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

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Programme Name: Diploma In Electronics Engineering

Programme Code	**: DELNE**	**With Effect From Academic Year**	**: 2023-24**
Duration of Programme	**: 6 Semester**	**Duration**	**: 16 Weeks**
Semester	**: SIXTH**	**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 Hrs. /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		SA-PR		SLA		
													Max	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	
1	Data Communication and Networking Protocols	DCN	DSC	233EX61	0	3	-	3	-	6	3	3	30	70	28	100	40	25@	10	25#	10	-	-	150
2	Mobile Communication	MC	DSC	233EX62	0	3	-	3	-	6	3	3	30	70	28	100	40	25@	10	25#	10	-	-	150
3	Embedded System	ES	DSC	233EX63	0	3	-	3	-	6	3	3	30	70	28	100	40	25@	10	25#	10	-	-	150
4	**Elective II**		SEC	233EX64(x)	0	3		3		6	3	3	30	70	28	100	40	25@	10	25#	10	-	-	150
5	Project II	P2	INP	233EX65	0	-	-	4	4	8	4	-	-	-		-	-	100@	40	100#	40			200
6	Digital Marketing	DM	VEC	233EX66	0	3	1	-	1	5	2.5	-	-	-		-	-	-	-			25@	10	25
7	Institute Industry Interaction	III	AEC	233EX67	0	2			1	3	1.5											25@	10	25
Total					-	17	01	16	6	40	20		120	280		400		200		200		50		850

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, *# On Line Examination, @$ Internal Online Examination

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

Curriculum Coordinator **Head Diploma in Electronics Engineering** **Dean - Diploma**

DIPLOMA PROGRAMME	**: DIPLOMA IN ELECTRONICS ENGINEERING**
PROGRAMME CODE	**: DELNE**
SEMESTER	**: SIXTH**
COURSE TITLE	**: DATA COMMUNICATION AND NETWORKING PROTOCOLS**
COURSE CODE	**: 233EX61**

I. TEACHING AND EXAMINATION SCHEME:

TEACHING SCHEME						ASSESSMENT SCHEME											
CL	TL	LL	Self-learning	CR	Total IKS Hrs for Sem	PAPER HRS	FA-TH (MST)	SA-TH (ESE)	TOTAL		Based on LL & TL Practical				Based on Self-learning		TOTAL MARKS
											FA-PR (CA)		SA-PR (PR/OR)		SLA		
							Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
3	-	3	-	3	-	3	30	70	100	40	25@	10	25#	10	-	-	150

II. RATIONALE

The course on Data Communication and Networking aims to provide students with a solid understanding of networking concepts, technologies, and terminologies. It covers the basics of data communications and computer networks, examining network protocols and architectures to prepare students for modern networking technologies. The curriculum includes topics such as transmission media, network devices, and performance evaluation parameters, enabling students to design and analyze network systems effectively.

III. COURSE OUTCOMES (COS)

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

CO1:	Recall key concepts of data communication, network devices, protocols, and security mechanisms.
CO2:	Comprehend the operation of networking models, routing algorithms, and error control techniques.
CO3:	Design, configure, and manage network infrastructures by implementing appropriate protocols, configuring devices, and applying security measures to ensure efficient and secure network operations.

IV. COURSE CONTENTS WITH SPECIFICATION TABLE

SECTION-I								
Unit & Sub-Unit		Topics/Sub-topics	Hrs	Marks	CO	R Level	U Level	A Level
1		**Fundamentals of Data Communication**	4	7		40%	60%	-
	1.1	Components of communication, types of communication, introduction to network topologies.			1			
	1.2	Categories of network (LAN, WAN, MAN) Introduction to OSI model and layered Architecture.			1,2			
	1.3	TCP/IP Protocol suit, Difference between OSI model and TCP/IP Protocol suit compatible with Cisco Packet Tracer suit			1,2			
2		**Network Devices & Switching**	9	13		30%	50%	20%
	2.1	Passive hubs (repeaters), Active hubs bridges			1			
	2.2	Two and three layer switches			1			
	2.3	Introduction to switching techniques. Circuit switched network, Datagram Network message Switching And Virtual Circuit switching network.			1,2			
3		**Flow Control and Multiple Access**	11	15		20%	60%	20%
	3.1	Introduction to flow control and error control techniques (sliding window, stop and wait , ARQ)			2,3			
	3.2	Types of errors, Error detection techniques (VRC, LRC, CRC, Check sum)			1,3			
	3.3	Multiple access control: pure Aloha, Slotted Aloha and Random Acess.			2,3			
	3.4	Polling and token ring technique.			2			

SECTION-II								
Unit & Sub-Unit		Topics/Sub-topics						
4		**Data link layer protocols**	7	10		30%	50%	20%
	4.1	Wireless LAN: IEEE 802.11 its Architecture			2,3			
	4.2	Physical layer technologies used in 802.11 Wireless LAN: FHSS, DSSS and OFDM			2			
	4.3	Two sublayers (MAC layers): DCF, PCF			2			
5		**Network and Transport Layer Protocol**	9	15		40%	40%	20%
	5.1	Link state routing, distance vector routing, Types of routing and routing algorithms.			2,3			
	5.2	Addressing system in IP. Types of Addressing (Class full and Classless). Introduction to IPV4 and IPV6. Compatibility with IPV4.			2,3			

	5.3	TCP / UDP, port no, multiplexing and de-multiplexing.			2			
6		**Network Security and Cryptography**	**8**	**10**		**30%**	**60%**	**10%**
	6.1	Introduction and importance of Network Security,			1			
	6.2	Encryption Basics (Symmetric and Asymmetric Encryption), Virtual Private Networks (VPNs).			1,3			
	6.3	Basics of Cryptography (private and public key), Encryption vs. Decryption.			1,3			
	6.4	Basic Cryptographic Protocols (SSL/TLS)			2,3			
Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxanomy).								

Notes: This specification table shall be treated as a general guideline and actual distribution of marks may slightly vary from table. But the questions from each topic should be asked as per marks weightage. Numerical questions are to be asked only if specified.

