Veermata Jijabai Technological Institute (V.J.T.I)

(Central Technological Institute, Maharashtra State, INDIA)
H. R. Mahajani Marg, Matunga, Mumbai 400019
Tel.No. +91 22 24198101-02 Fax: +91 22 24102874
Website: www.vjti.ac.in

Programme: Diploma in Electrical Engineering (DEE) **Semester: V** **Implemented from: 2017-18**

COURSE CODE	COURSE	GR	TEACHING SCHEME (HRS/WK)				EXAMINATION SCHEME												
			L	T	P	CR	PAPER HRS	TH Max	TH Min	IST	TOTAL Max	TOTAL Min	PR Max	PR Min	OR Max	OR Min	TW Max	TW Min	TOTAL MARKS
172EE51	Industrial Training(6 weeks in summer break after 4 sem)	A			6#														
172EE52	Power System II	C	3	2		5	3	80	32	20	100	40			75**	30	75@	30	150
172EE53	Electrical Machines II	C	3		3	6	3	80	32	20	100	40			25**	10	25@	10	150
172EE54	Microprocessor and Microcontroller	C	3		3	6	3	80	32	20	100	40	25**	10			25@	10	150
172EE55	Control System	C	3		2	5		80	32	20	100	40	25**	10			25@	10	150
$	**Elective (Any one)**		3		2	5	3	80	32	20	100	40			25**	10	25@	10	150
172EE57	Project (Mini Project)	A			3	3									50**	20	50@	20	100
172EE58	Interview Preparation & Aptitude Test	B			2	2													
	TOTAL		**15**	**2**	**21**	**32**		**400**		**100**	**500**		**75**		**175**		**250**		**1000**

Abbreviations: B – Basic; C – Core; A – Applied; M – Management; L – Theory Lecture; T – Tutorial; P – Practical; TH – Theory Paper; IST – In-Semester Tests (02); PR – Practical Exam; OR – Oral Exam; TW- Term Work.

*:- Assessment by Internal Examiner **:- Assessment by External And Internal Examiner @ : -TW assessment by Internal .

#:-.Evaluation of industrial training and its reports will be done in 5th semester and the credits for same will be included in 5th semester mark sheet. The teaching load assigned to a faculty member for guiding students in preparation of training report and its evaluation for a batch of students (equivalent to practical batch size) would be 1 hour/week in 5th semester

Curriculum Coordinator

Head Yadawad
Diploma in Electrical Engineering

Dean - Diploma

VERMATA JIJABAI TECHNOLOGICAL INSTITUTE MATUNGA MUMBAI - 19

DEE,

VJTI

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Programme: Diploma in Electrical Engineering (DEE) **Implemented from: 2017-18**

$ List of Electives V and VI Semester

Sr. No.	Course Code	Course Name
1	172EE56E1	PLC /SCADA
2	172EE56E2	Power System Analysis
3	172EE56E3	High Voltage Engineering
4	172EE56E4	Renewable Energy
5	172EE56E5	Solar Photovoltaic Technology And Wind Electrical Systems
6	172EE64E1	Illumination Engineering
7	172EE64E2	Energy Conservation and audit
8	172EE64E3	Smart Grid
9	172EE64E4	Substation Practices

Curriculum Coordinator

Head
Diploma in Electrical Engineering

Dean - Diploma

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE MATUNGA MUMBAI - 19

DIPLOMA PROGRAMME	: DIPLOMA IN ELECTRICAL ENGINEERING
PROGRAMME CODE	: DEE
SEMESTER	: FIFTH
COURSE TITLE	: INDUSTRIAL TRAINING
COURSE CODE	: 172EE51

TEACHING AND EXAMINATION SCHEME:

TEACHING SCHEME				EXAMINATION SCHEME											
L	T	P	CR	PAPER HRS	TH		IST	TOTAL		PR		OR		TW		TOTAL MARKS
					Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
-	-	6	6	-	-	-	-					75**	30	75@	30	150

@- Assessment by Internal Examiner **-Assessment by External and Internal Examiner

Course Objectives:

To understand the various domains of industry along with exposure to work environment and latest developments in technologies

Course Outcomes:

Student should be able to

CO1	Understand scope and functions of various industrial aspects viz. manufacturing processes, maintenance schedule, productivity improvement, quality control, team work and job responsibility in various departments
CO2	Develop work culture, industrial practices, organizational behaviour and ethics, safety and environment awareness
CO3	Interpret and solve routine technical problems through application of engineering principles
CO4	Integrate theory with practice with the help of industrial practitioner
CO5	Develop leadership and management skills

Course Content:

Methodology

The students shall undergo in plant training for 6 weeks in between fourth and fifth semesters in any Electrical manufacturing and service industry. A faculty mentor shall be assigned to each student undergoing training for guidance and monitoring during the training period. The student shall carry out detailed study of different activities in various departments and try to locate the problem areas. The student shall maintain a daily diary and record in brief the observations made, work problems in section/ project undertaken, literature referred, data etc, which shall be countersigned by the section in charge or industry officer. The student shall submit the certificate for satisfactory completion of training for the entire duration received from the training organization after completion of training. The student shall submit typed and bound training report to the faculty mentor for assessment. The students will be examined through viva-voce by the internal and external examiners.

(The external examiner should be from industry).

3.5 Specific areas of study and working: -

Students are required to collect the relevant information on the specific area given below.

This information should be recorded in daily diary and further used in preparing the Final Report.

Areas as per program discipline:

- Manufacturing
- Designing
- Maintenance
- Services
- Quality Control
- Power plant visit

Training Monitoring

The student shall update the faculty mentor regarding the training undertaken everyweek. The student shall submit his daily dairy to faculty mentor for assessment.

Assessment

Each student shall submit a typed and bound inplant training report along with the copy of training completion certification received from the industry within 15 days after completion of industrial training. The term work assessment shall be done by internal examiner only. The students shall give presentation of work done by them in industry during training period and shall be assessed for the oral and presentation by external and internal examiners.

Subject Coordinator

Curriculum Coordinator **Head** **Dean-Diploma**

Diploma in Electrical Engineering

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE MATUNGA MUMBAI - 19

DIPLOMA PROGRAMME	: DIPLOMA IN ELECTRICAL ENGINEERING
PROGRAMME CODE	: DEE
SEMESTER	: FIFTH
COURSE TITLE	: POWER SYSTEM-II
COURSE CODE	:172EE52

TEACHING AND EXAMINATION SCHEME:

TEACHING CHEME				EXAMINATION SCHEME											
L	T	P	CR	PAPER HRS	TH		IST	TOTAL		PR		OR		TW		TOTAL MARKS
					Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
3	2	-	5	3	80	32	20	100	40	-	-	25**	10	25@	10	150

@- Assessment by Internal Examiner **-Assessment by External and Internal Examiner

Course Objectives: '

At the end of Diploma Program, student will be able to

1) To have profound knowledge of power system

2) To be able to understand the problems of power system

3) Know types of conductors used in transmission and distribution circuits

Course Outcomes:

Student should be able to

CO1	Identify various components & know their functions.
CO2	Know Effect of Power Factor on Transmission
CO3	Know the effect of changes in parameters on performance of the EHVAC & HVDC line
CO4	Identify various faults and losses in power system & measures to minimize it.
CO5	Study of different types of earthing

Course Content:

SECTION-I								
Unit & Sub-Unit		**Topics/Sub-topics**	**Hours**	**Marks**	**CO**	**R Level**	**U Level**	**A Level**
1.	**Per Unit System**							
	1.1	Per Unit Method						
	1.2	Advantages of Per Unit Systems	4	5	1	30%	40%	30%
	1.3	Per Unit Impedances of Transformer						
	1.4	Simple problems on P. U. system						
2.	**Performance of Transmission Lines**							
	2.1	Classification of Transmission line according to distance such as Short, Medium & long Transmission Line.						
	2.2	Definition of efficiency & Regulation of Transmission line.						
	2.3	Effect of Power Factor on Transmission efficiency and Regulation, Draw Vector diagram for Lag, Lead & Unity Power factor.						
	2.4	Derivation of Regulation Short Transmission line	12	20	1,2	30%	40%	30%
	2.5	Numerical on 1-phase & 3-phase Short Transmission lineShort Transmission LinesCalculate Efficiency & Percentage Regulation						
	2.6	Analysis of Short transmission line: Equivalent Circuit & Vector Diagram (No Mathematical Treatment)						
	2.7	Analysis of Medium transmission line: Equivalent Circuit with Nominal 'T', Nominal 'π', and End Condenser Method, its Phasordiagram (No Mathematical Treatment)						

