Delhi

Reference Books :

Sl.No.	Name of the Book	Author	Publisher
1	Electrical Power System	CL. Wadhawa.	Fourth Edition 2005 New Age International New Delhi
2	A Course in Electrical Power	Soni, Gupta Bhatnagar	Dhanpath Rai & Co (P) Ltd., New Delhi
3	Electrical Power	S.L. Uppal	Khanna Publishers, New Delhi
4	A Course in Electrical Power	J.B. Gupta.	Reprint 2004 Katson Publishing House, New Delhi
5	HVDC Power Transmission System & Technology	KR. Padiyar.	Reprint 2005 New Age International New Delhi
6	Electrical Power System Planning	A.S.Pabla	McMillan India Ltd., New Delhi
7	Digital Protection – Protective relaying from electromechanical to microprocessor	L.P.Singh	New Age International New Delhi Second Edition 1997
8	Power system Protection and Switch gear	B.Ram D.N.Viswakarma G.D.Rai	TMH 1995
9	Non-conventional Energy Sources	B.Ravindranath M.Chadar	15th Reprint 2005 Khanna Publishers, Delhi
10	Power System Protection and Switchgear		Reprint 2005 New Age International

EEK 520 - MICROPROCESSOR AND MICROCONTROLLER

Total No. of Hrs / Week : 5
 Total No. of Weeks / Semester : 16
 Total No. of Hours / Semester : 80

Scheme of Instruction and Examination

SUBJECT	Instruction		Examination		
			Assessment Marks		
			Internal	Board Exam	Total
Microprocessor and Microcontroller	5	80	25	75	100

Topics and Allocation

Unit	Topic	Time (Hrs)
Unit 1	Microprocessor and Applications	14
Unit 2	8051 Microcontroller	14
Unit 3	Programming concepts	14
Unit 4	Peripheral devices and Interfacing	14
Unit 5	Microcontroller applications	14
	Revision and Test	10
Total		80

Objectives:

On completion of the following units of syllabus contents, the students must be able to

- Understand the history and need of Microprocessor.
- Understand the internal architecture details of 8085 Microprocessor.
- Know the instruction set of 8085.
- Draw the timing diagrams for typical instructions
- Understand Interrupt Structure of 8085
- Explain Architecture of 8051 Microcontroller.
- Explain the functions of various registers.
- Understand interrupt structure of 8051.

- Understand serial data communication concepts.
- Understand the programming techniques.
- Explain various addressing modes.
- Write simple programs using 8051.
- Understand the block diagram and control word formats for peripheral devices.
- Understand how to interface with RS232C.
- Understand how to interface with 8255.
- Understand various application of 8051 Microcontroller

DETAILED SYLLABUS

Unit – I Microprocessor and Applications

(16 Hrs)

Evolution of Microprocessors - 8085 MPU – Architecture – Instruction Formats – Addressing mode – Instruction set – Different types of instructions – instruction cycle – timing diagram for LDA, MOV r1, r2, Call Instructions – ROM Organization – Interrupt structure – Memory mapping – Status signals. (Programs not required)

Unit – II 8051 Microcontroller

(18 Hrs)

8051 Architecture – Introduction – The 8051 Oscillator and Clock – Program Counter and Data Pointer – A and B CPU Registers – PSW – Memory Organisation – Stack – Special Function Registers – GPIO – Timers – Serial Data – Input / Output – Interrupts Structure – timer Flag Interrupt – External Interrupt – Reset – Interrupt Control – Interrupt Priority – Interrupt Destinations – Pin Configuration of 8051 and their functions.

Unit – III Programming Concepts

(18 Hrs)

Programming Tools and Techniques – Addressing Modes – Instruction set - Interrupts and returns. 8051 Operational code Mnemonics – Program examples – 8 bit Addition / Subtraction , 8 bit Multiplication / Division, 16 bit Addition / Subtraction, largest / smallest of n numbers, sum of array of n numbers, ascending / descending order of arranging n numbers, code conversion

Unit – IV Peripheral Devices and Interfacing

(16 Hrs)

Block and signal diagrams and control word format of the following peripheral devices 8255, 8254, 8259, 8279. Interfacing 8051 with 8255, RS 232C serial interface, ADC/DAC interfacing.

Unit – V Microcontroller Applications

(16 Hrs)

Keyboard Interface - Display interface – LCD interface – Traffic Light controller – Temperature controller with ON / OFF control system, Stepper motor interface (Full and Half stepping) – DC motor interface – solenoids and relays interface – Frequency and period measurements

Text Books:

Sno	Name of the book	Author	Publication
1.	Microprocessor and Microcontroller	R. Theagarajan	SciTech Publication.
2.	The 8051 Microcontroller: Architecture Programming and Applications	Kenneth.J.Ayala	Penram International Publication.
3.	Microcontroller	Mazdi & Mazdi	

Reference Books:

1	Microcontroller and Applications	R.Theagarajan	SciTech Publication.
2.	Digital Design	M. Morris Mano	Third Edition, Prentice Hall 2002.
3.	Analog Interfacing to Embedded Microprocessor real world design	Stuart - R. Ball P.E.	ISBN 0 7506 7723 6.

EEK 531 CONTROL OF ELECTRICAL MACHINES

Total No. of Hours / Week : 6

Total No. of Weeks / Semester : 16

Total No. of Hours / Semester : 96

Scheme of Instruction and Examination

Subject	Instruction		Examination		
	Hours / Week	Hours / Semester	Assessment Marks		
CONTROL OF ELECTRICAL MACHINES	6	96	Internal	Board Exam	Total
			25	75	100

Topics and Allocation

UNIT	TOPIC	TIME (Hrs.)
UNIT I	CONTROL CIRCUIT COMPONENTS	18
UNIT II	DC MOTOR CONTROL CIRCUITS	16
UNIT III	AC MOTOR CONTROL CIRCUITS	16
UNIT IV	PROGRAMMABLE LOGIC CONTROLLER	16
UNIT V	MAINTENANCE OF TRANSFORMERS	18
	Revision, Test	12
	Total	96

OBJECTIVES

- Understand the concept of the term motor control starting reversing , speed control and protection.
- Types of shutters used to operate induction motors.
- Types of relays for protecting the induction motors.
- Types of timer used in the control circuits.
- Types of acceleration for DC motors.
- Field failure protection and deceleration circuit for DC motor.
- Jogging control, dynamic braking control, reversing control and plugging

- control circuits.
- Speed control using UJT and SCR.
- Motor current at start and during acceleration.
- No load speed and final speed of motor.
- DOL starter, Automatic auto Transformer starter, open and closed circuit transition.
- Star / delta starter series and automatics starter.
- Starter for two speed.
- Two winding motor, the direction of rotation of induction motor.
- Plug stopping of the motor.
- Dynamic Braking
- Three steps motor resistance starter wound induction motor.
- Secondary frequency acceleration starts.
- Definition of PLC
- Requirements of PLC
- PLC advantages over relay logic.
- PLC – programming the PLC
- Program loader.
- How the PLC operates.
- Additional Capabilities of PLC Ladder.
- Logic diagram.
- Symbols for common logic.
- Sequence components in a Data diagram.
- Ladder logic diagram for DOL starter star / Delta Starters.
- Fluid filling operation.
- Typical low level language.
- Instruction fact for a PLC input module, output module.
- PLC Scan.
- Preliminary inspection regarding installation.
- Measurement of IR value.

- Drying out process of Transformer.
- Measuring of dielectric strength of transformer oil.
- Methods of oil purification
- Acidity Test
- Dismantling procedure Distribution Transformer.
- Testing of Transformer.
- Transformer protection.
- Short circuit mechanical forces.
- Surge protection and condenser ring inrush current.
- Merz price system of protection.
- Bucholz relay and testing
- Gas analyses
- Common transformer troubles
- Transformer noise.
- Earthing and measurement of earth resistance.

DETAILED SYLLABUS

UNIT I: CONTROL CIRCUIT COMPONENTS

Switches – Push button, selector, drum, limit, pressure, temperature (Thermostat), float, zero speed and Proximity switches.

Relays – Voltage relay, dc series current relay, frequency response relay, latching relay and phase failure relay (single phasing preventer).

Over current relay – Bimetallic thermal over load relay and Magnetic dash pot oil filled relay.

Timer – Thermal, Pneumatic and Electronic Timer.

Solenoid Valve, Solenoid type contactor (Air Break Contactor), Solid State Relay, Simple ON-OFF motor control circuit, Remote control operation and interlocking of drives.

UNIT II: DC MOTOR CONTROL CIRCUITS

Current limit acceleration starters – Series relay and counter EMF starters
- Definite Time acceleration starters – Field failure protection circuit – field acceleration protection circuit – field deceleration circuit.

