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 Name: Diploma In Electrical Engineering

Programme Code	**: DEE**	**With Effect From Academic Year**	**: 2024-25**
Duration of Programme	**: 6 Semester**	**Duration**	**: 16 WEEKS**
Semester	**: Fifth**	**Scheme**	**: R-2023**

Sr No	Course Title	Abbreviation	Course Type	Course Code	Total IKS Hrs for Sem.	Learning Scheme					Credits	Assessment Scheme												
						Actual Contact Hrs./Week			Self Learning (Term Work + Assignment)	Notional Learning Hours /Week		Paper Duration (hrs.)	Theory					Based on LL & TL				Based on Self Learning		Total Marks
																		Practical						
						CL	TL	LL					FA-TH(MST)	SA-TH (ESE)		Total		FA-PR(CA)		SA-PR (PR/OR)		SLA		
													Max	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	
1	INDUSTRIAL TRAINING	IT	INP	232EE51		-	-		-	-	4	-	-	-	-	-	-	100@	40	100#	40	-	-	200
2	POWER SYSTEM-1I	PS-II	DSC	232EE52		3	2			5	2.5	3	30	70	28	100	40	25@	10	25#	10	-	-	150
3	ILLUMINATION ENGINEERING	IE	DSC	232EE53		3	2			5	2.5	3	30	70	28	100	40	25@	10	25#	10	-	-	150
4	ESTIMATION AND COSTING	E&C	DSC	232EE54		3		2		5	2.5	3	30	70	28	100	40	25@	10	25#	10	-	-	150
5	POWER ELECTRONICS	PE	DSC	232EE55		3		3		6	3	3	30	70	28	100	40	25@	10	25#	10	-	-	150
6	ELECTIVE-I	-	DSC			3		2		5	2.5	3	30	70	28	100	40	25@	10	25#	10	-	-	150
7	PROJECT(Mini Project)	-	INP	232EE57				6		6	3							50@	20	50#	20	-	-	100
Total						**15**	**04**	**13**		**32**	**20**		**150**	**350**		**500**		**275**		**275**		-	-	**1050**

Abbreviations: CL- Classroom Learning, TL- Tutorial Learning, LL-Laboratory Learning, FA - Formative Assessment, SA -Summative Assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# Online Examination, @$ Internal Online Examination

Course Category: Discipline Specific Course Core (DSC): 2, Discipline Specific Elective (DSE): 0, Value Education Course (VEC): 1, Intern. /Apprenti./Project./Community (INP) : 0, Ability Enhancement Course (AEC) : 2, Skill Enhancement Course (SEC) : 2, Generic Elective (GE) : 0

Curriculum Coordinator

Head of Electrical Engineering (DEE)

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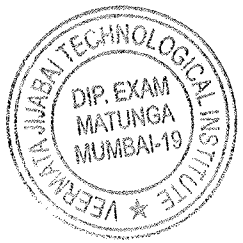
Dean Diploma

List of electives for Semester V

Serial No.	Course Code	Course Title
1.	232EE56E1	RENEWABLE ENRGY
2.	232EE56E2	PRINCIPLE OF COMMUNICATION ENGINEERING
3.	232EE56E3	ELECTRIC VEHICLE TECHNOLOGY
4.	232EE56E4	POWER SYSTEM ANALYSIS



DIPLOMA PROGRAMME	**DIPLOMA IN ELECTRICAL ENGINEERING**
PROGRAMME CODE	**: DEE**
SEMESTER	**: FIFTH**
COURSE TITLE	**: INDUSTRIAL TRAINING**
COURSE CODE	**: 232EE51**

I. TEACHING AND EXAMINATION SCHEME

ourse Code	Course Title	Abbreviation	Course Category	Learning Scheme					Credits	Assessment Scheme												
				Actual Contact Hrs.						Paper Duration	Theory					Based on LL & TSL				Based on SL		Total Marks
																Practical						
				CL	TL	LL	SLH	NLH			FA-TH (MST)	SA-TH (ESE)		Total		FA-PR		SA-PR		SLA		
											Max	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	
32EE51	INDUSTRIAL TRAINING	IT	INP	-	-	-	-	-	4	-	-	-	-	-	-	100 @	40	100 #	40	-	-	200

Total IKS Hrs for Sem.: 00 Hrs
Abbreviations: CL- Classroom Learning, TL- Tutorial Learning, LL-Laboratory Learning, FA - Formative Assessment,SA -Summative Assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# Online Examination, @$ Internal Online Examination

Total IKS Hrs for Sem.: - Hrs

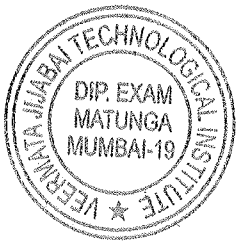
Abbreviations : CL- Classroom Learning , TL- Tutorial Learning, LL-Laboratory Learning, FA - Formative Assessment,SA -Summative Assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends : @ Internal Assessment, # External Assessment, *# Online Examination , @$ Internal Online Examination

Course Category : Discipline Specific Course Core (DSC) : 3, Discipline Specific Elective (DSE) : 0, Value Education Course (VEC) : 1, Intern./Apprenti./Project./Community (INP) : 0, AbilityEnhancement Course (AEC) : 2, Skill Enhancement Course (SEC) : 2, Generic Elective (GE) : 0

II. RATIONALE

The industry training is aimed to impart employable skills in the respective field to get a job/employment. Students are expected to learn the work practice and environment of the respective industry and develop a report. On the basis of this report the institute departments will evaluate the student performance.



III. COURSE OUTCOMES (COs)

Students will be able to achieve the following COs on completion of course based learning

- CO1 - Gain hands-on experience in applying theoretical concepts to real-world tasks, improving their understanding and problem-solving abilities and readiness for the workforce.
- CO2 - Boosts students' self-confidence and encourages them to pursue ambitious career goals. to earn a livelihood for a better status in society.
- CO3 - Interact with industry professionals during training to build valuable connections for job opportunities.

IV. GENERAL GUIDELINES FOR ORGANISING INDUSTRIAL TRAINING

The Industry/organization selected for Industrial training/ internships shall be Government / Public Limited/ Private limited / Startup /Centre of Excellence/Skill Centers/Skill Parks etc.

a) Duration of Training - 8 weeks students engagement time (Min. 28-30 hrs./week)
b) Period of Time slot - After 4th Semester
c) Industry area - Engineering Programme Allied industries of large, medium or small-scale, Organization / Govt. / Semi Govt Sectors.

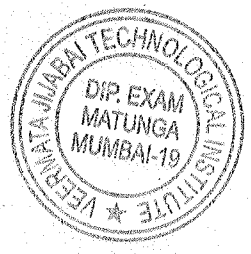
Role(s) of Training and Placement Office (TPO)- Diploma Programs at the Institute:

The TPO - Diploma Programs shall be responsible for placing the student for industrial training which shall be a Government / Public Limited/ Private limited / Startup /Centre of Excellence/Skill Centers/Skill Parks etc.

Role(s) of the respective Heads of Department- Diploma / / Industrial Training Supervisor(s):

1. Concerned **Head of Department - Diploma** shall appoint a Faculty Industrial Training Coordinator, who can be a permanent / ad-hoc / contractual faculty of the respective department in their departmental faculty meetings before the start of the Mid semester Test for Fourth Semester.
   Heads of Department - Diploma shall send the decided names of the Departmental Faculty Industrial Training Coordinator to the TPO - Diploma Programs before the start of the Mid Semester Test of the Fourth Semester.

2. The **Faculty Industrial Training Coordinator shall** coordinate with the TPO- Diploma Programs and ensure that all the students of their respective departments are placed by the TPO - Diploma Programs. He/She shall allocate Faculty supervisors to all the students undergoing Industrial Training in their respective departments in consultation with the Diploma Head of Department.



Before the scheduled date as decided by the Diploma Exam Section they shall collect and compile the marks received from the respective Faculty Supervisors for all the students that have undergone the Industrial Training that semester.

The marks shall be submitted to the Diploma Exam Section and the required entries made in the software as per the regular instructions from the Diploma Exam Section. A self signed copy of the final compiled marksheet shall be submitted to the TPO - Diploma Programs and the Diploma Head of Department for records.

3. **Faculty Supervisors** shall coordinate with the allocated industry/organisation and monitor the attendance and progress of the students allocated to them. They shall acquire the undertaking from Parents/Guardians(Format 1) and Student(Format 2). They shall ensure to maintain all records like Internship Diary of each student and complete the evaluation for the students allocated to them in consultation with the **Faculty Industrial Training Coordinator and the Diploma Head of Department**. Maintain the final report submitted by the students at the end of their evaluation. They shall submit the marks to the respective **Departmental Faculty Industrial Training Coordinator.**

Role(s) and Responsibilities of students:

a) Students shall interact with the **Faculty Supervisors** allocated to them for suggestions on Industrial Training choices of suitable industry, if any. If students have any contact in industry through their parents or relatives then the same may be utilized for securing placement for themselves and their peers through proper documentation through their Faculty Supervisors and TPO Diploma Programs.

b) Students have to obtain the forms/formats duly signed by institutional authorities along with a training letter and submit it to the training officer/mentor in the industry on the first day of training.

c) Students must submit the undertaking as provided in Format 1 and Format 2 to their faculty Supervisors.

d) Students must carry with him/her Identity card issued by the institute during the training period.

