



**GOVERNMENT OF TAMIL NADU**

**CURRICULUM AND SYLLABUS**

**DIPLOMA  
IN  
ELECTRICAL AND ELECTRONICS ENGINEERING  
2007 – '08  
K - SCHEME**



**DIRECTORATE OF TECHNICAL EDUCATION  
TAMIL NADU**

## 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/EEE P.T.Lee C.N. Poly. College, Vepery, Chennai – 600 007	2.	Mr.B. Subbaraj, Sr.Lectr./EEE Tamil Nadu Poly. College, Madurai 625 011.
2.	Mr.R. Thirunavukarasu, Sr. Lect./EEE P.T.Lee C.N.Poly. College, Vepery, Chennai-7	4.	Mr.V. Ramalingam, Lect./EEE Central Polytechnic College, Tharamani, Chennai 600 113
5.	Miss. Marjori Theadre, HOD/EEE IRT Poly. College, Konganthanparai, Thirunelveli 627 007	6.	Mr.G. Natarajan, HOD,/EEE S.A. Polytechnic College, Sundara Solavaram, Thiruverkadu Post, Chennai 600 077
7.	Mr.Srinivasan, HOD EEE SS Polytechnic College, Puthur.	8.	Mr.M. Vijayaragavan, Sr. Lect. (Retd.) EEE Central Poly College, Tharamani, Chennai 600 113.
9.	Mr.P. Govindasamy, Sr. Lect./EEE Bhaktavatchalam Poly. College, Kancheepuram 631 552	10.	Dr. N.T. Kumar, Principal (Retd) EEE Govt. Polytechnic College
11.	Prof. K.Rajeswaran, HOD /EEE, Mada Engg. College, Kunrathur, Chennai 600 069\	12.	Mr.B. Murali, Superintending Engineer (Retd.) TNEB
13	Mr. S.V.Singaravelu HOD/EEE PAC Ramasamy Raja Poly Rajapalayam	14	Mr. S.Jawahar Sr. lect. EEE VSVN Polytechnic College Virudhunagar

**ANNEXURE - I**  
**Curriculum and scheme of Examination**  
**Diploma in Electrical and Electronics Engineering (Full Time)**  
**K – Scheme**  
**(with effect from 2008-2009)**

Total curriculum hours : 35 hours/week

Total working Hours : 35 hours/week: 16 weeks/semester

**III Semester**

Sl. No	Subject Code	Subject	Hrs Per week	Scheme of Examination				
				Duration of Exam Hours	IA	BE*	Total	Min. * Marks for pass
1	13031	Electrical Circuit Theory	6	3	25	75	100	40
2	13032	Electrical Machines – I	6	3	25	75	100	40
3	14031	Electronic Devices and Circuits**	5	3	25	75	100	40
4	13034	Electrical Circuits and Machines Practical	6	3	25	75	100	50
5	14034	Electronic Devices and Circuits Labl**	6	3	25	75	100	50
6	13036	Workshop Practical	6	3	25	75	100	50

**\*\* Common with ECE**

- Minimum of 30 marks out of 75 marks in Theory Examination.
- Minimum of 35 marks out of 75 marks in Practical Examination.

**IV Semester**

Sl. No	Subject Code	Subject	Hrs Per week	Scheme of Examination				
				Duration of Exam Hours	IA	BE*	Total	Min. * Marks for pass
1	13041	Electrical Machines - II	6	3	25	75	100	40
2	13042	Measurements and Instrumentation	7	3	25	75	100	40
3	14041	Analog and Digital Electronics**	6	3	25	75	100	40
4	11011	English Communication Practical	4	3	25	75	100	50
5	13045	Electrical Machines and Instrumentation Practical	6	3	25	75	100	50
6	14044	Analog and Digital Electronics Practical**	6	3	25	75	100	50

**\*\* Common with ECE**

### V Semester

Sl. No	Subject Code	Subject	Hrs Per week	Scheme of Examination				
				Duration of Exam Hours	IA	BE*	Total	Min. * Marks for pass
1	13051	Power System - I	6	3	25	75	100	40
2	14051	Microprocessor and Microcontroller**	5	3	25	75	100	40
3	13071	<b>Elective Theory - I</b> Control of Electrical Machines	6	3	25	75	100	40
	13072	Programmable Logic Controller	6	3	25	75	100	40
	13073	Electrical Machine Design	6	3	25	75	100	40
4	13054	Electrical Wiring and Winding Practical	6	3	25	75	100	50
5	14054	Microprocessor and Microcontroller Practical**	6	3	25	75	100	50
6	13074	<b>Elective Practical - I</b> Control of Electrical Machines Practical	6	3	25	75	100	50
	13075	Programmable Logic Controller Practical	6	3	25	75	100	50
	13076	Electrical Machine Design Practical	6	3	25	75	100	50

**\*\* Common with ECE**

- Minimum of 30 marks out of 75 marks in Theory Examination.
- Minimum of 35 marks out of 75 marks in Practical Examination.

## VI Semester

Sl. No	Subject Code	Subject	Hrs Per week	Scheme of Examination				
				Duration of Exam Hours	IA	BE*	Total	Min. * Marks for pass
1	13061	Power System - II	6	3	25	75	100	40
2	13062	Electrical Estimation	6	3	25	75	100	40
3	13081	<b>Elective Theory - II</b> Power Electronics	5	3	25	75	100	40
	14061	Computer Hardware and Networking**	5	3	25	75	100	40
	14033	"C" Programming and OOPS**	5	3	25	75	100	40
4	13064	Computer Aided Electrical Drawing (CAED) Practical	6	3	25	75	100	50
5	13084	<b>Elective Practical - II</b> Power Electronics Practical	6	3	25	75	100	50
	14064	Computer Hardware and Networking Practical**	6	3	25	75	100	50
	14036	"C" Programming and OOPS Practical**	6	3	25	75	100	50
6	13066	Project work, Entrepreneurship, Environment and Disaster Management	6	3	25	75	100	50

**\*\* Common with ECE**

- Minimum of 30 marks out of 75 marks in Theory Examination.
- Minimum of 35 marks out of 75 marks in Practical Examination.

**ANNEXURE - II**

**CURRICULUM AND SCHEME OF EXAMINATION FOR  
DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING (Sandwich)  
(Course No.:2030)  
K – Scheme  
(with effect from 2008-2009)**

**FULL TIME**

Total working hours : 35 Hrs/week  
Total Curriculum Hours : 35 Hrs/Week  
Physical Education Hours : 2 Hrs/Week after the normal working hours  
NSS activities : 2 Hrs/week after the normal working hours

**III SEMESTER**

S.No	Subject Code	Name of Subject	Hours Per Week	Scheme of Examination				
				Exam Duration In Hrs	Internal Marks	Board Exam Marks	Max. Marks	Min. for Pass
1	13031	Electrical Circuit Theory	6	3	25	75	100	40
2	13032	Electrical Machines I	5	3	25	75	100	40
3	14031	Electronic Devices & Circuits	5	3	25	75	100	40
4	13042	Measurements and Instrumentation	5	3	25	75	100	40
5	13034	Electrical Circuits and Machines Practical	6	3	25	75	100	50
6	14034	Electronic Devices and Circuits Lab	4	3	25	75	100	50
7	13036	Workshop Practical	4	3	25	75	100	50

#### **IV SEMESTER**

S.No	Subject Code	Name of Subject	Hours Per Week	Scheme of Examination				
				Exam Duration In Hrs	Internal Marks	Board Exam Marks	Max. Marks	Min. for Pass
1	13041	Electrical Machines II	----	3	25	75	100	40
2	13045	Electrical Machines and Instrumentation Practical	----	3	25	75	100	50
3		Inplant Training	-----	3	100	----	100	40

#### **INPLANT TRAINING**

##### **Marks allotment**

Work diary	---	50
Viva voce (oral)	---	30
Question Answer (written)	---	20
		-----
<b>Total</b>	<b>---</b>	<b>100</b>
		-----

**V SEMESTER**

S.No	Subject Code	Name of Subject	Hours Per Week	Scheme of Examination				
				Exam Duration In Hrs	Internal Marks	Board Exam Marks	Max. Marks	Min for Pass
1	13051	Power System I	6	3	25	75	100	40
2	14051	Microprocessor and Microcontroller	6	3	25	75	100	40
3	14041	Analog and Digital Electronics	6	3	25	75	100	40
4	<b>Elective Theory I</b>							
	13071	Control of Electrical Machines	5	3	25	75	100	40
	13072	Programmable Logic Controller	5	3	25	75	100	40
	13073	Electrical Machine Design	5	3	25	75	100	40
5	14044	Analog and Digital Electronics Practical	4	3	25	75	100	50
6	14054	Microprocessor and Microcontroller Practical	4	3	25	75	100	50
7	<b>Elective Practical I</b>							
	13074	Control of Electrical Machines Practical	4	3	25	75	100	50
	13075	Programmable Logic Controller Practical	4	3	25	75	100	50
	13076	Electrical Machine Design Practical	4	3	25	75	100	50

## VI SEMESTER

Sl.No	Subject Code	Name of Subject	Hours Per Week	Scheme of Examination				
				Exam Duration In Hrs	Internal Marks	Board Exam Marks	Max. Marks	Min. for Pass
1	13061	Power System II	6	3	25	75	100	40
2	13062	Electrical Estimation	6	3	25	75	100	40
3	<b>Elective Theory II</b>							
	13081	Power Electronics	6	3	25	75	100	40
	14081	Computer Hardware & Networking	6	3	25	75	100	40
	14033	Programming in C & OOPs	6	3	25	75	100	40
4	11011	English Communication Practical	5	3	25	75	100	50
5	13054	Wiring and Winding Practical	4	3	25	75	100	50
6	<b>Elective Practical II</b>							
	13084	Power Electronics Practical	4	3	25	75	100	50
	14064	Computer Hardware & Networking Practical	4	3	25	75	100	50
	14036	Programming in C & OOPs Practical	4	3	25	75	100	50
7	13064	Computer Aided Electrical Drawing Practical	4	3	25	75	100	50

**VII SEMESTER**

<b>S.No</b>	<b>Subject Code</b>	<b>Name of Subject</b>	<b>Hours Per Week</b>	<b>Scheme of Examination</b>				
				<b>Exam Duration In Hrs</b>	<b>Internal Marks</b>	<b>Board Exam Marks</b>	<b>Max. Marks</b>	<b>Min. for Pass</b>
01	13066	Project work, Entrepreneurship, Environment and Disaster Management	----	3	25	75	100	50
02		In plant Training	----	3	25	75	100	50

**ANNEXURE - III**  
**CURRICULUM AND SCHEME OF EXAMINATION FOR**  
**Diploma in Electrical and Electronics Engineering (Part Time)**  
**(Course No.: 3030)**  
**K – Scheme**  
**(with effect from 2008-2009)**

**III SEMESTER**

Sl. No	Subject Code	Subject	Hrs Per week	Scheme of Examination				
				Duration of Exam Hours	IA	BE*	Total	Min. * Marks for pass
1	13031	Electrical Circuit Theory	4½	3	25	75	100	40
2	12005	Engineering Graphics	4½	3	25	75	100	40
3	12008	Computer Application Practical	4½	3	25	75	100	50
4	13036	Workshop Practical	4½	3	25	75	100	50

- Minimum of 30 marks out of 75 marks in Theory Examination.
- Minimum of 35 marks out of 75 marks in Practical Examination.

**IV SEMESTER**

Sl. No	Subject Code	Subject	Hrs Per week	Scheme of Examination				
				Duration of Exam Hours	IA	BE*	Total	Min. * Marks for pass
1	13032	Electrical Machines-I	4	3	25	75	100	40
2	14031	Electronic Devices and Circuits**	4	3	25	75	100	40
3	13034	Electrical Circuits and Machines Practical	3	3	25	75	100	50
4	14034	Electronic Devices and Circuits Labl**	3	3	25	75	100	50
5	11011	English Communication Practical	4	3	25	75	100	50

\*\* Common with ECE

- Minimum of 30 marks out of 75 marks in Theory Examination.
- Minimum of 35 marks out of 75 marks in Practical Examination.

### V SEMESTER

Sl. No	Subject Code	Subject	Hrs Per week	Scheme of Examination				
				Duration of Exam Hours	IA	BE*	Total	Min. * Marks for pass
1	13041	Electrical Machines-II	4	3	25	75	100	40
2	13042	Measurements and Instrumentation	4	3	25	75	100	40
3	14041	Analog and Digital Electronics**	4	3	25	75	100	40
4	13045	Electrical Machines & Instrumentation Practical	3	3	25	75	100	50
5	14044	Analog and Digital Electronics Practical**	3	3	25	75	100	50

\*\* Common with ECE

- Minimum of 30 marks out of 75 marks in Theory Examination.
- Minimum of 35 marks out of 75 marks in Practical Examination.

### VI SEMESTER

Sl. No	Subject Code	Subject	Hrs Per week	Scheme of Examination				
				Duration of Exam Hours	IA	BE*	Total	Min. * Marks for pass
1	13051	Power System – I	4½	3	25	75	100	40
2	13062	Electrical Estimation	4½	3	25	75	100	40
3	13054	Electrical Wiring and Winding Practical	4½	3	25	75	100	50
4	13064	Computer Aided Electrical Drawing (CAED)Practical	4½	3	25	75	100	50

- Minimum of 30 marks out of 75 marks in Theory Examination.
- Minimum of 35 marks out of 75 marks in Practical Examination.

## VII SEMESTER

Sl. No	Subject Code	Subject	Hrs Per week	Scheme of Examination				
				Duration of Exam Hours	IA	BE*	Total	Min. * Marks for pass
1	14051	Microprocessor and Microcontroller**	4½	3	25	75	100	40
2	13071	<b>Elective Theory - I</b> Control of Electrical Machines	4½	3	25	75	100	40
	13072	Programmable Logic Controller	4½	3	25	75	100	40
	13073	Electrical Machine Design	4½	3	25	75	100	40
3	14054	Microprocessor and Microcontroller Practical**	4½	3	25	75	100	50
4	13074	<b>Elective Practical - I</b> Control of Electrical Machines Practical	4½	3	25	75	100	50
	13075	Programmable Logic Controller Practical	4½	3	25	75	100	50
	13076	Electrical Machine Design Practical	4½	3	25	75	100	50

\*\* Common with ECE

- Minimum of 30 marks out of 75 marks in Theory Examination.
- Minimum of 35 marks out of 75 marks in Practical Examination.

### VIII SEMESTER

Sl. No	Subject Code	Subject	Hrs Per week	Scheme of Examination				
				Duration of Exam Hours	IA	BE*	Total	Min. * Marks for pass
1	13061	Power System - II	4½	3	25	75	100	40
2	13081	<b>Elective Theory - I</b> Power Electronics	4½	3	25	75	100	40
	14061	Computer Hardware and Networking**	4½	3	25	75	100	40
	14033	"C" Programming and OOPS**	4½	3	25	75	100	40
3	13084	<b>Elective Practical - II</b> Power Electronics Practical	4½	3	25	75	100	50
	14064	Computer Hardware and Networking Practical**	4½	3	25	75	100	50
	14036	"C" Programming and OOPS Practical**	4½	3	25	75	100	50
4	13066	Project work, Entrepreneurship, Environment and Disaster Management	4½	3	25	75	100	50

\*\* Common with ECE

- Minimum of 30 marks out of 75 marks in Theory Examination.
- Minimum of 35 marks out of 75 marks in Practical Examination.