Jogging control, dynamic braking control, reversing control and plugging control circuits.

Speed control using UJT&SCR.

UNIT III: AC MOTOR CONTROL CIRCUITS

Motor current at start and during acceleration – No load speed and final speed of motor – DOL starter – Automatic auto transformer starter (open circuit and closed circuit transition) – Star/Delta starter (semi automatic and automatic) – Starter for two speed, two winding motor – Reversing the direction of rotation of induction motor – Plug stopping of the motor – Dynamic braking – Three step rotor resistance starter for wound induction motor – Secondary frequency acceleration starter.

UNIT IV: PROGRAMMABLE LOGIC CONTROLLER

PLC –Definition – Requirements of PLC – Advantages over relay logic – components of PLC – Programming the PLC – Program loader – How the PLC operates – Additional capabilities of PLC – Ladder logic diagram – Symbols for common logic and sequence components in a ladder diagram – Ladder logic diagram for DOL starter, star/delta starter and fluid filling operation – Typical low level language instruction set for a PLC – Input module (schematic and wiring diagram) – Output module(schematic and wiring diagram) – PLC scan.

UNIT V : MAINTENANCE OF TRANSFORMERS

Preliminary inspection – inspection on arrival and before installation – measurement of insulation resistance – drying out qualities of a good transformer oil – transformer oil tester – methods of oil purification – centrifugal purifier – stream line purifier – metasil filter – acidity and acidity test – dismantling procedure for distribution transformer – voltage test, continuity test and short circuit test on distribution transformer.

Transformer protection – short circuit mechanical forces – surge protection and condenser ring in-rush current – Merz-Price system of protection – harmonic restraint – importance of Bucholz relay – Bucholz relay testing – Bucholz relay gas analyser construction – gas analysis by colour of gas by using gas analyser – common transformer troubles and their causes – transformer noise – earthing – measurement of earth resistance.

Reference Books :

Sl.No.	Name of the Book	Author	Publisher
1	Control of Electrical Machines	S.K. Bhattacharya	New Age International Publishers New Delhi.
2	Automation, Production System And Computer-Integrated Manufacturing	Mikell P. Groover	Prentice Hall of India (P) Ltd., New Delhi
3	Operation and maintenance of Electrical Machines	B V S Rao	Khanna Publishers New Delhi

EEK 532 PROGRAMMABLE LOGIC CONTROLLERS

Total No. of Hours / Week : 6

Total No. of Weeks / Semester : 16

Total No. of Hours / Semester : 96

Scheme of Instruction and Examination

Subject	Instruction		Examination		
	Hours / Week	Hours / Semester	Assessment Marks		
PROGRAMMABLE LOGIC CONTROLLERS	6	96	Internal	Board Exam	Total
			25	75	100

Topics and Allocation

UNIT	TOPIC	TIME (HRS.)
UNIT I	Introduction to Programmable logic controller	16
UNIT II	Input and Output Modules	16
UNIT III	PLC Programming	18
UNIT IV	Networking	16
UNIT V	Data Acquisition Systems	18
	Revision, Test	12
	Total	96

Objectives :

On completion of the following units of syllabus contents, the students must be able to

- **differentiate between the hard-wire and PLC based control system**
- **give the block diagram of a PLC**
- **explain the principle of working of PLC**
- **explain the various types of inputs**
- **explain the organization of modular PLC**
- **give examples of practical PLCs**

- explain the layout scheme for input modules for PLC
 - explain the working of the components of input modules for PLC
 - explain the various types of sensors used as input devices for the PLC
 - explain the input addressing schemes for few popular PLCs
 - explain the different types of outputs
 - explain the layout scheme for output modules for PLC
 - explain the working of the components of output modules for PLC
- explain the output addressing schemes for few popular PLCs
 - give the various symbols used in PLC system
 - explain the various relay logic functions
 - explain the Ladder, FBD, STL, CSF methods of PLC programming
 - PLC implementations for NO / NC contacts
 - explain timer, counter, data manipulating and math functions in PLC
 - explain PID and PWN functions available in PLCs
 - give block schematic and PLC ladder implementations for Automatic star-delta starter and 4-floor lift system
 - explain the activities in the various levels of an industrial control system
 - explain the different types of networking
 - explain the organization and working of Field bus system
 - explain the components and Protocol of a TCP/IP network system
 - explain the different types of LAN implementation
 - briefly explain file transfer protocol
 - explain the need for a data acquisition system
 - briefly explain the use of computers in process control system
 - explain the need for data loggers
 - explain the working of components in a data acquisition system

- explain the different modes of a digital controller
- explain the components of a SCADA system
- explain the use of SCADA in a network

DETAILED SYLLABUS

Unit I : Introduction to Programmable Logic Controller

PLC evolution – hardwire control system compared with PLC system - advantages of PLCs – criteria for selection of suitable PLC - Block diagram of PLC – principle of operation – CPU – memory organization – I/O modules – Input types – Logic, Analog – pulse train – expansion modules – power supplies to PLC – modular PLCs - list of various PLCs available

Unit II : Input and Output Modules

Input

Modules :

Discrete input module – AC input module – DC input module – sinking and sourcing – sensor input – special input modules – Sensors – limit switch, reed switch, photo electric sensor, inductive proximity sensor – Input Addressing scheme in important commercial PLCs.

Output modules:

Discrete output module – TTL output module – Relay output – Isolated output module – surge suppression in output – Analog outputs – open collector output. Output Addressing scheme in important commercial PLCs.

Unit III : PLC Programming

Symbols used – relays and logic functions – OR, AND, Comparator - Programming Devices – programming methods – STL and CSF, FBD and Ladder methods – simple instructions – Programming NC and NO contacts - EXAMINE ON and EXAMINE OFF instructions - online, offline methods– Latch and Unlatch outputs – pulse edge evaluation – timer instructions – on-delay and off-delay timer. Counter instructions – UP / DOWN counters – **Timer and**

Counter applications. Program control instructions – Data manipulating instructions – Math instructions. converting simple relay ladder diagram into PLC relay ladder diagram – PID and PWM functions. Sample PLC implementations for Automatic Star-Delta Starter and 4 - floor Lift system.

Unit IV : Networking

Levels of industrial control – types of networking – network communications – principles – transmission media – Field Bus – introduction, concepts, international field bus standards – Networking with TCP / IP Protocol – Network architecture – Physical addressing – LAN technologies – Ethernet – Token Ring – Sub-netting – subnet mask – transport layer – ports – sockets- network services – file transfer protocol.

Unit V : Data Acquisition Systems

Computers in Process control – Data Loggers – Data acquisition systems (DAS) – Alarms – Direct Digital Control (DDC) - Characteristics of digital data – Controller software – Digital Controller modes – Error, Proportional, Derivative and composite control modes. Computer Process interface for Data Acquisition and control – Computer control loops.– Supervisory Digital Control (SCADA) - introduction and brief history of SCADA – SCADA Hardware and software – Landlines for SCADA – use of modems in SCADA – SCADA with LAN

Text Book :

SI No.	Title of the Book	Author(s)	Publishers
1.	Introduction to Programmable Logic Controllers	Gary Dunning	Thomson Delmar Learning Second Edition Second reprint 2003

Reference Books :

SI No.	Title of the Book	Author(s)	Publishers
1	Programmable controllers hardware software and applications	George L. Battin	
2	Programmable Controllers	Richard Cox	Thomson Delmar Learning
3.		Joe Casad	Pearson Education First Indian reprint 2004
4.	Teach yourself TCP/IP Programmable Logic Controllers – PLC manual	Petruzella	

EEK 540 - 'C' PROGRAMMING PRACTICAL

Total No. of Hours / Week : 6
Total No. of Weeks / Semester : 16
Total No. of Hours / Semester : 96

Scheme of Instruction and Examination

Subject	Instruction		Examination		
	'C' PROGRAMMING PRACTICAL	Hours / Week	Hours / Semester	Assessment Marks	
6		96	Internal	Board Exam	Total
			25	75	100

OBJECTIVE

On completion of the experiment students should be able to write programs in C and execute it.

LIST OF EXERCISES :

1. Program to calculate simple and compound interest.
2. Solution of a Quadratic Equation.
3. Program for Pay bill calculation.
4. Program to compute sum of series using While loop.
5. Printing of multiplication table using Do...While loop.
6. Program to find whether the given number is a positive number, negative number or zero.
7. Program to sort a list of numbers
8. Program to sort the strings.
9. Preparation of the rank list of a class of students.
10. Program to implement Matrix addition & multiplication.
11. Program to implement Fibonacci series.