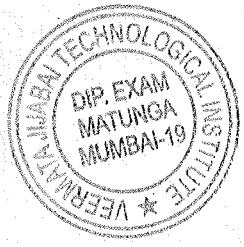
e) Students should follow industrial dressing protocols, if any. In absence of specific protocol students must wear appropriate uniform compulsorily as required by the industry.

f) Students will have to get all necessary information from the training officer/mentor at industry regarding schedule of training, rules and regulation of the industry and safety norms to be followed. Students are expected to observe these rules, regulations and procedures strictly.

g) Students must be fully aware that if they disobey any rule of industry or do not follow the discipline then non-disciplinary action will be taken.

h) Students must maintain a weekly diary (Format 3) by noting daily activities undertaken and get it duly signed from Industry mentor or Industrial training in charge.

i) In case students face any major problems in industry such as an accident or any disciplinary issue then they should immediately report the same to their Faculty Supervisor.



j) Prepare a final report about the training for submission to the department at the time of evaluation, presentation and viva-voce etc. and get it signed by the Faculty Supervisor, Departmental Faculty Industrial Training Coordinator and Diploma Head of Department.

Typographical guidelines for Industry Training report:

Following is the suggestive format for preparing the training report.Actual report may differ slightly depending upon the nature of industry. The training report may contain the following

a) The training report shall be computer typed (English-British) and printed on A4 size paper.
b) Text Font -Times New Roman (TNR), Size-12 point
c) Subsection heading TNR- 12 point bold normal
d) Section heading TNR- 12 capital bold
e) Chapter Name/ Topic Name – TNR- 14 Capital
f) All text should be justified. (Settings in the Paragraph)
g) The report must be typed with 1.5 spacing with a margin 3.5 cm on the left, 2.5 cm on the top, and 1.25 cm on the right and at bottom.
h) The training report must be Spiralbound. The name of the candidate, diploma (department), year of submission, name of the institute shall be printed on the cover [Refer sample sheet . (outer cover)]
i) The training report, the title page should be given first then the Certificate followed by the acknowledgment and then contents with page numbers.

Suggestive format of industrial training report:

Following format may be used for training reports. Actual format may differ slightly depending upon the nature of Industry/ Organization.

- Title Page Certificate Abstract
- Acknowledgement
- Content Page

Chapter 1

Organization structure of Industry and general layout.

Chapter 2

Introduction to Industry / Organization (history, type of products and services, turn over and number of employees etc.)

Chapter 3

Types of Major Equipments/raw materials/ instruments/machines/ hardware/software used in industry with their specifications, approximate cost, specific use and routine maintenance done

Chapter 4

Processes/ Manufacturing Manufacturing techniques and methodologies and material handling procedures

Chapter 5

Testing of Hardware/Software/ Raw materials/ Major material handling product (lifts, cranes, slings, pulleys, jacks, conveyor belts etc.) and material handling procedures.

Chapter 6

Safety procedures followed and safety gears used by industry.

Chapter 7

Particulars of Practical Experiences in Industry/Organization if any in Production/Assembly/Testing/Maintenance

Chapter 8

Detailed report of the tasks undertaken (during the training).

Chapter 9

Special/challenging experiences encountered during training if any.

Chapter 10

Conclusion

Chapter 11

References / sources of information

NOTE: The above Format is only a guideline and the Chapters may change as per the Industry and Department of Training received.

Format-1
Consent Letter from parents/guardians
(Undertaking from Parents)

To,
The Diploma Head of Department,

_____.

Subject: Consent for Industrial Training

Sir/Madam,
I am fully aware that -

1. My ward studying in _____semester at your institute has to undergo _____weeks of Industrial training for partial fulfillment towards completion of Diploma in Engineering.
2. For this fulfillment he/she has been deputed at _____industry, located at _____ for Industrial training /Internship for the period from_____ to _____.

With respect to above I give my full consent for my ward to travel to and from the mentioned industry. Further I undertake that –

1. My ward will undergo the training at his/her own cost and risk during training and/or stay during the period of training.
2. My ward will be entirely under the discipline of the organization where he/she will be placed and will abide by the rules and regulations in face of the above mentioned industry.
3. My ward is NOT entitled to any leave during the training period.
4. My ward will regularly submit a prescribed weekly diary, duly filled and countersigned by the training supervisor of the industry to the faculty supervisor of the department.

I have explained the contents of the letter to my ward,who has also promised to adhere strictly to the requirements. I assure that my ward has been properly instructed by me to take his own care to avoid any accidents / injuries in the industry. In case of any accident neither industry nor the institute will be held responsible.

Signature of Parent/Guardian :_____ Signature of the student: _____

Name : _____ Name of the Student: _____

Address : _____ Registration No: _____

Phone Number:_____ Phone Number of student: _____

Place and Date : _____

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Format-2

Undertaking by the Student

To,
The Diploma Head of Department,

_____Department.

Subject: Undertaking regarding Placement for Industrial training of 8 weeks duration

I _____Registration No_____S/o/D/o_____

studying in _____ Department at Veermata jijabai Technological Institute am fully aware of the Industrial Training requirements and related responsibilities and participation in the Industrial training at _____ (Industry Name and Place).

From: _____To_____

I assure you that I will be of good behavior and be obedient to the staff and mentor during the training period mentioned above. I will also abide by and will not participate in irresponsible activities. I will also discipline myself within the rules and regulations of the Institution. I am also aware that I am participating in the Industrial Training at my own risk and I will not hold Veermata Jijabai Technological Institute responsible in any way in any eventuality namely Accident /Injury/death or whatever mishap and I myself will be solely responsible for my safety.

Place : _____ Signature of the student: _____

Date : _____

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Format 3

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE

[Central Technological Institute, Maharashtra state]

Matunga, Mumbai-400019

DIARY

Industrial Training and Internship

DEPARTMENT OF _____ ENGINEERING

Year: _____

Name of Industry: _____

Address: _____

Contact No. of Industry Mentor _____

Name of the Student: _____

Registration No. _____

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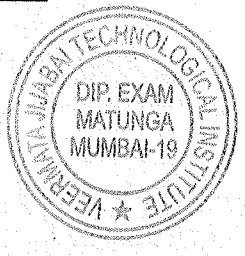
WEEK NO. ___

Date	Details of Work Allotted	Sign of Industry Mentor

Institute Faculty Supervisor's Name: _____

Signature:_____



V. ASSESSMENTS METHODOLOGIES /TOOLS

1. Formative assessment (Assessment for Learning)

   Academic year : 20___-20___

   Name of the industry: _____

   Marks : Max 100, Min 40

   Based on the following:

   - Weekly reports of the Internship Diary in the given format to the Faculty Supervisors (Marks:).
   - Behaviour at the Industry (Marks:).
   - Feedback from the Industry Mentor (Marks:).

   Name of mentor : _____

   Signature of Mentor : _____

2. Summative Assessment (Assessment of Learning)

   Academic year : 20___-20___

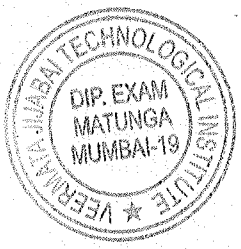
   Name of the industry: _____

   Marks : Max 100, Min 40

Sr No	Registration No	Name of the Student	Observations from Orals/Presentations				Total Marks Obtained Out of 100
			Knowledge about Industry & Departments (Marks:)	Knowledge of Layout/M/C Specifications / Components etc (Marks:)	Skill Developed Presentation / Discipline etc. (Marks:)	Submitted Report (Marks:)	

Name of mentor : _____

Signature of Mentor : _____



VI. SUGGESTED COS-POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)			
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3	PSO-4
CO1	2	3	1	-	1	-	2	2	3	1	2
CO2	1	3	2	3	-	-	2	2	-	1	2
CO3	1	3	2	3	-	-	2	2	1	1	2

Curriculum Coordinator **Head of the Department** **Dean Diploma**
Diploma in Electrical Engineering

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DIPLOMA PROGRAMME	: DIPLOMA IN ELECTRICAL ENGINEERING
PROGRAMME CODE	: DEE
SEMESTER	: FIFTH
COURSE TITLE	: POWER SYSTEM II
COURSE CODE	:232EE52

I. TEACHING, LEARNING AND EXAMINATION SHCEME:

Course Code	Course Title	Abbre vation	Course Categ ory	Learning Scheme					Cr edi ts	Pa per Du rat io n	Assessment Scheme											
				Actual Contact Hrs.			S L H	N L H				Theory				Based on LL & TSL Practical				Based on SL		Tot IM rks
				CL	TL	LL					FA-TH (MST)	SA-TH (ESE)		Total		FA-PR		SA-PR		SLA		
											Max	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	
232EE52	POWER SYSTEM II	PS-II	DSC	3	2	-	-	5	2.5	03	30	100	28	100	40	25 @	10	25 #	10	-	-	15

Total IKS Hrs for Sem.: 00 Hrs

Abbreviations: CL- Classroom Learning, TL- Tutorial Learning, LL-Laboratory Learning, FA - Formative Assessment, SA -Summative Assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# Online Examination, @$ Internal Online Examination

II. COURSE OBJECTIVES:

1. To have a profound knowledge of power system
2. To be able to understand the faults of the power system
3. Compare advantages, limitations, and applications of EHVAC and HVDC.
4. Understand fault calculations and protection mechanisms.