**ANNEXURE - IV**  
**DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING**  
**EQUIVALENT PAPERS FOR J SCHEME SUBJECTS IN K SCHEME**  
**FULL TIME**

**III SEMESTER**

<b>S. No</b>	<b>Subject Code J Scheme</b>	<b>Name of Subject J Scheme</b>	<b>Subject Code K Scheme</b>	<b>Name of Subject K Scheme</b>
1	EEJ310	Electrical Circuit Theory	13031	Electrical Circuit Theory
2	EEJ320	Electrical Machines - I	13032	Electrical Machines - I
3	EEJ330	Electronic Devices & Circuits	14031	Electronic Devices & Circuits
4	EEJ340	Electrical Machines - I Lab	13034	Electrical Circuits & Machines Practical
5	EEJ350	Electronic Devices & Circuits Lab	14034	Electronic Devices & Circuits Practical
6	EEJ360	MS Office Lab	-----	No Equivalent

**IV SEMESTER**

<b>S. No</b>	<b>Subject Code J Scheme</b>	<b>Name of Subject J Scheme</b>	<b>Subject Code K Scheme</b>	<b>Name of Subject K Scheme</b>
1	EEJ410	Electrical Machines - II	13041	Electrical Machines - II
2	EEJ420	Measurement and Instrumentation	13042	Measurements and Instrumentation
3	EEJ430	Basics of Mechanical Engineering	-----	No Equivalent
4	EEJ440	Electrical Machines - II Lab	13045	Electrical Machines and Instrumentation Practical
5	EEJ450	Computer Aided Electrical Drawing Lab	13064	Computer Aided Electrical Drawing (CAED) Practical
6	EEJ460	Mechanical Engineering Lab	13036	Workshop Practical

## V SEMESTER

S. No	Subject Code J Scheme	Name of Subject J Scheme	Subject Code K Scheme	Name of Subject K Scheme
1	EEJ 510	Generation, Transmission and Switch Gear	13051	Power System - I
2	EEJ 520	Analog and Digital Electronics	14041	Analog and Digital Electronics
3	EEJ 530	Elective Theory I		Elective Theory I
	EEJ 531	Programming in C	14033	'C' Programming & OOPS
	EEJ 532	Control Of Electrical Machines	13071	Control Of Electrical Machines
	EEJ 533	Non Conventional Energy Sources.	-----	-- No Equivalent—
	EEJ 534	Electrical Machine Design	13073	Electrical Machine Design
4	EEJ540	Wiring, Winding and Estimation Lab	-----	-- No Equivalent—
5	EEJ550	Analog and Digital Electronics Lab	14041	Analog and Digital Electronics Practical
6	EEJ560	Elective Practical I		Elective Practical I
	EEJ 561	Programming in C – Lab	14036	'C' Programming – Practical
	EEJ 562	Control Of Electrical Machines Lab	13074	Control of Electrical Machines Practical
	EEJ 563	Non Conventional Energy Sources Lab	-----	-- No Equivalent—
	EEJ 564	Electrical Machine Design Lab	13076	Electrical Machine Design Practical

## VI SEMESTER

S. No	Subject Code J Scheme	Name of Subject J Scheme	Subject Code K Scheme	Name of Subject K Scheme
1	EEJ610	Distribution and Utilization	13061	Power System - II
2	EEJ620	Micro controllers	14051	Microprocessor and Microcontroller
3	EEJ 630	Elective Theory II		Elective Theory II
	EEJ 631	Power Electronics	13081	Power Electronics
	EEJ 632	Programmable Logic Controller Including Data Acquisition System (DAS)	13072	Programmable Logic Controller
	EEJ 633	Programming In C++	-----	-- No Equivalent –
	EEJ 634	Computer Hardware Servicing	-----	-- No Equivalent—
4	EEJ640	Micro controller Lab	14054	Microprocessor & Microcontroller Practical
5	EEJ650	Elective Practical II		Elective Practical II
	EEJ 651	Power Electronics Lab	13084	Power Electronics Practical
	EEJ 652	Programmable Logic Controller Including Data Acquisition System (Das) Lab	13075	Programmable Logic Controller Practical
	EEJ 653	Programming In C++ Lab	-----	-- No Equivalent—
	EEJ 654	Computer Hardware Servicing Lab	14064	Computer Hardware & Networking Practical
6	EEJ660	Project Work and Entrepreneurship	13066	Project Work, Entrepreneurship, Environment and Disaster Management

### III SEMESTER

#### 13031 - 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	Subject	Instruction		Examination		
		Hours / Week	Hours / Semester	Assessment marks		
				Internal	Board Exam	Total
13031	Electrical Circuit Theory	6	96	25	75	100

Topics and Allocation

Unit	TOPIC	TIME (Hours)
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

To understand

- Electric field, capacitance, basic electricity, dc circuits and related laws.
- Network analysis, basic theorems and other solving techniques for dc circuits.
- Single phase ac fundamentals, RLC circuits and ac power.
- RLC resonance, three phase ac circuit fundamentals and 3 phase power measurement.
- Behavior of RLC circuits in transient conditions and storage batteries.

## **13031 - ELECTRICAL CIRCUIT THEORY**

### **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 Book:

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

#### Reference Book :

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

**13031 - ELECTRICAL CIRCUIT THEORY  
MODEL QUESTION PAPER – I**

Time 3 hours

Max.Marks: 75

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

*Part C questions carry each 10 marks and answer all questions by*

Selecting 'either' or 'or'.

Part A

1. Write the expression for power in terms of voltage and resistance in D.C. circuit.
2. Write the formula to calculate capacitance of parallel plate .
3. Write the expression for star to delta transformation.
4. Give the current equivalent of voltage source.
5. State peak factor for a sinusoidal waveform
6. State the condition for the resonance.
7. Write the Q factor of parallel resonance circuit.
8. Calculate the power factor of the load when power and power factor of a 3 phase circuit is measured by two watt meter method.
9. What is the electrolyte of Lead – Acid cell?
10. What is switching?

Part B

11. Define (a) Electric Flux (b) Electric Field intensity in an electrostatic circuit.
12. State and explain Thevenin's Theorem.
13. Define peak factor and form factor of alternating current
14. Derive the relation between line and phase values of voltage and current in a 3 phase Delta connection.
15. Mention three defects of Lead acid Battery and give remedies .

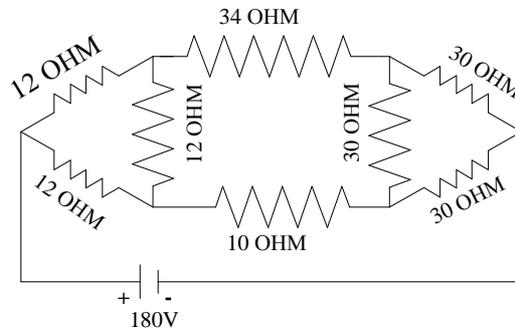
Part C

16.a) Two capacitors  $C_1$  and  $C_2$  when connected in series gives a capacitance of  $0.03 \mu\text{F}$  and when connected in parallel gives a capacitance of  $0.16 \mu\text{F}$ . Find the values of capacitance of each capacitor.

(or)

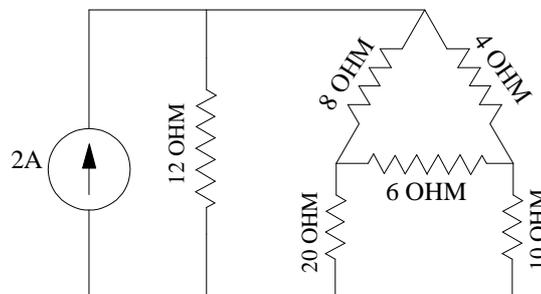
- b) A Wheat stone Bridge has  $AB = 4\Omega$ ,  $BC = 3\Omega$ ,  $CD = 6\Omega$  and  $DA = 5\Omega$ . A Galvanometer of  $110\Omega$  is connected across AC. A battery of 2V is connected across BD. Find the current in galvanometer.

17.a) Find current through 10 Ω resistor using DELTA – STAR conversion.



(or)

b) Find current in 6 Ω resistor using Mesh current analysis.



18.a) A resistor of 10 Ω is connected across a coil of resistance 8 Ω and reactance of 15Ω. An A.C. voltage of 230V, 50 Hz is applied to this parallel circuit. Find the branch currents. Find also i) current, ii) power factor and iii) power for this circuit.

(or)

b) A circuit with a resistor of 5 Ω connected in series with a coil, is supplied with 200V, 50 Hz. Voltage across resistor is 50V and across the coil is 230V. Find the power factor of the coil. Find also the i) resistance and ii) inductance of the coil.

19.a) In a RLC Series resonance circuit,  $R = 10 \Omega$ ,  $L = 20 \text{ mH}$  and  $C = 0.5 \mu\text{F}$ . Find i) resonant frequency, ii) Quality factor, iii) half power frequencies, iv) Bandwidth.

(or)

b) Three identical coils are connected in Delta to a 3 Phase 400V, 50Hz supply. The system takes a line current of 34.65A and consumes a power of 4.4KW.

Find coil constants and coil power factor.

20.a) A series RC circuit is consisting of a  $100\ \Omega$  resistor and  $10\ \mu\text{F}$  capacitor. A switch connects the circuit to a 50V D.C. at time  $t = 0$ . Find the equation for transient current when (a) Initial capacitor charge is zero and (b) Initial charge is 0.001 coulombs.

(or)

c) i) With neat diagram explain the construction of Lithium Cell. ii) Write the merits and demerits of this cell. iii) State any three fields where this cell is used.

**13031 - ELECTRICAL CIRCUIT THEORY**  
**MODEL QUESTION PAPER – II**

Time 3 hours

Max.Marks: 75

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

*Part C questions carry each 10 marks and answer all questions by*

Selecting 'either' or 'or'.

Part A

1. Write the unit of capacitance.
2. Write the property of series Circuit.
3. What is a node?
4. State condition for the maximum power transferred from source to load.
5. State the relation between current and voltage in inductive circuit.
6. Convert  $6 + j8$  into polar form.
7. Define Q factor.
8. Write the 3 phase power equation.
9. What is transient analysis?
10. Mention the rating of cell.

Part B

11. State and explain Kirchhoff's laws.
12. Discuss about superposition theorem.
13. Define: ac wave form Amplitude, RMS value.
14. What is resonant condition derive resonant frequency in RLC series circuit.
15. Derive the voltage across capacitor during charging condition of RC circuit?

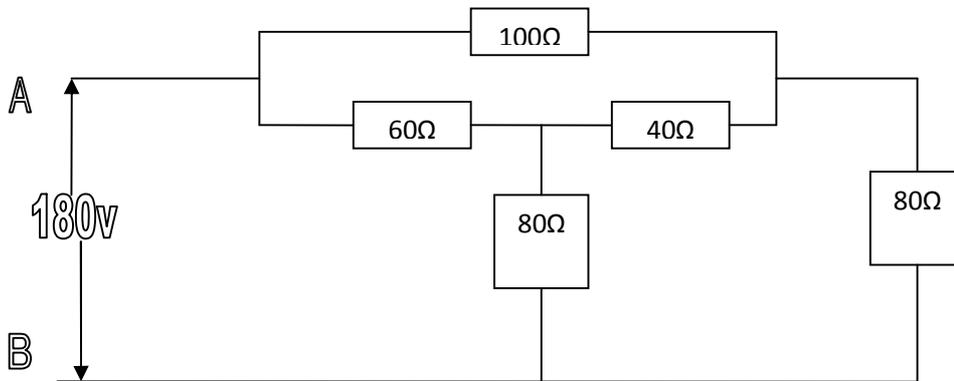
Part C

16.a) The total capacitance of two capacitors is  $0.02\mu\text{f}$ . When joined in series and  $0.15\mu\text{f}$ . When connection in parallel. Find the capacitance of each capacitor.

(Or)

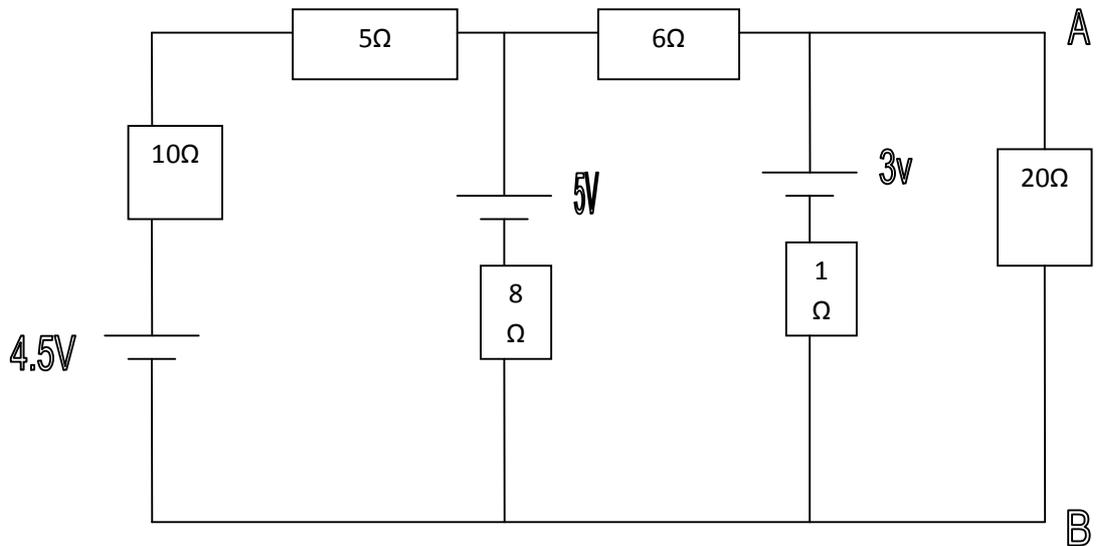
- b) Two cells are connected in parallel and supply a circuit of  $1\Omega$ . Their emf's are 2.5 and 2.0 and their internal resistances are  $0.05\Omega$  and  $0.04\Omega$  Respectively. Calculate the current in each coil.

17. a)



Find circuit resistance and circuit current use delta star transformation.

(Or)  
17.b)



Find out the voltage  $V_{ab}$  by applying Norton's theorem.

18. a) A Voltage of 125V at 50Hz is applied across a non inductive resistor connected in series with a condenser. The current in the circuit is 2.2A. The power loss in the resistor is 96.8 watts and that in the condenser is negligible. Calculate the resistance and capacitance.

(or)

b) Two impedances  $Z_1 = 6 + j8$  and  $Z_2 = 8 + j6$  are across a voltage of  $250 + j0$ .

Calculate the circuit current, branch current power factor and power.

19. a) A series RLC circuit consists of  $R=100 \Omega$ ,  $X_L=1\text{mH}$  and  $X_C = 100 \mu\text{f}$ . Calculate the frequency at which resonance will take place, if the applied voltage is 230V at 50Hz calculate the current and voltage drop across R,L,C.

(or)

b) Derive the relation between line and phase current in delta connected 3 phase system.

20. a) A RL circuit consists of  $5\Omega$  resistor and 0.5H inductor is fed by 10v dc source suddenly . Fine the current  $i(t)$  and the voltage across resistance and inductance.

(or)

b) Discuss about various methods of charging battery,.

### 13032 - 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 code	Subject	Instruction		Examination		
		Hours / Week	Hours / Semester	Assessment Marks		
13032	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:

#### *To understand*

- Magnetic circuits principle, associated laws and principle of transformer.
- Characteristics of transformer, auto transformer, three phase transformer construction, connection and paralleling, Scott transformer.
- DC generator principle, construction, types, characteristics, efficiency and applications.
- DC motor principle, construction, types, characteristics, testing and starters.
- Maintenance of dc machines, plant maintenance and safety.

## **13032 - ELECTRICAL MACHINES – I**

### **DETAILED SYLLABUS**

#### **UNIT – I: Electromagnetism**

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

Types of induced emf – static and dynamic – types of static induced emf – self and mutual – Transformer – principle of operation – construction – emf equation – voltage ratio – simple problems.

#### **UNIT – II: Transformers- performance**

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 – III: DC Generators**

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 – IV: D C Motors**

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 – V: Maintenance of Machines**

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 shock – Rule 48: precautions against leakage before connections – Rule 67 : connection with earth.

Text Book:

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

Reference Book:

<b>Sl.No.</b>	<b>Name of the Book</b>	<b>Author</b>	<b>Publisher</b>
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

**13032 – ELECTRICAL MACHINES- I**  
**MODEL QUESTION PAPER – I**

Time 3 hours

Max.Marks: 75

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

Part C questions carry each 10 marks and answer all questions by

Selecting 'either' or 'or'.

Part A

1. Write an expression for lifting power of an electromagnet.
2. State the working principle of transformer.
3. Write the expression for emf equation of a transformer.
4. Mention the use of breather.
5. State the different types of DC generator.
6. Mention the two types of windings in armature.
7. State purpose of starter.
8. Mention the two methods of speed control in dc motor.
9. Mention the function of the Growler.
10. Name the maintenance carried out in scheduled manner for a machine.

Part B

11. State and explain Faradays laws of electro magnetic induction.
12. Write a note on auto transformer.
13. State the causes of voltage drop in DC generator. Explain.
14. List the various losses in DC motor. Discuss on them.
15. Why staggering of a brush is necessary?

Part C

16. a) Derive an expression for energy stored in a magnetic field.

(or)

- b) The field winding of a DC electromagnet is wound with 960 turns and has resistance of 50 ohms. When the exciting voltage is 230 V, the magnetic flux linking the coil is 0.005 weber. Calculate the self-inductance of the coil and energy stored in the magnetic field.

17. a) Draw and explain the phasor diagram of a transformer for lagging power factor.

(or)

- b) The following test results were obtained for a 1000 / 100 V, 100 kVA, single phase transformer.

*O.C. test: Primary volts = 1000, Secondary volt = 100*

Watts in primary = 1000

*S.C. test: Primary volts for full-load current = 22*

Watts in primary = 1050

Determine the regulation and efficiency of the transformer at full-load and 0.8 lagging power factor.

18.a) Explain the constructional features of DC generator with neat diagram  
(or)

b) A 4-pole lap wound dc-shunt generator has a useful flux per pole of 0.07 weber. The armature winding consist of 220 turns each of 0.004 ohms resistance. Calculate the terminal voltage when running at 900 r.p.m. if the armature current if 50A.