	2.8	Concept and Basic Equations of generalized circuit constants 'A','B', 'C', 'D' (No Derivation and Numerical)						
	2.9	Analysis of Long Transmission Lines (Rigorous method of solution of long transmission line)						
	2.10	Evaluation of ABCD parameters, Ferranti Effect						
3.	**E.H.V.A.C and H.V.D.C Transmission Systems**							
	3.1	Definition of EHV line, Its necessity and Importance.						
	3.2	Advantages, Limitations and Applications of Extra High Voltage AC (EHVAC) Transmission Line.						
	3.3	Advantages, Limitation & Application of High Voltage DC (HVDC)Transmission Line	8	15	3	20%	40%	40%
	3.4	Layout of HVDC Transmission Line: Mono-polar, Bi-Polar & Homo-Polar HVDC Transmission Line Routes in India,						
	3.5	Comparison of EHVAC & HVDC Transmission line. H.V.D.C System, Types of H.V.D.C systems. Configuration of E.H.V.A.C transmission system.						
	Power System Earthing							
	4.1	Earth Electrode, Earth Current, Resistance of Earth Electrode						
	4.2	Step potential, Touch Potential, Transferred Potential	6	10	5	20%	40%	40%
	4.3	Tolerable Limits of Body Currents						
	4.4	Soil resistivity, Earth Resistance						

	4.5	Tolerable Step and Touch voltage, Actual Touch and Step voltage						

SECTION-II

	4.6	Neutral Earthing • Solid-earthed neutral • Unearthed neutral. • Resistance-earthed neutral. Low-resistance earthing. High-resistance earthing. • Reactance-earthed neutral.Using earthing transformers						
5	**Faults**		10	15	4	20%	40%	40%
	5.1	Symmetrical Fault Symmetrical components						
	5.2	Unsymmetrical Faults						
	5.3	Single Line to Ground Fault Line to Line Fault Double Line to Ground Fault						
	5.4	Calculations and problems on above faults.						
6		**Corona**	6	10	4	20%	40%	40%
	6.1	The Phenomenon of Corona						
	6.2	Disruptive Critical Voltage Visual Critical Voltage						
	6.3	Corona Loss Factors and conditions affecting Corona Loss Radio Interference due to corona Loss						
	6.4	Corona calculations						

7		**Economic Load Dispatch**						
		Introduction and necessity of load dispatch	2	5	1	20%	40%	40%
Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxanomy).								

Course Outcome:

Students should be able to

CO1	Understand various functions and elements related to power system.
CO2	Select proper and required parameters for different power system elements used in MATLAB software.

List of Practical/Assignments/Tutorials:

Sr. No.	Assignments/Tutorials	CO
1	5 assignments on the given syllabus.	1
2	Introduction to MATLAB software (SIM Power System Tool used in Simulink).	1,2
3	Tutorials based on the problems given in the syllabus	1

Reference Books: -

Text Books:

Sr. No.	Author	Title	Publisher and Edition
1	B. R. Gupta,	Power System Analysis and Design	4th Edition S. ChandPublisher.

Reference books and Websites:

Sr. No.	Author	Title	Publisher and Edition
1	D. P. Kothari and I. J. Nagrath,	ModernPower System Analysis	3rd Edition Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1994.

Websites:

1. https://en.wikipedia.org/wiki/Electric_power_system
2. https://nptel.ac.in/courses/Webcourse-contents/IIT-KANPUR/power-system/chapter_1/1_1b.html
3. https://www.electrical4u.com/power-system

Subject Coordinator

Curriculum Coordinator **Head** **Dean-Diploma**

Diploma in Electrical Engineering

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE MATUNGA MUMBAI - 19

DIPLOMA PROGRAMME	: DIPLOMA IN ELECTRICAL ENGINEERING
PROGRAMME CODE	: DEE
SEMESTER	: FIFTH
COURSE TITLE	: ELECTRICAL MACHINES II
COURSE CODE	: 172EE53

TEACHING SCHEME				EXAMINATION SCHEME												
L	T	P	CR	PAPER HRS	TH		IST	TOTAL		PR		OR		TW		TOTAL MARKS
					Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
3	0	3	6	3	80	32	20	100	40	25**	10	-	-	25@	10	150

@- Assessment by Internal Examiner **-Assessment by External and Internal Examiner

TEACHING AND EXAMINATION SCHEME:

Course Objectives:

After studying this subject, students will be able

1) To know various types of electrical machines.

2) To identify various parts& know their functions.

3) To differentiate types of motors used in electrical system.

4) To analyze the effect of changes in power factor on performance of motor

5) Draw phasor diagram of different machines as per the requirements

Course Outcomes:

Student should be able to

CO1	To know the construction /working principle of synchronous machine.
CO2	To know various rating and starting methods for synchronous machine
CO3	To develop the skills for parallel operations and load sharing.
CO4	To know the construction /working principle of three phase I.M.
CO5	To choose the particular motor for proper applications and to understand the characteristics and applications of three phase Induction motor
CO6	To understand the characteristics and applications of special machines with constructional feature and characteristics.

Course Content:

Unit & Sub-Unit		Topics/Sub-topics	Hours	Marks	CO	R Level	U Level	A Level
SECTION I								
1		Poly Phase Induction Motor	10	20	2	40%	40%	20%
	1.1	Production of rotating magnetic field, construction, types of three induction machine Principle of operation						
	1.2	Induction motor as transformer, Rotor frequency, EMF, Current, Torque- Slip characteristic, Power-Slip characteristic						
	1.3	Induction Motor and Phasor Diagram, Equivalent Circuit, Analysis of equivalent circuit, Determination of equivalent circuit parameters						
	1.4	Power stages and Efficiency, Performance of Induction Machine						
2		Starting and Speed control of Poly Phase Induction Motor	07	10	2&3	40%	40%	20%
	2.1	Starting of induction motor - Squirrel cage motor Wound Rotor						
	2.2	Speed control of induction motor - Squirrel cage motor Wound Rotor,						
	2.3	Circle diagram, Power factor Control of three phase induction motor and application						
	2.4	Power stages and Efficiency, Performance of Induction Machine						
	2.5	Circle diagram, Power factor Control of three phase induction motor and application						
3		Special Purpose Machines (Basics)	07	10	3&4			
	3.1	Types of Single Phase induction motor, double field revolving theory, Equivalent Circuit, application of different types of single phase machine						
	3.2	A.C. series motor, Construction, Working Principle						

		and Applications - A.C. series motor				40%	35%	25%
	3.3	Induction Generator, Linear induction motor, Construction, Working Principle and Applications - Induction Generator, Linear induction motor						
	3.4	Construction, Working Principle and Applications -D. C. and A. C. Servomoto, Stepper Motor						
SECTION II								
4		Synchronous Machine	10	20	1	40%	50%	10%
	4.1	Construction and working Principle, Armature winding, generated EMF, distribution and pitch factor						
	4.2	Excitation system for synchronous machine, Flux and MMF phasor in synchronous machine, cylindrical rotor, salient pole rotor						
	4.3	The Open Circuit and Short circuit characteristic of machines, Phasor diagram of cylindrical rotor alternator, Voltage Regulation of an alternator						
	4.4	The electromotive force (EMF) method, Zero power factor characteristics and potier triangle						
	4.5	Synchronous motor phasor diagram , Operating characteristic of an alternator and their rating , External load Characteristic						
5		Performance of Synchronous Machine	07	10	1	40%	40%	20%
	5.1	Rating of alternator, Power angle characteristics of Synchronous machine						
	5.2	Two reactance theory of salient pole machine, hunting and damper winding, Efficiency of synchronous machine, Power Factor Correction by Synchronous Condenser						
	5.3	Starting of Synchronous machine against high starting torque, synchronous machine application , effect of load on synchronous motor						
6		Parallel operation of Alternator						

	6.1	Requirement of parallel operation	07	10	2	40%	30%	30%
	6.2	Condition for proper synchronizing						
	6.3	Synchronizing of three phase alternator a) Lamp load b) synchronoscope						
	6.4	Synchronizing current power and torque						
	6.5	Load sharing between two alternator						
Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxanomy).								