III. COURSE OUTCOMES:

Student should be able to

CO1	Identify and analyze different types of transmission lines.
CO2	Understand fault calculations and protection mechanisms.
CO3	Interpret real-world case studies of transmission line failures and improvements.

IV. 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			1	40%	30%	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.						
	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.						
	2.5	Numerical on 1-phase & 3-phase Short Transmission line, Calculate Efficiency & Percentage Regulation						
	2.6	Analysis of Short transmission line: Equivalent Circuit & Vector Diagram (No Mathematical Treatment).			1	20%	40%	40%
	2.7	Analysis of Medium transmission line: Equivalent Circuit with Nominal 'T', Nominal 'π', and End Condenser Method, its Phasor diagram (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). Evaluation of ABCD parameters, Ferranti Effect.						
3		**E.H.V.A.C and H.V.D.C Transmission Systems**			1	40%	30%	30%

	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.						
	3.4	Advantages, Limitation & Application of High Voltage DC (HVDC) Transmission Line.						
	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.						
SECTION -II								
4		**Faults**			2			
	4.1	Symmetrical Fault, Symmetrical components						
	4.2	Unsymmetrical Faults. Single Line to Ground Fault Line to Line Fault Double Line to Ground Fault.				20%	40%	40%
	4.3	Calculations and problems on above faults.						
5		**Corona**						
	5.1	The Phenomenon of Corona.						
	5.2	Disruptive Critical Voltage Visual Critical Voltage.			3	40%	30%	30%
	5.3	Corona Loss Factors and conditions affecting Corona Loss Radio Interference due to Corona Loss.						
6		**Economic Load Dispatch**			**3**			
	6.1	Introduction of load dispatch				40%	30%	30%
	6.2	Necessity of load dispatch						

V. LIST OF ASSIGNMENTS/TUTORIALS:

Sr. No.	Unit	Tutorials	Approx. Hours	CO
1	1,2,4	Numerical on the topics	2	1,2,3
2	2,4	Case-study of different transmission lines.	2	1

3	3,4	Case-study of faults	2	2
4	1,2,3,4	5 assignments on the syllabus	2	1,2,3

VII. ASSESMENTS METHODOLOGIES /TOOLS

Formative assessment (Assessment for Learning)

- Tutorials
- Midterm Test Exam
- Self-learning
- Term Work
- Seminar/Presentation

Summative Assessment (Assessment of Learning)

- End Term Exam
- Micro-project/Assignments

Tutorial Performance

VIII. REFERENCE BOOKS AND WEBSITES:

Sr. No.	Author	Title	Publisher and Edition
1	I.J. Nagrath & D. P. Kothari	Modern Power system analysis	4" 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	7" edition, New Age Internationals

Websites:

1. **https://www.youtube.com/watch?v=HI5xq0EdpeA**
2. **https://www.youtube.com/watch?v=0CPOzcYBTX8**
3. **https://www.youtube.com/watch?v=Sw9OW21jPS8&t=2584s**
4. **https://www.youtube.com/watch?v=5bVNOA3oSZg**
5. **https://www.youtube.com/watch?v=WtzAhCrK5Mo**
6. **https://www.youtube.com/watch?v=57axhRZETp0&list=PLe8lX1SLwAPG_ssxiyipma2oHqeusP3co&index=20**
7. **https://www.youtube.com/watch?v=WK8DmdNo2hE&list=PLe8lX1SLwAPG_ssxiyipma2oHqeusP3co&index=38**
8. **https://www.youtube.com/watch?v=kPtVND9H_wM&list=PLe8lX1SLwAPG_ssxiyi**

pma2oHqeusP3co&index=43

9. https://www.youtube.com/watch?v=FOr1y8usiHA&list=PLe8lX1SLwAPG_ssxiyipma2oHqeusP3co&index=44
10. https://www.youtube.com/watch?v=PIvfgncUPXQ&list=PLe8lX1SLwAPG_ssxiyipma2oHqeusP3co&index=49
11. https://www.youtube.com/watch?v=Z51mNqBOOnA&list=PLe8lX1SLwAPG_ssxiyipma2oHqeusP3co&index=51
12. https://www.youtube.com/watch?v=Z0_KlGqm30M&list=PLe8lX1SLwAPG_ssxiyipma2oHqeusP3co&index=81

XI. COs POs Matrix

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)			
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO- 2	PSO - 3	PSO - 4
CO1	2	3	1	-	1	-	2	2	3	-	-
CO2	1	3	2	3	-	-	2	2	-	-	-
CO3	1	3	2	3	-	-	2	2	1	-	2

Curriculum Coordinator

Head of the department
Diploma in Electrical Engineering

Dean-Diploma

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE
DIP. EXAM
MATUNGA
MUMBAI-19

DIPLOMA PROGRAMME	: DIPLOMA IN ELECTRICAL ENGINEERING
PROGRAMME CODE	: DEE
SEMESTER	: FIFTH
COURSE TITLE	: ILLUMINATION ENGINEERING
COURSE CODE	:232EE53

I. TEACHING, LEARNING AND EXAMINATION SHCEME:

Course Code	Course Title	Abbrevation	Course Category	Learning Scheme					Credits	Paper Duration	Assessment Scheme											
				Actual Contact Hrs.			SLH	NLH				Theory				Based on LL & TSL Practical				Based on SL		Total Marks
				CL	TL	LL					FA-TH (MST)	SA-TH (ESE)		Total		FA-PR		SA-PR		SLA		
											Max	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	
232EE53	ILLUMINATION ENGINEERING	IE	DSC	3	2			5	2.5	03	30	70	28	100	40	25 @	10	25 #	10			150

Total IKS Hrs for Sem.: 00 Hrs

Abbreviations: CL- Classroom Learning, TL- Tutorial Learning, LL-Laboratory Learning, FA - Formative Assessment,SA -Summative Assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# Online Examination, @$ Internal Online Examination

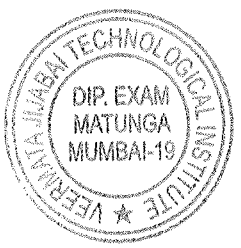
II. COURSE OBJECTIVES:

1) Understand the meaning of the terms used in illumination engineering.
2) To get detailed insight of indoor and outdoor illumination system components, its controls and design aspects.
3) To know the requirements of energy efficient lighting.
4) To introduce the modern trends in the lighting.

III. COURSE OUTCOMES:

Student should be able to

CO1	Define and reproduce various terms in illumination.
CO2	Identify various parameters for illumination system design.
CO3	Design indoor and outdoor lighting systems.
CO4	Study requirements of illumination levels and modem trends for various applications



IV. COURSE CONTENT:

SECTION-I								
Unit & Sub-Unit		Topics/Sub-topics	Hours	Marks	CO	R Level	U Level	A Level
1		**Fundamentals of Illumination**	6	7	1	30%	40%	30%
	1.1	Identify and measure the level of illumination, Design illumination schemes						
	1.2	Illumination terminology: Illumination, Light intensity, Lumen, Lux.						
	1.3	Laws of Illumination (Simple numerical, Features of good Illumination scheme, Advantages of good Illumination scheme, Good and bad effects of lighting & perfect level of illumination						
2		**Lamps & Lighting Accessories**	12	13	1,2, 3	40%	30%	30%
	2.1	Lamp materials: Filament, glass, ceramics, gases, phosphors and other metals and non-metals.						
	2.2	Discharge Lamps: Theory of gas Discharge phenomena,lamp design considerations, characteristics of low and high mercury and Sodium vapor lamps, Low Vapor Pressure discharge lamps — Mercury Vapor lamp, Fluorescent Lamp, Compact Fluorescent Lamp (CFL)						
	2.3	High Vapour Pressure discharge lamps – Mercury Vapour lamp, Sodium Vapour lamp, Metal halide Lamps, Solid Sodium Argon Neon lamps, SOX lamps, Electro luminescent lamps, Induction lamps						
	2.4	Construction, working principle advantages and disadvantages of all lamps						
	2.5	a. Watt square method b. Lumens or light flux method c. Point to point method (Simple numerical)						
3		**Electrical Control of Light Sources:**	10	15	1,2, 3	40%	30%	30%
	3.1	Purpose of lighting control						