V. LIST OF PRACTICALS/ASSIGNBMENTS/TUTORIALS

Sr. No.	Unit	Practical/Assignment	Approx. Hours	Relevant COS
1	1	To implement and simulate topologies using cisco packet tracer.	2	1 & 3
2	3	To study and implement token ring technique in cisco packet tracer.	2	1 & 3
3	2	To implement collision detection for Ethernet network.	2	1 & 3
4	2	To study static routing using cisco packet tracer.	2	1 & 3
5	1	Connecting LAN with routers.	2	1 & 3
6	5	To study dynamic routing (Routing Information Protocol).	2	2 & 3
7	5	To implement sub-netting using cisco packet tracer.	2	2 & 3
8	6	Create a simple encryption-decryption program using private and public keys to simulate cryptography basics.	2	2 & 3
9	6	Set up a basic secure communication between two devices using SSH or VPN and observe the security protocols in action.	2	1 & 3
* Minimum 7 and maximum 8 practicals/experiment sessions to be included in a course in a term				

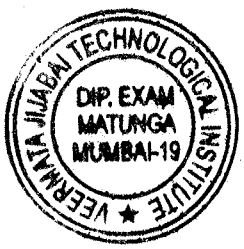
VI. ASSESMENTS METHODOLOGIES /TOOLS

Formative assessment (Assessment for Learning)

- Midterm Test Exam
- Assignments and Case Studies
- Mini Project on Data Communication

Summative Assessment (Assessment of Learning)

- End Term Exam
- Practicals



VII. 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	PSO-5
CO1	3	2	1	1	1	2	2	3	1	2	-	-
CO2	3	3	2	1	1	1	2	3	3	2	-	-
CO3	3	3	2	1	1	2	2	3	2	2	-	-
Legends :- High:03, Medium:02,Low:01, No Mapping: - 0												

VIII. SUGGESTED LEARNING MATERIALS TEXTBOOKS/REFRENCE BOOKS/WEBSITES

Sr. No	Author	Title	Publisher
1	Behrouz A. Forouzan	Data Communications and Networking	McGraw-Hill Education
2	William Stallings	Data Communications and Networking	Pearson Education
3	Theodore S. Rappaport	Wireless Communications	Pearson Education
4	Andrew S. Tanenbaum	Computer Networks	Pearson Education
5	William Stallings	Cryptography and Network Security	Pearson Education

IX. LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://onlinecourses.nptel.ac.in/noc22_ee61/preview	Basics of OSI Layer and Routing Algorithms
2	https://archive.nptel.ac.in/courses/106/105/106105183/	Basics of computer networks and protocols

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

BOS VJTI Approval Dt. 23/05/2025

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE DIP. EXAM MATUNGA MUMBAI-19

DIPLOMA PROGRAMME	**: DIPLOMA IN ELECTRONICS ENGINEERING**
PROGRAMME CODE	**: DELNE**
SEMESTER	**: SIXTH**
COURSE TITLE	**: MOBILE COMMUNICATION**
COURSE CODE	**: 233EX62**

I. TEACHING AND EXAMINATION SCHEME:

TEACHING SCHEME						ASSESSMENT SCHEME											
CL	TL	LL	Self-learning	CR	Total IKS Hrs for Sem	PAPER HRS	FA-TH (MST)	SA-TH (ESE)	TOTAL		Based on LL & TL Practical				Based on Self-learning		TOTAL MARKS
											FA-PR (CA)		SA-PR (PR/OR)		SLA		
							Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
3	-	3	-	3	-	3	30	70	100	40	25@	10	25#	10			150

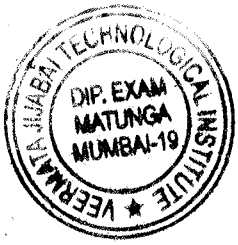
II. RATIONALE

The course aims to provide students with a strong understanding of mobile communication technologies and systems. It focuses on the principles of mobile network architecture, system performance, and propagation mechanisms. Students will develop the skills to analyze, optimize, and apply mobile communication concepts to real-world scenarios, preparing them for advanced studies and practical challenges in the field.

III. COURSE OUTCOMES (COS)

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

CO1:	Identify and recall key terminology, foundational principles, components and functions of mobile networks.
CO2:	Understand the core principles and mechanisms that govern mobile communication systems and how various factors influence their design, performance, and efficiency.
CO3:	Apply theoretical knowledge to effectively analyze, solve practical problems, and optimize mobile communication systems in real-world scenarios.



IV. COURSE CONTENTS WITH SPECIFICATION TABLE

SECTION-I								
Unit & Sub-Unit		Topics/Sub-topics	Hrs	Marks	CO	R Level	U Leve	A Level
1		**Basics of Wireless Communication**	**06**	**07**		**50%**	**50%**	**-**
	1.1	Evolution of mobile radio communications (1G to 5G wireless system)			1			
	1.2	Applications of wireless communication systems i. Paging System. ii. Cordless telephone system. iii. Cellular telephone system			1,2			
	1.3	Block Diagram and operation of cellular telephone system. Call processing in cellular telephone system.			1,2			
	1.4	Definition of mobile base station, Mobile control station.			2			
2		**Concepts of Cellular Technology**	**10**	**16**		**30%**	**30%**	**40%**
	2.1	Introduction to cellular system. • Frequency reuse concept. • Cellular system operation and Planning Principles. • System Architecture			2,3			
	2.2	Hand off strategies and Power control.			2			
	2.3	Interference and system capacity. • Co channel interference & system capacity. • Channel planning for wireless system. • Adjacent channel Interference. • Numerical based on channel capacity.			2,3			
	2.4	Improving coverage and capacity in cellular system. a) Cell splitting b) Sectoring c) Umbrella Cell Approach			2,3			
3		**Mobile Radio Propagation**	**08**	**12**		**40%**	**40%**	**20%**
	3.1	Propagation mechanisms, Reflection, ground reflection model (2 ray model).			1,2			
	3.2	FRIIS free space propagation model			2,3			
	3.3	Numericals based on propagation models.			3			

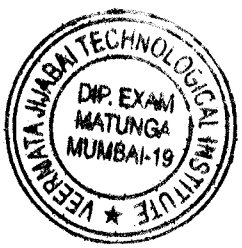
SECTION-II								
Unit & Sub-Unit		Topics/Sub-topics						
4		**Code Division Multiple Access** (CDMA)	**07**	**10**		**40%**	**45%**	**15%**
	4.1	CDMA architecture. CDMA services and features.			1,2			

	4.2	Introduction to 3G and W-CDMA, Features and Specifications of W-CDMA.			2,3			
	4.3	Key features and Introduction of IS-95 (CDMA one)			2			
5		**Mobile Communication Standards**	**09**	**13**		**30%**	**50%**	**20%**
	5.1	Global System for Mobile Communication (GSM) • GSM architecture • GSM services and features			2,3			
	5.2	Long-Term Evolution (LTE) • LTE architecture , services and features			1,2			
	5.3	5G Networks • 5G architecture • Key features and services.			2,3			
6		**Wireless Networks**	**08**	**12**		**40%**	**40%**	**20%**
	6.1	Bluetooth technology: Features, architecture, applications, personal area network (PAN)			1,2			
	6.2	Mobile Ad-hoc networks (MANET's): MANET topologies, applications and features.			2,3			
	6.3	Wi-Fi (IEEE 802.11), ZIGBEE, RFID: Architecture, features and specifications.			1,2			
Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxanomy).								