Practical Course Outcomes:

Student should be able to

CO1	Understand the concepts of Three phase machines.
CO2	Ability to test, plot and verify the characteristics.
CO3	Measure different parameters using different meters according to circuit diagram.
CO4	Measure the values and note down the readings.
CO5	Operate Synchronous motor.

List of Practical/Assignments/Tutorials:

Sr. No.	Practical	Hours	CO
1	To reverse the direction of rotation of 3-phase IM.	3	1
2	To measure the performance of 3-phase IM by direct loading	3	1, 2
3	Perform speed control on 3-phase induction motor.	3	1,3
4	Using an MG set (DC motor-Alternator) observe the effect of excitation & speed on induced emf& plot O.C.C. of the given alternator.	3	1, 3
5	To find the percentage regulation of 3-phase alternator by synchronous impedance method at various power factors.	3	1,4
6	To find the percentage regulation of 3-phase alternator by Zero power factor method at various power factors.	3	1,3
7	To list & explain various starting methods of synchronous motor & applying one of them to start the synchronous motor. Plot V & inverted V curve of the same.	3	4,5

List of Assignments:

Sr. No.	Assignment	CO
1	5 assignments based on the syllabus.	1,2,3
2	Study of any practical of three phase motors (report to be made).	3,4
3	Visit to generating station & write brief report on it	1

Text Books:

Sr. No.	Author	Title	Publisher and Edition
1	3rd Edition by S K Bhattacharya	Electrical Machines	Tata McGraw- Hill Publishing Company Limited

Reference Books: -

Sr. No.	Author	Title	Publisher and Edition
1.	P.S. Bhimbra	Electrical Machinery	Khanna Publishers
2.	H. Cotton	Electrical Technology	CBS Publishers and Distributors.
3.	B.L Theraja, and A K Theraja	Electrical Technology -Vol. II	S Chand & Company Ltd.
4.	SamarjitGhosh	Electrical Machines	Pearson Education

Websites:

http://www.electricaleasy.com

https://www.youtube.com/watch?v=D4RFFnzRdkk

http://nptel.ac.in/courses/108105017/

www.standardsbis.in/

http://www.tpub.com/neets/book2/1c.htm

Subject Coordinator

Curriculum Coordinator **Head** **Dean-Diploma**

Diploma in Electrical Engineering

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE MATUNGA MUMBAI - 19

DIPLOMA PROGRAMME	: DIPLOMA IN ELECTRICAL ENGINEERING
PROGRAMME CODE	: DEE
SEMESTER	: FIFTH
COURSE TITLE	: MICROPROCESSOR AND MICROCONTROLLER
COURSE CODE	: 172EE54

TEACHING AND EXAMINATION SCHEME:

TEACHING SCHEME				EXAMINATION SCHEME											
L	T	P	CR	PAPER HRS	TH		ISE	TOTAL		PR		OR		TW		TOTAL MARKS
					Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
3	-	3	6	3	80	32	20	100	40	25**	10	-	-	25@	10	150

@- Assessment by Internal Examiner **-Assessment by External and Internal Examiner

Course Objectives:

After studying this subject, students will be able to

1) Understand architecture and operation of typical microprocessor and microcontroller.
2) Program and interfacing of microprocessor and microcontroller.
3) Design real world applications using microprocessor.

Course Outcomes:

Student should be able to

CO1	Explain the microprocessor and Microcontroller internal architecture
CO2	Apply knowledge and demonstrate programming proficiency using the various addressing modes, data transfer instructions and other instruction set of the microprocessor.
CO3	Interface of microprocessor with memory chips, Interfacing Device and its applications and interface memory chips microcontroller.

Course Content:

SECTION-I								
Unit & Sub-Unit		**Topics/Sub-topics**	**Hours**	**Marks**	**CO**	**R Level %**	**U Level %**	**A Level %**
1		Introduction to 8085 Microprocessor:	09	15	1	40%	50%	10%
	1.1	Schematic diagram of microcomputer. General function of microprocessor and interfacing devices like latches, buffers, decoders, encoders.						
	1.2	Evolution of microprocessors.						
	1.3	Silent features of 8085 Microprocessor						
	1.4	Architecture of 8085 microprocessor.						
	1.5	Pin definition of 8085 microprocessor.						
2		8085 Instructions Set, Assembly language Programming.	09	15	1&2	10	40	50
	2.1	Instruction Format (one byte, two byte and three byte instruction), Addressing modes of 8085, 8085 Instruction set (Arithmetic, logical, data transfer, program control transfer, Machine control, I/O control), Instructions related with interrupts.						
	2.2	8085 programming with examples.						
3		8085 Interfacing with Memory and Programmable peripheral interface 8255 with applications.	06	10	1&3	10	40	50
	3.1	Address decoding techniques						
	3.2	Simple example of RAM/ROM memory interfacing with microprocessor						
	3.3	Block diagram and interfacing of 8255 chip with the 8085 Microprocessor.						

	3.4	Interfacing example: - Traffic Light Controller. - Temperature Controller. - Speed control of Stepper Motor. - Level Controller.						
SECTION II								
4		Introduction to Microcontroller	12	20	1&3	30	50	20
	4.1	Comparison of Microprocessor, Microcontroller and Microcomputer						
	4.2	Commercial Microcontroller devices and families.						
	4.3	MCS-51 Architecture and details (8051 Microcontroller)						
	4.4	Pin configuration						
	4.5	8051 Hardware details :- Clock, Oscillator, Registers, SFRs, DPTR, Flags, Stack, PC, Port structure and operations.						
	4.6	Power saving options						
	4.7	Memory Organization :- Program memory, Data memory, External memory.						
	4.8	External memory interfacing with 8051 microcontroller						
5		MCS-51 Timers/Counters, Interrupts and Serial Interface	12	20	1	40	50	10
	5.1	Study of Timers/Counters :- Timer modes of operations, SFRs of timer TMOD and TCON in detail.						
	5.2	Study of Interrupts :- Priority level structure, IE and IP SFRs, external interrupt, Response time.						
	5.3	Study of Serial Interface :- SCON, SBUF, PCON SFRs, Multiprocessor communications, Baud Rates and generating baud rates, Serial port in different modes.						

Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxanomy).

Practical Course Outcomes:

CO1	Develop algorithm, Flowchart and Assembly language program for 8085 microprocessor.
CO2	Load and execute the program in microprocessor kit.
CO3	Observe the result in the internal architecture of 8085 microprocessor and memory location.

List of Practical:

Sr. No.	Unit	Practical/Assignment	Approx. Hours	CO
1	1,2	Add / Sub two 8 bit/16 bit numbers.	3	1,2,3
2	1,2	Add/ Sub of two Multibyte numbers. e.g. Two 3/4 Byte Numbers.	3	1,2,3
3	1,2	Find sum of series of 8 bit numbers.	3	1,2,3
4	1,2	Multiply two 8 bit numbers and square of given number.	3	1,2,3
5	1,2	Square of given number using look up table.	3	1,2,3
6	1,2	Division two 8 bit numbers.	3	1,2,3
7	1,2	Addition of two BCD numbers and Find one's and two's complement of a given number.	3	1,2,3
8	1,2	Find No. of 0's and 1's from 8 bit Binary number and from 10 bytes.	3	1,2,3
9	1,2	Transfer block of data from Source memory location to Destination memory location and exchange given memory locations data.	3	1,2,3
10	1,2	Exchange the lower & upper nibble of a byte and Sort odd and even byte from given 10 bytes.	3	1,2,3
11	1,2	Calculate the sum of series of even and odd numbers from given 10 bytes	3	1,2,3
12	1,2	Find smallest/ largest number from array of n numbers	3	1,2,3
13	1,2	Arrange numbers in array in ascending/ descending order.	3	1,2,3
14	1,2	Find a given byte in the list of 10 numbers stored in the consecutive memory locations.	3	1,2,3
15	1,2	BCD to Binary and Binary to BCD conversion.	3	1,2,3
16	1,2	BCD to HEX and HEX to BCD conversion.	3	1,2,3

Text Books:

Sr. No.	Author	Title	Publisher and Edition
1	Ramesh S. Gaonkar,	Microprocessor Architecture, Programming, and Applications with the 8085, 5thEdition	PenramInternation Publisher.
2	Kenneth J Ayala,	The 8051 Microcontroller, Architecture Programming and Application, 2nd Edition	Penram International Publishers (India).