19.a) Explain with neat sketch the construction and working principle of a 3 point starter.

(or)

b) Explain the method of predetermining the efficiency of a DC motor using Swinburne's test

20.a) Explain the various defects in commutation with neat sketches and suggest suitable remedies.

(or)

b) List the various causes for accident in industry and how they can be prevented.

**13032 – ELECTRICAL MACHINES- I  
MODEL QUESTION PAPER – II**

Time 3 hours

Max.Marks: 75

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

Part C questions carry each 10 marks and answer all questions by

Selecting 'either' 'or'.

Part A

1. Name the two types of induced emf.
2. What is eddy current?
3. What is turn ratio of transformer?
4. Mention the connection of 3 phase distribution transformer.
5. Draw the diagram of DC shunt generator.
6. List the two field windings in a compound generator.
7. Give three applications of DC series motor.
8. Mention the losses in dc motor.
9. What is preventive maintenance?
10. Give examples for machine protective devices.

Part B

11. State Lenz's law.
12. Derive the emf equation of transformer.
13. Write the conditions for maximum efficiency of a DC generator?
14. What is meant back emf and write the equation for back emf.
15. Name the three types of resurfacing of commutator and give a note.

Part C

- 16.a) Drive an expression for the lifting power of an electro magnet.

(or)

b) A conductor length of 100 cm moves at right angle in a uniform flux density of 1.5 weber / m<sup>2</sup> with a velocity of 50 m/sec. Calculate the emf induced (a) when the coil moving parallel to the lines of forces (b) when the conductor moves at an angle of 90' (c) when the conductor moves at an angle of 30' to the direction of field

- 17.a) Drive an expression for regulation of a transformer for lagging power factor.

(or)

b) Draw and explain the construction and working of a off-load tap changer.

- a) Explain the load characteristics of a self excited shunt generator with neat diagram.

(or)

b) Explain the armature reaction in a DC generator with neat sketch.

19.a) Derive the torque equation of a DC motor

(or)

d) Explain the field control and armature control of controlling of the speed of DC shunt motor.

20.a) Explain how the defect in a DC armature winding is tested by means of a Growler.

(or)

b) What is preventive maintenance and explain the procedure followed for preventive maintenance?

### 14031 - Electronic Devices and Circuits

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	Internal	Board Exam	Total
Electronic Devices and Circuits	6	96	Assessment Marks		
			25	75	100

#### Topics and Allocation

UNIT	TOPIC	TIME(HRS)
1	Components and Diodes	16
2	Bipolar Junction Transistor	16
3	Transistor oscillators and FET and UJT	18
4	SCR, DIAC, TRIAC, MOSFET and IGBT	16
5	Opto Electronics Devices and Waveshaping Circuits	18
	Revision and test	12
Total		96

**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

**14031 - ELECTRONIC DEVICES AND CIRCUITS  
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.

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**14031 Electronic Devices and Circuits  
MODEL QUESTION PAPER - I**

**Total Marks: 75**

**PART – A**

**Answer all questions**

**10 x 1 = 10 marks**

1. Distinguish between a Rectifier and a Zener
2. Define rectifier efficiency.
3. Mention the application of an Emitter follower.
4. What are current and voltage gain of common emitter configuration
5. What is Barkhausen criterion .
6. Define intrinsic stand off ratio
7. What is meant by controlled rectifier?
8. State application of TRIAC.
9. What are the two types of LCD?
10. What is meant by DC restorer?

**PART – B**

**Answer all questions.**

**5 x 3 = 15 marks**

11. How to identify the value of a resistor? And What is PIV of Bridge Rectifier?
12. Describe the features of common Base configuration, What is meant by negative feedback?
13. What are the conditions for oscillations? And compare FET and BJT.
14. Explain (a) Firing angle and (b) Conduction angle of an SCR.
15. What is meant by IGBT? Explain

**PART – C**

**Answer any one from each question**

**5 x 10 = 50 marks**

16. (a) Explain the operation of Zener diode. Distinguish between avalanche and zener breakdown.  
or  
(b) With suitable sketches, explain the operation of full wave rectifier.
17. (a) Explain the input and output characteristics of common emitter configuration.  
or  
(b) Explain the principle of emitter follower and its application.
18. (a) Explain the operation of Hartley oscillator  
or  
(b) With suitable sketches, explain the operation of FET amplifier.
19. (a) Explain the operation of SCR under two transistor analogy and draw the VI characteristics of SCR.  
or  
(b) What is a Triac? Sketch its characteristics and describe its operation.

20. (a) Describe the principle of operation of an avalanche photo-diode and mention its application.

or

(b) With suitable sketches, explain the operation of monostable multivibrator.

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**14031 ELECTRONIC DEVICES AND CIRCUITS  
MODEL QUESTION PAPER - II  
Total Marks : 75**

**PART – A**

**Answer all questions**

**10 x 1 = 10marks**

1. Define Ripple factor.
2. Define cutin voltage.
3. What are current gain and voltage gain of CB configuration.
4. State the advantage of self bias.
5. What is meant by Pinch-off voltage?
6. State any Two difference between BJT and FET.
7. Distinguish JFET and MOSFET.
8. State any two application of MOSFET.
9. Distinguish between clipper and clamper.
10. Differentiate between astable and monostable multivibrator.

**PART – B**

**Answer all questions.**

**5x 3 = 15 marks**

11. What is zener breakdown? Explain the operation of limit switch.
12. What is the need for biasing a transistor?
13. Draw an LC oscillator.
14. What are the feature of SCR and Triac
15. What is meant by opto coupler.? Mention its applications.

**PART – C**

**Answer any one from each question  
marks**

**5 x 10 = 50**

16. (a) Describe the action of PN junction diode under forward and reverse bias.  
or  
(b) With suitable sketches, explain the operation of a bridge rectifier.
17. (a) Draw and explain the operation of common collector configuration.  
or  
(b) Discuss the switching characteristics of a transistor for a pulse input.
18. (a) Explain the operation of RC phase shift oscillator.  
or  
(b) Draw the equivalent circuit of UJT and explain its operation, with the help of emitter characteristics.
19. (a) Explain the speed control of fan using Diac and Triac.  
or

(b) What is an IGBT? Sketch its construction and describe its operation.

20. (a) Describe the principle of operation of an LCD.

or

(b) With suitable sketches, explain the operation of an astable multivibrator.

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### 13034 - 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 Code	Subject	Instruction		Examination		
		Hours / Week	Hours / Semester	Assessment Marks		
13034	Electrical Circuits And Machines Practical	6	96	Internal	Board Exam	Total
				25	75	100

### OBJECTIVES:

#### *To construct and test*

- Circuit for verifying Superposition, Maximum power transfer and Thevenin theorems.
- Circuit for power measurement and RLC series resonance.

#### *To conduct experiments on machines & transformers to obtain*

- No load and load characteristics of shunt generator, load characteristic of series generator and load characteristics of series, shunt and compound motor.
- Load characteristic, efficiency and load sharing characteristic of transformer.

### 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.**

## **14034-ELECTRONIC DEVICES AND CIRCUITS PRACTICAL**

1. VI Characteristics of PN JN Diode
2. VI Characteristics of Zener diode.
3. HW, FW with and without filter.
4. Bridge Rectifier with and without filters.
5. VI characteristics of Regulator.
6. Input/output characteristics of CE Transistor.
7. Frequency response of RC coupled amplifier.
8. Emitter follower.
9. Negative feedback amplifier.
10. RC phase shift oscillator.
11. Hartley and Colpitts oscillator.
12. JFET characteristics.
13. Common source amplifier.
14. UJT characteristics.
15. UJT relaxation oscillator.
16. SCR characteristics.
17. DIAC and TRIAC characteristics.
18. Clipper, clamper and voltage doubler.
19. LDR, Photo diode and Photo transistor characteristics.
20. Solar cell and opto coupler.

## 13036 WORKSHOP PRACTICAL

### Scheme of Instruction and Examination

Subject Code	Subject	Instruction		Examination		
		Hours / Week	Hours / Semester	Assessment Marks		
13036	Workshop Practical	6	96	Internal	Board Exam	Total
				25	75	100

### DETAILED SYLLABUS

#### Compulsory Exercises

#### I Lathe

- 1) Plain turning
- 2) Step turning
- 3) Taper turning
- 4) Knurling
- 5) Drilling
- 6) Thread cutting

#### II Foundry

- 1) Preparation of mould of a gear wheel.
- 2) Preparation of mould of a flange coupling.
- 3) Preparation of mould of a bush bearing.
- 4) Preparation of mould of a yoke.
- 5) Bearing top (Half bearing)

#### III Welding

#### **Making the following joints in MS flats of 6mm thick by arc welding**

- 1) Lap joint
- 2) Butt joint
- 3) 'T' Joint
- 4) 'L' Joint

**IV**  
**SEMESTER**

### 13041- 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 code	Subject	Instruction		Examination		
		Hours / Week	Hours / Semester	Assessment Marks		
13041	Electrical Machines – II	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:

#### *To understand*

- Alternator principle, construction, types, emf induced and cooling.
- Performance characteristic and paralleling of alternator, test and predetermination of performance characteristic of alternator.
- Synchronous motor starting, running and applications, comparison with induction motor.
- Single phase motors types, construction, characteristic and applications.
- Special motors.
- 3 phase induction motor construction, principle, types, characteristics, applications and starting.
- Induction motor types, ratings, maintenance.
- Starter maintenance.

## **13041- ELECTRICAL MACHINES – II DETAILED SYLLABUS**

### **UNIT – I: Alternator Principle & Construction**

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**

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**

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**

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**

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.
<b>Reference Books:</b>			
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

**13041- ELECTRICAL MACHINES- II**  
**MODEL QUESTION PAPER I**

Time 3 hours

Max.Marks: 75

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

*Part C questions carry each 10 marks and answer all questions by*

Selecting 'either' or 'or'.

Part A

1. What are the requirements of Alternator?
2. What are the two types of alternators?
3. Write the formula to calculate the synchronous speed of the alternator.
4. Define 'Synchronous Impedance.
5. What is a Synchronous Condenser?
6. Calculate the step angle of 200 steps per revolution stepper motor.
7. Write the two types of 3 phase induction motor.
8. Define Slip.
9. Mention the code of practice for the selection of starters for induction motor and installation and maintenance of Induction motors.
10. What is single phasing?

Part – B

11. Calculate the distribution factor for 48 slots, 4 pole single layer 3 phase winding.
12. What are the effects of armature reaction in alternators?
13. Name the four methods of starting a synchronous motor.
14. In the Cage rotor the slots are made with a slight skew. Why?
15. What is "continuous rating" and "intermittent rating" of motor?

Part – C

16.a) Explain with a neat sketch the constructional details of a salient pole alternator.

(or)

b) Explain the methods of obtaining sine wave in salient pole alternators with neat sketches.

17.a) Explain armature reaction of alternators on load at various power factors.

(or)

b) Determine the voltage regulation of a 2000 Volts single phase alternator delivering a current of 100A at 0.8 p.f. lagging from the following test results. Full load current of 100A on short circuit by a field excitation of 2.5A, an emf of 500V is produced on open circuit by same excitation. Armature resistance is 0.8 ohm.

18.a) Why is a synchronous motor not self starting? Explain any one method of

starting of synchronous motor.

(or)

- b) Explain the constructional details and working principle of a shaded pole single phase induction motor.

19.a) Explain the slip-torque characteristic of induction motor and identify the stable and unstable regions.

(or)

- b) The supply is taken from a 8 pole, 3 phase 750 rpm alternator to a 6 pole 3 phase induction motor. If the slip of the induction motor is 4% calculate the full load speed of the induction motor.

20.a) What do you mean by single phasing? Explain how single phasing is prevented using current operated relays.

(or)

- b) Explain degreasing, varnishing and vacuum impregnation for improving the insulation resistance value of Induction motor.

**13041- ELECTRICAL MACHINE - II**  
**MODEL QUESTION PAPER II**

Time 3 hours

Max.Marks: 75

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

Part C questions carry each 10 marks and answer all questions by  
Selecting 'either' or 'or'.

Part A

1. Mention the advantages of short pitch winding.
2. Mention the types of alternator rotor.
3. What is armature reaction in an alternator?
4. Mention the methods used for synchronization.
5. What will happen when the synchronous motor is over loaded?
6. What is the use of damper winding in a synchronous motor?
7. Mention the principle of induction motor.
8. Define "Slip" of an Induction motor.
9. How will you check unbalancing in rotor?
10. What is meant by "Degreasing"?

Part B

11. State the advantages of rotating field system in alternators.
12. What are the conditions to be fulfilled for parallel operation of alternators?
13. What is "V" Curve and inverted "V" curve of synchronous motor?
14. Mention the advantages in using a double cage motor.
15. Mention the important factors which influence the selection of starters of Induction motor.

Part C

16. a) Explain with a neat sketch the constructional details of turbo alternators.  
(or)  
b) Calculate the speed and open circuit phase voltage of a 4 pole 50Hz star connected alternator with 36 slots 30 conductors per slot and full pitch. The flux per pole in 0.05 Weber sinusoidally distributed.
17. a) Explain the various methods of cooling applied to turbo alternators.  
(or)  
b) Explain synchronous impedance method of determining the regulation of Alternator.

18. a) Explain in detail the different methods of starting a synchronous motor.

(or)

b) Explain with a neat diagram, the working of a capacitor start motor and state its applications.

19. a) Explain step by step how you will draw the equivalent circuit of an induction motor by conducting no load and blocked rotor test.

(or)

b) Show the arrangements and explain for speed control by pole changing method for 4 poles and 8 poles induction motor.

20. a) Explain the methods of drying out process carried out in the case of induction motor.

(or)

b) What are the checks to be done before commissioning of an induction motor?

### 13042 - 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:

##### To understand

- Basic concepts on measuring system, construction of general instruments.

- Analog instruments used to measure voltage, current and ohm and their principle of working, Cathode Ray Oscilloscope construction and working.
- Wattmeter, Energy Meter types, construction and working.
- Maximum Demand indicator, trivector meter, frequency meter, recorders and Bridges.
- Basic transducers and their working.

## **13042 - MEASUREMENTS AND INSTRUMENTATION**

### **DETAILED SYLLABUS**

#### **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 and CRO**

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.Battacharya 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

## 13042 MEASUREMENTS AND INSTRUMENTATION

### MODEL QUESTION PAPER I

Time 3 hours

Max.Marks: 75

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

Part C questions carry each 10 marks and answer all questions by Selecting 'either' or 'or'.

#### Part A

1. Write a formula of instruments efficiency.
2. List the Three Operation forces.
3. What are the 2 Types of MI instruments?
4. State the use of Megger.
5. What is the control torque in LPF wattmeter?
6. List 2 errors of induction type's energy meter.
7. Mention the use of Synchroscope.
8. Write the use of Schering bridge.
9. Define the transducers.
10. Mention any two uses of ultrasonic.

#### Part B

11. Explain any 3 effects used in an instruments?
12. What are the requirements of ammeters shunt?
13. List the types of wattmeters?
14. Mention the application of X- Y Recorders?
15. Write short notes a "Digital encoding transducers"

#### Part C

16. a) Explain the following
- |                        |     |
|------------------------|-----|
| Air Friction damping   | (5) |
| Fluid friction damping | (5) |
- (or)
- b) (i) Define i) True value ii) Accuracy. (4)
- (ii) Compare Spring and Gravity control. (6)
17. a) With a neat sketch and explain PMMC instruments?
- (or)
- b) (i) Explain with a sketch the working of series types Ohm meter? (5)
- (ii) Write short notes and the various types of sweeps in a CRO? (5)
18. a) Write short notes an "CREEP". How will you present. Draw the sketch of 3 phase two element wattmeters?

(or)

b) Explain the working of dynamometers type wattmeters. ?

19. a) With a block diagram explain the working of a Digital Multimeter?

(or)

b) (i) What are the types of frequency meters? (4)

(ii) Draw Anderson bridge and Write down formula obtained?. (6)

20. a) Describe with a neat sketch the working of LVDT

(or)

b) (i) Explain the principle of Capacitive Transducers? (5)

(ii) Explain how you will measure the angular velocity using DC Tachometer generator? (5)

**13042 – MEASUREMENT AND INSTRUMENTATION  
MODEL QUESTION PAPER II**

Time 3 hours

Max.Marks: 75

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

Part C questions carry each 10 marks and answer all questions by

Selecting 'either' or 'or'.

Part - A

1. Mention the type of scale in moving iron instrument.
2. In under damped instrument when the final value will be obtained
3. Mention the instrument used for measure the current with out connecting in the circuit.
4. Write the coating used in CRT screen.
5. Mention the purpose of providing a hole in the disc of Energy meter.
6. Mention the purpose of current transformer.
7. Write the quantities measured by trivector meter
8. State the bridge used to measure high voltage capacitance.
9. Expand LVDT.
10. Differentiate between positive temperature co- efficient and negative temperature co-efficient.