Notes: This specification table shall be treated as a general guideline and actual distribution of marks may slightly vary from table. But the questions from each topic should be asked as per marks weightage. Numerical questions are to be asked only if specified.

V. LIST OF PRACTICALS/ASSIGNBMENTS/TUTORIALS

Sr. No.	Unit	Practical/Assignment	Approx. Hours	Relevant COS
1	2	To study and verify the FRIIS equation for free space.	2	1 & 3
2	2	To analysis the effect of cluster size on system capacity.	2	1 & 3
3	2	To analyse the effect of interference on the system capacity.	2	1 & 3
4	2	To implement interleaving for CDMA.	2	1 & 3
5	2	To implement and analyse the two ray ground reflection model.	2	1 & 3
6	3	To generate the PN sequence code and encode the given data with help of PN sequence.	2	2 & 3
7	4	To plot radiation pattern of given antenna.	2	2 & 3
8	4	To implement 3G/4G network using cisco packet tracer.	2	2 & 3
9		Case study	2	
* Minimum 7 and maximum 8 practicals/experiment sessions to be included in a course in a term				



VI. ASSESMENTS METHODOLOGIES /TOOLS

Formative assessment (Assessment for Learning)

- Midterm Test Exam
- Term Work

Summative Assessment (Assessment of Learning)

- End Term Exam
- Practicals

VII. 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	PSO-5
CO1	3	2	1	1	1	1	2	3	1	2	-	-
CO2	3	3	2	1	1	2	1	3	3	2	-	-
CO3	3	3	2	1	1	2	1	3	2	2	-	-
Legends :- High:03, Medium:02,Low:01, No Mapping: - 0												

VIII. SUGGESTED LEARNING MATERIALS TEXTBOOKS/REFRENCE BOOKS/WEBSITES

Sr. No	Author	Title	Publisher
1	T.S. Rappaport	Wireless Communication Principles & Practice	Pearson Education
2	William Lee	Mobile Cellular Tele communication	Tata McGraw Hill
3	C K Toh	Ad Voc Mobile wireless Networks	Pearson Education
4	Raj Pandya	Mobile and Personal communication system and services	IEEE PRESS PHI
5	Steffano Basagni Marco, Silvia, Ivan	Mobile AD HOC Network	Wiley India Pvt. Ltd.

IX. LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	www.nptel.ac.in	Basics of Cellular System
2	https://study.com/academy/lesson/video/mobile-networking-definition-components-comparison.html	Evolution and basic concepts of mobile communication.
3	http://nptel.iitm.ac.in/	CDMA and GSM

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

DIPLOMA PROGRAMME	**: DIPLOMA IN ELECTRONICS ENGINEERING**
PROGRAMME CODE	**: DELNE**
SEMESTER	**: SIX**
COURSE TITLE	**: EMBEDDED SYSTEM**
COURSE CODE	**: 233EX63**

I. TEACHING AND EXAMINATION SCHEME:

TEACHING SCHEME						ASSESSMENT SCHEME												
CL	TL	LL	Self-learning	CR	Total IKS Hrs for Sem	PAPER HRS		SA-TH (ESE)	TOTAL		Based on LL & TL Practical				Based on Self-learning		TOTAL MARKS
											FA-PR (CA)		SA-PR (PR/OR)		SLA		
							Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
3	-	3	-	3	-	3		70	100	40	25@	10	25#	10	-	-	150

II. RATIONALE

In today's fast-evolving digital landscape, embedded systems play a crucial role across diverse domains, including industrial and home automation, entertainment, medical devices, and beyond. At the core of these systems lies a combination of electronic hardware and software, driving their functionality and efficiency. To meet the growing demand for expertise in this field, it is essential to equip learners with a strong foundation in embedded technology, along with practical skills for designing, developing, and maintaining hardware-based embedded systems.

III. COURSE OUTCOMES (COS)

Students will be able to achieve the following CO'S on completion of course based learning

- CO1 - Define and explain different embedded systems design technologies and analyze the Real – Time Operating System architecture.
- CO2 - Understand and explain key concepts of embedded systems like types of memory, system communication protocol, IO, timers, interrupts and interaction with peripheral devices.
- CO3 - Achieve proficiency in programming environment such as C programming and ALP, used to develop embedded systems and able to debug the program for various embedded system.
- CO4 - Develop basic application using Embedded System.

IV. COURSE CONTENTS WITH SPECIFICATION TABLE

SECTION-I								
Unit & Sub-Unit		**Topics/Sub-topics**	**Hrs**	**Marks**	**CO**	**R Level**	**U Level**	**A Level**
1		**Introduction of Embedded System**	**7**	**10**	1	30%	60%	10%
	1.1	Processor in the system Different Hardware Units. Software Embedded into System. Exemplary Embedded system.						
	1.2	System –On-Chip (SOC) & VLSI system.						
	1.3	Terminologies: RISC, CISC, VLIW						
	1.4	Fundamental Architecture: Harvard, Von Neumann						
2		**Programming: Assembly and Embedded C**	**10**	**15**	1,3	10%	30%	60%
	2.1	Assembly Language V/S Embedded C.						
	2.2	Software Development Cycle: Editor, Assembler, Compiler, Cross-Compiler, Linker, Locator						
	2.3	Addressing Modes: Immediate, Register, Direct, Indirect, Indexed						
	2.4	Instruction set: Data Transfer, Arithmetic, Logical, Branching, Machine control and Boolean						
	2.5	Assembler Directives: ORG, DB, EQU, END, CODE, DATA						
	2.6	Assembly Language Programming (ALP): Data manipulation, Masking, Stack operation, Branch related programming						
	2.7	Programming with 'C': Input/output operation, Bit/Byte operations, Arithmetic and Logical operations on data, Time delay routines, Timer/Counter operations, Generation of patterns on port lines, Serial Communication.						
3		**Memory organization**	**7**	**10**	1,2	20%	70%	10%
	3.1	Structural units in processor.						
	3.2	Processor selection						
	3.3	Memory devices & memory selection						
	3.4	Memory Allocation						
	3.5	Direct Memory Access (DMA)						
	3.6	Interfacing processor & I/P O/P device						