12. Program to find factorial of given N numbers with out recursion.
13. Program to find factorial of given N numbers with recursion.
14. Program to tabulate a survey data.
15. Program to count number of characters, words & lines in a text.
16. Program to develop a pattern (eg.: pyramid, square)
17. Write a function to swap the values of to variables to illustrate the concept of pass by reference.
18. Write a program to add five numbers by getting the values through command line argument.

EEK 550 MICROPROCESSOR AND MICROCONTROLLER PRACTICAL

Total No. of Hours / Week : 6
Total No. of Weeks / Semester : 16
Total No. of Hours / Semester : 96

Scheme of Instruction and Examination

Subject	Instruction		Examination		
MICROPROCESSOR AND MICROCONTROLLER PRACTICAL	Hours / Week	Hours / Semester	Assessment Marks		
	6	96	Internal	Board Exam	Total
			25	75	100

Minimum 12 Experiments to be conducted

1. Introduction of Microcontroller Kit
2. Addition, Subtraction
3. Multi-byte addition
4. Multiplication of two numbers
5. Finding the maximum value in an array
6. Arranging the given data in Ascending order
7. BCD to Hex conversion
8. Hex to BCD conversion
9. Hex to ASCII
10. ASCII to Binary
11. Square Root of an given data
12. Least Common Multiple
13. Greatest Common Divisor
14. Parity bit generation
15. Program using I/Os in port 1
16. Counter using timer
17. Program using interrupt

Minimum Six Experiments to be conducted(Interfacing with application boards)

18. Digital I/O
19. Matrix keyboard
20. Seven segment displays
21. LCD Displays
22. Traffic light
23. 8 bit ADC and 8 bit DAC
24. STEPPER MOTOR CONTROL
25. DC motor control
26. Lift control
27. Sending data through serial port between controller kits
28. Printer Interfacing with Microcontroller kit

EEK 561 CONTROL OF ELECTRICAL MACHINES PRACTICAL

Total No. of Hours / Week : 6

Total No. of Weeks / Semester : 16

Total No. of Hours / Semester : 96

Scheme of Instruction and Examination

Subject	Instruction		Examination		
CONTROL OF ELECTRICAL MACHINES PRACTICAL	Hours / Week	Hours / Semester	Assessment Marks		
	6	96	Internal	Board Exam	Total
			25	75	100

List of Experiments

- (1) Perform breakdown test and determine the dielectric strength of transformer oil
- (2) Conduct acidity test on transformer oil
- (3) Test the timing characteristic of thermal overload relay
- (4) Wire and test the control circuit for jogging in cage motor
- (5) Wire and test the control circuit for semi-automatic star-delta starter
- (6) Wire and test the control circuit for automatic star-delta starter
- (7) Wire and test the control circuit for dynamic braking of cage motor
- (8) Wire and test the control circuit for two speed pole changing motor
- (9) Wire and test the control circuit for automatic Rotor resistance starter
- (10) Conduct test on speed control of DC motor using SCR
- (11) Test the working of single phase preventer
- (12) Wire and test the DOL starter using PLC
- (13) Wire and test the Star-Delta starter using PLC

- (14) Wire and test the control circuit for jogging, forward and reverse operations using PLC
- (15) Wire and test the single phase preventer using PLC
- (16) Testing of 25 KVA, 11 KV/400 V distribution transformer – voltage test, continuity test and short circuit test
- (17) Dismantling and re-assembling of 25 KVA, 11KV/400 V distribution transformer

EEK 562 PROGRAMMABLE LOGIC CONTROLLER PRACTICAL

Total No. of Hours / Week : 6

Total No. of Weeks / Semester : 16

Total No. of Hours / Semester : 96

Scheme of Instruction and Examination

Subject	Instruction		Examination		
PROGRAMMABLE LOGIC CONTROLLER PRACTICAL	Hours / Week	Hours / Semester	Assessment Marks		
	6	96	Internal	Board Exam	Total
			25	75	100

List of Experiments

- (1) DOL Starter with single phasing prevention
- (2) Changeover switch implementation with interlocking
- (3) Star Delta starter
 - single phasing prevention
 - Adjustable star-delta transfer time
 - Pre-settable Overload trip time
- (4) Automatic Load transfer
 - transfers load from one phase to another when one phase in a 3 ph. system fails
 - automatically restores when power is resumed
 - time delays are effected to prevent action during short time failure
- (5) Industrial sliding door automation
 - Sequencing
 - Open $\frac{1}{4}$ th Full width
 - Wait for next go command
 - Next open full
 - wait for a time and close full
- (6) Fire Alarm
 - Multiple alarms
 - sound alarm 1
 - if not acknowledged, sound alarms 1 and 2
 - similarly go upto 4 alarms
- (7) Conveyor Belt sorting
 - storing to left bin
 - storing to right bin
 - storing to exit bin
- (8) Three floor Hoist controller
 - Sequencing
 - floor level detection
 - Gate safety latch

- (9) Burglar scare random lighting in building with variable timing
- The lights in each room are switched on at pre-determined intervals and switched off at pre-determined time. The lighting is shifted from area to area randomly to scare the burglars with a false fear of presence of people.
 -
- (10) Analog input to PLC as a set of value for a comparator function block
- The output is multilevel illumination control. The input setting is by means of a potentiometer in an analog input to the PLC. The outputs turn on several groups of lamps to obtain desired level of illumination.
- (11) Heater control with PID function of the PLC
- A 1000 W water heater is controlled using the PID function of the PLC. The temperature transducer is a Temperature transmitter with 4 to 20 mA output and Pt 100 Probe
- (12) Round Table - Liquid filling System
- Dropping of Reagents into test tubes. The feedback is from a potentiometer. The program must ensure that the end limits of the pot are never reached by carefully balancing the clockwise and anti-clockwise revolution.
- (13) Sequential timer for educational institute
- Timings are alterable by supervisor while program is running. Pre-and-post – Holiday sequence selectable
- (14) PC monitoring of PLC operation. RS232 or USB communication for status display of inputs and outputs.
- (15) Slow speed motor control using PWM function of the PLC
- Slow speed 12V DC 18W Permanent Magnet Motor with a fly wheel is controlled with the PWM output and a feedback from a low resolution encoder
- (16) Man-machine interface lay-out and annunciation functions
- (17) Noise Immunity at the inputs of PLC
- Measurement of input resistance of the PLC
 - Determine the effect of high o/p source resistance at the inputs
- (18) Testing of RC snubber component for protection of PLC output from a highly inductive components like solenoids or relays.

VI SEMESTER

EEK 610 POWER SYSTEM - II

Total No. of Hours / Week : 5
Total No. of Weeks / Semester : 16
Total No. of Hours / Semester : 80

Scheme of Instruction and Examination

SUBJECT	INSTRUCTION		EXAMINATION		
POWER SYSTEM - II	Hours / Week	Hours / Semester	Assessment Marks		
	5	80	Internal	Board Exam	Total
			25	75	100

Topics And Allocation

Unit	Topic	Time in Hrs
I	Distribution substation & bus bar arrangements	14
II	Industrial drives selection of motors & electrical braking methods	14
III	Electronic traction systems of track electrification mechanics of motors	14
IV	A. Traction control B. illumination	14
V	Electric heating and welding	14
	Revision & tests	10
	Total	80

OBJECTIVES:

- The student must be able to understand the network of Electrical distribution system and its components.
- Distinguish between various types of substations and bus bar arrangement
- Understand the characteristics of all types of motors together with various ratings, bking arrangements and their application
- select the proper drive for industrial application
- Gain knowledge about Electronic Traction system
- Draw speed time curves and solve problem on max speed

- Understand the concept of traction control methods of equipments
- Gain knowledge on 'illumination' solve problem using laws
- Understand the concept various methods of electrical heating of furnace operations temperature control
- Gain knowledge on welding methods & control equipments

Detailed syllabus

UNIT I: Distribution

Introduction - classification of distribution systems based on type of supply character of service, type of construction, number of wires and scheme of connections – types of AC distribution – calculation of voltage at load points on single phase distribution systems(with two load only)-fed at one end, both ends and ring mains – three phase four wire star connected unbalanced load circuit – problems with resistive load – consequences for different distribution systems and comparison between them.

Substations:

Classification – advantage and disadvantages of outdoor substations – single line diagram of 11KV/400V distributing substations – equip stations - substation auxiliary supply.