Part- B

11. Mention the various effects used in instruments for measurement.
12. Write a note on earth tester?
13. Draw the connection diagram of connection 3 phase two element wattmeter to a 3 phase load.
14. Give a brief account on phase sequence indicator.
15. Define electrical transducer. Mention its types.

Part- C

16. a) List various operating forces in instruments. Explain the need for each.

(or)

b) Write short notes on

- i) Permanent magnet
- ii) Pointer
- iii) Scale

17. a) Explain with neat sketch the working of i) Attraction type ii) repulsion type instruments .

(or)

b) Draw the block diagram of CRO and explain the various sections

18. a) Explain the working of induction type's wattmeter

(or)

b) With a neat sketch explain the operation of 3 phase Energy meter

19. a) How are frequency meter classified? Explain the working of a mechanical resonance type meter.

(or)

b) With a neat sketch, explain the working of Weston Synchroscope.

20. a) Explain the working principle of Piezo-electric transducer for pressure measurement.

(or)

b) Explain with a neat diagram how a pipe shells thickness is measured using Ultrasonic Waves.

**14041 - 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		Examinations		
	Hours/ Weeks	Hours/ Semester	Assessment Marks		
			Internal	Board Exam	Total
Analog and Digital Electronics	6	96	25	75	100

## Topics and Allocation

Unit	Topic	Time (Hrs)
Unit 1	Linear ICS : Op. amp. Timer and their applications	16
Unit 2	Boolean Algebra	16
Unit 3	Combinational Logic	18
Unit 4	Sequential Logic	18
Unit 5	D/A, A/D and Memory	16
	Revision and Test	12
	Total	96

## **OBJECTIVES:**

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

- Explain the characteristics of op. amp.
- Explain the various applications of op.amp.
- Explain the functional block diagram of 555 Timer.
- Explain Astable and Monostable Multivibrator using 555.
- Explain the various number systems binary, BCD, Octal, Hexadecimal
- State and explain Demorgan's Theorems
- Write the Truth Table and symbol of Logic gates OR, AND, NOT, NAND NOR, Ex-OR.
- Simplification of Logic functions using karnaugh's map.
- Explain the operation of Half-Adder, Full Adder, Half Subtractor, Full Subtractor.
- Explain parity Generator, and checkers.
- Explain decoder and encoder
- Explain Demultiplexer and Multiplexer
- Explain various Digital Logic families
- Explain various FF, D, T, SR, and MSJK.
- Explain Asynchronous Binary counter, Decode Counter, synchronous counter
- Explain the shift Register
- Explain weighted register and R-2R Ladder Type D/A convertor
- Explain simultaneous, Ramp, successive approximation, Dual slope
- Explain memories, Expanding memories.

## **14041 - ANALOG AND DIGITAL ELECTRONICS**

### **DETAILED SYLLABUS**

#### **UNIT – I : 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 – II: 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 – III : 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 – IV : 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 – V : 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:** R.P. Jain – Modern Digital Electronics – TMH 2003.

Reference books:

1. Albert Paul Malvino and Donald P. Leach – Digital Principles and applications – TMH – 1991.
2. Roger L. Tokheim Macmillan – Digital Electronics – McGraw – Hill – 1994.
3. William H. Goth Mann – Digital Electronics – An introduction to theory and practice – PHI 1998.
4. Satnam P. Mathur and others – Electronic devices, Applications and Integrated Circuits – Umesh Publications – 1982.

**14041 - ANALOG AND DIGITAL ELECTRONICS**  
**MODEL QUESTION PAPER I**

Time 3 hours

Max.Marks: 75

Note: Part A questions carry each 1 mark and answer all questions.

1. Part B questions carry each 3 marks and answer all questions.
2. Part C questions carry each 10 marks and answer all questions by
3. Selecting 'either' or 'or'.

Part A

1. What is op-amp?
2. Define slew rate.
3. Convert decimal 9 to binary
4. State Demorgan theorem
5. What is a Demulti plexer?
6. What is decoder?
7. How may FFS are required to construct a Decade counter?
8. What is race around condition?
9. What is a volatile memory?
10. What is meant by quantization?

Part B

11. State the characteristics of an ideal op. amp.
12. Draw the Logic diagram for the Boolean function  $AB + C$ .
13. State the Truth Table of a HALF Adder and FULL Adder.
14. What are the differences between Ring counter and Johnson counter?
15. Draw the circuit diagram of a 4 bit weighted – Resistor D/A converter.

Part C

16. (a) Explain with neat diagram op. amp as (i) summer  
(ii) Zero crossing detector
- or**
- (b) Draw the Functional Block diagram of 555 Timer and explain its operation.
17. (a) State and prove Demorgan's Theorems
- or**
- (b) Construct i. AND ii. Ex-OR gates using NOR gates and explain its operation
18. (a) Draw the Logic diagram of a Full Adder and explain its working.
- or**
- (b) Explain with a neat diagram 1 of 8 Multiplexer.
19. (a) Explain the working of a 4 bit Binary up counter with a neat diagram and waveforms.
- or**
- (b) Explain the working of JK MS Flip-Flop with a neat diagram.
20. (a) Explain the working of a 4 bit R-2R Ladder D/A converter with a neat diagram.
- or**
- (b) Explain with a neat diagram, the successive approximation type A/D converter.

**14041 - ANALOG AND DIGITAL ELECTRONICS  
MODEL QUESTION PAPER II**

Time 3 hours

Max.Marks: 75

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

Part C questions carry each 10 marks and answer all questions by  
Selecting 'either' or 'or'.

Part A

1. Define CMRR of op.amp.
2. What is virtual ground?
3. Convert binary  $011011_2$  to Hexadecimal.
4. State logic equation for EX-OR gate
5. Define a multiplexer
6. State difference between Half adder and full adder
7. What is a D-Type Flip-Flop
8. State difference between Synchronous and asynchronous counter
9. How many comparators are required for a 4 bit parallel comparator (simultaneous) A/D converter?
10. State difference between static and dynamic memory.

Part B

11. What is virtual Ground of an op.amp? and explain Op amp as inverter.
12. Give the Truth Table of 2 input Ex-OR gate and NOR gate.
13. Define fan in and fan out of a logic gate.
14. Give the logic diagram and Truth Table of JKMS FF.
15. Draw the circuit diagram of a 4 bit R-2R Ladder D/A converter

Part – C

16. (a) (1) Explain the working of a Comparator using op-amp.  
(2) With a neat diagram and Waveforms, explain Zero Crossing detector using op. amp.

or

- (b) (1) Explain a monostable Multivibrator using 555 IC  
(2) Explain the working of an integrator using op. amp.

17. (a) Simplify the Boolean expression by using karnaugh's map

$$F = \overline{A}BCD + A\overline{B}CD + ABC\overline{D} + ABCD$$

or

- (b) Construct i) NOR ii) Ex-OR gates using NAND gates and explain its operation.

18. (1) Draw the Logic diagram of a Half-Adder and explain its working

or

- (2) Explain with a neat diagram, BCD to seven segment Decoder.

19. (1) Explain the working of a Decade counter with a neat diagram and waveforms.

or

(2) Explain with a neat diagram serial in serial out 4 bit shift register.

20. (1) Explain the working of a 4 bit weighted Register D/A Converter with a neat diagram.

or

(2) Explain with a neat diagram, the Dual slope A/D converter.

**11011 - 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 code	Subject	INSTRUCTION		EXAMINATION			Duration
		Hours/Week	Hours/Semester	Marks			
11011	English communication practical	4	64	Internal Assessment	Board Exam	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 Behavior**

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 5minutes 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**

**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:***

<b>GROUP</b>	<b>UNIT</b>	<b>TIME</b>	<b>MARKS ALLOTTED</b>
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 theirpersonality. 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 : 75**

**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?
- 3) 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?

**I**

**( 2 x 5 = 10)**

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

**II**

**( 2 x 5 = 10)**

- 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.



## 13045 - 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		
	Hours / Week	Hours / Semester	Assessment Marks		
Electrical Machines (Ac) And Instrumentation Practical	6	96	Internal	Board Exam	Total
			25	75	100

## OBJECTIVES

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

## LIST OF EXPERIMENTS

### ELECTRICAL MACHINES (AC)

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 phases 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.**

**14044 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		
	Hours / Week	Hours / Semester	Assessment Marks		
Analog And Digital Electronics Practical	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 Ics and observe the output waveform.
14. Construct a Decade counter using 7473 Ics 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**

### 13051- 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 CODE	SUBJECT	INSTRUCTION		EXAMINATION		
		Hours / Week	Hours / Semester	Assessment Marks		
13051	Power System - I	6	96	Internal	Board Exam	Total
				25	75	100

#### Topics and Allocation

UNIT	TOPIC	TIME (HRS.)
UNIT I	Generation of electrical Power and Energy Conservation	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:

##### To understand

- Conventional Power Plants - layout, site.
- Non conventional power generation - methods.
- • Grid system.
- Energy Conservation, Audit and Management
- AC transmission – supports, conductors, lines, effects.
- High Voltage DC transmission.
- Line insulators, UG cables.
- Circuit Breakers and Relays.
- Earthing and fuses.

### 13051- POWER SYSTEM - I

## DETAILED SYLLABUS

### **UNIT – I: Generation Of Electrical Power and Energy Conservation**

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.

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

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

Principles of energy audit and Energy Management – economics – preliminary audit – detailed audit

### **UNIT – II: AC Transmission & HvdC Transmission**

#### **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**

#### **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**

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, SF<sub>6</sub> 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**

### **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	TMH 1995 15 <sup>th</sup> Reprint 2005
9	Non-conventional Energy Sources	G.D.Rai	Khanna Publishers, Delhi
10	Power System Protection and Switchgear	B.Ravindranath M.Chadar	Reprint 2005 New Age International

**MODEL QUESTION PAPER – I**

Time 3 hours

Max.Marks: 75

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

Part C questions carry each 10 marks and answer all questions by Selecting 'either' or 'or'.

Part – A

1. What are the conventional sources of energy for power generation?
2. What is the function of moderator in a nuclear reactor?
3. State Kelvin's law.
4. Define voltage regulation of a Transmission line.
5. Name the various types of line supports.
6. Name the different types of cable laying.
7. What is a circuit breaker?
8. What is the function of a fuse?
9. Name the two types of differential relays.
10. What is a static relay?

Part – B

11. Define load factor and diversity factor.
12. Define 'sag' in overhead lines and on what factor does the magnitude of sag depends.
13. Explain briefly on suspension type insulator.
14. What are the advantages of Air blast circuit breaker?
15. What are the main requirements of a good protective relay?

Part – C

16. (a) Draw the schematic diagram of a Nuclear Power Plant and explain its working.  
(or)  
(b) i) What do you mean by energy conservation and mention the benefits in using energy conservation plan.  
ii) Explain the basic principle of working of solar plant.
17. (a) State the merits and demerits of Copper and Aluminium conductor materials in over head lines.

(or)

(b) Write short notes on i) skin effect ii) Ferranti effect.

18. (a) A three phase over head line is supported by 3 disc suspension insulator. The potential across the first and second insulators are 8kv and 11kv respectively. Calculate the line voltage and string efficiency.

(or)

- (b) Sketch and explain the construction of three core oil filled cable and state their advantages and disadvantages.

19. (a) Explain with neat sketch the construction and operation of SF6 circuit breaker. What are their advantages?

(or)

(b) Explain with neat sketch the construction and working of HRC cartridge fuse.

20. (a) Explain with neat sketch the construction and working of Induction type over current relay.

(or)

(b) i) What are the advantages of grounded neutral system?

ii) Write short notes on Resonant grounding and Grounding Transformer.

**13051- POWER SYSTEM – I**  
**MODEL QUESTION PAPER II**

Time 3 hours

Max.Marks: 75

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

Part C questions carry each 10 marks and answer all questions by

Selecting 'either' or 'or'.

Part – A

1. What is a base load plant? Give examples.
2. Give two important uses of a load curve.
3. Name the various types of conductor material used in over head line.
4. Define 'sag' in over head line.
5. Define 'string efficiency'
6. Name the two types of grading of cables.
7. State any two function of a circuit breaker.
8. Define 'fusing current' of a fuse.
9. What are the types of static relays?
10. What is meant by 'Grounding'

Part – B

11. What is the function of a Surge Tank in Hydro electric plant?
12. What are the advantages of DC transmission?
13. Mention the advantages of suspension type insulators in over head lines.
14. What are the merits and demerits of oil minimum circuit breaker?
15. Briefly explain the function of a protective relay.

Part – C

16. (a) Explain with neat sketch the arrangement and the function of hydro electric power plant.

(or)

- (b) Explain energy conservation measures in Industries and in Homes.

17. (a) Draw a typical lay out of AC power supply scheme and explain. Note the voltages for Generation, Transmission and distribution.

(or)

- (b) An over head line has a span of 250m between level supports. The conductor weight is 700kg/km. Calculate the maximum sag if the ultimate tension of the conductor is 6000kg.

Assume a factor of safety as 2.

18. (a) Explain the various causes of the failure of insulators.

(or)

- (b) Sketch the construction of a three core belted cable and explain the various parts.

19. (a) Explain the construction and working of a cross blast air circuit breaker. State its merits and demerits.

(or)

(b) i) Differentiate fuse and circuit breaker.

ii) Explain the construction and working of HRC fuse with tripping device.

20. (a) Explain with a neat sketch the construction and working of an Earth leakage relay.

(or)

(b) Explain the following types of grounding.

(i) Equipment grounding (ii) System grounding

### **14051 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		
	Hours / Week	Hours / Semester	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
	<b>Total</b>	<b>80</b>

### **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

## **14051 MICROPROCESSOR AND MICROCONTROLLER**

### **DETAILED SYLLABUS**

#### **UNIT – I: Microprocessor and Applications**

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**

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**

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**

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**

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.

**14051 MICROPROCESSOR AND MICROCONTROLLER**  
**MODEL QUESTION PAPER – I**

Time 3 hours

Max.Marks: 75

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

Part C questions carry each 10 marks and answer all questions by

Selecting 'either' or 'or'.

Part – A

1. Define Microprocessor.
2. What are the different type of addressing mode in 8085?
3. Mention the number of bytes in internal RAM and internal ROM of 8051.
4. State any two differences between microprocessor and microcontroller.
5. List the Addressing modes in 8051.
6. Mention the subroutine instructions of 8051.
7. For what purpose RS232C standard is used.
8. What is the function of 8279 IC?
9. Which scheme of keyboard connection is suitable for large number of key interfacing?
10. Write the step sequence for running stepper mot or in forward direction.

Part – B

11. Classify the Instruction of 8085 according to their function?
12. Write notes on external interrupt of 8051..
13. Write a program to add two 8 bit numbers using immediate addressing instructions.
14. Develop control word to use all the ports of 8255 as output.
15. Draw 4 digit 7 segment interface circuit.

Part – C

16. (a) Draw and explain the architectures of 8085 microprocessor  
(or)  
(b) Draw and explain the Timing Diagram for LDA address instruction
17. (a) Draw and explain the block Diagram of 8051 microcontroller (or)  
(b) i). List the special function registers with their addresses and explain anyone of them  
ii). Draw and explain the Structure of Internal RAM of 8051
18. (a) Write an assembly language program to arrange the given set of 'n' numbers in ascending order  
(or)  
(b) i). Explain briefly about CALL instruction  
ii) Explain briefly about Rotate instruction
19. (a) Explain in details about the 8279.

(or)

20. (b) Explain about the ADC interfacing.  
(a) Explain about Traffic controller interfacing with 8051.  
(or)  
(b) Explain about stepper motor interfacing with 8051

**14051 MICROPROCESSOR AND MICROCONTROLLER**  
**MODEL QUESTION PAPER – II**

Time 3 hours

Max.Marks: 75

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

Part C questions carry each 10 marks and answer all questions by  
Selecting 'either' or 'or'.

Part – A

1. What is the function of stack Pointer?
2. What are various flags in 8085?
3. What is the purpose of PSW register?
4. What is the purpose of special function register?.
5. State the function of SWAP instruction.
6. State the purpose of XCH A, Rn instruction.
7. State the purpose of RS232 serial interface.
8. What is meant by BSR mode in 8255?
9. How frequency may be measured with 8051 chip?
10. Draw DC motor interface circuit.

Part – B

11. Classify various interrupts in 8085
12. Explain fetch cycle and Execution cycle.
13. What are bit oriented instruction?
14. Write notes on mode 0 operation of 8051Timer.
15. Write notes on Temperature controller interface.