SECTION-II								
Unit & Sub-Unit		**Topics/Sub-topics**						
4		**Communication Protocols**	**6**	**8**	1,2	20%	70%	10%
	4.1	Need of communication interface in embedded system.						
	4.2	Serial Communication – RS-232, I2C, CAN, USB, Bluetooth, RFID, Zigbee						

	4.3	Parallel Communication – ISA, PCI, PCI-X						
	4.4	Advanced I/O buses						
5		**I/O interfacing**						
	5.1	Interfacing Keys, LEDs, matrix keyboard, relay and LCD and its programming with 'C'.						
	5.2	Interfacing of ADC & DAC and its programming with 'C' for generation of different patterns.	**6**	**8**	1,2	10%	30%	60%
	5.3	Interfacing Stepper Motor, DC Motor and its programming with 'C'.						
6		**Real Time Operating System**						
	6.1	Real Time and Embedded systems OS						
	6.2	Requirement, Need, Specification of RTOS in Embedded systems						
	6.3	Architecture of Real Time Operating System (RTOS)	**10**	**14**	1	20%	60%	20%
	6.4	Interrupt routines in RTOS						
	6.5	RTOS task scheduling models						
	6.6	Mutual Exclusion, Starvation, Deadlock						
7		**Embedded System Applications**						
	7.1	Temperature sensor (LM35) interfacing using ADC to 8051	**2**	**5**	1,2,3 ,4	10%	30%	60%
	7.2	Water Level controller design using 8051						
Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms' Revised Taxonomy).								

Notes: *This specification table shall be treated as a general guideline and actual distribution of marks may slightly vary from table. But the questions from each topic should be asked as per marks weightage.*

V. LIST OF PRACTICALS/ASSIGNBMENTS/TUTORIALS

Sr. No.	Unit	Practical/Assignment	Approx. Hours	Relevant COS
1	1,3	Write a program to input and output data operation via ports of 8051.	3	1,3
2	1,3	Write a program to perform arithmetic and logical operations.	3	1,3
3	1,3	Write a program to blink a LED connected on port pin.	3	1,3
4	1,3	Write a program to generate square wave on port of 8051.	3	1,3
5	1,3	Write a program to read the status of key and turn ON/OFF a LED connected to port pins of 8051.	3	1,3
6	1,3	Write a program to ON/OFF a bulb through a relay connected to port pin of 8051.	3	1,3
7	1,3	Write a program to Interface 7 segment display to 8051 and to display 1 to 9 numbers on it.	3	1,3
8	1,3	Write a program to Interface 7x5 dot matrix displays to 8051 and to display an alphabet on it.	3	1,3
9	1,3	Write a program to Interface 16 x 2 LCD to 8051 and to display string on it.	3	1,3
10	1,3	Write a program to Interface a 4 x 4 matrix keyboard and 16 x 2 LCD to 8051 and read and display key code on LCD.	3	1,3
11	1,3	Write a program to Interface 8 bit ADC and 16 x 2 LCD to 8051 and to read and display data of ADC on LCD.	3	1,3
12	1,3	Write a program to interface dc motor.	3	1,3

13	1,3	Write a Program to Interface stepper motor.	3	1,3
14	1,3	Write program to rotate stepper motor with different speed in clockwise and counter clockwise direction.	3	1,3
15	1,3	Write a program to message "YES" serially at 9600 baud rate 8 bit data.	3	1,3
* Minimum 14 and maximum 15 practical/experiment sessions to be included in a course in a term				

VI. ASSESMENTS METHODOLOGIES /TOOLS

Assignments

- Develop codes for relevant topics suggested by teacher.
- Solve an assignment on any relevant topic given by teacher.

Micro Project (if any)

- Develop some simple real world application projects.

VII. ASSESMENTS METHODOLOGIES /TOOLS

Formative assessment (Assessment for Learning)

- Experiments performance and journal completion.
- Class Test
- Self-learning
- Term Work
- Seminar/Presentation

Summative Assessment (Assessment of Learning)

- End Term Exam
- Micro-project.
- Assignments.

VIII. 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
CO1	3	1	1	1	2	1	3	1	1	1
CO2	3	2	1	1	3	1	3	1	1	1
CO3	3	2	3	2	2	2	3	2	2	3
CO4	1	3	3	3	3	2	3	2	2	3
Legends :- High:03, Medium:02,Low:01, No Mapping: -										

IX. SUGGESTED LEARNING MATERIALS TEXTBOOKS/REFRENCE BOOKS/WEBSITES

Sr. No.	Author	Title	Publisher and Edition
1	Raj Kamal,	Embedded Systems: Architecture, Programming and Design	Tata McGraw- Hill, 2nd Edition
2	Mazidi & McKinlay	The 8051 Microcontroller and Embedded System Using Assembly and C	Prentice Hall
3	Raj Kamal,	Embedded Systems: Architecture, Programming and Design	Tata McGraw- Hill, 2nd Edition
4	J W Stewart and K X Miao	The 8051 Microcontroller: Hardware, Software and Interfacing	Prentice Hall, 2nd Edition
5	M Predko	Programming & Customizing 8051 Microcontrollers	Tata McGraw-Hill, 1st Edition

X. LEARNING WEBSITES & PORTALS

SR NO	LINK /PORTAL	DESCRIPTION
1	https://onlinecourses.nptel.ac.in/noc20_ee98/preview	ES
2	https://onlinecourses.nptel.ac.in/noc20_cs16/preview	RTOS

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

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VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE DIP. EXAM MATUNGA MUMBAI-19

Elective I subjects (Skill based subject 04) any one out of four V semester			
Sr. No	Subject code	Subject name	Abbreviation
1	233EX56(a)	Biomedical and Instrumentation	BMI
2	233EX56(b)	PLC-SCADA	PS
3	233EX56(c)	Introduction to solar cell	RB
4	233EX56(d)	Industry 4.0	IN