Bus –Bar systems:

Different types of bus – bar arrangement with sketches – their advantages and disadvantages

UNIT II: Industrial Drives

Introduction – advantages of electric drives – parts of electric drives(load, motors and controls units) – types of electric drives(industrial, group and multi drives) – nature and classification of load torque – review of different types of motors and their performance characteristics – factors governing the selection of motors – mechanical consideration – standard ratings of motors – classes of load duty cycles of load duty cycles – selection of motors for different duty cycles – selection of motors for specific application – electric breaking – necessity and

advantages of electric breaking – rheostat, dynamic, plugging and electric regenerative breaking.

UNIT III: Electric Traction

Traction systems – comparison and applicability of different traction systems – diesel electric traction – advantage and disadvantage – different types of electrical transmission in diesel electric traction – electric traction – advantages and disadvantages.

System of Track Electrification:

Different methods of supplying power (rail connected system, over head system) – over head equipments – category and dropper – current collection gear for OHE – bow collector and pantograph collector – different systems of track electrification – DC system – low frequency AC system – high frequency AC system – high frequency AC system – AC system – composite system (both 1 to 3, AC to DC systems) – advantages methods of connecting booster transformer – neutral sectioning.

Traction mechanics:

Units and notations used in traction mechanics – speed time curves (main line ,sub urban and urban)- simplified speed time curve – average speed – scheduled speed – tractive effort – problems using simplified speed time curve, tractive effort and power requirement.

Traction motors:

Desirable characteristics of traction motors suitable for traction purpose (DC series, AC series motor, repulsion motor, cage induction motor and linear induction motor).

UNIT IV: A)Traction control

Necessity of control equipments – principle of control of DC traction motors – various methods for starting and speed control of DC traction motors – rheostatic control – series parallel control – shunt transition – bridge transition – multiple unit control – drum control – contactor type bridge transition – thyristor

control – equipments of bracking systems – pneumatic bracking – regenerative bracking applied to traction

B) Illumination

Definition and units of different terms used in illumination – sold angle, light, luminous flux, luminous intensity ,candle power, illumination, MSCP, MHSCP, MHSCP – reduction factor – luminance or brightness – glare – lamp efficiency – space height ratio – depreciation factor and maintenance factor – utilization factor or co – efficient of utilization – waste light factor –absorption

Factor – beam factor – reflection factor – essential of good lighting system – laws of illumination – problems – sources of light – arc lamp – incandescent lamp – halogen lamp – discharge lamps – gaseous discharge lamps – sodium vapor lamp – high pressure mercury vapor lamp –neon tube – fluorescent tube – effect of voltage variation – energy saving consideration for fluorescent lamp – lamp fittings and lighting systems – illumination level required for various applications – factors to be considered while designing lighting scheme.

UNIT V:-Electric Heating and Welding

Electric Heating:

Introduction – advantages of electric heating – classification of heating methods based on temperature range – modes of heat transfer – classification of electric heating – power frequency electric heating (direct resistance heating, indirect resistance heating, infra-red heating and arc heating)-high frequency supply electric heating(induction heating, eddy current heating and dielectric heating).

Resistance ovens and Furnaces:

Requirements of heating element materials- commonly used heating element materials- resistance furnaces for specials purposes- temperature control of resistance furnace – submerged arc furnace- power supply and control for arc furnace – reasons for employing low voltage and high current supply.

Induction furnaces:

Direct core type- indirect core type- coreless induction furnace- method of obtaining power supply for coreless induction furnace.

Welding:

Introduction for welding –types of electrical welding.

Resistance welding:

Seam welding – butt welding- projection welding- flash welding.

Arc welding:

Carbon arc welding- metal arc welding- atomic hydrogen arc welding- inert gas metal arc welding- submerged arc welding.

Radiation welding:

Ultra sonic welding- electron beam welding-LASER beam welding.

Requirements of good welding:

Preparation of working for welding - electrodes used for welding - electric welding equipments - control of current flow - welding transformers - comparison of arc welding and resistance welding.

References Books:

SI.NO	Name of the Books	Author	Publisher
1	A Course in Electrical Power	JB.Gupta	Katson Publishing House, New Delhi.
2	Electric power	S.L.uppal	Khanna publisher, New Delhi
3	A text book in electric power	1.Soni 2.Gupta 3.Bhatnagar	Dhanpat Rai&Sons, Delhi
4	Modern electric traction	H.Partab	Dhanpat Rai& Sons, New Delhi
5	Electrical power distribution system	A.S.Pabla	Tata McGraw Hill publishing Co, New Delhi
6	Fundamentals of electrical drives	GK.Dubey	Narosa Publishing House, New Delhi.
7	Utilization of electric power	N.V.Suryanarayana	Tata McGraw hill publishing Co., New Delhi
8	Electric drives	Vedam subramaniam	New age international, New Delhi
9	Industrial drives and control	TTTI, Chennai.	Tata McGraw Hill Publishing Co, New Delhi.

EEK 620 Electrical wiring Estimation and Energy Management

Total No. of Hours / Week : 6
Total No. of Weeks / Semester : 16
Total No. of Hours / Semester : 96

Scheme of Instruction and Examination

Subject	Instruction		Examination		
	Hours / Week	Hours / Semester	Assessment Marks		
Electrical wiring Estimation and Energy Management	6	96	Internal	Board Exam	Total
			25	75	100

Topics And Allocation

Unit	Topic	Time in Hrs
I	Electrical symbols and IE Rules (1956)	16
II	Specification of wiring materials and Accessories Types of wiring, fuse and earthing	16
III	Domestic and industrial installations and testing	18
IV	Service connection & Illumination	18
V	Energy Management	16
	Revision & tests	12
	Total	96

OBJECTIVES

- Draw conventional symbols for various wiring installation.
- State the specification of switches, plugs fuse unit, ceiling rose.
- Differentiate types and size of wire.
- List the specification of earth pipe plate and different size of wires used for earthing.
- Write the specification of different of switch board.
- List the points to be considered for the selection of wiring system.

- List the precautions to be observed-listing the different types of wiring system.
- Determine the size of cable for a voltage and load in a wiring circuit.
- To quote the relevant IE rule for a given electrical installation.
- To interpret the relevant IE rules (1956) respect the lighting and power installation.
- To quote the relevant IE rule about clearance of service lines.
- Specify the need for earthing.
- Describe the different system of earthing.
- Estimate the quantity of material for pipe earthing.
- Estimate the quantity of material for plate earthing.
- Describe the methods of substance earthing.
- Differentiate between neutral and earthing.
- Estimate the quantity of material required for wiring residential building with different systems of wiring.
- Estimate the quantity of material required for using an industrial level.
- Estimate the quantity of material required for using an irrigation pump motor.
- Estimate the quantity of material required for using an auditorium.
- Estimate the quantity of materials required for using an the room of primary health center.
- State the factors to be considered the checking lighting installation.
- State the factors to be considered the checking power installation.
- Explain the different length recommended for lighting installation as per IE rule.
- Explain the periodical list to be carried out an existing electrical installation.
- To differentiate between half service connection and UG service connection.
- List the materials used for service connection.
- State the rules and regulation for providing a service connection to a consumer.
- Estimate the materials for giving a single phase overhead service connections to a residential building.
- Estimate the materials for giving 3 phase overhead service connections to a residential building.
- Estimate the materials for giving 3 phase service connection to on industrial load.
- Define the terms luminous flux, intensity and illumination.
- State the factors govern illuminance of visual task.
- Design illumination schemes for interior buildings.
- Estimate the material for interior lighting.
- Estimate the materials for street lighting.

DETAILED SYLLABUS

Unit 1: Electrical symbols and IE Rules (1956)

Electrical symbols

Lines existing	Lines planned
OH Line	UG Cable
Main fuse board with switches (lighting)	
Distribution fuse board with switches (lighting)	
Main fuse board with switches (power)	
Distribution fuse board with switches (power)	
Isolator	Junction of conductor
Line crossing	Surface conduit wiring
Concealed conduit wiring	Earth & Earth point
Single pole switch	Double pole switch
Three pole switch	Push button
Socket outlet 5A	Socket outlet 15A
Socket outlet with switch 5A	Socket outlet with switch 15A
Rewirable fuse	Cartridge fuse
Neutral link	Bulb head fitting
Water tight fitting	Fluorescent lamp
Signal lamp	Indication lamp
Bell	Buzzer
Siren	Ceiling fan
Bracket fan	Exhaust fan
Heater	Energy meter
Shielded cable	Magnetic core
Laminated core	3phase transformer
3phase auto_transformer	Induction moter_cage
Induction motor_wound	

IE Rules (1956)

30. Service lines and apparatus on consumer's premises.
31. Cutout on consumer's premises.
33. Earthed terminal on consumer's premises.
43. Provisions applicable to protection equipment.
44. Instructions for restoration of persons suffering from electric shock.
47. Testing of consumer's installation.
48. Precautions against leakage before connection.
51. Provisions applicable to medium high or extra high voltage installation.
54. Declared voltage pf supply to consumers.
57. Meters, MDI and other apparatus on consumer's premises.
58. Point of commencement of supply.
60. Test for installation resistance.
67. Connections with earth.