Part – C

16. (a) Explain various addressing mode in 8085 with example  
(Or)  
(b) Draw and explain the Timing Diagram for STA address instruction
17. (a) Draw and explain the pin details of 8051 microcontroller.  
(Or)  
(b) Explain with a neat sketch the memory organization of 8051
18. (a) Classify 8051 instruction based on function and explain with example.  
(Or)  
(b) Explain various addressing mode in 8051 with example.
- 19 (a) Explain the function of 8254..  
(Or)  
(b) Explain about DAC interfacing with 8051
20. (a) Explain about Stepper motor interfacing with 8051  
(Or)  
(b) Explain about matrix keyboard interfacing with 8051

### 13071- 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 code	Subject	Instruction		Examination		
		Hours / Week	Hours / Semester	Assessment Marks		
13071	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

### *To understand*

- Electrical control circuit elements including various types of industrial switches, industrial relays, industrial timers, solenoids, contactors and interlocking arrangements.
- DC motor control circuits for direction control, speed control, acceleration control, braking control and jogging using contactors.
- Speed control of dc motor using Electronic components.
- AC motor control circuits for direction control, speed control, acceleration control, braking control and jogging using contactors.
- Basics of Programmable Logic controller.
- Transformer installation, protection, oil checking and maintenance

## 13071- CONTROL OF ELECTRICAL MACHINES

### 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 :

<b>Sl.No.</b>	<b>Name of the Book</b>	<b>Author</b>	<b>Publisher</b>
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

**13071 - CONTROL OF ELECTRICAL MACHINES (ELECTIVE THEORY I)  
MODEL QUESTION PAPER I**

Time 3 hours

Marks 75

Note: Part A questions carry each 1 mark and answer all questions.  
Part B questions carry each 3 marks and answer all questions.

*Part C questions carry each 10 marks and answer all questions by  
selecting 'either' or 'or'.*

Part A

1. What is Relay?
2. What type of controls is provided by Bimetallic strip?
3. At what speed the motor tends to run when the field coil opens.
4. Define the function of jogging.
5. List the factors which control the speed of ac machine.
6. How to reverse the speed of AC induction motor?
7. What is PLC?
8. State interface field devices with PLC.
9. Mention the various oil purification methods.
10. Mention the IR value of 11 KV distribution transformers

Part B

11. How to classify the relays? Give a note on them.
12. Name the types of braking and give brief account on them.
13. Why closed circuit transition is necessary while using autotransformer starter?
14. Draw the ladder diagram of DOL starter.
15. What is the function of Bucholz relay in power transformer?

Part C

16. a) Draw the control circuit of electrical interlock and mechanical interlock and explain.  
or  
b) Discuss the principle of operation of Pneumatic timer.
17. a) Explain the control circuit of field failure protection circuit.  
or  
b) Explain with neat circuit diagram the speed control circuit using DIAC and SCR.
18. a) Draw the connection diagram of winding for two speed control of induction motor and explain.

OR

b) Explain with neat control circuit the working of automatic star-delta starter.

19. a) Develop ladder diagram for star/delta starter and explain.

OR

b) List down and explain the various types of programming a PLC.

20. a) Name the different types of transformer oil purifiers and briefly explain any one.

OR

b) Explain with the circuit diagram voltage test, continuity test and short circuit test on distribution transformer.

# 13071 - CONTROL OF ELECTRICAL MACHINES (ELECTIVE THEORY I)

## MODEL QUESTION PAPER II

Time 3 hours

Marks 75

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

*Part C questions carry each 10 marks and answer all questions by selecting 'either' or 'or'.*

### Part A

1. What is NO and NC ?
2. Mention the need for interlocking.
3. What is meant by inching?
4. How dynamic braking is achieved in dc motor control?
5. Define Plugging.
6. which induction motor uses Secondary frequency acceleration starters are used.
7. What is PLC scan?
8. Mention the basic components of PLC.
9. Mention the test carried out to find the PH value of transformer oil.
10. Mention the causes for the noise in transformer.

### Part B

11. Draw the multiple push button switch circuit.x
12. Define the term counter emf acceleration.
13. Draw the control circuit of DOL starter.
14. Mention four advantage of PLC over relay logic.
15. What is the use of explosion vent in the transformer?

### Part C

16. a) Explain the constructional details of solenoid contactor with neat sketch.

or

- b) Explain the working of phase failure relay with neat sketch.

- a) Explain with neat circuit diagram the series relay starter. or b) Draw and explain the control circuit of dynamic braking.

17. a) State and explain the closed circuit transaction in auto transformer starter for induction motor.

or

- b) Draw the control for automatic rotor resistance starter for three phase induction motor and explain.

- a) Draw the block diagram of PLC system and explain
- Or
- b) Develop ladder logic diagram for bottle filling plant control and explain the rungs in the ladder diagram.
- a) List the nature of faults and the corresponding Bucholz relay response. or b) Explain the working of winding hot spot temperature indicator.

### 13072 - PROGRAMMABLE LOGIC CONTROLLER

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	Subject	Instruction		Examination		
		Hours / Week	Hours / Semester	Assessment Marks		
13072	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

To understand

- Evolution, internal structure, interface modules, advantages and market available PLCs.
- Various types of input and output modules.
- Input sensors.
- Various PLC programming methods, basic instructions like ON, OFF, timer, counter, latched and unlatched outputs.
- Simple PLC ladder programs for starters, filling plants.
- PLC networking, industrial standard communication networks.
- SCADA system hardware and software.

## **13072 - PROGRAMMABLE LOGIC CONTROLLER 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 :**

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

**13072 -PROGRAMMABLE LOGIC CONTROLLER**  
**MODEL QUESTION PAPER I**

**Time 3 hours**

**Max. Marks 75**

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

Part C questions carry each 10 marks and answer all questions by selecting 'either' or 'or'.

Part A

1. State the use of PLC.
2. List the various types of PLC.
3. State the purpose of input output interface.
4. Mention the output address scheme of Siemens Micro PLC
5. Draw the symbol for PLC comparator
6. When NO becomes NC in relay.
7. Mention some transmission media.
8. Which field bus is required with distributed control system.
9. Expand DAS .
10. Expand SCADA .

Part B

11. List some standard PLCs available in market.
12. Write a note on analog output module.
13. Differentiate latched and unlatched outputs.
14. what is communication protocol ?
15. Give a note on Direct Digital Controller.

Part C

16a) Discuss in detail about advantages of PLC over hardwired system.

(or)

- b) Draw the basic block diagram of PLC and give brief account on each block.

17a) Draw the discrete input module and explain the operation.

(or)

- b) Discuss in detail about various output module of PLC.

18a) Explain ON delay and OFF delay timer instructions with simple examples.

(or)

- b) Develop relay logic diagram of star delta starter and convert it into logic diagram

19 a) draw a typical architecture of industrial control system showing field bus and explain?

(Or)

b) Give a note on: i) Ethernet ii) Transport layer

20 a) What do you understand by DAS. Discuss its function with simple real time example.

(or)

b) Discuss in detail about SCADA software.

**13072 -PROGRAMMABLE LOGIC CONTROLLER**  
**MODEL QUESTION PAPER II**

Time 3 hours

Max. Marks 75

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

Part C questions carry each 10 marks and answer all questions by  
selecting 'either' or 'or'.

***Part A***

1. State any two uses of PLC.
2. Mention the function of CPU in PLC.
3. Draw the symbol of limit switch.
4. Name the component in isolation section
5. mention the different types of timer values.
6. Which function is needed for process control instrumentation.
7. Mention any two international field bus standards
8. What is the necessity of file transfer protocol?
9. State the uses of data acquisition system.
10. Expand SCADA.

Part B

11. Give a note on various analog signals that can be given to PLC input.
12. Write a note on open collector output.
13. Discuss about statement list programming method of PLC.
14. what are the requirements of field bus?
15. What do you understand by data logging?

Part C

- 16 a) Discuss in detail about PLC operation.  
(or)  
b) Explain the memory organization of standard PLCs
- 17a) Discuss about AC input module.  
(or)  
b) Draw the discrete output module and explain the operation.
- 18 a) What are the counting operation available in standard PLCs? Explain them.  
(or)  
b) Develop ladder logic control for 4 floor lift system and explain.
- 19 a) Discuss about various layers in Communication protocol

(or)

b) Give a note on: Field level communication protocol.

20 a) Discuss about various modes of digital controller.

(or)

b) What do you understand by SCADA system? Give a brief account on it.

### **13073 ELECTRICAL MACHINE DESIGN (ELECTIVE THEORY-1)**

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

#### Scheme of Instruction and Examination

Subject Code	SUBJECT	Instruction		Examination		
		Hours / Week	Hours / Semester	Assessment Marks		
				Internal	Board Exam	Total
13073	Electrical Machine Design	6	96	25	75	100

#### Topics and Allocation

Unit	Topic	Time (Hrs)
Unit 1	Electrical Machine Design-Basic Consideration	18
Unit 2	Magnetic Circuit Calculations	16
Unit 3	Design of Transformer	16
Unit 4	Design of DC machines	16
Unit 5	Design of AC Machines	18
	Revision and Test	12
	<b>Total</b>	<b>96</b>

### **OBJECTIVES:**

#### ***To understand***

- Static and Rotating Electrical Machine specifications, materials, losses and effects of temperature rise.
- Magnetic force, magnetic force for gap, teeth and leakage flux in static and rotating electrical machines.
- Designing of single phase, three phase transformer, core and coil.
- Designing of dc machines.
- Designing of 3 phase induction motor and 3 phase synchronous machines.

**13073 ELECTRICAL MACHINE DESIGN (ELECTIVE THEORY-1)  
DETAILED SYLLABUS**

**UNIT – I: Electrical machine design – basic consideration**

Standardization and standards – specification of transformer , dc machines and ac machines – design and constructional elements of transformer, rotating machines – Materials – conducting, magnetic and insulating materials – losses – electrical and magnetic losses – temperature-rise – class of duty – limits of temperature rise.

**UNIT – II: Magnetic Circuit Calculations**

Calculation of magnetizing force – magnetic force for the gap – magnetic force for the teeth – leakage flux – leakage reactance.

Rotating machines – salient field poles – non salient field poles – armature – slot leakage reactance.

**UNIT III: Design of Transformer**

Important considerations – core and shell types – distribution transformer – generator transformer – transmission transformer – core section – clearance – yoke section.

Main dimension – single phase core type transformer – three phase core type transformer – output coefficient – voltage per turn – specific magnetic and electric loading of transformer.

Winding design – cross over, helix, disc and disc helix.

**UNIT – IV: Design of dc machines**

Important design consideration – number of poles – advantages of large number of poles – air gap – armature slot – current density – field system – commutator – influence of thyristor supply – design of large dc motor.

Specific magnetic and electric loading of dc machines – flowchart to estimate for KW and dimension.

**UNIT – V: Design of ac machines**

Ac machine design consideration – power equation – separation of diameter and length – problems.

Three phase induction motor – important design consideration – standard frames and stampings – gap length – flux density – current density - power factor – efficiency – slot combination – winding - design of 3 phase induction motors.

Three phase synchronous machines – important design consideration – radial gap length – stator slot – stator coil – rotor construction – design of 3 phase synchronous machines.

**References Books:**

SI.NO	Name of the Books	Author	Publisher
1	Principles of Electrical Machine Design	S.K. Sen	Oxford & IBH publishing co.pvt. ltd., New Delhi
2	The performance and design of ac machines	M.G. Say	CBS publishers and distributors, New Delhi
3	Elements of Electrical machine design	Alfred still, Charles S. siskind	McGraw – Hill, New Delhi

**13073-ELECTRICAL MACHINE DESIGN (ELECTIVE THEORY I)**  
**MODEL QUESTION PAPER I**

Time 3 hours

Max. Marks 75

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

Part C questions carry each 10 marks and answer all questions by selecting  
'either' or 'or'.

Part A

1. In which transformer Oil deteriorates faster.
2. Which shaft type is generally used in Water wheel generators.
3. Mention the factors that affect the voltage regulation transformer and rotating machines.
4. In which machines, the air gap is minimum along the direct axis and increases as the pole tip is approached.
5. State the use of Distribution transformers.
6. Define specific magnetic loading.
7. Write the formula for The frequency of flux reversal in armature.
8. Mention the current density of small wire wound armature.
9. Mention the type of air gap in Turbo alternator.
10. State the factor that governs Diameter in ac machines.

Part B

11. Mention two points in favor of standardization.
12. What is air gap leakage?
13. Mention the functions of distribution, generator and transmission transformers.
14. What are the effects of thyristorized supply to dc machine?
15. Why is a short gap length so important to the operation of an induction motor?

Part C

16. a) What are the important design and construction elements of a transformer? Discuss about them.

(or)

b) Discuss in detail about magnetic materials used for machine design.

17.a) Explain in detail about rotating machine leakage reactance.

(or)

b) Discuss about magnetizing force for teeth.

18. a) Compute core and window area of 1 MVA, 3 phase, 50 Hz delta connected distribution transformer.

$B_m = 1.55 \text{ T}$ ;  $J = 2.75 \times 10^6 \text{ A/m}^2$ ;  $K_{AQ} = 0.0018$ ;  $k_i = 0.95$ ;  $k_w = 0.35$

(or)

b) Discuss about helix type transformer winding.

19. a) Arrive the power equation of dc generator and dc motor.

(or)

c) Enumerate the advantages of large number of poles in dc machine.

20.a) Mention the important design considerations of 3 phase induction motor and discuss about them.

(or)

b) Determine approximate values for the stator bore and the effective core length of a 55 KW, 415 V, three phase, star connected, 50 Hz four pole induction motor. Efficiency = 90% ; power factor = 0.91; winding factor = 0.955.

Assume suitable data wherever necessary.

## 13073-ELECTRICAL MACHINE DESIGN (ELECTIVE THEORY I)

### MODEL QUESTION PAPER II

Time 3 hours

Max. Marks 75

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

Part C questions carry each 10 marks and answer all questions by selecting

'either' or 'or'.

#### Part A

- 1) What happens to resistivity of steel when silicon is added.
- 2) State two types major classification of machine duty.
- 3) Define specific magnetic loading.
- 4) Mention the two components of armature leakage flux.
- 5) Define specific electrical loading.
- 6) which ducts are used in core for cooling purpose For number of steps 6 and above.
- 7) Which material is used for commutator?
- 8) Write average flux density in dc machine.
- 9) Write the value of the gap density of induction motor for general purpose.
- 10) Which type of construction is suitable for large motor?

#### Part B

- 11) Mention 3 fundamental requirements for the good insulating material.
- 12) Why magnetic circuit in rotating machine is more complex than in transformer?
- 13) Mention the factors on which the clearance between LV & HV coils depends.
- 14) Mention the design considerations for large dc motors.
- 15) Describe important features of modular construction of induction motor frame.

#### Part C

16.a) What are the important design and construction elements of rotating machines? Discuss about them.

(or)

b) Enumerate the component losses in a transformer and rotating machine.

17.a) Discuss about magnetizing force for teeth.

(or)

b) Explain in detail about transformer leakage reactance.

18. a) Derive the power equation of 1 phase core type transformer.

(or)

b) Show that for minimum total  $I^2$  loss in a transformer, current densities of primary and secondary should be approximately equal.

19.a) Draw the general flow chart for the design of dc machine and explain.

(or)

b) What are the considerations to be taken into account in the choice of number and dimensions of slots for a dc machine? Discuss about them.

20.a) Derive the power equation of ac generator and motor.

(or)

b) Mention the important design considerations of 3 phase synchronous machines and discuss about them.

### 13054 – ELECTRICAL WIRING AND WINDING 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 Code	Subject	Instruction		Examination		
		Hours / Week	Hours / Semester	Assessment Marks		
13034	Wiring And Winding Practical	6	96	Internal	Board Exam	Total
				25	75	100

### OBJECTIVES:

At the end of this practical subject the students should be able to

- To execute a staircase wiring for G+3 floors.
- To control two lamps from 3 different places.
- To control one emergency bell from three different places.
- To connect a 1 phase motor load with main switch, starter, MCB and run.
- To connect a 3 phase motor load with main switch, starter, ELCB and run.
- To connect a 3 phase Main Switch, DB with suitable load.
- To make 1 phase service main with necessary items.
- To develop the wiring circuit to control (on/off) lamps (Incandescent lamp, CFL, Fluorescent Lamp, Sodium vapour lamp, Mercury Lamp, Neon sign lamp) with a provision of fuse/ MCB/ electronic choke /switches.
- To prepare a test board with series/ parallel connection testing provisions.
- To wind a small transformer and testing it.
- To design and wind the No-volt coil used in starters.
- To wind and Insert starting and running coils for a given single phase induction motor.
- To wind and Insert the coils for a given three phase induction motor,
- To give end connection for a 3 phase Winding study motor connection.
- To wind coils for ceiling fan motor.
- To prepare a price list for various Electrical wiring items and other accessories.
- To prepare a note on various insulation materials used in motor winding.