Elective II subjects(Skill based subject 05) any one out of four VI semester			
Sr. No	Subject code	Subject name	Abbreviation
1	233EX64(a)	Signal Processing	SP
2	233EX64(b)	Computer Peripheral and Hardware Maintenance	CPHM
3	233EX64(c)	Virtual Instrumentation	VI
4	233EX64(d)	Optical Fiber Communication	OFC

Curriculum Coordinator

Head Diploma in Electronics Engineering

Dean - Diploma

ELECTRICAL ENGG. DEPARTMENT VJTI MATUNGA MUMBAI-19

DIPLOMA PROGRAMME	**: DIPLOMA IN ELECTRONICS ENGINEERING**
PROGRAMME CODE	**: DELNE**
SEMESTER	**: SIXTH**
COURSE TITLE	**: SIGNAL PROCESSING**
COURSE CODE	**: 233EX64(a)**

I. TEACHING AND EXAMINATION SCHEME:

TEACHING SCHEME						ASSESSMENT SCHEME											
CL	TL	LL	Self-learning	CR	Total IKS Hrs for Sem	PAPER HRS	FA-TH (MST)	SA-TH (ESE)	TOTAL		Based on LL & TL Practical				Based on Self-learning		TOTAL MARKS
											FA-PR (CA)		SA-PR (PR/OR)		SLA		
							Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
3	-	3	-	3	-	3	30	70	100	28	25@	10	25#	10			150

II. RATIONALE

After studying this subject, students will be able to understanding different types of signals (continuous-time, discrete-time, periodic, aperiodic) and their mathematical representation. Analyzing system properties like linearity, time-invariance, causality, and stability through mathematical models. Applying Fourier Transform techniques to analyze signals in the frequency domain. Utilizing Laplace Transform for analyzing continuous-time systems. Applying Z-Transform for analyzing discrete-time systems

III. COURSE OUTCOMES (COS)

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

CO1:	Comprehend the mathematical representation and characteristics of continuous-time and discrete-time signals and systems.
CO2:	Analyze continuous-time signals in the frequency domain using Laplace and Fourier transforms, and discrete-time systems using the Z-transform
CO3:	Establish the input-output relationship for Linear Time-Invariant (LTI) systems and apply the convolution operation for both continuous-time and discrete-time systems.

IV. COURSE CONTENTS WITH SPECIFICATION TABLE

SECTION-I								
Unit & Sub-Unit		Topics/Sub-topics	Hrs	Marks	CO	R Level	U Level	A Leve
1		**Continuous Time signals and Systems:**	08	12	1,3	20%	20%	60%
	1.1	Definition of Continuous time signal, Classification and Operations on signal.						
	1.2	Definition and Classification of systems.						
	1.3	LTI systems, Linear Convolution, Difference equations.						
2		**Laplace Transform their applications to systems:**	10	15	2	30%	20%	50%
	2.1	Definition & properties of One and Two-sided Laplace Transform.						
	2.2	Concept of Region of Convergence (ROC). Problems on ROC.						
	2.3	Inverse Laplace transforms and System transfer function.						
3		**Fourier Transforms and their applications to**	06	8	2	10%	20%	70%
	3.1	Introduction to Fourier Transform (FT), Concept and Applications. Properties of Fourier Transform						
	3.2	Energy Spectral Density, Power Spectral Density.						
	3.3	Representation of periodic functions by Fourier series.						

SECTION-II								
Unit & Sub-Unit		Topics/Sub-topics						
4		**Discrete Time Signals & Systems:**	08	12	1,3	20%	20%	60%
	4.1	Discrete time signals, Classification and Representation, operations on sequences.						
	4.2	Discrete time systems and classification						
	4.3	LTI systems, Linear Convolution, Circular Convolution, Difference equations.						
5		**Z Transform and their applications to systems:**	10	15	2	20%	30%	50%
	5.1	Definition & properties of One and Two-sided Z Transform						
	5.2	Concept of Region of Convergence (ROC).						
	5.3	Inverse Z Transform. Problems based on z and inverse z transform.						

6		**Analysis of Discrete Time Systems:**	**06**	**08**	**3**	**10%**	**20%**	**70%**
	6.1	System Transfer function & Impulse response						
	6.2	Structural realization of discrete systems – Direct form – I, Direct form-II, Cascade and parallel forms.						
	6.3	Introduction to Discrete Time Fourier Transform (DTFT)						
Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxanomy).								

Notes: This specification table shall be treated as a general guideline and actual distribution of marks may slightly vary from table. But the questions from each topic should be asked as per marks weightage. Numerical questions are to be asked only if specified.

V. LIST OF PRACTICALS/ASSIGNBMENTS/TUTORIALS

Sr. No.	Unit	Practical/Assignment	Approx. Hours	Relevant COS
1	1	Identify and plot different types of signals (continuous, discrete, periodic, even, odd).	2	CO1
2	1	Generate and analyze unit step, impulse, ramp, and sinusoidal signals.	2	CO1
3	1,2	Apply and observe the effects of time shift and time scaling on basic signals.	2	CO2
4	2	Perform addition and multiplication of signals and analyze linearity.	2	CO2
5	3	Compute and visualize the Fourier Series; plot amplitude and phase spectra.	2	CO2
6	3,4	Compute Fourier Transforms of signals and interpret their spectra.	2	CO2
7	2	Perform and verify properties of convolution (commutative, associative, distributive).	2	CO1, CO2
8	2	Use Laplace Transforms to solve differential equations and analyze systems.	2	CO2
9	5	Apply Z-Transform, determine poles/zeros, and analyze ROC.	2	CO2
10	4	Design and simulate linear time-invariant systems; study system response.	2	CO3
* Minimum 7/8 practical/experiment sessions to be included in a course in a term				

VI. ASSESMENTS METHODOLOGIES /TOOLS

Formative assessment (Assessment for Learning)

- Midterm Test Exam
- Term Work

Summative Assessment (Assessment of Learning)

- End Term Exam

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE DIP. EXAM MATUNGA MUMBAI-19

VII. 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
CO1	3	2	1	1	1	2	2	3	1	2
CO2	3	3	2	1	1	1	1	3	3	2
CO3	3	3	2	1	1	1	1	3	2	2
Legends :- High:03, Medium:02,Low:01, No Mapping: - 0										

VIII. SUGGESTED LEARNING MATERIALS TEXTBOOKS/REFRENCE BOOKS/WEBSITES

Sr. No	Author	Title	Publisher
1	Simon Haykins and Barry Van Veen,	"Signals and Systems"	2nd Edition, Wiley India.
2	Allan V.Oppenheim, S.Wilsky and S.H.Nawab	" Signals and Systems"	Pearson, 2007.
3	Proakis	Digital Signal Processing	Algorithms and Applications.(PHI)
4	M.J. Roberts	"Signals and Systems"	Tata McGraw Hill 2007
5	Schaum's Outlines Series	"Signals and Systems"	Tata McGraw Hill
6	B.P. Lathi	Signals & Systems and Communication	BSP.