- 77. Clearance above ground of the lowest conductor.
- 79. Clearance from buildings of low and medium voltage service line.
- 87. Lines crossing or approaching each other.
- 88. Guarding.

Unit 2: Specification of wiring materials and Accessories Types of wiring, fuse and earthing

Specification of wiring materials and Accessories

Tumbler switch, Flush type switch, main switch, push button switch, Wall socket, Plug, fuse units, Lamp holders, ceiling rose, switch boards.

Wires and cable (PVC, TRS, VR, Weather proof) UG cable.

Lamps:- Incandescent lamp, fluorescent lamp, Discharge lamps, compact fluorescent lamps, earthing electrode, Earthing heater, Electric iron, Immersion heater, Ceiling fan, Copper conductor sizes and rating.

Types of wiring, fuse and earthing

Points to be considered for selection of wiring-types advantages and disadvantages.

Fuses

Metals-HRC fuse-kitkat fuse – fusing current and melting current of fuse – fusing factor – detection of faults of HRC fuse selection and rating.

Earthing

Necessity of earthing – methods of earthing – pipe earthing – plate earthing – strip earthing – earthing procedures with diagrams – earthing of domestic fitting and appliances earthing in industrial premises – substation earthing – maximum earth resistance –selection of earth electrode- difference between neutral and earth wires.

Unit 3: Domestic and industrial installations and testing

Conditions and requirements – plan (layout) – Schematic of wiring diagram – position of main and distribution boards – routes of main and sub mains – number of points to be controlled on individual circuit – size of wire – selection of lamps and fittings. Socket outlet points – schedule of material

Estimation of material for house wiring and residential building.

Estimation of material for an auditorium, class room – computer center, primary health center.

Estimation of industrial load (small) as Saw mill, Rice mill, Small workshop with 4 or 5 machines.

Estimation for irrigation pump motor.

Testing of installation

Insulation resistance between earth and conductor, between conductors – leakage test – insulation resistance of motor and other equipment – general inspection – factors to be considered for checking installation – testing of wiring installation – measurement of earth resistance – periodical testing – earthing of UG cable – guidelines for installation of fitting switches, socket outlet light, fans, fuses and earthing of appliances and electrical machines.

Unit 4: Service connection & Illumination

Service connection

OH service connection – UG service connection – different materials required – estimation of materials required – rules and regulations for providing service connection:- single phase OH service connection – 3 phase OH service connection.

Illumination

Terminology – luminous flux, intensity, illumination – units practical lighting scheme – factors governing illumination of visual task – recommended values of illumination level (for various application) – light sources and light fittings selection, size, mounting height of interior illumination calculations (Lumens method) design consideration of street lighting scheme – factors to be considered for street lighting – aim – points to be considered – lamp used – conductor spacing – selection of conductors – rules and regulation of distribution line – street lighting calculation.

Unit 5: Energy Management

(Syllabus content is under consideration)
EEK 631 - POWER ELECTRONICS

Total No. of hours/week : 6

Total No. of weeks/Semester : 16

Total No. of hours/Semester : 96

Scheme of Instruction and Examination

Name of Subject	Instruction		Examination		
	Hours / Week	Hours / Semester	Assessment marks		
			Internal	Board Exam	Total
POWER ELECTRONICS	6	96	25	75	100

Topics and Allocation

UNIT	TOPIC	TIME (Hrs)
I	Thyristor Family, Trigger and Commutation Circuits	18
II	Phase Controlled Rectifier	16
III	Choppers and Inverters	18
IV	Control of DC Drives	16
V	Control of AC Drives	16
	Revision, Test	12
	Total	96

OBJECTIVES:

On completion of this unit the student should be able to :

- Explain the characteristics of Thyristor family.
- Draw the SCR trigger circuits.
- Explain the working of trigger circuits.
- Draw the commutation circuits.

- Explain the operation of commutation circuits.
- State the applications of trigger and commutation circuits.
- Familiarize the phase controlled rectifier
- Know the applications of the phase controlled rectifier
- Draw and describe the working of half wave controlled rectifier circuit with R and R L load
- Draw and explain the working of single phase semiconverter bridge and single phase full converter Bridge for RL load.
- Draw and explain the operation of single phase and three phase full converter with RL load
- Study the complete protection of converter circuits
- Understand the working choppers and inverters
- Know the applications of choppers and inverters
- Explain the various types of choppers with circuit diagram
- Describe the various methods of inverters with circuit diagram
- Understand the control of DC Drives
- Know the various methods of speed control of DC drives
- Learn the different types of power factor improvement in phase controlled converter
- Study the closed loop control of DC drives
- Familiarize the control of AC drives
- Know the torque - speed characteristics of three phase induction motor
- Study the speed control of three phase induction motor
- Understand the closed loop control of AC drive
- Know the operation of single phase and three phase cyclo converter

DETAILED SYLLABUS

UNIT I Thyristor Family, Trigger and Commutation Circuits

Thyristor family –(Review) SCR-symbol, working , characteristic, holding current, latching current, dv/dt , di/dt ratings, gate protection- Insulated gate bipolar transistor (IGBT) – MOSFET - Symbol, working and characteristics of DIAC, TRIAC, SUS, SCS, SBS, LASCR, and GTO – symbol, working and characteristics - specifications of the above power devices

Gate trigger circuits – DC triggering, AC triggering, pulse gate triggering- Pulse transformer in trigger circuit – Electrical isolation by opto isolator – Resistance firing circuit and waveform – Resistance capacitor firing circuit and waveform, Synchronized UJT triggering (ramp triggering) – Ramp and pedestal trigger circuit for ac load.

Commutation circuits – SCR turn off methods – Natural commutation – Forced commutation- Class A, Class B, Class C, Class D, Class E and Class F- Explanation with wave form .

UNIT II Phase Controlled Rectifier

Introduction-applications of phase controlled rectifier-classifications of rectifier-halfwave controlled rectifier with resistance load ,resistance inductive load, effect of freewheeling diode with waveform – single phase half controlled bridge with RL load (semiconverter) – average DC output voltage – waveform – input power factor (definition and expression) – single phase fully controlled bridge with RL load (full converter) – average DC output voltage – waveform – input power factor (definition and expression) – effect of single phase fully controlled bridge with source impedance for RL load – wave form – working.

Three phase fully controlled bridge with RL load – firing sequence – average DC output voltage and current waveform – three phase half controlled bridge with RL load- average DC output voltage – waveform.

Complete protection of converter – against surge current, surge voltage, dv/dt and di/dt protection.

UNIT III Choppers and Inverters

Choppers

Introduction – applications – principle of chopper – control strategies (time ratio and current limit control) – types of chopper – type A, B, C, D, and E – step up chopper – Jones chopper – Morgan chopper – Chopper using MOSFET – PWM Control circuit for driving MOSFET in chopper.

Inverters

Introduction – applications – inverter classifications – single phase series inverter – basic parallel inverter , voltage and current waveform – single phase full bridge inverter – single phase inverter output voltage control – types – single pulse width modulation – multiple pulse width modulation – sinusoidal pulse width modulation – basic three phase bridge inverter with 120 degree conduction mode – circuit, trigger sequence, waveform and working – parallel inverter using MOSFET and IGBT – SMPS – Buck, Boost, Flyback converter – Control circuit for SMPS – UPS – working of UPS – on-line and off-line UPS.

UNIT IV Control of DC Drives

Introduction – History of DC drive - applications – basic dc motor speed equation – operating region of armature voltage control and field current control – constant torque and constant hp regions – schemes for separately excited dc motor speed control – single phase full converter drives - circuit, operating quadrants, waveform – power factor improvement in phase controlled converter – phase angle control, semiconverter operation of full converter, asymmetrical firing – three phase full converter drives – operation and waveform – chopper fed dc series motor drive. - four quadrant DC – DC converter drive using MOSFET and IGBT – circuit and operation

Closed loop control of dc drives – basic block diagram – Phase locked loop(PLL) control of dc drives –block diagram – microprocessor based closed loop control of dc drive – block diagram and working

UNIT V Control of AC Drives

Introduction – applications – torque speed characteristics of three phase induction motor – speed control of induction motor – stator voltage control, variable frequency control – necessity of maintaining v/f ratio constant – rotor resistance control – inverters for variable voltage and frequency control – speed control by rotor resistance for slip ring motors – static scherbius drive (slip power recovery scheme) – closed loop control of AC drive – block diagram – microcomputer based pulse width modulation control of induction motor drive.