		Working principle and operation of Dimmer - a. Resistance type dimmer b. Salt water dimmer Dimmer Transformer 1) Auto transformer dimmer 2) Two winding transformer dimmers						
	3.2	Modern control technique: Electronic Dimmer: working principle and operation a. Thyristor operated dimmer b. Triac operated dimmer						
	3.3	Methods used for light control: Control circuits for lamps: single lamp controlled by single switch, two switches. Single Lamp control by two-point method, three-point method & four-point method.						
SECTION –II								
4		**Illumination for Interior Applications**	10	15	3	35%	35%	30%
	4.1	Standards for various situations in Interior Illumination, Methods for Designing illumination schemes						
	4.2	Design considerations for Interior location of Residential, Commercial, Industrial premises, Design Illumination scheme for different Interior locations of Residential, Commercial, Industrial unit, Special purpose lighting schemes Decorative lighting, Theatre lighting Aquarium, swimming pool lighting.						
	4.3	Numerical based on Determination of Lamp Lumen output taking into account voltage and temperature variations, Calculation *of* wattage of each lamp and no of lamps needed, Layout of lamp luminaire, Calculation of space to mounting height ratio						
	4.4	Indian standard recommendation and standard practices for illumination levels in various areas, Special feature for entrance, staircase, Corridor lighting and industrial building						

5		**Illumination for Outdoor Applications**	8	10	3	30%	35%	35%
	5.1	Outdoor Lighting Design: Road classifications according to BIS, pole arrangement, terminology, lamp and luminaire selection, different design procedures, beam lumen method, point by point method, Isolux diagram, problems on point by point method.						
	5,2	General requirements for lighting schemes 1. factory Lighting 2. Street Lighting 3. Flood Lighting 4. Railway platform Lighting 5. Lighting for Advertisement/Hoardings 6. Sports Lighting						
6.		**Modern trends in illumination**	6	10	1,2, 3,4	50%	25%	25%
	6.1	LED luminary designs 1. Intelligent LED fixtures 2. Natural light conduiting						
	6.2	Organic lighting system LASERS, characteristics, features and applications						
	6.3	Optical fiber, its construction as a light guide, features and applications						

V. LIST OF ASSIGNMENTS/TUTORIALS:

Sr. No.	Practical/ Assignment	Approx. Bours	CO
I	Estimate and compare luminous efficiency of incandescent and compact fluorescent lamp.	03	3
2	Compare performance of magnetic and electronic ballast. Estimate the energy saving with electronic ballast.	03	1,2,3
3	Understand energy efficient illumination equipment's	03	3
4	Design illumination scheme for any one of the following. (A) Mall (B) Cloth shop (C) Restaurant(D) Show-room Write a report on illumination scheme used in industry by visiting small or medium.	03	1,2,3,4

5	Conduct illumination assessment in workplace using lux meter.	03	1,3
6	Understand biological implication of artificial illumination.	03	3,4

VII. ASSESMENTS METHODOLOGIES /TOOLS

Formative assessment (Assessment for Learning)

- Tutorials
- Midterm Test Exam
- Self-learning
- Term Work
- Seminar/Presentation

Summative Assessment (Assessment of Learning)

- End Term Exam
- Micro-project/Assignments

Tutorial Performance

VIII. REFERENCE BOOKS AND WEBSITES:

Sr. No.	Author	Title	Publisher and Edition
1	H.S. Mamak	Book on Lighting	Publisher International lighting Academy
2	Joseph B. Murdoch	Illumination Engineering from Edison's Lamp to Lasers	York, PA Visions Communications
3	M.A. Cayless , A.M. Marsden,	Lamps and Lighting	Publisher-Butterworth-Heinemann(ISBN 978-0-415-50308-2)
4	Designing with light	Lighting Handbook	Anil Valia; Lighting System 2002
5	N. V. Suryanarayana	Utilisation of Electrical	Power Wiley Eastern Limited

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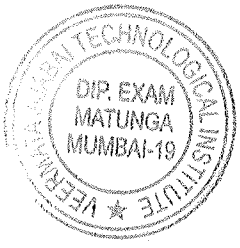


IX. COs POs Matrix

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)			
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO- 2	PSO - 3	PSO - 4
CO1	2	3	2	2	2	-	1	2	3	-	-
CO2	2	2	-	-	-	-	1	2	-	-	-
CO3	2	3	3	-	-	-	1	2	1	-	2
CO4	2	3	3	2	2	2	1	2	3	-	-

Curriculum Coordinator

Head of the department
Diploma in Electrical Engineering

Dean-Diploma

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE
DIP. EXAM
MATUNGA
MUMBAI-19

DIPLOMA PROGRAMME	: DIPLOMA IN ELECTRICAL ENGINEERING
PROGRAMME CODE	: DEE
SEMESTER	: FIFTH
COURSE TITLE	: ESTIMATION & COSTING
COURSE CODE	: 232EE54

I. TEACHING, LEARNING AND EXAMINATION SHCEME:

Course Code	Course Title	Abbrevation	Course Category	Learning Scheme					Credits	Paper Duration	Assessment Scheme											
				Actual Contact Hrs.			SLH	NLH				Theory				Based on LL & TSL Practical				Based on SL		Total Marks
											FA-TH (MST)	SA-TH (ESE)		Total		FA-PR		SA-PR		SLA		
				CI	TI	LL					Max	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	
2EE54	ESTIMATION & COSTING	E & C	DSC	3	2			5	2.5	03	30	70	28	100	40	25@	10	25#	10			150

Total IKS Hrs for Sem.: 00 Hrs

Abbreviations: CL- Classroom Learning, TL- Tutorial Learning, LL-Laboratory Learning, FA - Formative Assessment,SA -Summative Assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# Online Examination, @$ Internal Online Examination

II. COURSE OBJECTIVES:

After studying this subject, students will be able to

1) Understand the purpose of Estimation and costing of electrical installations and Indian Electricity rules.
2) Read & interprets Electrical Installation drawings of residential, Commercial and industrial buildings.
3) Use data tables & specification of wire, cables, LT lines & Distribution Transformer, MCCB, ELCB.
4) Understand the concept of contract and tendering.

III. COURSE OUTCOMES:

Student should be able to

CO1	To prepare estimate of quantity and cost for an electrical project according to IE Rules-2003
CO2	To prepare estimate and costing of Residential, commercial and industrial installations
CO3	To prepare estimate and costing of distribution and transmission lines in Indian power system

IV. COURSE CONTENT:

SECTION-I								
Unit & Sub-Unit		Topics/Sub-topics	Hours	Marks	CO	R Level	U Level	A Level
1		**General principles of Estimation**	4	8	CO1,3	40%	30%	30%
	1.1	Introduction to estimation & costing						
	1.2	Electrical Schedule. Catalogues, Market Survey, source Selection, Recording of estimates, overhead charges, Profit						
	1.3	Qualities of a good estimator, essential elements of good estimator essential elements of good estimator						
	1.4	Purchase system, Purchase enquiry and selection appropriate purchase mode						
	1.5	Comparative statement, Purchase orders, Payment of bills. Tender form						
	1.6	General idea about IE rules, Indian Electricity Act and major applicable I.E rules for purpose, estimation and costing						
2		**Residential building Electrification**	10	16	CO1,2,3	30%	30%	40%
	2.1	General Rules guidelines for wiring of residential installation and positioning of equipment's, Principles of circuit design in lighting and power circuits						
	2.2	Method of drawing single Line diagram, Selection of type of wiring and rating of wires and cables, Load calculations and selection of size of conductor, Selection of rating of main switch						
	2.3	Selection of rating of Distribution board, protective switchgear ELCB and MCB and wiring accessories						
	2.4	Earthing of residential Installation, Sequence to be followed for preparing estimate, Preparation of detailed estimates and costing of residential installation						
3		**Electrification of Commercial and Industrial Installation**	10	16	CO1,2,3	30%	30%	40%
	3.1	Concept of commercial installation, Differentiate between electrification of residential and commercial installation						

	3.2	Fundamental considerations for planning of an electrical installation system for commercial building and industries						
	3.3	Design considerations of electrical installation system for commercial building and industries						
	3.4	Load calculation and selection of size of service Connection and nature of supply.						
	3.5	Deciding the size of the cables, bus bar and bus bar chambers, Mounting arrangements and positioning of switchboards, distribution boards main switch etc,						
	3.6	Selection of type wire, wiring system and layout, Earthing of the electrical installation						
	3.7	Sequence to be followed to prepare estimate Preparation of detailed estimate and costing of Commercial installation						
4		**Design and estimation of overhead transmission & Distribution lines**						
	4.1	Introduction, Typical AC electrical power system, Main components of overhead lines, Line supports.						
	4.2	Overhead line insulators, Insulator materials, Types of insulators, Lightning Arrestors, Phase plates, Danger plates, Anti climbing devices, Bird guards, Beads of jumpers, Points to be considered of supports	10	16	CO1,3	30%	40%	30%
	4.3	Factors governing height of pole, Conductor materials Determination of size of conductor for overhead transmission line, Cross arms, Pole brackets and clamps, Guys and Stays, Conductors configuration spacing and clearances						
	4.4	Preparation of detailed estimate and costing of distribution line and transmission line (case study)						
5		**Design and Estimation of Substations**						
	5.1	Introduction, Classification of substation, Indoor substations, Outdoor substations, Selection and location of site for substation	8	12	CO1,3	40%	30%	30%
	5.2	Main Electrical Connections, Graphical symbols for various types of apparatus and circuit elements on substation main connection diagram						
	5.3	Key diagram of typical substations.						