IX. LEARNING WEBSITES & PORTALS

Sr. No	Link /Portal	Description
1	https://ocw.mit.edu/courses/res-6-007-signals-and-systems-spring-2011/	Basic concepts for both continuous-time and discrete-time signals and systems.
2	http://www.eas.uccs.edu/	Signals processing.
3	https://nptel.ac.in/courses/117104074/	Introduction to signals and systems video lectures.

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

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VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE DIP. EXAM MATUNGA MUMBAI-19

DIPLOMA PROGRAMME	**: DIPLOMA IN ELECTRONICS ENGINEERING**
PROGRAMME CODE	**: DELNE**
SEMESTER	**: SIX**
COURSE TITLE	**: COMPUTER PERIPHERAL AND HARDWARE MAINTENANCE**
COURSE CODE	**: 233EX64(b)**

I. TEACHING AND EXAMINATION SCHEME:

TEACHING SCHEME						ASSESSMENT SCHEME											
CL	TL	LL	Self-learning	CR	Total IKS Hrs for Sem	PAPER HRS	FA-TH (MST)	SA-TH (ESE)	TOTAL		Based on LL & TL Practical				Based on Self-learning		TOTAL MARKS
											FA-PR (CA)		SA-PR (PR/OR)		SLA		
							Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
3	-	3	-	3	-	3	30	70	100	28	25@	10	25#	10			150

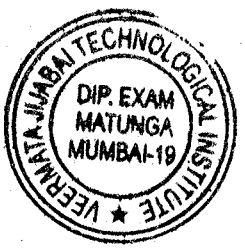
II. RATIONALE

As electronics engineers play a crucial role in designing and maintaining hardware systems, understanding computer hardware and peripheral maintenance is essential. This syllabus equips electronics students with practical knowledge of processors, motherboards, memory, and peripherals, bridging the gap between electronics and computing. By gaining hands-on experience in assembling, troubleshooting, and repairing computer systems, students enhance their technical expertise. With the growing demand for hardware support and embedded system integration, this course prepares them for careers in IT hardware, embedded systems, and technical support domains.

III. COURSE OUTCOMES (COS)

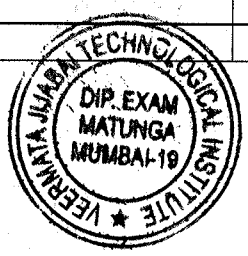
Students will be able to achieve the following CO'S on completion of course based learning

- CO1: Explain the architecture and working of computer hardware components.
- CO2: Identify, troubleshoot, and repair common hardware and peripheral issues.
- CO3: Assemble, configure, and maintain computer systems.



IV. COURSE CONTENTS WITH SPECIFICATION TABLE

SECTION-I								
Unit & Sub-Unit		**Topics/Sub-topics**	**Hrs**	**Marks**	**CO**	**R Level**	**U Level**	**A Level**
1		**Introduction to Computer Hardware**	06	10	CO1	30%	50%	20%
	1.1	Basics of Computer Hardware and its Components						
	1.2	Functional Block Diagram of a Computer						
	1.3	Evolution of Computer Hardware						
	1.4	Computer Buses and Data Transfer Methods						
	1.5	System Boot Process and BIOS/UEFI						
2		**Processor, Motherboard, and Memory**	08	12	CO1	30%	50%	20%
	2.1	rocessor Types (Intel, AMD, ARM) and Architectures						
	2.2	Motherboard Components and Chipsets						
	2.3	Bus Standards (PCI, PCIe, SATA, NVMe)						
	2.4	Memory Types (RAM, ROM, Cache, Virtual, Flash)						
	2.5	Memory Hierarchy and Data Access Speeds						
3		**Storage Devices and Power Supply**	10	13	CO1, CO2	10%	40%	50%
	3.1	Types of Storage Devices: HDD, SSD, NVMe, Optical Drives						
	3.2	RAID Technology and Its Configurations						
	3.3	File System Types (NTFS, FAT32, exFAT, ext4)						
	3.4	SMPS Working and Troubleshooting						
	3.5	Power Supply Problems and Solutions						
SECTION-II								
Unit & Sub-Unit		**Topics/Sub-topics**						
4		**Computer Peripherals and Interfacing**	08	12	CO1, CO2	20%	40%	40%
	4.1	Input Devices: Keyboard, Mouse, Scanner, Joystick						
	4.2	Output Devices: Monitors (LCD, LED, OLED), Printers, Speakers						
	4.3	Display Interfaces: HDMI, VGA, DVI, DisplayPort						
	4.4	External Storage Devices and Interfaces: USB, Thunderbolt, SD Cards						
	4.5	Printer Types, Troubleshooting, and Maintenance						
5		**System Assembly and Installation**	08	12	CO2, CO3	10%	30%	60%
	5.1	PC Assembly: Selecting Components, Step-by-Step Assembly						
	5.2	Installing and Configuring an Operating System						
	5.3	BIOS Settings and Firmware Updates						
	5.4	Dual Boot Configuration						
	5.5	Installing Drivers and Software Updates						



6		**Hardware Troubleshooting and Maintenance**	08	11	CO2, CO3	10%	20%	70%
	6.1	Common Hardware Issues and Diagnostics						
	6.2	Troubleshooting Motherboard, RAM, CPU, Storage Issues						
	6.3	Preventive Maintenance and Best Practices						
	6.4	Using Diagnostic Tools for System Performance						
	6.5	Data Backup and Recovery Methods						
Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxanomy).								