Reference Books:

Sr. No.	Author	Title	Publisher and Edition
1	N K Srinath,	8085 Microprocessor Programming & Interfacing, 1st Edition	Prentice Hall of India Pvt. Ltd.
2	B Ram	Fundamentals of Microprocessor and Microcomputers, 1st Edition	DhanpatRai and Sons.
3	Ajay Deshmukh	Microcontrollers: Theory & Applications, 1st Edition	Tata McGraw-Hill
4	Muhammad Ali Mazidi Janice GillispieMazidi Rolin D. McKinlay	The 8051 Microcontroller and Embedded Systems	Pearson publication

Subject Coordinator

Curriculum Coordinator **Head** **Dean-Diploma**

Diploma in Electrical Engineering

DIPLOMA PROGRAMME	: DIPLOMA IN ELECTRICAL ENGINEERING
PROGRAMME CODE	: DEE
SEMESTER	: FIFTH
COURSE TITLE	: CONTROL SYSTEM
COURSE CODE	: 172EE55

TEACHING AND EXAMINATION SCHEME:

TEACHING SCHEME				EXAMINATION SCHEME												
L	T	P	CR	PAPER HRS	TH		ISE	TOTAL		PR		OR		TW		TOTAL MARKS
					Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
3	-	2	5	3	80	32	20	100	40	25**	10	-	-	25@	10	150

@- Assessment by Internal Examiner **-Assessment by External and Internal Examiner

Course Objectives:

After studying this subject, student will be able to:

1) Learn the classification of control system.
2) Understand Steady state, time response, and frequency response analysis.
3) Determine Stability using Routh-Hurwitz criterion, Root locus methods and Frequency response plots.

Course Outcomes:

CO1	Simplify complicated block diagrams using block reductions algebra and signal flow graphs techniques.
CO2	Transient and steady-state response analysis.
CO3	Analyze absolute and relative Stability by Routh-Hurwitz criterion and Root locus technique.
CO4	Stability analysis from Frequency response plots (Bode plot, polar plot)

Course Content:

SECTION-I								
Unit & Sub-Unit		**Topics/Sub-topics**	**Hours**	**Marks**	**CO**	**R Level**	**U Level**	**A Level**
1		**Introduction to control system**	6	10	1	30%	40%	30%
	1.1	Different Types of Control Systems with examples						
	1.2	Open Loop & Closed Loop Control Systems: Definition, Block Diagram						
	1.3	Concept of transfer function						
2		**Mathematical Modelling of Dynamic Systems**	8	14	1	30%	60%	10%
	2.1	Mathematical Modelling of Electrical Systems (Transfer function Approach for RLC circuits)						
	2.2	Block diagram reduction Algebra						
	2.3	Signal flow graphs and Mason's gain formula						
3		**Time Response Analysis**	10	16	2	30%	50%	20%
	3.1	Time domain analysis- first order system, impulse and step response analysis of second order system						
	3.2	Steady-state Error Analysis, "Type" of the systems, Static Error Coefficients and Steady-State Errors						

SECTION-II								
Unit & Sub-Unit		**Topics/Sub-topics**	**Hours**	**Marks**	**CO**	**R Level**	**U Level**	**A Level**
4		**Stability Analysis**	8	14	3	30%	40%	30%
	4.1	Concept and definitions of Absolute, Relative, Conditional and Marginal Stabilities.						
	4.2	Routh-Hurwitz stability criterion, Relative stability.						
5		**Root Locus Method**	6	10	3	20%	40%	40%
	5.1	Root Locus concept, rules						
	5.2	Construction of approximate (without scale) root loci of simple systems						
6		**Frequency Response Analysis**	10	16	4	20%	50%	30%
	6.1	Frequency Domain Specification (no derivations)						
	6.2	Construction of Bode Plots and Polar Plots						
	6.3	Determination of Stability from Bode plots and Polar Plots (Gain Margin and Phase margin.)						
Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxanomy).								

Practical Course Outcomes:

Student should be able to

1. Determine transient domain specifications.
2. Determine frequency domain specifications.

List of Practicals / Assignments/Tutorials:

Sr. No.	Unit	Practical/Assignment	Approx. Hours	CO
1	3	Time response of First order systems.	2	1
2	3	Time response of Second order systems (Over Damped)	2	1
3	3	Time response of Second order systems (Under Damped)	2	1
4	4	Bode Plot of First order systems.	2	2
5	6	Bode Plot of Second order systems(Over damped)	2	2
6	6	Bode Plot of Second order systems(Critically damped)	2	2
7	6	Bode Plot of Second order systems(Under damped)	2	2
8	6	Determination of transfer function by Drawing Bode Plot	2	2
9	6	Polar plot of first order system.	2	2
10	6	Polar plot of second order system.	2	2

Text Books:

Sr. No.	Author	Title	Publisher and Edition
1	Katsuhiko Ogato	Modern Control Engineering	4th Edition Prentice Hall of India Ltd.
2	I J Nagrath and M Gopal	Control Systems Engineering	5th New Age International

Reference books and Websites:

Sr. No.	Author	Title	Publisher and Edition
1	Norman S Nise	Control Systems Engineering	5thEdition,Wiley India Pvt. Ltd.
2.	B. C Kuo and F Golnaraghi	Automic Control System	8th Edition Wiley India Pvt. Ltd.

Websites:

1. https://www.javatpoint.com/control-system-tutorial
2. https://www.electrical4u.com/control-system-closed-loop-open-loop-control-system
3. https://nptel.ac.in/courses/108106098

Subject Coordinator

Curriculum Coordinator **Head** **Dean-Diploma**

Diploma in Electrical Engineering

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE
MATUNGA
MUMBAI - 19

DIPLOMA PROGRAMME	: DIPLOMA IN ELECTRICAL ENGINEERING
PROGRAMME CODE	: DEE
SEMESTER	: FIFTH
COURSE TITLE	: PLC / SCADA
COURSE CODE	: 172EE56E1

TEACHING AND EXAMINATION SCHEME:

TEACHING SCHEME				EXAMINATION SCHEME											
L	T	P	CR	PAPER HRS	TH		IST	TOTAL		PR		OR		TW		TOTAL MARKS
					Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
3	-	2	5	3	80	32	20	100	40	-	-	25**	10	25@	10	150

**- Assessment by External and Internal examiner @-TW assessment by internal examiner.

Course Objectives:

After studying this subject, students will be able to

1. Understand Automation and its need in today's developing world.
2. Understand the operation of various components used in ladder diagrams and PLC program.
3. Design and analyze the ladder logic for specified control jobs.
4. Understand the hardware of a PLC, its wiring and identifying the functions of the main components.
5. Understand the concept of SCADA and its applications

Course Outcomes:

Student should be able to

CO1	Depict the operation of basic components used in ladder diagram.
CO2	Explore the use of various inputs and output devices in industrial machine control and select appropriate addressing for I/O modules of PLC for a specific application along with its wiring connections.
CO3	Configure virtual logic circuits in PLC program.
CO4	Read and interpret ladder logic diagrams for specified control jobs.
CO5	Define the function of SCADA, it's communication with PLC and application in various fields.

Course Content:

SECTION-I								
Unit & Sub-Unit		**Topics/Sub-topics**	**Hours**	**Marks**	**CO**	**R Level (%)**	**U Level(%)**	**A Level (%)**
1		**Introduction to Automation and Ladder diagram Fundamentals**	04	08	1	30	40	10
	1.1	Definition and Need of Automation,						
	1.2	Advantages of Automation.						
	1.3	Basic Components and Their Symbols: Control transformers, Fuses, Switches, Indicator lamps, Relays, Timers.						
	1.4	Fundamentals of Ladder Diagrams. Machine Control Terminology						
2		**Programmable logic controller**	04	08	2	30	40	10
	2.1	Basic history, PLC Configurations.						
	2.2	System Block Diagram and description of different parts: Processor, Input / output Modules, Power supply, Programming unit.						
	2.3	Execution of Ladder program: Update-Solve the Ladder-Update.						
3		**Fundamental PLC programming**	08	12	3,4	20	60	40
	3.1	Physical Components vs. Program Components PLC wiring diagram						
	3.2	Ladder diagram for basic logic circuits and their hardware connections (NOT, AND,OR, NAND, NOR, XOR, X-NOR).						
	3.3	Oscillator circuit, Disagreement circuit, Majority circuit, Always energized and de-energized circuit, Holding (also called Sealed, or Latched) Contacts.						