	5.4	Equipment for Substation and switchgear installations, Substation auxiliaries supply, Substation Earthing						
6		**Contracts, Tenders and Execution**	6	12	CO1,2,3	40%	30%	30%
	6.1	Introduction, Types of tenders						
	6.2	Requirements of valid contract and good contractor, types of contracts						
	6.3	Tender notice, Procedure for submission and opening of tenders, Comparative statements for selection of contractors						
	6.4	Principles of execution of work Billing of executed works.						

V. LIST OF ASSIGNMENTS/TUTORIALS:

Sr. No.	Unit	Tutorials	Approx. Hours	CO
1	1	Understand the following Wiring a.. Tube light wiring b. Stair case wiring c. Godown wiring d. Parallel loop wiring	3	1
2	2	To prepare cost estimate of a domestic installation (Residential building, drawing room)	3	1,2
3	3	To prepare cost estimate of a commercial installation (Hospital, School, Colleges)	3	1,2,3
4	3	To prepare cost estimate of industrial installation (workshop, agriculture pump)	3	1,2,3
5	4	To prepare cost estimate of overhead service connection	3	1,2,3
6	4	To prepare cost estimate of material list of 220 KV/110 KV transmission line	3	1,2,3
7	4	To prepare cost estimate of material list of 440KV 3-phase transmission line	3	1,2,3

VI. SUGGESTED SELF LEARNING ASSIGNMENTS / MICROPROJECT / ACTIVITIES

Assignments (if any)

Micro Project (if any)

VII. ASSESMENTS METHODOLOGIES /TOOLS

Formative assessment (Assessment for Learning)

a. Tutorials

b. Midterm Test Exam

c. Self-learning

d. Term Work

e. Seminar/Presentation

Summative Assessment (Assessment of Learning)

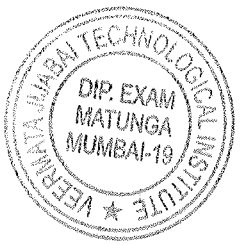
f. End Term Exam

g. Micro-project/Assignments

Tutorial Performance

VIII.TEXT BOOKS AND WEBSITES:

Sr. No.	Author	Title	Publisher and Edition
1	Raina K. B.	Electrical Estimation & Costing	New Age International
2	Uppal S. L.	Electrical Estimation & Costing	New Age International
3	Surjit Singh	Electrical Estimation & Costing	New Age International



IX. COs POs Matrix

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)			
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO- 2	PSO - 3	PSO - 4
CO1	2	2	3	2	2	-	3	3	2	2	2
CO2	2	3	2	3	3	1	3	2	2	2	2
CO3	2	3	3	3	3	1	3	2	3	2	3

Curriculum Coordinator

Head of the Department
Diploma in Electrical Engineering

Dean-Diploma

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE
DIP. EXAM
MATUNGA
MUMBAI-19

DIPLOMA PROGRAMME	: DIPLOMA IN ELECTRICAL ENGINEERING
PROGRAMME CODE	: DEE
SEMESTER	: FIFTH
COURSE TITLE	: POWER ELCTRONICS
COURSE CODE	: 232EE55

I. TEACHING, LEARNING AND EXAMINATION SHCEME:

Course Code	Course Title	Abbrevation	Course Category	Learning Scheme					Credits	Paper Duration	Assessment Scheme											
				Actual Contact Hrs.			SLH	NLH				Theory				Based on LL & TSL				Based on SL		Total Marks
																Practical						
				CL	TL	LL					FA-TH (MST)	SA-TH (ESE)		Total		FA-PR		SA-PR		SLA		
											Max	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	
232EE55	POWER ELECTRONICS	PE	DSC	3	2			5	2.5	03	30	70	28	100	40	25@	10	25#	10			150

Total IKS Hrs for Sem.: 00 Hrs

Abbreviations: CL- Classroom Learning, TL- Tutorial Learning, LL-Laboratory Learning, FA - Formative Assessment,SA -Summative Assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# Online Examination, @$ Internal Online Examination

II. COURSE OBJECTIVES:

1. Understand the working and applications of various power electronic devices.
2. Control dc and ac power using proper power electronic device.
3. Understand the steady state and dynamic behavior of electrical drives

III. COURSE OUTCOMES:

Student should be able to

CO1	Describe the basics of semiconductor switches, rectifier, control converter, inverter, choppers, and cyclo-converter and matrix converter circuits
CO2	Analyze the Power Electronic Circuits such as rectifier, converter, inverter, choppers, and cyclo-converter and matrix converter circuits
CO3	Evaluate the performance of power electronic circuits such as rectifier, converter, inverter, choppers, and cyclo-converter and matrix converter circuits.

IV. COURSE CONTENT:

SECTION-I								
Unit & Sub-Unit		Topics/Sub-topics	Hours	Marks	CO	R Level	U Level	A Level
1	1.1	**Power Semiconductor Switches**	6	8	CO1	60%	20%	20%
	1.2	Introduction of Power Semiconductor Devices such as Power Diode, Power BJT(Transistor), Power MOSFET, TRIAC, IGBT, GTO, DIAC						
	1.3	Construction of Power Diode, Power BJT(Transistor), Power MOSFET, TRIAC, IGBT, GTO, DIAC						
	1.4	Characteristics of ideal switch, V-I Characteristics, Rating						
	1.5	Protection and cooling of power semiconductor devices such as power diodes, transistor, MOSFET, IGBT and GTO						
	1.6	Comparative study of MOSFET, GTO, BJT and IGBT.						
2		**Silicon Controlled Rectifier**	8	15	CO1	60%	20%	20%
	2.1	Introduction & Construction of SCR						
	2.2	Static characteristics of SCR, Two transistor model.						
	2.3	Turn on methods of thyristor						
	2.4	Commutation (Turn off methods) of thyristor Class A, B, C, D, E and F						
	2.5	Thyristor protection: 1. Snubber Circuit. 2. Over-Voltage Protection. 3 Over-Current Protections. 4 Gate Protections.						
3		**Phase Controlled AC to DC Converters**	6	12	CO2	50%	25%	25%
	3.1	Classification of converters, Single phase half-controlled thyristor converters with R, RL, RL & FD and RLE loads.						
	3.2	Single phase fully controlled thyristor converters with R, RL, RL & FD and RLE loads.						
	3.3	Performance factors for the converter such as displacement factor, distortion factor, total harmonic distortion, ripple factor and transformer utilization factor						
	3.4	Applications of converter.						

4		**DC to DC Converters (Choppers)**	6	10	CO2, 3	40%	30%	30%
	4.1	Introduction and Control strategies of DC-to-DC converters						
	4.2	Principle of operation of step-up chopper						
	4.3	Principle of operation of step-down (buck converter) chopper						
	4.4	Types of Chopper: A, B, C						
	4.5	Types of Choppers: D and E						
	4.6	Applications of chopper						
5		**Switch Mode DC – AC Inverters**	8	15	CO2,3	40%	30%	30%
	5.1	Basic concepts of switch mode inverters						
	5.2	Types: VSI and CSI						
		Single phase half bridge inverter with R and RL Load						
	5.3	Single phase full bridge inverter with R and RL Load						
	5.4	Sinusoidal Pulse Width Modulated Inverter						
	5.5	Single phase basic series inverter. Disadvantages of basic series inverter						
	5.1	Single phase parallel inverter						
	5.2	Requirements of a good inverter, Applications of Inverter						
6		**Cycloconverters**	6	10	CO2,3	40%	30%	30%
	6.1	Single Phase step up cycloconverter						
	6.2	Single Phase step down cycloconverter Applications of cycloconverter.						