Notes: This specification table shall be treated as a general guideline and actual distribution of marks may slightly vary from table. But the questions from each topic should be asked as per marks weightage.

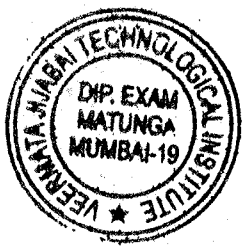
V. LIST OF PRACTICALS/ASSIGNBMENTS/TUTORIALS

Sr. No.	Unit	Practical/Assignment	Approx. Hours	Relevant COS
1	1	Identify and describe different computer hardware components.	3	CO1
2	1	Disassemble and reassemble a computer system.	3	CO1
3	2	Install and configure a processor and apply thermal paste.	3	CO2
4	2	Install and test different types of RAM modules.	3	CO2
5	3	Install, partition, and format HDD/SSD/NVMe drives.	3	CO2
6	3	Configure RAID levels and study their performance.	3	CO3
7	3	Troubleshoot and repair power supply issues (SMPS).	3	CO3
8	4	Connect and configure different input/output devices.	3	CO3
9	4	Install and troubleshoot different printer types.	3	CO3
10	5	Assemble a functional computer from individual components.	3	CO2
11	5	Install an operating system and configure BIOS/UEFI settings.	3	CO3
12	5	Set up dual-boot and install necessary drivers.	3	CO3
13	6	Diagnose and repair common motherboard and CPU faults.	3	CO3
14	6	Use diagnostic tools to analyze system performance.	3	CO3
15	6	Perform preventive maintenance and cleaning of a computer.	3	CO3
16	6	ecover lost data and implement backup solutions.	3	CO3
* Minimum 15 and maximum 16 practical/experiment sessions to be included in a course in a term				

VI. ASSESMENTS METHODOLOGIES /TOOLS

Assignments

- Develop codes for relevant topics suggested by teacher.
- Solve an assignment on any relevant topic given by teacher.



Micro Project (if any)

- Develop some simple real world application projects.

VII. ASSESMENTS METHODOLOGIES /TOOLS

Formative assessment (Assessment for Learning)

- Experiments performance and journal completion.
- Class Test
- Self-learning
- Term Work
- Seminar/Presentation

Summative Assessment (Assessment of Learning)

- End Term Exam
- Micro-project.
- Assignments.

VIII. 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
CO1	3	1	1	1	1	1	3	1	2	1
CO2	3	3	2	3	3	2	3	1	2	3
CO3	3	3	2	3	3	2	3	1	2	3
Legends :- High:03, Medium:02,Low:01, No Mapping: -00										

IX. SUGGESTED LEARNING MATERIALS TEXTBOOKS/REFRENCE BOOKS/WEBSITES

Sr. No.	Author	Title	Publisher and Edition
1	James. K. L	The computer hardware installation, interfacing, troubleshooting and maintenance	PHL Learning
2	Gupta, Vikas	Comdex: Hardware and networking course kit	Dreamtech Press, New Delhi
3	Minasi, Mark	The Complete PC upgrade and maintenance guide	BPB Publication
4	Kadam, Sachine	Computer architecture and maintenance Vol. 1	Shroff Publication

X. LEARNING WEBSITES & PORTALS

SR NO	LINK /PORTAL	DESCRIPTION
1	https://www.youtube.com/watch?v=JJoK4349Qk4	Computer Maintenance
2	https://www.iitg.ac.in/cse/hardware/	IIT Guwahati Lab Tools and Lab Manuals

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

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VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE DIP. EXAM MATUNGA MUMBAI-19

DIPLOMA PROGRAMME	**: DIPLOMA IN ELECTRONICS ENGINEERING**
PROGRAMME CODE	**: DELNE**
SEMESTER	**: SIXTH**
COURSE TITLE	**: VIRTUAL INSTRUMENTATION**
COURSE CODE	**: 233EX64(c)**

I. TEACHING AND EXAMINATION SCHEME:

TEACHING SCHEME						ASSESSMENT SCHEME											
CL	TL	LL	Self-learning	CR	Total IKS Hrs for Sem	PAPER HRS	FA-TH (MST)	SA-TH (ESE)	TOTAL		Based on LL & TL Practical				Based on Self-learning		TOTAL MARKS
											FA-PR (CA)		SA-PR (PR/OR)		SLA		
							Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
3	-	3	-	3	-	3	30	70	100	40	25@	10	25#	10	-	-	150

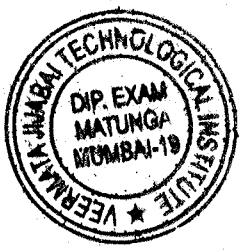
II. RATIONALE

Virtual instrumentation (VI) combines software and hardware to create flexible, cost-effective, and customizable measurement systems. Unlike traditional instruments, which are fixed in function, VI allows users to design and modify systems based on their specific needs. VI systems are scalable, portable, and can be accessed remotely, making them ideal for rapid prototyping, automation, and data management. Overall, VI offers greater flexibility and efficiency in various scientific, industrial, and research applications.

III. COURSE OUTCOMES (COS)

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

CO1:	Describe the concepts of virtual instrumentation and Comprehend various aspects of the VI.
CO2:	Apply the concepts of LabVIEW in developing graphical programs for the given logic.
CO3:	Analyze the software and hardware components of VI with data acquisition.



IV. COURSE CONTENTS WITH SPECIFICATION TABLE

SECTION-I								
Unit & Sub-Unit		**Topics/Sub-topics**	**Hrs**	**Marks**	**CO**	**R Level**	**U Level**	**A Level**
1		**Introduction to Virtual Instrumentation and LabVIEW**	**10**	**15**		**40%**	**40%**	**20%**
	1.1	Virtual instrument and traditional instrument, hardware and software in VI, VI for test, control and design, VI in engineering process, virtual instruments beyond personal computer, graphical system design using LabVIEW.			1,2			
	1.2	Introduction to LabVIEW: LabVIEW environment-Pop-Up Menus, Palettes-Tools, Controls and Functions Palette. Editing and debugging tools.			2			
	1.3	Advantages, software environment, creating and saving VI, front panel and block diagram, palettes, controls and indicators, block diagram, data types, data flow program.			2,3			
2		**Modular Programming**	**10**	**12**		**30%**	**50%**	**20%**
	2.1	Sub VI-Definition and utility, creating sub VI-connector and selection method. Express VI- utility, generation of signal using express VI.			1,2			
	2.2	Build a VI front panel and block diagram, building a connector pane, displaying sub VIs and express VIs, creating sub VIs			1,3			
	2.3	**Repetition and loops:** For loops, while Loops, terminal inside or outside loops, shift registers, feedback nodes, control timing, communication among multiple loops, local and global variables.			2			
3		**Structures**	**04**	**08**		**20%**	**40%**	**40%**
	3.1	Formula node, MATLAB script node, use of shift registers, case, sequence, customizing			1			
	3.2	Global VI and flat sequence structure, timed structures, formula nodes, event, event structures.			2			