	3.4	Ladder Diagrams Having More Than One Rung, Ladder program Execution sequence.						
4		**Mnemonics coding and Advanced Programming Techniques**	10	12	2,4	20	50	30
	4.1	Mnemonic Programming Code Introduction, Mnemonic Coding for All logic gates rung, Simple branches and Complex branches.						
	4.2	Introduction, Flip Flops: RS Flip Flop PLC program, D Flip Flop PLC program, T Flip Flop PLC program						
	4.3	Automatic One shot						
	4.4	Counters: UP counter, DOWN counter, BI-DIRECTIONAL counter.						
	4.5	Sequencers, Timers: TON delay, TOF delay Retentive TON						
	4.6	PLC program using timers and counters.						
SECTION-II								
5		**Wiring Techniques**	12	15	2	20	30	30
	5.1	PLC Power Connection						
	5.2	Input Wiring						
	5.3	Inputs Having a Single Common						
	5.4	Relay Outputs						
	5.5	Solid State Outputs						
	5.6	Introduction to Analog Input and Analog Output, Analog to Digital conversion in Input module and Digital to Analog conversion in Output module.						
	5.7	Analog Data Handling, Analog I/O Potential Problems						
6		**Discrete Position Sensors**	10	15	2	20	40	40
	6.1	Sensor Output Classification						

	6.2	Connecting Discrete Sensors to PLC Inputs						
	6.3	Types of Sensors						
	6.4	PLC program using sensor.						
7		**Definition of SCADA**						
	7.1	Functional Block Diagram						
	7.2	Function of SCADA	04	10	5	20	40	20
	7.3	Communication between PLC and SCADA						
	7.4	SCADA Applications						
Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxanomy).								

Practical Course Outcomes:

Student should be able to

CO1	Understand the various hardware components of PLC and its software program execution.
CO2	Write programs for logic gates and Flip-flop circuits in ladder language
CO3	Understand the PLC programming components used in PLC software.
CO4	Understand the use of MULTISIM FOR LADDER DIAGRAMS.

List of Practicals/Assignments/Tutorials:

Sr. No.	Unit	Practical/Assignment	Approx. Hours	CO
1	2	Introduction to PLC Components	2	1
2	1	Introduction to Ladder Diagram	2	1
3	3	Ladder Diagram for Logic Gate AND, OR, NOT, NAND, NOR, Ex-NOR, Ex-OR.	2	2,3,4
4	3	Ladder diagram for Adder and Substractor	2	4

5	3	Ladder logic for Majority Circuit Application.		4
6	4,8	Timer using Ladder logic	2	3,4
7	4,8	Counters using Ladder logic	2	3,4
8	4	Flip-flops using Ladder logic	2	2,3,4
9	3,4, 8	**Perform Exercises on NI Multisim 11 Software Package like:** i) Creating a Ladder Diagram. ii) AND Rungs and OR Rungs. iii) Sample circuits: Holding Tank, Conveyor Belt, Traffic Light.	2	2,3,4.
*Note:Perform at least one program in PLC programming software.				

Text Books:

Sr. No.	Author	Title	Publisher and Edition
1	John R. Hackworth & Frederick D.Hackworth, Jr	"Programmable Logic Controllers: Programming Methods and Applications", 1st Edition.	Pearson Education

Reference books:

Sr. No.	Author	Title	Publisher and Edition
1	Terry L. M. Bartelt	Industrial Control Electronics: Devices, Systems and Applications, 2nd Edition.	Thomson Delmar Learning
2	Gary Dunning	Introduction to Programmable Logic Controllers, 2nd Edition,	Thomson Delmar Learning
3	Madhuchand A Mitra&SamarjitSen Gupta	-Programmable logic controllers and Industrial automation	Penram International

4	C D Johnson	Process Control Instrumentation Technology	Prentice Hall India
5	Petruzella	Programmable Logic Controller	McGraw Hill
6	NIIT-Programmable Logic control-Principles and applications		Prentice Hall India

Subject Coordinator

Curriculum Coordinator **Head** **Dean-Diploma**

Diploma in Electrical Engineering

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE MATUNGA MUMBAI - 19

DIPLOMA PROGRAMME	: DIPLOMA IN ELECTRICAL ENGINEERING
PROGRAMME CODE	: DEE
SEMESTER	: FIFTH
COURSE TITLE	: POWER SYSTEM ANALYSIS
COURSE CODE	: 172EE56E2

TEACHING AND EXAMINATION SCHEME:

TEACHING SCHEME				EXAMINATION SCHEME											
L	T	P	CR	PAPER HRS	TH		IST	TOTAL		PR		OR		TW		TOTAL MARKS
					Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
3		2	5	3	80	32	20	100	40	-	-	25**	10	25@	10	150

@- Assessment by Internal Examiner **-Assessment by External and Internal Examiner

Course Objectives: '

The students will be able to:

1) The course lays the foundation for exploring the ways and means to perform power system analysis in normal operation and under symmetrical and unsymmetrical faults.
2) Assembling of Single line diagram of generators, transformers and transmission lines essential for such analyses.
3) To establish principles for the formulation, solution, and application of optimal power flow.

Course Outcomes:

Student should be able to,

CO1	Describe the structure of power system in the view of load flow.
CO2	Analyze the load flow in power system with different methods.
CO3	Understand the importance of voltage control and different methods to improve it.
CO4	Know the concept of power system stability by using various methods.
CO5	Understand basic concept of FACTS.

Course Content:

SECTION-I								
Unit & Sub-Unit		**Topics/Sub-topics**	**Hours**	**Marks**	**CO**	**R Level**	**U Level**	**A Level**
1	**Power system Structure**		04	10	1	30%	40%	30%
	1.1	Network and Topology						
2.	**Load flow**		10	15	1,2	30%	40%	30%
	2.1	Need of load flow analysis						
	2.2	Aspects of load flow analysis						
	2.3	Input data required for load flow analysis						
	2.4	Classification of buses.						
	2.5	Y bus formation						
	2.6	Static load flow equation for simple two bus characteristics information obtained from load flow.						
	2.7	Constraint to be consider in load flow						
	2.8	Relation between P-Q and $\delta - V$						
3.	**Approximate load flow(maximum three bus system problem)**		10	15	1,2	30%	30%	40%
	3.1	Gauss seidel method						
	3.2	Newton – Raphson method						
	3.3	De- coupled load flow.						
	3.4	Fast decoupled load flow						
	3.5	Comparison of all load flow studies for various advantage and disadvantage						
SECTION-II								
4.	**Voltage profile control**		08	14	3	20%	40%	40%
	4.1	Using tap changing transformer						
	4.1	Generator excitation						
5.	**Power system Stability**		10	18	4	20%	40%	40%
	5.1	Stability Definitions						
	5.2	Rotor angle stability						
	5.3	Voltage stability.						
	5.4	Equal area criteria for power system stability(No differential equations)						

6.	**Introduction of FACT's Devices**	06	08	5	20%	50%	30%
Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxanomy).							

Tutorial:

1) Numericals based on above syllabus.
2) 5 Assignments based on above syllabus.