V. LIST OF ASSIGNMENTS/TUTORIALS:

Sr. No.	Unit	Tutorials	Approx. Hours	CO
1	1	To study and plot VI characteristics of Power Diode		1
2	2	To study and plot VI characteristics of SCR		1
3	1	To study and plot VI characteristics of DIAC		1
4	1	To study and plot VI characteristics of TRIAC		1
5	1	To study and plot VI characteristics of Power BJT (Transistor)IGBT		1
6	1	To study and plot VI characteristics of MOSFET		1
7	1	To study and plot VI characteristics of GTO		1
8	3	To study the performance of Single-phase half controlled thyristor converters with R, RL, RL & FD and RLE loads		1,2
9	3	To study the performance of Single-phase half controlled thyristor converters with R, RL, RL & FD and RLE loads		1,2
10	3	To study the performance of Single phase full controlled thyristor converters with R, RL, RL & FD and RLE loads		1,2
11	4	To study the performance of step-up chopper		1,2
12	4	To study the performance of step-down chopper		1,2
13	5	To study the performance of single-phase half bridge inverter with R and RL load		1,2
14	5	To study the performance single phase Inverter with PWM control		2,3
15	6	To study the performance of single-phase step up cycloconveter		2,3
16	6	To study the performance of single-phase step down cycloconveter		2,3

VI. SUGGESTED SELF LEARNING ASSIGNMENTS / MICROPROJECT / ACTIVITIES

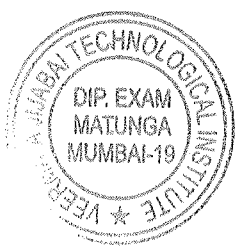
Assignments (if any) Micro

Project (if any)

VII. ASSESMENTS METHODOLOGIES /TOOLS

Formative assessment (Assessment for Learning)

- Tutorials
- Midterm Test Exam
- Self-learning



- Term Work
- Seminar/Presentation

Summative Assessment (Assessment of Learning)

- End Term Exam
- Micro-project/Assignments

Tutorial Performance

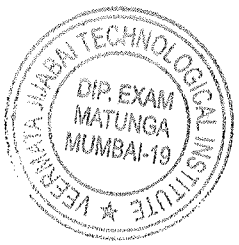
VIII. TEXT BOOKS AND WEBSITES:

Sr. No.	Author	Title	Publisher and Edition
1	P. S. Bhimra	Power Electronics	Khanna Publishers, 3rd Edition, 2002
2	M. H. Rashid	Power Electronics, Circuits, Devices and Applications	Pearson Education Inc., 4 th Edition, November 2017.

REFERENCE BOOKS

Sr. No.	Author	Title	Publisher and Edition
1	B. K. Bose	Modern Power Electronics and A.C. Drives	Prentice Hall of India Pvt. Ltd. Publication, 2002.
2	Mohan, Undeland Robins	Power Electronics, Converter Applications and Design	John Wiley and sons (Asia) Pvt. Ltd., 3rd Edition, 2010.

1. *https://www.electricaltechnology.org/2015/10/electrical-drives-ac-drives-vfd-dc- drives.html*
2. *https://www.electricaltechnology.org/2015/10/electrical-drives-ac-drives-vfd-dc- drives.html*
3. *www.nptel.ac.in/courses/108101038*
4. *www.ee.iitb.ac.in/-apel*
5. *www.tutorialpoint.com/power_electronics/*
6. *SEQUEL: software for power electronics*
7. *www.youtube.com https://nptel.ac.in/courses/108105066*



IX. COs POs Matrix

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)			
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO- 1	PSO- 2	PSO- 3	PSO - 4
CO1	3	-	1	2	-	-	2	3	-	2	1
CO2	3	2	2	3	2	1	2	3	2	2	2
CO3	2	2	3	3	2	1	2	2	3	2	2

Curriculum Coordinator **Head of the Department** **Dean-Diploma**

Diploma in Electrical Engineering

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE DIP. EXAM MATUNGA MUMBAI-19

DIPLOMA PROGRAMME	: DIPLOMA IN ELECTRICAL ENGINEERING
PROGRAMME CODE	: DEE
SEMESTER	: FIFTH
COURSE TITLE	: RENEWABLE ENERGY
COURSE CODE	:232EE56E1

I. TEACHING, LEARNING AND EXAMINATION SHCEME:

Course Code	Course Title	Abbreviation	Course Category	Learning Scheme					Credits	Paper Duration	Assessment Scheme											
				Actual Contact Hrs.			SLH	NLH				Theory				Based on LL & TSL Practical				Based on SL		Total Marks
				CL	TL	LL					FA-TH (MST)	SA-TH (ESE)		Total		FA-PR (CA)		SA-PR (OR/PR)		SLA		
											Max	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	
232EE56E1	RENEWABLE ENERGY		DSC	3	0	3		5	2.5	3	30	70	28	100	40	25@	10	25#	10			150
	Total IKS Hrs for Sem.:																					

Abbreviations: CL- Classroom Learning, TL- Tutorial Learning, LL-Laboratory Learning, FA - Formative Assessment,SA -Summative Assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# Online Examination, @$ Internal Online Examination

II. COURSE OBJECTIVES:

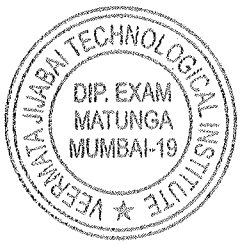
After studying this subject, students will be able

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

III. COURSE OUTCOMES:

Student should be able to

CO1	Understand the societal impact and benefits of utilizing renewable energy.
CO2	Analyze the potential of renewable energy sources at different locations and learn about their theory and applications.
CO3	Gain skills in designing renewable energy systems to meet specific needs and producing electrical energy from renewable sources.



IV. COURSE CONTENT:

SECTION-I								
Unit & Sub-Unit		**Topics/Sub-topics**	**Hours**	**Marks**	**CO**	**R Level (%)**	**U Level (%)**	**A Level (%)**
1		**ENERGY SOURCES**	06	10	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	10	2	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	15	2& 3	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	15	2	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-RESOURCESBIOFUELS**	14	20	2 & 3	30%	40%	30%
	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.						
	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).								

V. LIST OF ASSIGNMENTS/TUTORIALS:

Sr. No.	Unit	Tutorials	Approx. Hours	CO
1	2 and 3	Problem solving on calculation for solar constants.	02	2
2	4	Identification of total wind power plants in India.	02	1 & 3
3	5	Use of Biomass is hazardous to environment or benefit to human beings, discuss.	02	1 & 3
4	2 and 3	Any Small model on solar energy utilization.	02	2
5	1 and 3	Arrange visit to Solar power plant.	02	2 & 3

VI. SUGGESTED SELF LEARNING ASSIGNMENTS / MICROPROJECT / ACTIVITIES

- Designing of various renewable energy system for different requirements (residential load and commercial load)
- Identify the present contribution of production of renewable energy by all states of India.

VII. ASSESMENTS METHODOLOGIES /TOOLS

Formative assessment (Assessment for Learning)

- Tutorials
- Midterm Test Exam
- Self-learning
- Term Work
- Seminar/Presentation

Summative Assessment (Assessment of Learning)

- End Term Exam
- Micro-project/Assignments

Tutorial Performance

IX. REFERENCE BOOKS AND WEBSITES:

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 Edition, Tata Mc-Graw Hill
3	S. Rao & B. B. Parulekar	Energy Technology : Nonconventional Renewable	1st, Khanna Publisher
4	S. P. Sukhatme Chetan Singh Solanki	Solar Energy: Principles of thermal collection and storage	2nd edition, Tata McGraw Hill Publishing Com an Ltd.
5	Chetan Singh Solanki	Solar Photovoltaics : Fundamental, Technologies and A lications	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:			
https://youtube.com/playlist?list=PLwdnzlV3ogoXUifhvYB65lLJCZ74o_fAk&si=S7k7N0SHSmPuRAIr			

https://youtube.com/playlist?list=PLwdnzlV3ogoVFaDTCr-N2b_TSBPEeBJdU&si=qtItyZ3vOhzcIZrd
https://youtube.com/playlist?list=PLyqSpQzTE6M-ZgdjYukayF6QevPv7WE-r&si=_bd6IdZFXWPR7cQ3
https://mnre.gov.in/

X. COs POs Matrix

	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)			
Course Outcomes (COs)	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO- 2	PSO - 3	PSO - 4
CO1	3	-	1	2	-	-	2	3	-	2	1
CO2	3	2	2	3	2	1	2	3	2	2	2
CO3	2	2	3	3	2	1	2	2	3	2	2

Curriculum Coordinator **Head of the department** **Dean-Diploma**

Diploma in Electrical Engineering

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE DIP. EXAM MATUNGA MUMBAI-19

DIPLOMA PROGRAMME	: DIPLOMA IN ELECTRICAL ENGINEERING
PROGRAMME CODE	: DEE
SEMESTER	: FIFTH
COURSE TITLE	: PRINCIPLES OF COMMUNICATION ENGINEERING
COURSE CODE	:232EE56E2

I. TEACHING, LEARNING AND EXAMINATION SHCEME:

Course Code	Course Title	Abbrevation	Course Category	Learning Scheme					Credits	Paper Duration	Assessment Scheme											
				Actual Contact Hrs.			SLH	NLH				Theory				Based on LL & TSL				Based on SL		Total Marks
																Practical						
				CL	TL	LL					FA-TH (MST)	SA-TH (ESE)		Total		FA-PR		SA-PR		SLA		
											Max	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	
232EE56E2	PRINCIPLE OF COMMUNICATION ENGINEERING	POCE	DSC	3	1	3	-	7	3.5	03	30	70	28	100	40	25 @	10	25 #	10	-	-	150

Total IKS Hrs for Sem.: 00 Hrs

Abbreviations: CL- Classroom Learning, TL- Tutorial Learning, LL-Laboratory Learning, FA - Formative Assessment,SA -Summative Assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# Online Examination, @$ Internal Online Examination

II. COURSE OBJECTIVES:

1. Classify different types of communication system and explain electromagnetic spectrum.
2. Describe and compare amplitude modulation & Frequency modulation.
3. Understand working of modulators and Demodulators of AM and FM.
4. Describe different types of Pulse modulation techniques like PAM, PWM, and PPM.
5. Describe different parameter of transmission line and their application as resonant lines.
6. Describe different types of Antenna and their Radiation pattern.
7. Understand basics of fiber optic communication and concept of RADAR.
8. Understand concept of different multiplexing technique and modes of data transmission.