Cycloconverter - introduction – single phase to single phase cycloconverter – input, output waveform with resistive load – single phase bridge type cycloconverter – three phase to three phase cycloconverter – schematic diagram, basic circuit and working.

Text Books:

Sl.No.	Name of the Book	Author	Publisher
1	Power Electronics	MDSingh KBKhanchandaniata	McGrawHillPublishingCompany NewDelhi . Seventeenth reprint 2005

Reference Books:

Sl.No.	Name of the Book	Author	Publisher
1	Power Electronics- Converter Applications And Design	Mohan Underland Robbins	John Wiley and Sons , NewYork 2 nd Edition
2	Fundamentals of Electrical Drives	G K Dubey	Narosa Publishing House, New Delhi Fourth reprint 2004.
3	Fundamentals of Power Electronics	SRamaReddy,	NarosaublishingHouse,N ewDelhi, First Reprint 2002
4	Power Electronics	Dr P S Bimhra	Khanna Publishers . 1991
5	Power Electronics	P C Sen	Tata McGraw Hill Publishing Company New Delhi, 24 th reprint 2005
6	Power Electronics	MUHAMMED H.RASHID	Prentice-Hall of India Pvt. Ltd New Delhi-110001. Third Edition-2005

EEK 632 - COMPUTER HARDWARE AND NETWORKING

Total No. of Hrs / Week	:	6
Total No. of Weeks / Semester	:	16
Total No. of Hours / Semester	:	96

Scheme of Instruction and Examination

Subject	Instruction		Examination		
	week	semester	Assessment Marks		
			Internal	Boar d Exam	Total
COMPUTER HARDWARE AND NETWORKING	6	96	25	75	100

Topics and Allocation

Unit	Topic	Time (Hrs)
Unit 1	Motherboards and processors	16
Unit 2	Peripherals	18
Unit 3	I/O ports and External peripherals	18
Unit 4	PC Assembling and Testing	16
Unit 5	Computer Network and Installation	16
	Revision and Test	12
Total		96

Objectives:

On completion of the following units of syllabus contents, the students must be able to

- Familiarize themselves the evolution of PCs.
- Familiarize with the motherboards, memory chips.
- Familiarize with various Bus standards, chip sets and processors.
- Understand the operation of Keyboard, Mouse and Displays.
- Understand the concept of HDD, FDD and special devices.
- Understand the operation of CD and DVD.
- Familiarize with the working of video capture board, sound blaster cards.

- Understand the different I/O ports and SMPS used in the PCs.
- Understand the working of Modem, Digital camera, Printer and Scanners.
- Acquire knowledge about assembling of PC.
- Understand the concept of CMOS set up program & post diagnostics software and viruses.
- Familiarize with the different computer networks, network media and hardware.
- Understand the concept of installation & configuring network, network administration.

DETAILED SYLLABUS

Unit – 1

Introduction: Evolution - PC through Pentium core2 Duo – comparison chart - PC system units – Front Panel / Rear side connectors, switches and indicators - specification parameters - Lap top PCs – Palm top PCs.

Mother Board: Evolution – Mother Board components - BIOS – CMOS RAM – Form Factor – Riser Architecture – Main Memory – memory chips (SIMM, DIMM, RIMM) – extended – expanded – cache – virtual Memories.

Bus Standards: PC BUS – ISA and Knowledge of other Busses – PCI – AGP – USB Architectures, important signals – comparison chart.

Chip sets: Introduction – Intel chipset 945 series and knowledge of other chip sets – AMD chipset series.

Processors: Introduction – CISC Basic structure – RISC basic structure – evolution – Intel CPUs(P IV, Dual core, Core DUO, Core2 DUO) – AMD CPUs(K6, ATHLON, DURON) – VIA Cyrix CPUs(6X86MX, VIA/CYRIX III, VIA SAMUEL II).

Unit II

Keyboard & Mouse: introduction – keyboard operation – key board signals – keyboard interface logic – wireless keyboard function – Mouse construction - principle operation of Mouse – optical mouse – wireless mouse – mouse signals – Mouse Installation – track pads.

Displays: Video basics – anatomy of CRT, LCD and TFT displays - resolution –interlacing - refresh rate – dot pitch – data projectors – touch screens.

HDD: introduction – HDD construction – parameters – operation- HDC block diagram – working principle – IDE, EIDE, SCSI, ultra ATA, and SATA series – installation – partitioning– partition table – formatting – FAT –data reading – data writing (FM, MFM) - Boot record - Directory structure.

FDD & Special Devices: Introduction – disk construction – types - FDD construction – drive operation – types – FDC operation – pen drives –

flash drives – I pods.

CD & DVD: Introduction – construction – operation – formats – Technology
DVD writer combo drive construction – read/write operation – DVD drive
installation.

UNIT III

Video Capture Board: Introduction – block diagram of an integrated video
capture/ VGA card – connectors – capture process – audio and video
capture and play back sequence – compression and de-compression
techniques.

Sound Blaster Card: Basics of digital sound – audio compression and
decompression – sound blaster card – installation – MIDI – 3D audio –
EAX – MP3 – SDMI.

I/O Ports & SMPS: serial - parallel port - game port – controllers (Block
Diagram) – operation – signals – SMPS – working – block diagram – AT &
ATX connectors

Modem: Introduction – functional block of modem – working principle –
types – installation.

Digital Camera: introduction – construction – operation – SLR camera–
features.

Printer: introduction – types – dot matrix – inkjet – laser – operation –
construction – features – installation – troubleshooting.

Scanner: Introduction – operation – scan resolution – color scanners –
scan modes – file formats.

UNIT IV

PC Assembly: Power supplies - Configuring mother board/jumper setting
– connectors – cables - Adding memory modules – assembling a
computer – upgrading a PC.

CMOS setup program & POST: CMOS setup program - various setup
options – POST definition – IPL hardware – POST test sequence – beep
codes – error messages.

Diagnostic Software & Viruses: PC latest diagnostic software – benchmark programs – computer viruses – Precautions – Anti-virus software – signature of viruses – Fire walls.

UNIT V

Computer Network Basics: Introduction – OSI layer model - network types – LAN- WAN – CAN – MAN – HAN – internet – intranet – extranet – uses – Blue tooth Technology.

Local Area Network: LAN topologies – star – ring – mesh – bus – Client/Server – peer to peer.

Network Media & Hardware: Twisted wire - Coaxial cable - fiber optic cable – flow control – Ethernet – Arc net – Router – active hub - passive hub – wireless network – blue tooth dongle.

Installing and configuring Network (Windows NT 2003): Network Components and Connectors – Installing NIC – Installing Cables – Hub – Setting up NIC – Network Setup Wizard – Working with Network resources – Sharing resources on Network – New Connection Wizard.

Network Administration(Windows NT 2003): User Accounts and Groups – Working with User Accounts & security – passwords - Group Membership Profiles – Working with Groups – Granting Permissions – Managing Shares – Switching Between Users.

Text Books:

s.no	Name of the book	Author	publication
1.	Computer Installation and Servicing	D. Balasubramanian	TMH Publishing Company, New Delhi

Reference books:

s.no	Name of the book	Author	publication
1.	IBM PC and Clones	Govindarajulu	TMH Publishing Company, New Delhi.
2.	Computer Installation & Troubleshooting	M. Radhakrishnan D. Balasubramanian	ISTE Learning Material.
3	Introduction to Computers	Peter Norton	TMH Publishing Company, New Delhi.
4	Troubleshooting, Maintaining & Repairing PCs	Stephen J. Bigelow	TMH Publishing Company.
5	Local Networks – An introduction to the technology	McNamara John. E	PHI.