Books :

Sr. No.	Author	Title	Publisher and Edition
1	I.J. Nagrath& D. P. Kothari	Modern Power system analysis	4th edition, McGraw Hill education
2	Dr. B. R Gupta	Power system analysis and Design	S. Chand and Company
3	C.L. Wadhwa	Electrical Power system	7th edition, New Age Internationals

Websites:

https://nptel.ac.in/courses/108105067/

https://nptel.ac.in/courses/108104051/4

https://www.electrical4u.com/load-flow-or-power-flow-analysis/

Subject Coordinator

Curriculum Coordinator **Head** **Dean-Diploma**

Diploma in Electrical Engineering

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE MATUNGA MUMBAI - 19

DIPLOMA PROGRAMME	: DIPLOMA IN ELECTRICAL ENGINEERING
PROGRAMME CODE	: DEE
SEMESTER	: FIFTH
COURSE TITLE	: HIGH VOLTAGE ENGINEERING
COURSE CODE	: 172EE56E3

TEACHING AND EXAMINATION SCHEME:

TEACHING SCHEME				EXAMINATION SCHEME											
L	T	P	CR	PAPER HRS	TH		IST	TOTAL		PR		OR		TW		TOTAL MARKS
					Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
3	-	2	5	3	80	32	20	100	40	-	-	25**	10	25@	10	150

@- Assessment by Internal Examiner **-Assessment by External and Internal Examiner

Course Objectives:

The students will be able to:

1) To provide an understanding of high voltage phenomena and to present basic of high voltage insulation testing and designing.

2) Understand the generation and measurement of high voltages

3) Understand electric fields and field stress control around high voltage systems.

4) Understand the phenomena involved in non-destructive insulation and testing as well as over voltages in power systems.

Course Outcomes:

Student should be able to,

CO1	Explain the various breakdown processes in solid, liquid and gaseous materials.
CO2	Illustrate sound knowledge of Testing, Generation & measurement methods of DC, AC and impulse voltages and current.
CO3	Describe lightning phenomenon, natural cause of overvoltage in detail with formation of charge in clouds
CO4	To develop ability to carry out various testing procedures as per IS in laboratory
CO5	Understand earthing, safety and shielding of HV laboratory with judiciary aspect.

Course Content:

SECTION-I								
Unit & Sub-Unit		**Topics/Sub-topics**	**Hours**	**Marks**	**CO**	**R Level**	**U Level**	**A Level**
1.	**Electric field stress - control and estimation**		6	7	1	40%	30%	30%
	1.1	Concept of Electric field stress, its control and estimation						
	1.2	Analysis of Electrical field intensity a. in Homogenous Isotropic Single dielectric and b. in multi dielectric system.						
2.	**Conduction and breakdown in air and other gaseous dielectrics in electric fields.**		8	15	1	30%	40%	30%
	2.1	Ionization processes, Townsend's current growth equation-Primary and secondary processes.						
	2.2	Townsend's criterion for breakdown in electronegative gases.						
	2.3	Paschen's law, breakdown in non-uniform fields and corona discharges.						
	2.4	Post-breakdown phenomena and application.						
	2.5	Practical considerations in using gas for insulation purposes.						
3.	**Conduction and Breakdown in solid and liquid dielectrics.**		10	18	1	30%	30%	40%
	3.1	Intrinsic, Electro-mechanical and Thermal breakdown						
	3.2	Breakdown of solid dielectrics in practice						
	3.3	Breakdown of composite insulation						

	3.4	Application of insulating materials in electrical power apparatus and electronic equipment.						
SECTION II								
4.	**Generation of High Voltage and Currents.**		8	10	2	20%	40%	40%
	4.1	Generation of HVDC						
	4.2	Generation of HVAC and Impulse Voltage						
	4.3	Introduction to working of Impulse Generator						
	Measurement of high voltage and High currents							
	4.4	Measurement of HVDC						
	4.5	Measurement of HVAC and impulse voltage and currents						
5	**Testing and evaluation of dielectric materials and power apparatus.**		8	15	3	20%	40%	40%
	5.1	Non-destructive testing of dielectric materials , DC resistivity measurement						
	5.2	Dielectric and loss factor measurement,						
	5.3	Partial discharge measurements.						
	5.4	Testing of insulators, bushing, isolators, circuit breakers, cable, transformers, high voltage motors, surge diverters.						
	5.5	Radio interference measurement.						

6	**Lightning and Switching Over Voltages**		4	10	4	30%	30%	40%
	6.1	Causes of over voltages, lightning phenomenon, Different types of lightening strokes and mechanisms of lightening strokes,						
	6.2	Over voltage due to switching surges and methods to minimize switching surges.						
	6.3	Statistical approach of insulation coordination						
7	**High voltage safety principles**		4	5	5	40%	10%	50%
	7.1	Judiciary Aspects, a. Effect of electrical currents on the human body b. Electrical clearances c. Safety signs and working procedures						
	7.2	Safety Earthing						
	7.3	Safety in the High Voltage Laboratory						
Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxanomy).								

Part II:- Tutorials

- 5 assignments based on the syllabus.
- Visit to High Voltage Lab (report to be made)

Text Books:

Sr. No.	Author	Title	Publisher and Edition
1	Naidu M.S. and Kamaraju V	High Voltage Engineering	TMH Publication, 2nd edition.,1995
2	Wadhwa C.L.	High Voltage Engineering	Wiley Eastern Ltd, 1st edition., 1994.
3	Kuffel E. and Abdullah M	Introduction to High Voltage Engineering	Pergamon, 1970

Websites:

1. https://www.youtube.com/watch?v=vVfLRM2DgLY
2. https://www.annauniversityplus.com/plus/showthread.php?tid=2034#

Subject Coordinator

Curriculum Coordinator **Head** **Dean-Diploma**

Diploma in Electrical Engineering

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE MATUNGA MUMBAI - 19

DIPLOMA PROGRAMME	: DIPLOMA IN ELECTRICAL ENGINEERING
PROGRAMME CODE	: DEE
SEMESTER	: FIFTH
COURSE TITLE	: RENEWABLE ENERGY
COURSE CODE	: 172EE56E4

TEACHING AND EXAMINATION SCHEME:

TEACHING SCHEME				EXAMINATION SCHEME											
L	T	P	CR	PAPER HRS	TH		IST	TOTAL		PR		OR		TW		TOTAL MARKS
					Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
3	0	2	5	3	80	32	20	100	40	-	-	25**	10	25@	10	150

@- Assessment by Internal Examiner **-Assessment by External and Internal Examiner

Course Objectives:

The students will be able to:

1) To understand the importance, scope and potential of renewable energy resources.
2) To impart knowledge on the theory and applications of renewable energy.

Course Outcomes:

Student should be able to

CO1	Understand the impact of renewable energy utilization on society.
CO2	Analyze and interpret the potential of renewable energy at any location.
CO3	Gain knowledge on the theory and applications of renewable energy.
CO4	Do the basic design of various renewable energy systems for different requirements.
CO5	Acquire knowledge on the application of renewable energy sources for producing electrical energy.

Course Content:

SECTION-I								
Unit & Sub-Unit		**Topics/Sub-topics**	**Hours**	**Marks**	**CO**	**R Level**	**U Level**	**A Level**
1.	**ENERGY SOURCES**		06	08	1	40%	40%	20%
	1.1	Introduction, Importance of Energy Consumption as Measure of Prosperity.						
	1.2	Classification of Energy Resources; Conventional Energy Resources - Availability and their limitations;						
	1.3	Non-Conventional Energy Resources – Classification, Advantages, Limitations;						
	1.4	Comparison of Conventional and Non-Conventional Energy Resources.						
	1.5	World Energy Scenario; Indian Energy Scene						
2.	**SOLAR ENERGY BASICS**		08	16	2& 3	20%	40%	40%
	2.1	Introduction, Solar Constant, Basic Sun-Earth Angles – definitions and their representation,						
	2.2	Solar Radiation Geometry (numerical problems),						
	2.3	Estimation of Solar Radiation of Horizontal and Tilted Surfaces (numerical problems);						
	2.4	Measurement of Solar Radiation Data – Pyranometer and Pyrheliometer						
3	**SOLAR ELECTRIC SYSTEMS**		10	16	2,3 &4	10%	50%	40%
	3.1	Solar Thermal Electric Power Generation – Solar Pond and Concentrating Solar Collector (parabolic trough, parabolic dish, Central Tower Collector). Advantages and Disadvantages;						
	3.2	Solar Photovoltaic – Solar Cell fundamentals, characteristics, classification, construction of module, panel and array.						
	3.3	Solar PV Systems – stand-alone and grid connected;						
SECTION II								
4	**WIND ENERGY**		10	16	2& 3	30%	30%	40%
	4.1	Basic principles of wind energy conversion, wind energy conversion system						
	4.2	Site selection consideration, basic components of wind energy conversion system (WECS),						

	4.3	Classification of WEC system, generating system, energy storage, application of wind energy.						
5	**BIOMASS ENERGY- RESOURCES-BIOFUELS**							
	5.1	Biomass conversion process						
	5.2	Applications tidal power – energy estimation – site selection – types – important components of tidal power plants.						
	5.3	Wave energy – characteristics, energy and power from the waves, wave energy conversion devices.	14	24	3.4 &5	30%	40%	30%
	5.4	Geothermal energy – resources – estimation of geothermal power- geothermal energy conversion, applications.						
Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxanomy).								