III. COURSE OUTCOMES:

Student should be able to

CO1	Describe basic elements of a communication system and evaluate amplitude modulated wave and frequency modulated wave.

CO2	Implement various analog and Pulse modulation and demodulation techniques
CO3	Analyze the performance of communication techniques in various transmission environments.
CO4	Understand basic concept of optical communication, RADAR and Multiplexing Techniques

IV. COURSE CONTENT:

SECTION-I								
Unit & Sub-Unit		**Topics/Sub-topics**	**Hours**	**Marks**	**CO**	**R Level**	**U Level**	**A Level**
1		**Introduction to electronic communication**	3	05	1	30%	40%	30%
	1.1	Introduction to electronic communication.						
	1.2	Block Diagram of Communication system.						
	1.3	Modulation, Need for modulation, Types of Electronics communications						
	1.4	Simplex, Duplex — Full & Half, Digital, Analog communications						
	1.5	Applications of communication, The electromagnetic spectrum (different bands & their frequencies), Concept of Transmission bandwidth.						
2		**Amplitude & Frequency modulation demodulation**	10	20	1,2	20%	40%	30%
	2.1	Basic Definition: Modulation index definition, its effect on modulated signal simple numerical, Frequency modulation, Deviation ratio, maxes.						
	2.2	Mathematical expression of amplitude modulated wave & FM modulated wave and its meaning (concept of sidebands), Bandwidth requirement, Representation of AM & FM signal in time & frequency domain.						
	2.3	Power relation in AM & FM wave, simple numerical.						
	2.4	Types of AM & FM modulators, demodulators.						
	2.5	Characteristics of radio receiver- Sensitivity,						

		Selectivity and Fidelity, Principle of heterodyne, Block diagram of super heterodyne receiver and it's working						
3		Pulse **Communication**						
	3.1	Introduction, comparison with Continuous Wave Modulation	06	10	3	20%	50%	30%
	3.2	Sampling theorem, Nyquist rate, aliasing, natural & flat top sampling.						
	3.3	PAM, PWM, PPM definition, generation, block diagram, waveform analysis, and their comparison.						
	3.4	Digital Modulation Techniques: ASK, FSK, PSK definition & waveforms (Only Concept).						
SECTION-II								
		Topics/Sub-topics						
4		**Transmission Lines & Antennas**	10	14	3	30%	40%	30%
	4.1	Fundamentals of transmission line: Balanced and Unbalanced line, Equivalent circuit of transmission line.						
	4.2	Attenuation in a transmission line, Velocity factor and Characteristics impedance of transmission line, Standing wave — SWR, VSWR, Reflection coefficient, simple numerical.						
	4.3	Transmission line as circuit elements: Quarter wave & half wavelength line, Impedance matching, Properties of line of various lengths, Stubs.						
	4.4	Basic definitions: Polarization, Radiation, Radiation pattern and directivity, Gain, Effective radiated power, Antenna aperture, Antenna reciprocity, Antenna intensity, Radiation resistance.						
	4.5	Basic Antennas: Half wave Dipole, Folded dipole, Ground plane, Directional, Yagi-Uda(Parasitic arrays), Driven arrays.						
5		**Fiber-Optic Communications & Radar**	7	12	3	20%	40%	40%
	5.1	Fiber-Optic System and Application, Light Communication, Reflection, Refraction, Refractive Index.						
	5.2	Fiber-Optic Cables: Construction, Step index, Graded index, Single-mode Step index, Multi-mode Graded index, Multi-mode Step index.						

	5.3	Optical cable connectors, Transmitters and Receivers.						
	5.4	Concept of Radar and types of Radar.						
	5.5	Analysis of Pulse Radar system and its applications.						
6		**Data Communications & Multiplexing**	4	9	4	20%	50%	30%
	6.1	Modes of Data transmission: serial, para11e1, Synchronous, asynchronous communication.						
	6.2	Definition and Working Principle of Modems (Concept Only).						
	6.3	Protocols: Asynchronous and Synchronous						
	6.4	Concept of Multiplexing: FDM, TDM, WDM (Concept only).						
	6.5	General Block Diagram study of FDM and TDM Transmitters & Receivers.						

V. LIST OF ASSIGNMENTS/TUTORIALS:

Sr. No.	Unit	Tutorials	Approx. Hours	CO
1	2	Observe AM & FM Signal using Arbitrary Function Generator.	2	1,2,3
II	2	Generate an AM signal using BJT amplifier	2	2,3
III	2	Demodulate an AM signal using Peak Detector	2	3
IV	2	Generate a FM signal using timer IC and using VCO IC	2	3
V	2	Demodulate a FM signal using PLC IC.	2	3
VI	2	Plot graph of selectivity of VCO IC.	2	3
VII	2	Study BJT as a Mixer application.	2	2,3
VIII	3	Generate a PAM, PWM, PPM signal using kit.	2	3
IX	4	Measure the directivity and radiation pattern of Yagi uda antenna.	2	3
X	4	Plot the directional pattern of given antenna.	"2	4
XI	5	Setting up Fiber Optical Analog Link	2	4
XII	5	Study of Propagation loss and bending loss in Optical Fiber	2	4

VI. SUGGESTED SELF LEARNING ASSIGNMENTS / MICROPROJECT / ACTIVITIES

Assignments (if any)

- Prepare a report on speed control of DC Machines.

Micro Project (if any)

- Mathematical modeling of Transformer and Synchronous Machine

VII. ASSESMENTS METHODOLOGIES /TOOLS

Formative assessment (Assessment for Learning)

- Tutorials
- Midterm Test Exam
- Self-learning
- Term Work
- Seminar/Presentation

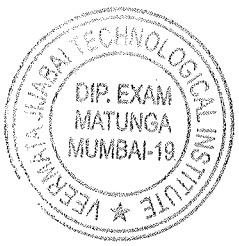
Summative Assessment (Assessment of Learning)

- End Term Exam
- Micro-project/Assignments

Tutorial Performance

VIII.REFERENCE BOOKS AND WEBSITES:

Sr. No.	**Author**	Title	**Publisher and Edition**
1	Louis E. Frenzel	Communication Electronics	Tata McGraw-Hill 4th Edition
2	B.P. Lathi, Zhi Ding	Modern Digital and Analog Communication system	Oxford University Press, Fourth edition.
3.	George Kennedy, and Davis	Electronic Communication Systems	Tata McGraw-Hill 4th Edition
	Taub, Schilling and Saha	Electronic Communication Systems Fundamental	Pearson Education
	Simon Haykin, Michel Moher	introduction to Analog and Digital Communication	Wiley, Second edition



IX.COs POs Matrix

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)			
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO- 2	PSO - 3	PSO - 4
C 1	3	3	3	2	0	0	1	3	3	0	1
CO2	3	2	2	2	0	0	0	3	2	0	0
CO3	2	0	2	3	1	0	1	2	2	0	0
CO4	2	0	2	3	1	0	1	2	2	0	0

Curriculum Coordinator **Head of the department** **Dean-Diploma**

Diploma in Electrical Engineering

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE DIP. EXAM MATUNGA MUMBAI-19

DIPLOMA PROGRAMME	: DIPLOMA IN ELECTRICAL ENGINEERING
PROGRAMME CODE	: DEE
SEMESTER	: FIFTH
COURSE TITLE	: Electric Vehicle Technology
COURSE CODE	: 232EE56E3

I. TEACHING, LEARNING AND EXAMINATION SHCEME:

Course Code	Course Title	Abbrevation	Course Category	Learning Scheme					Credits	Paper Duration	Assessment Scheme											
				Actual Contact Hrs.			SLH	NLH				Theory				Based on LL & TSL Practical				Based on SL		Total Marks
				CL	TL	LL					FA-TH (MST)	SA-TH (ESE)		Total		FA-PR		SA-PR		SLA		
											Max	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	
232EE56E3	Electric Vehicle Technology	EVT	DSC	3	-	2	-	5	2.5	3	30	70	28	100	40	25@	10	25#	10	-	-	150

Total IKS Hrs for Sem.: 00 Hrs

Abbreviations: CL- Classroom Learning, TL- Tutorial Learning, LL-Laboratory Learning, FA - Formative Assessment,SA -Summative Assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# Online Examination, @$ Internal Online Examination

II. COURSE OBJECTIVES:

- To illustrate the deign philosophies used in EV Domain
- To explore the selection of power and control architecture of EV drives.