## **13054 - WIRING AND WINDING PRACTICAL DETAILED SYLLABUS**

### Wiring

1. To control two lamps individually with a provision of MCB (to control the input) and use CFL.
2. To execute Stair case wiring for G + 3 floors.
3. To prepare a wiring circuit to check the availability of R/Y/B phases using one lamp only by operating individual switches for each phase and test it.
4. To control 3 bells in series to ring together when any one of the 3 push button is pressed. (Emergency alarm circuit).
5. To connect a Single Phase Main Switch, Single Phase DOL Starter, and MCB (Miniature Circuit Breaker) to a Single phase motor load and run it.
6. To connect a 3 phase Main Switch, Star / Delta Starter, and ELCB (Earth Leakage Circuit Breaker) to a 3 phase motor load and run, with a provision for arrangement to trip the ELCB when a fault occurs.
7. To connect a 3 phase TPN main switch, 3 phase 4 way DB with a suitable load.
8. To prepare of Service Mains with single phase Energy Meter, Cutout, main switch, 4 way DB, indicator lamp, terminated with 3 sub-circuit mains.
9. To prepare a wiring circuit for connecting Sodium Vapour lamp and Mercury Vapour lamp with single phase supply.
10. To execute a Fluorescent Tube light connection with Electronic Choke and test it, also measure the voltage across the tube light fitting.
11. To construct a simple model to know the working of Neon Tube circuit used in advertising (With minimum 3 blocks).
12. To prepare a testing board to test electrical appliances with a necessary series, parallel supply provision, and indicator lamp, fuse unit.

### Winding

13. To wind 230/12-0-12 volt, 500 ma transformer and test it.
14. To design and wind No Volt Coil used in starter.
15. To wind and insert the starting / running coils of a Single phase induction motor, for a minimum of one pole.
16. To wind and insert stator coils of a 3 phase induction motor (Single layer / Double Layer), for a minimum of one pole.
17. To give end connection for a 3 phase induction motor winding for a 2 pole / 4 pole operations and run it. Measure the rotor speed, starting current and running current.
18. To wind and insert the coils for ceiling fan motor (minimum 2 coils).

### Optional

To prepare a price list for various electrical wiring items and accessories.

To prepare a note on various insulation materials used in motor winding.

### NOTE FOR EXAMINERS:

Questions for Board Practical Examination should be set as follows. For Two exercises on WIRING, one exercise on WINDING should be selected for each session of practical Exam.

#### 14054 - 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		
	Hours / Week	Hours / Semester	Assessment Marks		
Microprocessor And Microcontroller Practical	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

### 13074 - 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 code	Subject	Instruction		Examination		
		Hours / Week	Hours / Semester	Assessment Marks		
13074	Control Of Electrical Machines Practical	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

### 13075 - 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 code	Subject	Instruction		Examination		
		Hours / Week	Hours / Semester	Assessment Marks		
13075	Programmable Logic Controller Practical	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  $\frac{1}{4}$ <sup>th</sup> 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.

**13076- ELECTRICAL MACHINE DESIGN PRACTICAL (Elective practical 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 Code	Subject	Instruction		Examination		
		Hours / Week	Hours / Semester	Assessment Marks		
13076	Electrical Machine Design Practical	6	96	Internal	Board Exam	Total
				25	75	100

## List of Experiments

1. By simple experiment, verify the magnetic laws using Coil, permanent magnet and Galvanometer.
2. Verify the rotating magnetic field with stator and ball.
3. Measure magnetic flux using flux meter.
4. Using Crawler test the windings.
5. Design a 1 phase 1 KVA ,230/15V loading transforemer and assemble the core.
6. Design 3 phase 1 KVA transformer and assemble winding, core, etc.,
7. Design 3 phase 1 KVA transformer (delta/star connected) and wind one coil set.
8. Design armature for 5 KW dc machine and insert one coil set.
9. Design field pole for 5 KW dc machine and assemble one pole and insert in the body.
10. Assemble the given dc machine (pole, inter pole, armature, commutator, brush etc.,)
11. Design and assemble ceiling fan.
12. Design and assemble a 3 HP induction motor.

# **VI SEMESTER**

### 13061- POWER SYSTEM - 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 code	Subject	Instruction		Examination		
		Hours / Week	Hours / Semester	Assessment Marks		
13061	Power System - II	6	96	Internal	Board Exam	Total
				25	75	100

#### Topics and Allocation

Unit	Topic	Time in Hrs
I	Distribution substation & bus bar arrangements	16
II	Industrial drives selection of motors & electrical braking methods	16
III	Electronic traction systems of track electrification mechanics of motors	18
IV	A. Traction control B. illumination	18
V	Electric heating and welding	16
	Revision & tests	12
	Total	96

#### 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, braking 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

## **13061- POWER SYSTEM - II**

### **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 braking systems – pneumatic braking – regenerative braking applied to traction

### **B) Illumination**

Definition and units of different terms used in illumination – solid 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.

13061 POWER SYSTEM – II  
**MODEL QUESTION PAPER – I**

Time 3 hours

Max. Marks 75

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

Part C questions carry each 10 marks and answer all questions by selecting

‘either’ or ‘or’.

**PART – A**

1. Name the three parts of a distribution system.
2. What are the different types of bus bar arrangements?
3. Name the three types of electric drives.
4. Draw the torque load characteristic of a DC series motor.
5. Name the various traction system.
6. Define average speed and schedule speed.
7. What is meant by transition in series – parallel connections?
8. Define the following terms and state their units  
i) Luminous flux ii) Luminous intensity.
9. Mention any three applications of Dielectric heating.
10. List the types of electric welding.

**PART – B**

11. Classify the substations on the basis of service and design.
12. Compare group drive and individual drive.
13. Name the various system of track electrification.
14. State the two laws of illumination.
15. Compare arc welding and resistance welding. (Only five points)

**PART – C**

16. (a) Compare the cost of conductor in AC 3 phase 3 wire to DC 2 wire on general assumption.

(or)

- (b) Draw a simple line diagram layout of a typical 11kv/400v substation with all details.

17. (a) Explain the various factors governing the selection of motors for a particular drive.

(or)

- (b) Explain how plugging is applied to DC shunt motor, DC series motor and induction motors.

18. (a) A train runs with an average speed of 40kmph. Distance between stations is 2km. Values of acceleration and retardation are 1.5kmphps and 2.5kmphps respectively. Find the maximum speed of train assuming trapezoidal speed – time curve.

(or)

(b) Write short notes on (i)Bow collector (ii)Pantograph.

19. (a) Explain the shunt transition method in steps with a neat diagram.

(or)

(b) Explain with neat sketch the construction and working of a Sodium Vapour Lamp.

20. (a) Explain the principle of operation of eddy current heating with the help of neat sketch and state its applications.

(or)

(b) With a neat sketch and explain laser beam welding. Give its applications

13061 POWER SYSTEM – II  
**MODEL QUESTION PAPER – II**

Time 3 hours

Max. Marks 75

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

Part C questions carry each 10 marks and answer all questions by selecting

‘either’ or ‘or’.

**PART – A**

1. Name the distribution system based on construction.
2. Name any three types of substations based on service requirement.
3. What are the disadvantages of individual drive?
4. Mention the types of motor used for (i) Belt conveyor (ii) Crane and (iii) Centrifugal pump.
5. Mention any two system of Railway Electrification.
6. Define tractive effort of a motor.
7. Name the three types of breaking.
8. What is an Indirect lighting?
9. What are the commonly used heating element materials?
10. What are the uses of Ajax Wyatt core type induction furnace in industries?

**PART – B**

11. Explain Ring main system of distribution.
12. Mention any five merits in using electric breaking
13. Briefly explain about single phase low frequency system.
14. What is stroboscopic effect on Fluorescent Lamp and how it can be minimized?
15. What are the requirements of heating element material?

**PART – C**

16. (a) A single phase AC distributor AB 200m long is fed from end ‘A’ and is loaded as under

(i) 100A at 0.707 p.f lagging 100m from point A

(ii) 200A at 0.8 p.f lagging 200m from point A

The total resistance and reactance of the distributor is 0.2ohm and 0.1ohm per kilometer.

Find the total voltage drop in distributor.

(or)

(b) Name and explain the important equipments used in substation.

17. (a) Explain how dynamic breaking is applied to (i) DC shunt motor and (ii) Induction motor with suitable circuit diagrams.

(or)

(b) Choose with reasons the suitable electric motor for (i) Cement mill (ii) Textile mill and (iii) Punching machines.

18. (a) Explain the working of a single phase 25kv composite system and state the advantages over DC systems.

(or)

(b) Describe the suitability of a DC series motor for traction duty.

19. (a) Explain the series parallel control of speed of traction motor with circuit diagram.

(or)

(b) A lamp having a uniform luminous intensity of 250CP suspended 6m above street level. What will be the illumination on the ground i) vertically below the lamp ii) 6m away from it.

20. (a) Explain with a neat sketch the construction and working of an indirect core less induction furnace.

(or)

(b) Explain the working of a high frequency dielectric heating. What are its merits and applications?

### 13062 - ELECTRICAL ESTIMATION

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

#### Scheme of Instruction and Examination

Subject Code	Subject	Instruction		Examination		
		HOURS/ WEEK	HOURS/ SEMESTER	Assessment Marks		
Internal	Board Exam			Total		
13062	Electrical Estimation	6	96	25	75	100

#### UNITS AND ALLOCATION

Unit	Topic	Time (Hrs)
Unit 1	Electrical Symbols.	3
Unit 2	Indian Electricity Rules (1956).	4
Unit 3	Specification of Electrical Items.	9
Unit 4	Systems of Internal Wiring, Wire size, Fuse, Shock, Earthing, and Testing of installation.	18
Unit 5	Domestic, Commercial and Industrial installation Estimates.	50
	Revision and Test	12
	<b>Total</b>	<b>96</b>

#### OBJECTIVES

##### *Unit-I*

At the end of this unit the student should be able to

- Draw conventional symbols for various wiring items, accessories etc.

##### *Unit-II*

At the end of this unit the student should be able to

- Quote the relevant I.E. Rule for a given electrical installation.
- Interpret the relevant I.E. Rules (1956) respect the lighting and power installations.
- Quote the relevant I.E. Rule for Earthing.
- Quote the relevant Rule about clearance of Service lines.

### ***Unit-III***

At the end of this unit the student should be able to

- To state the specification for various electrical items like switches, sockets, cables, panels, wiring items, MCB, ELCB, capacitor bank, lamps, heaters, LT/HT Panel, Earth wire, Electronic choke, stay set.
- List the specifications of electrical fire extinguishers, DG sets, 10hp SGIM, 300 KVA Transformer, Lightning arrester, bus-bar chamber.

### Unit-IV

At the end of this unit the student should be able to

- Different types of wiring, comparison between them.
- State the points to be considered for selecting a particular type of wiring.
- Know the position of installation of some wiring items.
- Considerations for selecting the size of wire.
- Determine the size of conductor/ cable for domestic installation.
- Determine the size of conductor/ cable for Service Connection and Distributors, the current rating of main switch.
- Know how to determine the number of circuits required, purpose of DB in electrical installation.
- Know the power rating of some important electrical appliances.
- Types of fuses and material used as fuse element.
- Selection of fuse wire.
- Why fuse is not provided in neutral.
- Difference between CB and fuse.
- Effects of electric shock.
- Factors influencing the electric shock.
- List the precautions against electric shock.
- Treatment for electric shock.
- Procedure for giving artificial respiration.
- Know the Fire hazards due to electricity.
- Specify the necessity for earthing.
- Describe different system of earthing with diagram (plate/pipe).

- List the requirement of earth electrode.
- How to give earth connection.
- Say the difference between neutral and earth wire.
- How many earths are to be provided for a motor and the size of earth wire?
- Know the value of earth resistance and factors on which it is dependent.
- List the points to be remembered while providing earth.
- Know about ELCB system.
- Write note on Domestic earthing, Industrial Earthing and Substation Earthing.
- Explain about Testing of electrical installation.
- Different type of tests to be performed before energizing an electrical installation.
- Describe the method of measuring insulation resistance of an installation and motors.
- List the factors to be considered for checking electrical power/lighting installation.
- How to test UG cable.
- State the periodical list to be carried out in an existing electrical installation.
- Know the guidelines for installation of electrical accessories and appliances.

### ***Unit-V***

At the end of this unit the student should be able to

- List the conditions and requirements for domestic, commercial, and Industrial installation.
- List the steps to be followed in preparing an electrical estimate.
- Estimate the quantity of materials required for one small residential single bedroom flat.
- Estimate the quantity of materials required for a small industrial power wiring.
- Estimate the quantity of materials required for providing a lighting scheme to a party hall.
- Estimate the quantity of materials required for making wiring for computer centre.
- Estimate the quantity of materials required for the erection of one motor in Saw Mill.
- Estimate the quantity of materials required for a School building.
- Estimate the quantity of materials required for a Primary Health Centre.
- Estimate the quantity of materials required for erection of pump motor used for irrigation.
- Estimate the quantity of materials required for doing the street light wiring.
- Estimate the quantity of materials required for 3 phase service connection to a building.



**13062 - ELECTRICAL ESTIMATION  
DETAILED SYLLABUS**

PART - A

**UNIT – I: Electrical Symbols**

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Main fuse-board with switches (lighting)  
Distribution fuse-board with switches (lighting)  
Main fuse-board with switches (power)  
Distribution fuse-board with switches (power)  
Main switches for Lighting and power.  
Junction of conductors  
Line Existing  
Line Proposed  
OH line  
UG cable  
Fault  
Line crossing  
Socket outlet 5 amps  
Socket outlet with switch 5 amps  
Socket outlet 15 amps  
Socket outlet with switch 15 amps  
Rewireable fuse  
Cartridge fuse  
Neutral link  
Earth  
Bulk head fitting  
Water tight fitting  
Incandescent lamp  
Fluorescent Lamp  
Signal lamp  
Push button  
Bell  
Fire alarm  
Siren  
Storage type Water Heater  
Ceiling Fan  
Exhaust Fan  
Energy Meter  
Shielded Cable  
3 phase transformer  
3 phase auto transformer  
Squirrel cage Induction Motor

Slip ring Induction Motor  
Lightning Arrester  
Circuit Breaker, Isolator  
Current Transformer and Potential Transformer.

PART – B

**UNIT – II: Indian Electricity Rules (1956)**

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Rule 28 Voltage

Rule 30 Service Lines and apparatus on consumer premises.  
Rule 31 Cut-out on consumer's premises.  
Rule 46 Periodical inspections and testing of consumer's installation.  
Rule 47 Testing of consumer's installation.  
Rule 54 Declared voltage of supply to consumer.  
Rule 56 Sealing of meters and cut-outs.  
Rule 57 Meters, maximum demand indicators and other apparatus on  
consumer Premises.  
Rule 77 Clearance above ground of the lowest conductor.  
Rule 79 Clearance from buildings of low and medium voltage lines and service lines.  
Rule 87 Line crossing or approaching each other.  
Rule 88 Guarding.

**UNIT – III: Specification of Electrical Items**

Switches - Main Switches - Sockets - Switch boards - Wall socket - Fuse units - Lamp Holders - Ceiling rose - Distribution boxes - Miniature Circuit Breaker - Earth Leakage Circuit Breaker - Ceiling fan - Electronic fan regulator - Storage type Water Heater – Immersion Heater – Wires and Cables (PVC, VIR, Weather Proof) - UG Cable (LT and HT) - Copper conductor sizes and rating – Earth wires.

Lamps: Incandescent lamp, fluorescent lamp, Sodium vapour lamp, High Pressure Mercury Vapour lamp, Halogen lamp - Neon tube/lamp - Electronic Choke for TL - Compact Fluorescent Lamp - Bus Bar Chamber - Earth plates - Stay set - Energy meter 1phase and 3 phase - Lightning Arrester - 10hp Squirrel cage Induction Motor - Electrical Fire Extinguishers – Distribution Transformer 250kVA – Current Transformer – Potential Transformer - Capacitor Bank – Star/Delta Starter.

Specifications of 5 KVA Single phase / three phase alternator coupled with Diesel Engine – 62.5kVA three phase alternator with 4 stroke diesel engine.

PART – C

**UNIT – IV: Systems of Internal Wiring, Wire size, Fuses, Shock, Earthing and Testing of installation**

**Topic 1 - Internal wiring, Wire size, Fuses, Shock**

Wiring systems – Types of wiring – points to be considered for selection of wiring -comparison – Looping back system and Joint box system and tree system – Position of switches, cutouts, main switch board, sub-distribution boards.

Considerations for selecting wire size – size of conductors /cable used for Domestic installation, Service connection, Distributors - Power rating of some important house holds electrical appliances.

Materials used as fuse element – Selection of fuse wire - types of fuses – difference between circuit breaker and fuse – why fuse is not used in the neutral – table for sizes of fuse wire.

Electric shock – Effects of electric shock – factors influencing the electric shock - Precautions against electric shock – cure of shock - Treatment for electric shock - artificial respiration - fire hazards due to electricity.