List of Practical/Assignments/Tutorials:

Sr. No.	Unit No.	Assignments/Tutorials	No. of Hours	CO
1	2 and 3	Problem solving on calculation for solar constants.	2	2&3
2	4	Identification of total wind power plants in India.	2	1&4
3	5	Use of Biomass is hazardous to environment or benefit to human beings, discuss.	2	1,4&5
4	2 and 3	Any Small model on solar energy utilization.	2	2&3
5	1 and 3	Arrange visit to Solar power plant.	2	3&4

Text Books:

Sr. No.	Author	Title	Publisher and Edition
1	G.D. Rai	Non Conventional Energy Sources	Khanna publishers
2	B. H. Khan	Non Conventional Energy Resources	2nd , The McGraw Hill Companies
3	S. Rao & B. B. Parulekar	Energy Technology : Nonconventional, Renewable and	1st, Khanna Publisher

		Conventional	
4	S. P. Sukhatme	Solar Energy: Principles of thermal collection and storage	2nd edition, Tata McGraw Hill Publishing Company Ltd.
5	Chetan Singh Solanki	Solar Photovoltaics : Fundamental, Technologies and Applications	PHI Learning Pvt. Ltd.
6	D.P. Kothari, K.C. Singal, RakeshRanjan	Renewable energy sources and emerging technologies,	Prentice hall of India, new Delhi, 2009

Websites:

1. MNRE- http://www.mnre.gov.in
2. ANERT- http://anert.gov.in/
3. NREL- http://www.nrel.gov/

Subject Coordinator

Curriculum Coordinator **Head** **Dean-Diploma**

Diploma in Electrical Engineering

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE MATUNGA MUMBAI - 19

DIPLOMA PROGRAMME	: DIPLOMA IN ELECTRICAL ENGINEERING
PROGRAMME CODE	: DEE
SEMESTER	: FIFTH
COURSE TITLE	: SOLAR PHOTOVOLTAIC TECHNOLOGY AND WIND ELECTRICAL SYSTEMS
COURSE CODE	: 172EE56E5

TEACHING AND EXAMINATION SCHEME:

TEACHING SCHEME				EXAMINATION SCHEME											
L	T	P	CR	PAPER HRS	TH		IST	TOTAL		PR		OR		TW		TOTAL MARKS
					Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
3	-	2	5	3	80	32	20	100	40	-	-	25**	10	25@	10	150

@- Assessment by Internal Examiner **-Assessment by External and Internal Examiner

Course Objectives:

At the end of Diploma Program, student will be able to help the student to attain the following industry identified competency through various teaching learning experiences

Course Outcomes:

Student should be able to

CO1	Analyse the working of different types of solar power systems
CO2	Understand the Maintenance of solar PV plants
CO3	Understand the Maintenance of wind power plants
CO4	Identify the power electronic device(s) in the given wind turbine.
CO5	Rectification of faults in turbines.

Course Content:

SECTION-I								
Unit & Sub-Unit		**Topics/Sub-topics**	**Hours**	**Marks**	**CO**	**R Level**	**U Level**	**A Level**
1.	**Solar Power Systems**		8	12	1	10%	30%	60%
	1.1	Renewable energy sources and Energy scenario in India.						
	1.2	Solar heating systems, solar thermal energy systems, solar PV systems,						
	1.3	Concentrated solar power (CSP) systems: Working principle of Parabolic trough, parabolic dish and solar power tower.						
	1.4	Photovoltaic cell: Types, Construction, working						
2.	**Solar PV panels**		8	12	2	20%	20%	60%
	2.1	Solar cells, arrays, modules, Series and parallel connections of solar modules.						
	2.2	Performance: Influencing factors-tilt angle, solar radiation, I-V, P-V characteristics, maximum power point tracking (MPPT), and conversion efficiency						
	2.3	DC-DC and DC-AC solar PV plants: Load estimation and selection of suitable solar panels, charge controller, batteries, switchgear and cables.						
3.	**Fundamentals of Solar PV power plants**		8	16	3	10%	30%	60%
	3.1	Energy in the wind, wind power density, wind maps						
	3.2	Vertical axis and horizontal axis small wind turbines						
	3.3	Drag and lift principle of working						
	3.4	Power curves of wind turbines.						
	3.5	Parts of large wind turbine						

SECTION-II								
4.	**Types of Electric Generators in Wind Turbines**		12	20	4	10%	10%	80%
	4.1	Electrical generators in large wind turbines: Squirrel-Cage rotor Induction Generator, Wound Rotor Induction Generator, Doubly Fed Induction Generator, Synchronous Generator						
	4.2	Electrical generators in small wind turbines: permanent magnet synchronous generators, induction generators						
	4.3	Power electronic converters in different types of wind turbines						
	4.4	Common electrical faults in large wind turbines						
5	**Maintenance e of small solar PV systems and wind turbines.**		12	20	5	10%	20%	70%
	5.1	Common mechanical faults in small wind turbines						
	5.2	Common electrical faults in large wind turbines						
	5.3	Routine Small wind turbine maintenance procedures						
	5.4	Maintenance of roof top and streetlight solar PV systems						
	5.5	Elements of wind solar hybrid system						
TOTAL			48	80				

Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxanomy).

List of Practical/Assignments/Tutorials:

Sr. No.	Practical	CO
1	Identify different types of solar systems	1

2	Identify different components of PV solar systems	1
3	Assemble a simple solar off grid PV system (DC-DC)	1
4	Assemble a simple solar off grid PV system (DC-AC)	1
5	Assemble a simple solar PV system with smart metering	2
6	Check performance of solar PV panel	2
7	Check the performance of the solar PV system	2
8	Check performance of DC-DC solar PV system	2

Books & Websites:-

Text Books:

Sr. No.	Author	Title	Publisher and Edition
1.	Solanki, Chetan Singh	Solar Photovoltaic Technology And Systems - A Manual For Technicians, TrainersAnd Engineers	PHI Learning, New Delhi, 2015 ISBN: 9788120347113
2.	Earnest, Joshua	Wind Power Technology	PHI Learning, New Delhi, 2015 ISBN: 9788120347786

Reference books:

Sr. No.	Author	Title	Publisher and Edition
1	Earnest, Joshua	Wind Power Plants and Project Development	PHI Learning, New Delhi, 2015 ISBN: 978-8120351271
2	Rajput, R.K.	Non-conventional energy sources and utilization	S.Chand and company Pvt. Ltd. ISBN:9788121939713

Websites:

1. www.mnre.gov.in
2. www.mahaurja.com
3. www.solarmango.com
4. www.ireda.gov.in
5. www.seci.gov.in

Subject Coordinator

Curriculum Coordinator **Head** **Dean-Diploma**

Diploma in Electrical Engineering

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE MATUNGA MUMBAI - 19

DIPLOMA PROGRAMME	: DIPLOMA IN ELECTRICAL ENGINEERING
PROGRAMME CODE	: DEE
SEMESTER	: FIFTH
COURSE TITLE	: PROJECT (MINI PROJECT)
COURSE CODE	: 172EE57

TEACHING AND EXAMINATION SCHEME:

TEACHING SCHEME				EXAMINATION SCHEME											
L	T	P	CR	PAPER HRS	TH		IST	TOTAL		PR		OR		TW		TOTAL MARKS
					Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
-	-	3	3	-	-	-	-	-	-	-	-	50**	20	50@	20	100

@- Assessment by Internal Examiner **-Assessment by External and Internal Examiner

Course Objectives:

To develop problem solving ability through scientific and systematic way using technical knowledge and skills gained during the program

Course Outcomes:

Student should be able to

CO1	Work in a team, plan and coordinate the work
CO2	Analyze the project requirements and review the available literature
CO3	Formulate the methodology to solve the identified problem
CO4	Apply the principles, tools and techniques from the acquired knowledge to solve the problem
CO5	Develop technical writing skills with effective communication