III. COURSE OUTCOMES:

Student should be able to

CO1	Understand Conventional IC Engine, Electric Vehicle components and its Electrical power flow
CO2	Types of Electric and Hybrid Vehicles and its architecture
CO3	Understand the concept of Motor Technology and Control Strategy.

IV. COURSE CONTENT:

SECTION-I								
Unit & Sub-Unit		Topics/Sub-topics	Hours	Marks	CO	R Level (%)	U Level (%)	A Level (%)
1.		**Introduction to Electric Vehicle**	8	13	1,2	30	50	20
	1.1	Types of Electric Vehicle						
	1.2	AC vs DC Charging						
	1.3	Charging Process and Smart Charging						
2.		**Working Methodology**	12	22	3	20	40	40
	2.1	Comparing ICE and EV						
	2.2	Sizing of the EV Powertrain						
	2.3	Drivetrain Conventional and EV						
SECTION-II								
3.		**Electric Motors**	12	22	3	20	40	40
	3.1	Induction Motor						
	3.2	Synchronous Motor						
	3.3	Introduction to Motor Controls, Motor Control Circuitry						
	3.4	BLDC Motor, Control Sequence of BLDC						
	3.5	Hall Sensor vs Back EMF Feedback						
4.		**Battery Technology**	8	13	1	30	50	20
	4.1	Battery Introduction, Battery Parameters, Battery Chemistry						
	4.2	Introduction to Lithium Ion Battery, C rate						
	4.3	Types of Cells						
	4.4	Battery Connection						
	4.5	Types of Lithium Polymer Batteries						
	4.6	Graphene Batteries						

V. LIST OF ASSIGNMENTS/TUTORIALS:

Sr. No.	Unit	Tutorials	Approx. Hours	CO
1	4.	Study of battery types, charging cycles, and management systems.	2	2
2	3	Examination of motor types, operation principles, and performance characteristics.	2	3
3	3	Analysis of inverters, converters, and their roles in energy flow.	2	2,3
4	2	Understanding of charging stations, protocols, and grid integration.	2	1
5	3	Exploration of vehicle control systems, regenerative braking, and energy efficiency.	2	3

VI. SUGGESTED SELF LEARNING ASSIGNMENTS / MICROPROJECT / ACTIVITIES

Assignments (if any)

Micro Project (if any)

VII. ASSESMENTS METHODOLOGIES /TOOLS

Formative assessment (Assessment for Learning)

- Tutorials
- Midterm Test Exam
- Self-learning
- Term Work
- Seminar/Presentation

Summative Assessment (Assessment of Learning)

- End Term Exam
- Micro-project/Assignments
- Tutorial Performance

IX. REFERENCE BOOKS AND WEBSITES:

Sr. No.	Author	Title	Publisher and Edition
1	C.C.Chan and K.T. Chau	Modern Electric Vehicle Technology	Oxford University Press Edition: 2001
2	Iqbal Husain	Electric and Hybrid Vehicles: Design Fundamentals	CRC Press *Edition:* 3rd Edition, 2021
3	Website:	https://www.electrichybridvehicletechnology.com/	

X. COs POs Matrix

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)			
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO- 2	PSO - 3	PSO - 4
CO1	3	3	2	3	3	2	3				
CO2	3	1	3	3	3	1	2				
CO3	3	3	3	3	1	1	3				

Curriculum Coordinator **Head of the department** **Dean-Diploma**
Diploma in Electrical Engineering

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE
DIP. EXAM
MATUNGA
MUMBAI-19

DIPLOMA PROGRAMME	: DIPLOMA IN ELECTRICAL ENGINEERING
PROGRAMME CODE	: DEE
SEMESTER	: FIFTH
COURSE TITLE	: POWER SYSTEM ANALYSIS
COURSE CODE	:232EE56E4

I. TEACHING, LEARNING AND EXAMINATION SHCEME:

Course Code	Course Title	Abbrevation	Course Category	Learning Scheme					Credits	Paper Duration	Assessment Scheme											
				Actual Contact Hrs.			SLH	NLH				Theory				Based on LL & TSL Practical				Based on SL		Total Marks
				CL	TL	LL					FA-TH (MST)	SA-TH (ESE)		Total		FA-PR		SA-PR		SLA		
											Max	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	
232EE56E4	POWER SYSTEM ANALYSIS	PSA		3	2			5	2.5	03	30	70	28	100	40	25 @	10	25 #	10			150

Total IKS Hrs for Sem.: 00 Hrs

Abbreviations: CL- Classroom Learning, TL- Tutorial Learning, LL-Laboratory Learning, FA - Formative Assessment,SA -Summative Assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# Online Examination, @$ Internal Online Examination

II. COURSE OBJECTIVES:

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.

III. COURSE OUTCOMES:

Student should be able to

CO1	Describe the structure of power system in the view of load flow and analyze the load flow in power system with different methods.
CO2	Comprehend the importance of voltage control and different methods to improve it.
CO3	Acquainted with the concept of power system stability by using various methods. And the concept of FACT's.

IV. COURSE CONTENT:

SECTION-I								
Unit & Sub-Unit		Topics/Sub-topics	Hours	Marks	CO	R Level	U Level	A Level
1		**Power system Structure**	04	07	1	30%	40%	30%
	1.1	Network and Topology						
2		**Load flow**	10	15	1	20%	50%	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 δ— V						
3		**Approximate load flow(maximum three bus system problem)**	10	15	1	20%	40%	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**	8	14	2	30%	40%	30%
	4.1	Using tap changing transformer						
	4.2	Generator excitation						
5		**Power system Stability**	10	18	3	30%	40%	30%
	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**	6	8	3	40%	30%	30%

V. LIST OF ASSIGNMENTS/TUTORIALS:

Sr. No.	Unit	Tutorials	Approx. Hours	CO
1		Five assignments based on the above syllabus	2	1,2,3
2		All types of numerical based on the above syllabus	2	1,2,3

VI. ASSESMENTS METHODOLOGIES /TOOLS

Formative assessment (Assessment for Learning)

- Tutorials
- Midterm Test Exam
- Self-learning
- Term Work
- Seminar/Presentation

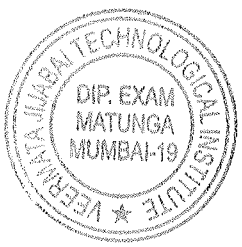
Summative Assessment (Assessment of Learning)

- End Term Exam
- Micro-project/Assignments

Tutorial Performance

VII. REFERENCE BOOKS AND WEBSITES:

Sr. No.	Author	Title	Publisher and Edition
1	I.J. Nagrath .& D. P. Kothari	Modern Power system analysis	4" 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	7" edition, New Age Internationals



VIII. COs POs Matrix

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)			
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3	PSO-4
CO1	2	3	2	2	2	-	1	2	3	-	-
CO2	2	2		-	-	-	1	2	-	-	-
CO3	2	3	3	-	-	-	1	2	1	-	2

Curriculum Coordinator **Head of the department** **Dean-Diploma**
Diploma in Electrical Engineering

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE
DIP. EXAM
MATUNGA
MUMBAI-19

DIPLOMA PROGRAMME	: DIPLOMA IN ELECTRICAL ENGINEERING
PROGRAMME CODE	: DEE
SEMESTER	: FIFTH
COURSE TITLE	: PROJECT (Mini Project)
COURSE CODE	:232EE57

I. TEACHING, LEARNING AND EXAMINATION SHCEME:

Course Cr	Course Title	Abbrevation	Course Category	Learning Scheme					Credits	Paper Duration	Assessment Scheme											
				Actual Contact Hrs.			SLH	NLH				Theory				Based on LL & TSL Practical				Based on SL		Total Marks
				CL	TL	LL					FA-TH (MST)	SA-TH (ESE)		Total		FA-PR		SA-PR		SLA		
											Max	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	
232EE57	PROJECT (Mini Project)		INP	-	-	6		6	3	-	-	-	-	-	-	50 @	20	50 #	20			100

Total IKS Hrs for Sem.: 00 Hrs

Abbreviations: CL- Classroom Learning, TL- Tutorial Learning, LL-Laboratory Learning, FA - Formative Assessment,SA -Summative Assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# Online Examination, @$ Internal Online Examination

II. COURSE OBJECTIVES:

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

III. 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 and 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

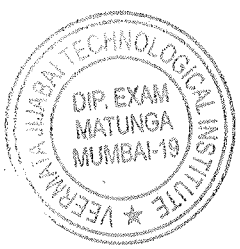
- Maintenance based projects: Systematic maintenance of a machine/equipment/ system lying idle due to lack of maintenance, repair it and bring it to working condition
- Industrial engineering-based projects: Projects based on work study, method study, method improvement or productivity improvement
- 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 sofl 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.

IV. COs POs Matrix

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)			
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CO1	2	3	2	2	2	3	1	2	3	3	1
CO2	2	2	1	3	2	3	1	2	2	3	-
CO3	2	3	3	3	1	3	1	2	1	3	2

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