### **Topic 2 – Earthing and Testing of Installation**

Necessity – different methods – pipe earthing and plate earthing – materials required - requirements of good earth electrode – neutral wire – difference between neutral wire and earth wire - connection with earth – value of earth resistance and factors on which it is dependent – points to be remembered while providing earth – ELCB system - Earthing of domestic fitting and appliances – Industrial Earthing – Substation Earthing.

Insulation Resistance test between earth and conductor and between conductor – Leakage test – Insulation Resistance of motors and other equipment – Factors to be considered for checking electrical installations – Testing of wiring installation: introduction, verification of polarity, effectiveness of earthing, insulation resistance, earth resistance – periodical testing – testing of UG cable – Guidelines for installation of fitting switches, light, fans, earthing of appliances and electrical machines.

### **UNIT – V: Domestic, Commercial and Industrial Installation Estimate**

Conditions and Requirements for Domestic, Commercial and Industrial Installation – steps to be followed in preparing electrical estimate (domestic, industrial and agricultural installation)

#### **Estimate the quantity of material required for**

- (1) Residential single bed room Flat (1BHK).
- (2) Industrial power wiring having 4 or 5 machines.
- (3) School building having 3 class rooms.
- (4) Primary Health Centre having minimum 6 rooms.
- (5) Lighting scheme of a party hall having minimum 20 twin TL fittings.
- (6) Erection of one no. 15hp induction motor in Saw mill / Flour mill.
- (7) Irrigation Pump motor (5hp) wiring.
- (8) Computer centre having 10 computers, a/c unit, UPS, light and fan.
- (9) Street Light service having 12 lamp light fittings
- (10) 3 phase Service connection to a building having 5 kW load.

#### **References**

1. Electrical Wiring, Estimating and Costing. By Dr.S.L.Uppal.

Khanna Publishers.

2. Electrical Design Estimating and Costing. By K.B.Raina & S.K.Battacharya. New age international (p) limited. Publishers.

**13062 - ELECTRICAL ESTIMATION**

Pattern of Question Paper

**Part A**

(1) Drawing five symbols (no choice) 5 x1 = 5  
marks

Each 1 mark

**Part B**

(2) Writing two IE Rules (no choice)  
Each 5 marks (Among 12 rules) 2x 5 = 10 marks

(3) Writing Specification for two questions  
(no choice) Each 5 marks 2 x5 = 10 marks

**Part C**

(4) Short Answer Questions (4 out of 6)

**3 Questions from each topic 1 and topic 2**

Each 5 marks 4 x5 = 20 marks

(5) Writing complete Estimation  
(1 out of 2) (Among 10 exercises) 1 x30 = 30 marks

[Plan / Layout and assumptions made- 10 marks

Single line diagram, Calculations - 10 marks

Material schedule with specification - 10 marks]

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**Total: 75 marks**

**13062 - ELECTRICAL ESTIMATION  
MODEL QUESTION PAPER - I**

**Time: 3 Hours**

**Max. Marks: 75**

- [N.B.:-(1) Answer all questions.  
(2) Cost of materials may be assumed suitably if necessary.  
(3) Electrical Estimation tables may be permitted in the examination hall.]

Part - A

- I. Draw the conventional symbol to represent the following:- 5 marks
- (a) Distribution Fuse Board with switches (Lighting).
  - (b) Exhaust fan.
  - © Socket Outlet 5 amps with switch.
  - (d) Circuit Breaker.
  - (e) Current Transformer.

Part – B

- II. Write down the relevant I.E. rules with reference for the following:- 10 marks
- (a) Service lines and apparatus on Consumer premises.
  - (b) Clearance from the ground of the lowest conductor.
- III. Write down the specifications of the following:- 10 marks
- (a) Ceiling Rose and Miniature Circuit Breaker.
  - (b) 250 kVA Distribution Transformer.

Part – C

- IV. Answer any four questions:- 20 marks
- (a) Compare the different types of wiring.
  - (b) Explain why the fuse is not provided in neutral?
  - © Write a note on Treatment for electric shock.
  - (e) What are the various points to be remembered while earthing?
  - (f) List the materials required for Pipe Earthing.
  - (g) Describe the method of measuring insulation resistance of an installation.

- V. Answer either (a) or (b):- 30 marks

- (a) A residential single bed room flat is to be electrified with PVC conduit concealed type of wiring. Estimate the quantity of materials required with specification. The details of the fitting are as follows.

Sl. No.	Name of the Room	Size	No. of Tube light points	No. of ceiling fan	No. of ordinary light points	No. of plug points
1.	Hall	5.0 m*6.0 m	2	1	2	2
2.	Bed room	4.0 m*4.0 m	1	1	1	1
3.	Kitchen	4.0 m*2.0 m	1	1	1	1
4.	Bath Room	1.5 m*1.5 m	--	--	1	1
5.	Toilet	1.5 m*1.5 m	--	--	1	--

Decide the number of circuits/ sub-circuits to be used according to Indian Electricity Rules. Draw the necessary plan of the flat and show the position of the fittings and switch boards, single line wiring diagram. Assume necessary data as per IE rules and mention them clearly.

(or)

- (b) An Induction motor of 5 HP has to be erected for pumping water for irrigation. Estimate the quantity of material required with specification for the installation. The distance between the supply pole and pump room is 50meters. The distance between the main switch and motor is 5meters. Provide one light point in pump room. Draw the layout, plan of pump room and single line diagram power distribution. Assume necessary data as per IE rules and mention them clearly.

**13062 - ELECTRICAL ESTIMATION  
MODEL QUESTION PAPER - II**

**Time: 3 Hours**

**Max. Marks: 75**

[N.B.:-(1) Answer all questions.

(2) Cost of materials may be assumed suitably if necessary.

(3) Electrical Estimation tables may be permitted in the examination hall.]

Part - A

I. Draw the conventional symbol to represent the following:- 5 marks

- (a) Main Switch for Power.
- (b) OH line.
- (c) Fluorescent Lamp.
- (d) Ceiling Fan.
- (e) Energy Meter.

Part - B

II. Write down the relevant I.E. rules with reference for the following:- 10 marks

(a) Voltage.

(b) Line crossing or approaching each other.

III. Write down the specifications of the following:- 10 marks

(a) Ceiling Fan and Storage type water heater.

(b) 5 KVA three phase alternator coupled with Diesel Engine.

Part - C

IV. Answer briefly any **four** questions:- 20 marks

- (a) State the points to be considered for selecting a particular type wiring.
- (b) List the power rating of any 5 important electrical appliances used in houses.
- (c) Write a note on materials used as a fuse element.
- (d) Describe the method of Plate Earthing.
- (e) Mention the value of earth resistance and factors on which it depends on.
- (f) Explain about Leakage Test.

V. Answer either (a) or (b):-  
marks

30

- (a) Estimate the quantity of materials required for wiring a Computer Centre of size 10m\*6m\*3m height, having the following electrical load.

Number of computer System:	10
No. Tube Light Fitting:	10
No. of Ceiling Fan:	04
Window model a/c unit:	1.5 ton, 2 nos.
No. of Scanner:	1
No. of Printer:	2

Draw a suitable installation plan, single line wiring diagram and estimate the quantity of materials required with specification. Type of wiring proposed is concealed conduit system. Assume necessary data as per IE rules and mention them clearly.

(or)

- (b) A small workshop 30m x 15m has to be equipped with the following machinery:-

- (1) One Lathe driven by 3 H.P., 415V, 3 Phase induction motor.
- (2) One Shaper Machine driven by 5 H.P., 415V, 3 Phase induction motor.
- (3) One Grinding Machine driven by 1 H.P., 415 volts, 3 Phase induction motor.
- (4) One Drilling Machine driven by 0.5 H.P., 230 volts, 1 phase.
- (5) One Welding Set of 10 kVA, 415V, 3 Phase.

Draw a suitable installation plan for the above installation. Estimate the quantity of materials required with specification, for power wiring only. Draw the single line wiring diagram of electrical power distribution starting from main switch. The wiring is to be of surface conduit. Assume necessary data as per IE rules and mention them clearly.

### 13081 - 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

Subject Code	Name of Subject	Instruction		Examination		
		Hours / Week	Hours / Semester	Assessment marks		
				Internal	Board Exam	Total
13081	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

## **13081 - POWER ELECTRONICS**

### **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	PowerElectronics	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 <sup>nd</sup> Edition
2	Fundamentals of Electrical Drives	G K Dubey	Narosa Publishing House, New Delhi Fourth reprint 2004.
3	Fundamentals of Power Electronics	SRamaReddy,	NarosaublishingHouse,New Delhi, 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 <sup>th</sup> reprint 2005
6	Power Electronics	MUHAMMED H.RASHID	Prentice-Hall of India Pvt. Ltd New Delhi-110001. Third Edition-2005

## 13081 – POWER ELECTRONICS (Elective II)

### MODEL QUESTION PAPER – I

Time 3 hours

Marks 75

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

Part C questions carry each 10 marks and answer all questions by

Selecting 'either' or 'or'.

### **PART A**

1. Draw the symbol of SCR and name the terminals.
2. State the purpose of Gate in SCR.
3. Write the applications of Phase controlled rectifier.
4. If  $\alpha$  is the firing angle and  $\beta$  is the conducting angle calculate the value of  $\alpha+\beta$
5. State the advantage of PWM.
6. State the function of chopper.
7. Which converter is used for four quadrant control?
8. Mention the type of speed control of DC motor used to get constant torque region.
9. What is cycloconverter?
10. List any two applications of AC drive

### **PART B**

11. Briefly explain the characteristics of light activated SCR.
12. Draw the circuit and waveform for half wave controlled rectifier with R load.
13. Explain briefly the working of class B chopper with diagram.
14. Draw and explain the block diagram of separately excited dc series motor.
15. Explain rotor resistance control of A.C motor

### **PART C**

16,a) Draw a neat circuit diagram to find the characteristics of IGBT and explain.  
(or)

b) With a neat circuit diagram explain the working of synchronized UJT triggering circuit. Draw the waveform across capacitor and at base1.

17.a) With a neat circuit diagram and waveform explain the operation of three phase half controlled bridge with RL load.

(or)

b) Draw the complete protection circuit for the single phase converter and explain in detail.

18.a) With a neat diagram, explain the working of Jones chopper  
(or)

b) Draw a neat circuit diagram and explain the operation of single phase Full Bridge inverter

19.a) Draw and explain the function of each block of closed loop control of DC motor drive.

(or)

b) With a neat diagram and explain the three phase full converter DC motor drive and draw the waveform.

20.a) With a suitable block diagram explain the operation of single quadrant closed loop speed control of AC drive.

(or)

b) Draw a neat circuit diagram of single phase bridge type cycloconverter. Explain the working with necessary waveform.

**13081 – POWER ELECTRONICS (Elective II)**

**MODEL QUESTION PAPER – II**

Time 3 hours

Max. Marks 75

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

*Part C questions carry each 10 marks and answer all questions by*

*Selecting 'either' or 'or'.*

**PART A**

1. Draw the symbol of IGBT.
2. What is commutation?
3. What is the necessity of  $di/dt$  protection.
4. State the purpose of free wheeling diode.
5. Mention the types of Inverters.
6. Write the applications of chopper.
7. Draw the converter fed dc drive circuit.
8. Mention the type of speed control of dc motor used to get constant hp region.
9. Mention the methods of controlling the speed of an ac induction motor.
10. Mention the advantages of ac drive.

**PART B**

11. Briefly explain the RC triggering circuit
12. Why regeneration is not possible with semi converter?
13. Explain briefly the step up chopper.
14. Draw and explain operating region of armature voltage control and field Current control.
15. Explain the speed control of induction motor using stator voltage control.

**PART C**

16. a) Draw a neat circuit diagram and explain the characteristics of GTO.  
(or)  
b) With a neat circuit diagram, explain the working of ramp and pedestal trigger circuit for AC load. Also draw the waveform.
17. a) With a neat circuit diagram and waveform explain the operation of single phase fully controlled bridge with RL load.  
(or)  
b) With a neat circuit diagram explain the effect of single phase fully controlled bridge with source impedance for RL load.

18.a) With a neat diagram ,explain the working of Morgan chopper.

(or)

b) Draw a neat circuit diagram and explain the operation of three phase bridge

inverter with 120 degree conduction mode.

19.a) Explain the operation of Four quadrant DC-DC converter drive using MOSFET . Also draw a neat circuit diagram.

(or)

b) With a neat block diagram explain the Microprocessor based Closed loop control of DC drive.

19. a) With a neat diagram explain the working of static scherbius drive for slip ring Induction motor.

(or)

b) Draw a neat circuit diagram of single phase to single phase cycloconverter.

Explain the working with necessary waveform.

## 14061 - 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	Board 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
<b>Total</b>		<b>96</b>

### 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.

# 14061 - COMPUTER HARDWARE AND NETWORKING

## DETAILED SYLLABUS

### UNIT – I: Motherboards and processors

**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: Peripherals

**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: I/O ports and External peripherals

**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 Assembling and Testing

**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 – bench mark programs – computer viruses – Precautions – Anti-virus software – signature of viruses – Fire walls.

#### UNIT – V: Computer Network and Installation

**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.

**14061 - COMPUTER HARDWARE AND NETWORKING**  
**MODEL QUESTION PAPER – I**

Time 3 hours

Max. Marks 75

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

*Part C questions carry each 10 marks and answer all questions by*

*Selecting 'either' or 'or'.*

**PART – A**

1. Mention any two functions of CPU.
2. Define formfactor.
3. List any two DVD data format.
4. State any two advantages of interlaced scanning.
5. Write any two features of digital camera.
6. State advantages of compression technique.
7. What is SCAN DISK?
8. Define POST
9. What are the different types of computer network?
10. State any two difference between LAN and WAN

**PART – B**

11. Mention the various types of bus standards.
12. What is the importance of FAT?
13. What are the various compression techniques used in Video Card?
14. List any four audio error codes generated by the POST.
15. Explain the ring topology.

**PART – C**

16. (a) Distinguish between the RISC and CISC processors.  
(or)  
(b) Explain about any four essential units of a Personal Computer.
17. (a) Explain the working of Keyboard with block diagram.  
(or)  
(b) Draw the construction of floppy disk. Briefly explain about its organization.
18. (a) Define scan resolution in scanners. What is the significance of it?  
(or)  
(b) Describe the layout of a standard sound card.
19. (a) Write the diagnosis procedure for the following keyboard error.

i. Keyboard interface problem ii. Non-operation of some of keys in the keyboard.  
(or)

(b) Explain the precautions to avoid viruses in computer systems.

20. (a) Describe the details of new connection wizard.

(or)

(b) What is the uses of granting permission to the user? How will you grant permission to the users?

**14061 - COMPUTER HARDWARE AND NETWORKING**  
**MODEL QUESTION PAPER – II**

Time 3 hours

Max. Marks 75

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

*Part C questions carry each 10 marks and answer all questions by*

*Selecting 'either' or 'or'.*

**PART – A**

1. Define Cache memory.
2. Define virtual memory.
3. What are the uses of pen drive?
4. State advantages of TFT Monitor.
5. What is MIDI?
6. State different types of Modem.
7. List the various types of computer viruses.
8. What is meant by Benchmark program?
9. Write the different types of network topologies.
10. State different types of layer in OSI model.

**PART – B**

11. Explain the Riser Architecture?
12. What are the differences between CRT and LCD displays?
13. Draw the pin details of a serial port.
14. How do you upgrade the memory (RAM) of a computer?
15. What is Bluetooth Technology?

**PART – C**

16. (a) Explain about AMD chipset series.  
(or)  
(b) Draw a PC motherboard layout and mark some important units.
17. (a) Explain the installation procedure of a Mouse.  
(or)  
(b) Draw the block diagram of HDC. Explain its working principle.
18. (a) Draw the sub-assemblies of dot-matrix printer and explain its working principle.  
(or)  
(b) Compare serial port, parallel port and game port.

19. (a) What are the signatures of viruses?

(or)

(b) Write the trouble shooting method for the following FDD problem:-

i. FDC controller failure, ii. Write fault error, iii. General failure error.

20. (a) Explain the working environment with user accounts and security.

(or)

(b) Briefly explain Network interface card and network hub.

### 14033 "C" PROGRAMMING & OOPS

Total No. of Hrs. / Week : 5

Total No. of Weeks / Semester : 16

Total No. of Hrs. / Semester : 80

#### Scheme of Instruction and Examination

Subject	Instruction		Examination		
	Hrs/ Week	Hrs/ Semester	Assessment Mark		
Internal			Board Exam	Total	
"C" Programming & OOPS	5	80	25	75	100

#### Topics and allocation

Unit	Topic	Time (Hrs)
I	Keywords, Constants, Variables and Datatypes	14
II	Decision Making, Branching and Looping and Arrays	14
III	Character String and Functions	14
IV	Pointers and File Management	14
V	Object oriented programming	14
	Revision, Test	10
	Total	80

## **OBJECTIVES**

- To understand various data types
- To understand various operators
- To understand various functions
- To understand various decision making statements
- To understand various loops
- To understand different types of arrays
- To understand functions of strings
- To understand the operations of structure and union
- To understand functions of pointer
- To understand various file management techniques
- To understand object oriented programming Techniques

## **14033 “C” PROGRAMMING & OOPS**

### DETAILED SYLLABUS

#### **UNIT – I: Keywords, Constants, Variables and Datatypes:**

Character Set – Constants – Integer Constants – Character Constants – String Constants; Variables – Declaration of Variables; Assigning value to Variables.