EEK 640 COMPUTER AIDED ELECTRICAL DRAWING PRACTICAL

Objectives

At the end of the semester the student must be able to draw:

- **2D diagrams using Auto CAD**
- **Symbols widely used in Electrical and Electronics circuits**
- **Starter circuits and winding diagrams**
- **The line diagrams of substations**
- **The simple basic diagrams for laboratory circuits**

Scheme of Instruction and Examination

Name of Subject	Instruction		Examination		
	Hours / Week	Hours / Semester	Assessment marks		
			Internal	Board Exam	Total
Computer Aided Electrical Drawing Practical	6	96	25	75	100

Detailed Syllabus

DRAWING - ELECTRICAL SYMBOLS

- 01. Draw the symbols for machines : Armatures, Alternators, Field winding - Shunt, Series and Compound, Transformers, Auto Transformers**
- 02. Draw the symbols for components :Resistor, Capacitor, Inductor, Diode, Transistor, FET, SCR, UJT, TRIAC, DIAC, Gates AND, OR, NOT, NAND, NOR, EXOR**
- 03. Draw the symbols used in circuits : Relays, contactors, fuses, main switch, electric bell, earth, antenna, DPST, DPDT, TPST, Neutral link**
- 04. Draw the symbols for instruments : Ammeter, Voltmeter, Wattmeter, Energy meter, Frequency meter, Power factor meter, Timers, Buzzers**

DRAWING - ELECTRICAL CONNECTION DIAGRAMS

- 05. Draw the panel wiring diagram of two shunt generators in parallel.**
- 06. Draw the panel wiring diagram of two single phase alternators in parallel.**
- 07. Draw the winding diagram of lap connected DC armature with commutator connections and brush positions.**
- 08. Draw the winding diagram of wave connected DC armature with commutator connections and brush positions.**
- 09. Draw the mush winding diagram of a three phase induction motor.**
- 10. Draw the concentric winding diagram of a single phase induction motor.**
- 11. Draw the control circuit of jogging.**
- 12. Draw the control circuit of automatic rotor starters.**
- 13. Draw the connection diagram of ON load tap changer.**
- 14. Draw the circuit of three phase transformers in parallel.**
- 15. Draw the connections of three point starter.**
- 16. Draw the connections of automatic star - delta starter.**
- 17. Draw the connections of direct on line starter.**
- 18. Draw the single line diagram of 110 KV / 11 KV receiving substation**

NOTE FOR EXAMINERS:

1. Five symbols should be asked from exercise 1 to 4 with at least one from each
2. One sketch should be asked from exercise 5 to 18.
3. Printed output of the given symbols and sketch is to be evaluated

EEK 651- POWER ELECTRONICS PRACTICAL

Total No. of Hours / Week : 6
Total No. of Weeks / Semester : 16
Total No. of Hours / Semester : 96

Scheme of Instruction and Examination

Subject	Instruction		Examination		
POWER ELECTRONICS PRACTICAL	Hours / Week	Hours / Semester	Assessment Marks		
	6	96	Internal	Board Exam	Total
			25	75	100

OBJECTIVES:

On completion of the following experiments, the students must be able to

- get the knowledge about the trigger circuit
- draw the input/output waveform using HCB and FCB
- know the performance of lamp control using DIAC-TRIAC
- learn the various techniques used for turn-off of Thyristor
- draw the waveform of series/parallel inverter
- draw the output waveform of DC chopper
- measure the output voltage of chopper
- find the performance of speed control of universal motor
- understand the concept of Closed loop control of AC motor
- know the performance of speed control of DC motor by varying firing angle
- understand the concept of Closed loop control of DC motor
- draw the output waveform of DC chopper using MOSFET/IGBT
- measure the variable output voltage using PWM technique

List of Experiments

1. Line synchronized, Ramp and Pedestal UJT trigger circuit with AC load

2. Single phase Half and Full Controlled Bridge with R load
3. Lamp control circuit using DIAC – TRIAC
4. SCR commutation circuits
5. Basic Series Inverter
6. Single phase Parallel Inverter using MOSFET / IGBT
7. DC chopper control circuit using thyristor (any one)
8. Single phase to Single phase cycloconverter
9. Universal motor control circuit using TRIAC
10. Closed loop speed control of Single phase AC motor
11. DC shunt motor control circuit
12. Closed loop speed control of DC motor with loading arrangement
13. PWM based step down DC chopper using MOSFET/IGBT
14. Single phase Single pulse / Sinusoidal PWM inverter using MOSFET/IGBT
15. SMPS using MOSFET/IGBT
16. Three phase Half bridge / Full bridge Converter

EEK 652 - COMPUTER HARDWARE & NETWORKING PRACTICAL

Total No. of Hours / Week : 6
Total No. of Weeks / Semester : 16
Total No. of Hours / Semester : 96

Scheme of Instruction and Examination

Subject	Instruction		Examination		
'C' PROGRAMMING PRACTICAL	Hours / Week	Hours / Semester	Assessment Marks		
	6	96	Internal	Board Exam	Total
			25	75	100

LIST OF EXERCISES:

1. Switches, Indicators and connectors of PC: Identification of front panel indicators and switches in a computer system of table top/ tower case model and also identification of rear side connectors.
2. PC system layout: Draw a Computer system layout and Mark the positions of SMPS, Mother Board, FDD, HDD, and CD-Drive/DVD-Drive add on cards in table top / tower model systems.
3. Mother Board Layout: Draw the layout of Pentium IV or Pentium Dual core or Pentium Core2 DUO mother board and mark Processor, Chip set ICs. RAM, Cache, Xtal, cooling fan, I/O slots and I/O ports and various jumper settings.
4. CMOS Setup Program:
 1. Changing the Standard settings
 2. Changing advanced settings (BIOS and Chipset features)
5. Installation of FDD:
 1. Install and configure an FDD in a computer system.
 2. Floppy drive diagnostics/servicing.
6. USB pen drives and I-pods.
 1. Connect and enable a pen drive or I-pod in a PC.
 2. Format the pen drive or I-pod.
 3. Copy files and folders from pen drive I-pod to HDD.

4. Copy files and folders from HDD to pen drive or I-pod.
7. HDD Installation:
 1. Install the given HDD.
 2. Configure in CMOS-Setup program.
 3. Partition the HDD using fdisk.
 4. Format the Partitions.
8. Printer Installation & Troubleshooting:
 1. Installing and checking a Dot-Matrix Printer.
 2. Installing and checking an Ink jet / Laser Printer.
 3. Possible problems and troubleshooting.
9. Modem Installation:
 1. Install and configure a Modem in a windows PC.
 2. Check the working condition of modem with PC.
10. DVD Multi-recorder drive installation:
 1. Install a DVD Multi-recorder drive in a PC.
 2. Configure using device driver.
 3. Check the read / write operation using a cd / dvd.
11. Installation of Scanner:
 1. Connect the given scanner with a PC.
 2. Configure the scanner with driver.
 3. Check the scanner by scanning a page / a portion in a page.
12. Familiarize : Scandisk, recent Anti-virus software and recent PC Diagnostic software.
13. Assembling a PC: Assemble a Pentium IV or Pentium Dual Core Pentium Core2 Duo system with necessary peripherals and check the working condition of the PC.
14. Install and Configure Windows NT2003 operating system in a PC.
15. Construct Network by connecting one or two computer with a Windows NT2003 Server.
16. Install and Configure LINUX operating system in a PC.

17. Construct Network by connecting one or two computer with a LINUX Server.
18. Configure the network for an Internet server.
19. Add / Remove devices using Hardware Wizard.
20. Add and Manage User Profile, Set permission to the users both in Windows NT 2003/ LINUX.

EEK 660 PROJECTWORK
(INCLUDING ENVIRONMENTAL MANAGEMENT & DISASTER
MANAGEMENT)

Total No. of Hours / Week : 6
Total No. of Weeks / Semester : 16
Total No. of Hours / Semester : 96

Scheme of Instruction and Examination

Subject	Instruction		Examination		
	Hours / Week	Hours / Semester	Assessment Marks		
PROJECTWORK (INCLUDING ENVIRONMENTAL MANAGEMENT & DISASTER MANAGEMENT)	6	96	Internal	Board Exam	Total
			25	75	100

SYLLABUS:

1. ENVIRONMENTAL MANAGEMENT:

- (a) Introduction – Environmental Ethics – Assessment of Socio Economic Impact – Environmental Audit – Mitigation of adverse impact on Environment – Importance of Pollution Control – Types of Industries and Industrial Pollution.
- (b) Solid waste management – Characteristics of Industrial wastes – Methods of Collection, transfer and disposal of solid wastes – Converting waste to energy – Hazardous waste management Treatment technologies.
- (c) Waste water management – Characteristics of Industrial effluents – Treatment and disposal methods – Pollution of water sources and effects on human health.
- (d) Air pollution management – Sources and effects – Dispersion of air pollutants – Air pollution control methods – Air quality management.

(e) Noise pollution management – Effects of noise on people – Noise control methods.

2. DISASTER MANAGEMENT:

(a) Introduction – Disasters due to natural calamities such as Earthquake, Rain, Flood, Hurricane, Cyclones etc – Man made Disasters – Crisis due to fires, accidents, strikes etc – Loss of property and life.

(b) Disaster Mitigation measures – Causes for major disasters – Risk Identification – Hazard Zones – Selection of sites for Industries and residential buildings – Minimum distances from Sea – Orientation of Buildings – Stability of Structures – Fire escapes in buildings - Cyclone shelters – Warning systems.