Project Topic Selection

The project topic can be selected from any of the broad areas listed below related to electrical discipline:

- Fabrication of small machines, devices, demonstration models, etc.
- Design and fabrication of mechanisms, machines, devices, etc.
- Development of computer programming for designing of machine components, simulation of movements and operations, 3D modeling, etc.
- Industry supported projects: Solving problem faced by industry
- Investigative projects: Causes for change in performance or structure under different constraints through experimentation and data analysis
- Maintenance based projects: Systematic maintenance of a machine/equipment/ system lying idle due to lack of maintenance, repair it and bring it to working condition
- Industrial engineering based projects: Projects based on work study, method study, method improvement or productivity improvement
- Low cost automation projects
- Innovative/ creative projects: Design, development and implementation of new concepts
- Environment based projects: Pollution control, waste management, waste recycling, energy conservation, etc.
- Market survey project: Identification of demand, sales forecasting, marketing strategies, distribution channels, etc.
- Project based on recent developments
- Technology application for rural areas

Activity Planning

1. Group formation (Maximum students 3 per group)
2. Literature survey and searching of topic
3. Project topic selection
4. Define problem statement for project work
5. Submission of synopsis of proposed work (2 to 5 pages)
6. Project planning and methodology
7. Allocation of work responsibility to team members
8. Procurement of raw material / collection of data/ survey/ Analysis

9. Project execution
10. Implementation of modules / Testing
11. Progressive presentation of work

Report Writing

- Each group shall submit one soft and one hard copy of project report to the department apart form individual copy.
- The project report shall be of 50 to 70 pages.
- The structure of the report shall be as follows:
    - Title page
    - Certificate
    - Abstract
    - Acknowledgement
    - Table of contents
    - List of tables and figures (if applicable)
    - Introduction
    - Objective of project
    - Methodology used: Design, Drawing Assembly, Testing, Costing
    - Results
    - Conclusions
    - Scope for future work
    - References
    - Annexure
- The format shall be as below:
    - Font type – Times new roman
    - Font size: Heading – 14 font (bold), content – 12 font
    - Alignment – Justified
    - Line spacing – 1.5
    - Header content – left side – name of epartment, right side – name of project
    - Footer – Page number (Center)
    - Numbering of chapters, sections and subsections: Decimal form e.g. Chapter 2, section 2.1, 2.2, etc and subsection 2.2.1, 2.2.2, etc.

- Numbering of tables and figures: Chapter wise e.g. Chapter 2, Table No. 2.1, 2.2, etc. and Figure No. 2.1, 2.2, etc.

Project Assessment

Continuous evaluation of individual team member shall be followed. Each student shall maintain a project diary giving details of planning, work execution, information collected, etc. on weekly basis assessed regularly by project guide. Attendance of the student shall also be taken into account during assessment. The project presentation and oral shall be jointly evaluated by external examiner and guide.

Subject Coordinator

Curriculum Coordinator **Head** **Dean-Diploma**

Diploma in Electrical Engineering

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE MATUNGA MUMBAI - 19

DIPLOMA PROGRAMME	: DIPLOMA IN ELECTRICAL ENGINEERING
PROGRAMME CODE	: DEE
SEMESTER	: FIFTH
COURSE TITLE	: INTERVIEW PREPARATION & APTITUDE TEST
COURSE CODE	: 172EE58

TEACHING AND EXAMINATION SCHEME:

TEACHING SCHEME				EXAMINATION SCHEME											
L	T	P	CR	PAPER HRS	TH		IST	TOTAL		PR		OR		TW		TOTAL MARKS
					Max	Min		Max	Min	Max	Min	Max	Min	Max	Min	
		2	2													

@- Assessment by Internal Examiner **-Assessment by External and Internal Examiner

Course Objectives:

After studying this subject, students will be able to

1) This course aims to sensitize students with the gamut of skills which facilitate them to enhance their employability quotient and do well in the professional space.
2) These skills are imperative for students to establish a stronger connect with the environment in which they operate.
3) An understanding of these skills will enable students to manage the placement challenges more effectively.

Course Outcomes:

Student should be able to

CO1	Evaluate critically the real life situations by resorting and analyzing of key issues and factors
CO2	Utilize their innovative thinking skills to project themselves for finding fresh approaches towards tribulations
CO3	Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions
CO4	Make and evaluate the assumptions used in analyzing quantitative data

Course Content:

SECTION-I								
Unit & Sub-Unit	**Topics/Sub-topics**		**Hours**	**Marks**	**CO**	**R Level**	**U Level**	**A Level**
1	**Quantitative Aptitude**		4	-	1	30%	40%	30%
	1.1	Number System						
	1.2	Speed and Distance						
	1.3	Ratio Proportion Variation						
	1.4	Averages Mixtures and Allegation						
	1.5	Time and Work						
	1.6	Percentages						
	1.7	Profit and Loss						
	1.8	Simple and Compound Interest						
	1.9	Fractions						
	1.10	Boats and Streams						
	1.11	Partnership						
	1.12	Progression						
	1.13	Permutation and Combination						
	1.14	Probability						
	1.15	Geometry and Mensuration						
	1.16	Simplification						
	1.17	Surds and Indices						
	1.18	LCM and HCF						
	1.19	Pipes and Cistern						
	1.20	Height and Distance						
2	**Reasoning**		10	-	1,2, 3	20%	40%	40%
	2.1	Blood Relations						
	2.2	Number Series						
	2.3	Circle Seating Arrangement						
	2.4	Cubes						
	2.5	Dices						
	2.6	Clocks						
	2.7	Analogy						
	2.8	Data related puzzles						
	2.9	Straight line or face to face or two line seating						
	2.10	Syllogisms						
	2.11	Letter Series						
	2.12	Coding-Decoding						
	2.13	Directions						

	2.14	Logical reasoning						
	2.15	Analytical reasoning						
	2.16	Odd-one out						
	2.17	Venn Diagrams						
	2.18	Input-Output problems						
	2.19	Floor based puzzles						
	2.20	Ranking						
SECTION-II								
3	**English**		10	-	1	50%	40%	10%
	3.1	Reading Comprehension						
	3.2	Usage of words						
	3.3	Reading Comprehension						
	3.4	Error spotting						
	3.5	Ordering						
	3.6	Preposition & Conjunctions						
	3.7	Cloze Test						
	3.8	Tenses						
	3.9	Sentence formation						
	3.10	Synonyms & Antonym						
4	**Group Discussion**		8	-	1,2, 3,4	20%	20%	60%
	4.1	**GD Topics on Abstract Topics:** These are the topics which have multiple interpretations and candidates can show their creativity and smart thinking						
	4.2	**GD Topics on Business & Economy:** It includes current trends in business and economy, major policy initiatives, latest business trends, and their impact globally and nationally.						
	4.3	**GD Topics on Current Affairs & Politics:** The GD topics on Current affairs may be based on national or international political development, Policies and issues which are highly debated in media.						
5	**Mock Interviews:**		6	-	1,2, 3	40%	40%	20%
	5.1	A telephone interview						
	5.2	A face to face interview						
	5.3	A Skype interview						
	5.4	A video interview						
	5.5	A practice of your presentation						

Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms' Revised Taxonomy).

Text Books:

Sr. No.	Author	Title	Publisher and Edition
1	R S Aggarwal	A modern approach to Verbal & Non - Verbal Reasoning	S. Chand
2	R S Aggarwal	Quantitative Aptitude	S. Chand.

Reference books and Websites:

Sr. No.	Author	Title	Publisher and Edition
1	AbhijitGuha	Quantitative Aptitude for Competitive Examinations	McGraw Hill Education
2	G.K.P	A Complete Reference Book General Aptitude	GK Publication

Additional Resources

1) http://indiabix.com
2) http://tamilcube.com/career/aptitude-test/verbal-reasoning
3) http://www.careerbless.com/aptitude/qa/home.php
4) http://www.mastguru.com/arithmetic-aptitude-questions-answers/sub-topic/8
5) http://www.aptitude-test.com/
6) http://placement.freshersworld.com/power-preparation/Aptitude-Preparation

Subject Coordinator

Curriculum Coordinator **Head** **Dean-Diploma**

Diploma in Electrical Engineering

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE MATUNGA MUMBAI - 19