#### **Operations and Expressions:**

Arithmetic, Relational, Logical, Assignment, Increment, Decrement, Conditional, Bitwise Operator, Arithmetic Expressions, Evaluation of Expression.

#### **I/O Statements:**

Printf() and Scanf() functions (Unformat and formatted), getchar() and putchar() functions.

#### **Functions:**

Predefined functions – isdigit, isupper, islower and ispunct functions in header file <ctype.h> ; cos, tan, exp, ceil, floor, abs, pow and sqrt functions in header file <math.h>; Strlen, strcpy, strcmp and strcat in header file <string.h>.

#### **UNIT – II: Decision Making, Branching and Looping and Arrays**

##### **Introduction:**

Simple if statement.

##### **Decision Making & Branching:**

The if...else statement; Nesting of if...else statement; else...if ladder; switch case statement; goto statement.

##### **Looping:**

While statement; do...while statement; for statement, break & continue statement.

##### **Arrays:**

One Dimensional Arrays; Two Dimensional Arrays – Initializing One dimensional & Two-Dimensional Arrays; Multidimensional Arrays.

### **UNIT – III: Character String and Functions**

#### **Character Strings:**

Introduction – declaring & initializing string variables; Reading Strings; Writing Strings; Comparison of two Strings; String handling functions; User defined functions.

#### **Functions:**

Function – declaration, function – definition, function call, passing arguments, returning values, return statement.

#### **Structures & Unions:**

Structure definition; Structure Initialization; Arrays of Structures; Structures within structures; Unions.

### **UNIT – IV: Pointers and File Management**

Macro Substitution; File Inclusion; Compiler Controlled Directives.

#### **Pointers:**

Understanding Pointers: Accessing the address of Variables; Declaring and Initializing Pointers; Accessing a variable through its pointer; Pointer Expressions; Pointer Increments; Pointers and Arrays; Pointer and character Strings; Pointer and functions; Pointers and Structures.

#### **File Management:**

Introduction; Defining and Opening a file; closing a file; Input / Output Operations on files (getc, putc, getw, putw, fprintf and fscanf functions); Error handling during I/O operation; Random Access files; Command line arguments; Appending items to a file.

### **UNIT – V: Object oriented programming**

#### **Introduction to OOPS:**

Limitation of Procedural Languages; Object Oriented approach – Analogy; Approach to Organisation, characteristics of Object Oriented Languages – Objects, Classes, Inheritance, Reusability, Structure of C++ Programs, Creating New Data types, Polymorphism, Inheritance and Overloading (Simple Programs) – Application of OOPs.

Reference Books :

<b>Sl.No.</b>	<b>Name of the Book</b>	<b>Author</b>	<b>Publisher</b>
1	Programming in 'C' (withCD)	Balagurusamy E	Tata McGraw Hill Publishing Company, New Delhi.
2	Object Oriented Programming with C++	Balagurusamy E	Tata McGraw Hill Publishing Company, New Delhi.
3	Computer Programming in C	Rajaraman V	Prentice Hall of India (P) Ltd., New Delhi



**14033 “C” PROGRAMMING & OOPS**  
**MODEL QUESTION PAPER I**

Time 3 hours

Max. Marks 75

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

*Part C questions carry each 10 marks and answer all questions by*

Selecting ‘either’ or ‘or’.

Part – A

1. Define term identifier.
2. What is meant by header file?
3. What is meant by looping?
4. State any two difference between Do-while statement and while statement.
5. What is meant by a string?
6. State any two difference between structure and union.
7. What is called macro substitution?
8. State the difference between getc and putc function.
9. Define inheritance.
10. Define object.

Part-B

11. State various functions available in math.h header file.
12. Discuss the syntax of while statement and do – while statement.
13. What are the various application of structures and unions?
14. Differentiate between the content of variable and address of a variable.
15. Explain the term polymorphism and class.

Part-C

16.(a) Explain the use of printf() and scanf() function with example  
(or)

(b) Write a program in “c” to solve a quadratic equation.

17.(a) Write down the syntax of while and do... while statement and explain.  
Write example.

(or)

(b)With suitable examples explain how one dimensional and two dimensional arrays declared and initialized.

18.(a) *What are the different ways of passing arguments to a function? Explain*  
with suitable examples.

(or)

(b) With the help of a suitable example explain structure within a structure.

19.(a) Write a function named swap to interchange the values stored in two locations.

(or)

(b) Explain how an array of storage is handled using pointers.

20.(a) Explain the characteristics of object oriented programming.

(or)

(b) Explain input/output operations on files.

## MODEL QUESTION PAPER II

Time 3 hours

Max. Marks 75

Note: Part A questions carry each 1 mark and answer all questions.

Part B questions carry each 3 marks and answer all questions.

*Part C questions carry each 10 marks and answer all questions by*

Selecting 'either' or 'or'.

### Part – A

1. What are bitwise operator?
2. What is meant by predefined function?
3. What is meant by a subscript?
4. Differentiate between one-dimensional and two dimensional array.
5. What is union?
6. State use of return statement.
7. What is called pointer?
8. What is meant by compiler controlled directive?
9. Define classes.
10. Define polymorphism.

### Part-B

11. What is meant by predefined function? and explain scanf function
12. Discuss the syntax of if...else statement and switch statement.
13. How to declare a string variable and explain compare of two string.
14. How to declare and initialize pointer.
15. State the advantage of object oriented approach and list the application of OOPS.

### Part-C

16. (a) Explain the use of functions available in <math.h> and <ctype.h> header files.  
(or)  
(b) Explain various operations available in "C" with example.
17. (a) Explain switch statement and for statement with example.  
(or)  
(b) Write a "C" program to count the number of characters in a given word.
18. (a) Write a "C" program to find the factorial of a number using function.  
(or)

(b) Write a "C" program to arrange the given N names in alphabetical order.

19. (a) Explain in detail about compiler controlled directives.  
(or)

(b) What is the use of pointers in function? How are they used.

20. (a) Show how a file can be opened, used and closed in "C" with example.  
(or)

(b) Write a c program to copy the contents from one file to another.

## **13064 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

#### **MODEL QUESTION**

- I Draw the symbol of Inductor, Power factor meter, DIAC, Buzzer,  
Alternator 10 marks
- II Given sketch shows the connection diagram of ON load tap changer.  
Draw this sketch and attach the output of the same 60 marks
- III Viva – Voce 05 marks

### 13084 - 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 Code	Subject	Instruction		Examination		
		Hours / Week	Hours / Semester	Assessment Marks		
13084	Power Electronics Practical	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

### 14036 - '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		
	Hours / Week	Hours / Semester	Assessment Marks		
'C' Programming Practical	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 without 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 two 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.

## 14064 - 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		
	Hours / Week	Hours / Semester	Assessment Marks		
Computer Hardware & Networking Practical	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.

<b>13066</b>	<b>PROJECT WORK AND ENTREPRENEURSHIP</b>
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**(PROJECT WORK NORMS AS PER THE LATEST REGULATIONS ONLY)**

**AIM:**

Project Work aims at developing innovative skills in the students whereby they apply the knowledge and skills gained through the course by undertaking a project. The individual students have different aptitudes and strengths. Project work, therefore, should match the strengths of students

The primary emphasis of the project work is to understand and gain the knowledge of the principles of software engineering practices, so as to participate and manage a large software engineering projects in future.

**OBJECTIVES:**

- Implement the theoretical and practical knowledge gained through the curriculum into an application suitable for a real practical working environment preferably in an industrial environment
- Develop software packages or applications to implement the actual needs of the community.
- Get exposure on industrial environment and its work ethics.
- Understand what is entrepreneurship and how to become an entrepreneur.
- Learn and understand the gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional knowledge as required.
- Carry out cooperative learning through synchronous guided discussions within the class in key dates, asynchronous document sharing and discussions, as well as to prepare collaborative edition of the final project report.
- Expose students to the field of computing and to gain experience in software design.
- Understand the facts and importance of environmental management.
- Understand and gain knowledge about disaster management.

### SCHEME OF INSTRUCTION AND EXAMINATION

Subject	Instruction		Examination		
	Hours/ Week	Hours/ Semester	Assessment Marks		
			Internal	Board Exam	Total
Project Work And Entrepreneuership	6	96	25	75	100

Minimum Marks for Pass is 50 out of which minimum 35 marks should be obtained out of 75 marks in the board Examination alone.

#### INTERNAL ASSESSMENT:

The internal assessment should be calculated based on the review of the progress of the work done by the student periodically as follows.

Detail of assessment	Period of assessment	Max. Marks
First Review	6 <sup>th</sup> week	10
Second Review	10 <sup>th</sup> week	10
Attendance	Entire semester	5
<b>Total</b>		<b>25</b>

#### EVALUATION FOR BOARD EXAMINATION:

Details of Mark allocation	Max Marks
Marks for Report Preparation, Demo, Viva-voce	45
Marks for answers of 15 questions which is to be set by the external examiner from the given question bank consisting of questions in the following three topics Entrepreneurship, Disaster Management and Environmental Management. Out of fifteen questions five questions to appear from each of the above topics i.e. 5 questions x 3 topics = 15 questions 15 questions x 2marks = 30 Marks	30
<b>Total</b>	<b>75</b>

## **DETAILED SYLLABUS**

### **ENTREPRENEURSHIP, ENVIRONMENTAL & DISASTER MANAGEMENT**

#### **1. ENTREPRENEURSHIP**

- 1.1 Introduction – Entrepreneur – types -Characteristics & attributes of Entrepreneur – Expectations of entrepreneurship – Contributions of an entrepreneur - Identifying problems and opportunities. - Why do Entrepreneurs fail
- 1.2 Types of Industries - Importance of SSI – Assistance offered – Governmental and Non-Governmental organizations – Identifying prospects of various Small scale industries in your area with resources and other infrastructural facilities available.
- 1.3 Starting a SSI – various stages – product – ownership – locality – points related to building, water and electricity – financial assistance – raw materials – machineries – human resource – efficient manufacturing techniques – marketing - Technical, Financial, Marketing, Personnel and Management Feasibility study and report - concessions and incentives offered by agencies.
- 1.4 Industrial Zones – industrial Estates - Pollution Control – industries with pollution problem - Marketing assistance
- 1.5 Acquiring common services – repairing – testing facilities – training institutions – suppliers of applied technology.

#### **2. ENVIRONMENTAL MANAGEMENT**

- 2.1 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.
- 2.2 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.
- 2.3 Waste water management – Characteristics of Industrial effluents – Treatment and disposal methods – Pollution of water sources and effects on human health.
- 2.4 Air pollution management – Sources and effects – Dispersion of air pollutants – Air pollution control methods – Air quality management.
- 2.5 Noise pollution management – Effects of noise on people – Noise control methods.

### 3. DISASTER MANAGEMENT

- 3.1 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..
- 3.2 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.
- 3.3 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 neighbors / Other organizations in Recovery and Rebuilding works – Financial commitments – Compensations to be paid – Insurances – Rehabilitation.

## LIST OF QUESTIONS

### 1. ENTREPRENEURSHIP

- 1 What is entrepreneurship? Explain.
- 2 Who is a successful entrepreneur? Why?
- 3 List the various stages of decisions an entrepreneur has to make before reaching the goal of his project.
- 4 List the types of industries.
- 5 Define - Small scale industry.
- 6 What are the qualities of an entrepreneur?
- 7 What are the expectations of entrepreneurship?
- 8 What are the various SSI that can flourish in your district?
- 9 Identify the infrastructural needs for an industry.
- 10 Identify the natural resources available in your area for starting a SSI.
- 11 What are the various agencies involved in the establishment and development of various SSI?
- 12 What are the roles of District Industries Centre?
- 13 Name some of the agencies funding SSI.
- 14 What are the various concessions and incentives available for a SSI?
- 15 List the points to be considered with relation to building, water and electricity before a SSI is started.

- 16 List the points to be considered with relation to human resource before a SSI is started.
- 17 Name some consumer products with wide demand that can be manufactured by a SSI?
- 18 Identify the non-qualified industries that may not be given financial assistance and concessions.
- 19 What is feasibility study?
- 20 What is the importance of SSI?
- 21 List some industries identified as pollution-free industries.
- 22 List some industries identified as industries with pollution problem.
- 23 What is an industrial zone?
- 24 What is an industrial estate?
- 25 What are the facilities available in an industrial estate?
- 26 Identify the various training agencies associated with SSI.
- 27 What is applied technology?
- 28 From whom you shall get applied technology for starting a SSI?
- 29 From where you shall get repairing and testing facilities?
- 30 What are the various training agencies available for acquiring SSI training?
- 31 List the governmental agencies from whom you shall get financial assistance for a SSI.
- 32 What are the steps involved in preparing a feasibility report.
- 33 What are the factors to be considered regarding raw materials for a SSI?
- 34 Name some SSI that may not need raw materials.
- 35 Differentiate various classifications of industries.
- 36 What is a LSI?
- 37 What are the features of a SSI?
- 38 Name some products that may not need electricity for production.
- 39 What are the factors to be considered for starting a SSI?
- 40 What are the advantages of becoming an entrepreneur?
- 41 If you opt to be an entrepreneur what are the steps you would take to become a successful entrepreneur.
- 42 What are the facilities available for a new SSI in an industrial estate?
- 43 List the various government departments that would be associated with a SSI.
- 44 Why do entrepreneurs fail?
- 45 What are the types of entrepreneurs?

## 2. 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 deal 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?

### 3. 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) Nagapattinam (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 inadequate.
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?

## SANDWICH DIPLOMA COURSE - INDUSTRIAL TRAINING

### INDUSTRIAL TRAINING -I

### INDUSTRIAL TRAINING -II

#### 1. Introduction

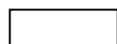
The main objective of the sandwich Diploma Course is to mould a well rounded technician acclimated with industrial environment while being a student in the institution.

The Sandwich Diploma Course study is pursued by students, in 7 semesters of 3½ years duration, the subjects of 3 years - Full Time Diploma Course being regrouped for academic convenience.

While in the 4<sup>th</sup> semester students under Industrial Training for 6 months (December through May ). They also do course work in the institution for one day in a week, While in the 7<sup>th</sup> semester they undergo another spell of 6 months (June through November ) industrial training.

The Apprenticeship (Amendment) Act 1973 is followed in regulating the Industrial training procedure for Sandwich Course.

I SEM	II SEM	III SEM	IV SEM	V SEM	VI SEM	VII SEM
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Institutional study



Industrial Training

First Spell - IV Semester (December - May)

Second Spell - VII Semester (June - November)

#### 2. Attendance Certification

Every month students have to get their attendance certified by industrial supervisor in the prescribed form supplied to them. Students have also to put their signature on the form and submit it to the institution supervisor. Regularity in attendance and submission of report will be duly considered while awarding the sessional mark.

#### 3. Training Reports

The students have to prepare two types of reports:

- Weekly report in the form of diary to be submitted to the concerned staff incharge of the institution. This will be reviewed while awarding sessional marks.
- Comprehensive report at the end of each spell which will be used for Board Examination.

### 3.1 Industrial Training Diary

Students are required to maintain the record of day - to- day work done. Such record is called Industrial training Diary. Students have to write this reports regularly. All days for the week should be accounted for clearly giving attendance particulars (Presence, Absence, Leave, Holidays etc). The concern Industrial supervisor is to check periodically these progress reports.

### 3.2 Comprehensive Training Report

In addition to the diary, students are required to submit a comprehensive report on training with details of the organisation where the training was undergone after attestation by the supervisors. The comprehensive report should be incorporating study of plant/ product /process/ construction along with intensive in-depth study on any one of the topics such as precesses, methods, tooling, construction and equipment, highlighting aspects of quality, productivity and system. The comprehensive report should be completed in the last week of Industrial training. Any data, drawings etc should be incorporated with the consent of the Organisation.

## 4. Scheme of Evaluation

### 4.1 Sessional Marks

First review (during 3 <sup>rd</sup> month)	: 10 marks
Second review (during 5 <sup>th</sup> month)	: 10 marks
Attendance	: 05 marks (Awarded same as in Theory)

**Total : 25 marks**

### 4.2 Board Examination

Presentation about Industrial Training	: 20 marks
Comprehensive Training Report	: 30 marks
Viva-voce	: 25 marks

**Total : 75 marks**

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