(c) Disaster Management – Preparedness, Response, Recovery – Arrangements to be made in the industries / factories and buildings – Mobilization of Emergency Services - Search and Rescue operations – First Aids – Transportation of affected people – Hospital facilities – Fire fighting arrangements – Communication systems – Restoration of Power supply – Getting assistance of neighbours / Other organizations in Recovery and Rebuilding works – Financial commitments – Compensations to be paid – Insurances – Rehabilitation.

List of Questions

1. ENVIRONMENTAL MANAGEMENT:

1. What is the responsibility of an Engineer-in-charge of an Industry with respect to Public Health?
2. Define Environmental Ethic.
3. How Industries play their role in polluting the environment?
4. What is the necessity of pollution control? What are all the different

- organizations you know, which deals with pollution control?
5. List out the different types of pollutions caused by a Chemical / Textile / Leather / Automobile / Cement factory.
 6. What is meant by Hazardous waste ?
 7. Define Industrial waste management.
 8. Differentiate between garbage, rubbish, refuse and trash based on their composition and source.
 9. Explain briefly how the quantity of solid waste generated in an industry could be reduced.
 10. What are the objectives of treatments of solid wastes before disposal ?
 11. What are the different methods of disposal of solid wastes ?
 12. Explain how the principle of recycling could be applied in the process of waste minimization.
 13. Define the term 'Environmental Waste Audit'.
 14. List and discuss the factors pertinent to the selection of landfill site.
 15. Explain the purpose of daily cover in a sanitary landfill and state the minimum desirable depth of daily cover.
 16. Describe any two methods of converting waste into energy.
 17. What actions, a local body such as a municipality could take when the agency appointed for collecting and disposing the solid wastes fails to do the work continuously for number of days?
 18. Write a note on Characteristics of hazardous waste.
 19. What is the difference between municipal and industrial effluent ?
 20. List few of the undesirable parameters / pollutants anticipated in the effluents from oil refinery industry / thermal power plants / textile industries / woolen mills / dye industries / electroplating industries / cement plants / leather industries (any two may be asked)
 21. Explain briefly the process of Equalization and Neutralization of waste water of varying characteristics discharged from an Industry.
 22. Explain briefly the Physical treatments "Sedimentation" and "Floatation" processes in the waste water treatment.

23. Explain briefly when and how chemical / biological treatments are given to the waste water.
24. List the four common advanced waste water treatment processes and the pollutants they remove.
25. Describe refractory organics and the method used to remove them from the effluent.
26. Explain biological nitrification and de-nitrification.
27. Describe the basic approaches to land treatment of Industrial Effluent.
28. Describe the locations for the ultimate disposal of sludge and the treatment steps needed prior to ultimate disposal.
29. List any five Industries, which act as the major sources for Hazardous Air Pollutants.
30. List out the names of any three hazardous air pollutants and their effects on human health.
31. Explain the influence of moisture, temperature and sunlight on the severity of air pollution effects on materials.
32. Differentiate between acute and chronic health effects from Air pollution.
33. Define the term Acid rain and explain how it occurs.
34. Discuss briefly the causes for global warming and its consequences
35. Suggest suitable Air pollution control devices for a few pollutants and sources.
36. Explain how evaporative emissions and exhaust emissions are commonly controlled.
37. What are the harmful elements present in the automobile smokes? How their presence could be controlled?
38. What is the Advantage of Ozone layer in the atmosphere? State few reasons for its destruction.
39. Explain the mechanism by which hearing damage occurs.
40. List any five effects of noise other than hearing damage.
41. Explain why impulsive noise is more dangerous than steady state noise.
42. Explain briefly the Source – Path – Receiver concept of Noise control.

43. Where silencers or mufflers are used ? Explain how they reduce the noise.
44. Describe two techniques to protect the receiver from hearing loss when design / redress for noise control fail.
45. What are the problems faced by the people residing along the side of a railway track and near to an Airport? What provisions could be made in their houses to reduce the problem?

2. DISASTER MANAGEMENT:

1. What is meant by Disaster Management? What are the different stages of Disaster management?
2. Differentiate Natural Disasters and Man made Disasters with examples.
3. Describe the necessity of Risk identification and Assessment Surveys while planning a project.
4. What is Disasters recovery and what does it mean to an Industry?
5. What are the factors to be considered while planning the rebuilding works after a major disaster due to flood / cyclone / earthquake? (Any one may be asked)
6. List out the public emergency services available in the state, which could be approached for help during a natural disaster.
7. Specify the role played by an Engineer in the process of Disaster management.
8. What is the cause for Earthquakes ? How they are measured ? Which parts of India are more vulnerable for frequent earthquakes ?
9. What was the cause for the Tsunami 2004 which inflicted heavy loss to life and property along the coast of Tamilnadu ? Specify its epicenter and magnitude.
10. Specify the Earthquake Hazard Zones in which the following towns of Tamilnadu lie : (a) Chennai (b) Nagapattinum (c) Coimbatore (d) Madurai (e) Salem.
11. Which parts of India are experiencing frequent natural calamities such as

- (a) heavy rain fall (b) huge losses due to floods (c) severe cyclones
12. Define basic wind speed. What will be the peak wind speed in (a) Very high damage risk zone – A, (b) High damage risk zone, (c) Low damage risk zone.
 13. Specify the minimum distance from the Sea shore and minimum height above the mean sea level, desirable for the location of buildings.
 14. Explain how the topography of the site plays a role in the disasters caused by floods and cyclones.
 15. Explain how the shape and orientation of buildings could reduce the damages due to cyclones.
 16. What is a cyclone shelter ? When and where it is provided ? What are its requirements ?
 17. What Precautionary measures have to be taken by the authorities before opening a dam for discharging the excess water into a canal/river ?
 18. What are the causes for fire accidents ? Specify the remedial measures to be taken in buildings to avoid fire accidents.
 19. What is a fire escape in multistoried buildings ? What are its requirements ?
 20. How the inmates of a multistory building are to be evacuated in the event of a fire/Chemical spill/Toxic Air Situation/ Terrorist attack, (any one may be asked).
 21. Describe different fire fighting arrangements to be provided in an Industry.
 22. Explain the necessity of disaster warning systems in Industries.
 23. Explain how rescue operations have to be carried out in the case of collapse of buildings due to earthquake / blast / Cyclone / flood.
 24. What are the necessary steps to be taken to avoid dangerous epidemics after a flood disaster ?
 25. What relief works that have to be carried out to save the lives of workers when the factory area is suddenly affected by a dangerous gas leak / sudden flooding ?
 26. What are the difficulties faced by an Industry when there is a sudden

- power failure? How such a situation could be managed?
27. What are the difficulties faced by the Management when there is a group clash between the workers? How such a situation could be managed?
 28. What will be the problems faced by the management of an Industry when a worker dies because of the failure of a mechanical device due to poor maintenance? How to manage such a situation ?
 29. What precautionary measures have to be taken to avoid accidents to labourers in the Industry in a workshop / during handling of dangerous Chemicals / during construction of buildings / during the building maintenance works.
 30. Explain the necessity of medical care facilities in an Industry / Project site.
 31. Explain the necessity of proper training to the employees of Industries dealing with hazardous products, to act during disasters.
 32. What type of disaster is expected in coal mines, cotton mills, Oil refineries, ship yards and gas plants?
 33. What is meant by Emergency Plan Rehearsal? What are the advantages of such Rehearsals?
 34. What action you will take when your employees could not reach the factory site because of continuous strike by Public Transport workers?
 35. What immediate actions you will initiate when the quarters of your factory workers are suddenly flooded due to the breach in a nearby lake / dam, during heavy rain?
 36. What steps you will take to avoid a break down when the workers union of your Industry have given a strike notice?
 37. List out few possible crisis in an organization caused by its workers? What could be the part of the middle level officials in managing such crisis?
 38. What types of warning systems are available to alert the people in the case of predicted disasters, such as floods, cyclone etc.
 39. Explain the necessity of Team work in the crisis management in an Industry / Local body.
 40. What factors are to be considered while fixing compensation to the

- workers in the case of severe accidents causing disability / death to them?
41. Explain the legal / financial problems the management has to face if safety measures taken by them are found to be in-adequate.
 42. Describe the importance of insurance to men and machinery of an Industry dealing with dangerous jobs.
 43. What precautions have to be taken while storing explosives in a match/ fire crackers factory?
 44. What are the arrangements required for emergency rescue works in the case of Atomic Power Plants?
 45. Why residential quarters are not constructed nearer to Atomic Power Plants