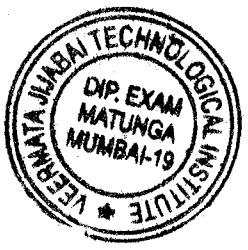
SECTION-II								
Unit & Sub-Unit		**Topics/Sub-topics**						
4		**Arrays and Clusters**	**08**	**10**		**20%**	**35%**	**45%**
	4.1	Arrays, concept of Auto-indexing, creating array controls and indicators, array operations.			1,2			
	4.2	Creating one dimensional, two dimensional, multi-dimensional arrays, array initialization, deleting, inserting, replacing elements within an array, array			2			

		function, auto indexing.						
	4.3	Clusters, creating clusters controls and indicators, cluster operations. Inter-conversion of arrays and clusters.			2,3			
5		**Charts and Graphs, File input and outputs**	**06**	**09**		**30%**	**40%**	**30%**
	5.1	Charts, scope, strip and sweep charts. Graphs, waveform graphs and XY graphs			1,2			
	5.2	File formats, file I/O functions, path functions, writing to and reading from files and spreadsheet.			1,3			
6		**Data acquisition**	**10**	**16**		**30%**	**30%**	**40%**
	6.1	Signals, signal conditioning, DAQ hardware configuration, DAQ hardware, analog inputs, outputs, counters.			2,3			
	6.2	Measurement and Automation Explorer (MAX), Acquiring and measuring data, DAQ in LABVIEW, DAQ assistant, task timing and task triggering in DAQ assistant, NI-DAQmax task, it's configuration, testing and measurements. Instrument control using LabVIEW			3			
Legends: R- Remember, U – Understand, A – Apply and above levels (Blooms's Revised Taxanomy).								

Notes: This specification table shall be treated as a general guideline and actual distribution of marks may slightly vary from table. But the questions from each topic should be asked as per marks weightage.

V. LIST OF PRACTICALS/ASSIGNBMENTS/TUTORIALS

Sr. No.	Unit	Practical/Assignment	Approx. Hours	Relevant COS
1	1	To Study tools, control and functional palettes of LabVIEW.	2	1
2	2	To create sub-VI in LabVIEW.	2	2
3	3	Create a Global VI which consists of a knob and a stop button.	2	2
4	4	Implementation of Array function.	2	1 & 2
5	3 & 4	Implementation of Structure/Cluster function.	2	2 & 3
6	5	Build a program which contains file path, loops, charts and indicators.	2	1 & 3
7	5	Build a LabVIEW virtual instruments that simulates a water level indicator.	2	2 & 3
8	5	Create a VI to change the state of the Boolean indicators n times between TRUE and FALSE.	2	3
9	6	Build a virtual instrument that simulates a Basic Calculator.	2	2 & 3
10	6	Home automation control system based on LabVIEW.	2	3
* Minimum 7 and maximum 8 practicals/experiment sessions to be included in a course in a term				



VI. ASSESMENTS METHODOLOGIES /TOOLS

Formative assessment (Assessment for Learning)

- Midterm Test Exam
- Term Work

Summative Assessment (Assessment of Learning)

- End Term Exam
- Practicals

VII. 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
CO1	3	1	1	1	1	1	3	3	1	2
CO2	2	2	2	2	1	2	2	1	2	1
CO3	1	3	2	3	1	2	2	2	1	2
Legends :- High:03, Medium:02,Low:01, No Mapping: - 0										

VIII. SUGGESTED LEARNING MATERIALS TEXTBOOKS/ REFERENCE BOOKS/ WEBSITES

Sr. No	Author	Title	Publisher
1	Jeffrey Travis , Jim Kring	LabVIEW for Everyone: Graphical Programming Made Easy and Fun	Prentice Hall Publications,2006.
2	Gary W. Johnson, Richard Jennings	LabVIEW Graphical Programming	4th Edition, MGH
4	Sanjay Gupta and Joseph John	Virtual Instrumentation using LabVIEW	TMH Publications, 2013.
5	Jerome and Jovitha	Virtual Instrumentation using LabVIEW	1st Edition, PHI, 2010 (Unit I, II, III).

IX. LEARNING WEBSITES & PORTALS

Sr. No.	Link / Portal	Description
1	www.ni.com	Data Acquisition and Controls

2	https://www.ni.com/en/shop/labview/virtual-instrumentation.html?srsltid=AfmBOorvUCN5DUI0j117QZTpuFP7iJxOc2ZVVRfDlsb-eDzVM13Ij-fI	Overview of Virtual Instrumentation
3	https://www.ni.com/en/shop/labview/virtual-instrumentation-for-test-control-and-design.html?srsltid=AfmBOorg6W6RG3M1RhadgAEIqUJGo9P4mgwKsu5sQlpKFsgHY-pUKC7C	Virtual Instrumentation for Test, Control, and Design

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

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE ★ DIP. EXAM MATUNGA MUMBAI-19

DIPLOMA PROGRAMME	**: DIPLOMA IN ELECTRONICS ENGINEERING**
PROGRAMME CODE	**: DELNE**
SEMESTER	**: SIXTH**
COURSE TITLE	**: OPTICAL FIBER COMMUNICATION**
COURSE CODE	**: 233EX64(d)**

I. TEACHING AND EXAMINATION SCHEME:

TEACHING SCHEME						ASSESSMENT SCHEME											
CL	TL	LL	Self-learning	CR	Total IKS Hrs for Sem	PAPER HRS	FA-TH (MST)	SA-TH (ESE)	TOTAL		Based on LL & TL Practical				Based on Self-learning		TOTAL MARKS
											FA-PR (CA)		SA-PR (PR/OR)		SLA		
							Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
3	-	3	-	3	-	3	30	70	100	40	25@	10	25#	10	-	-	150

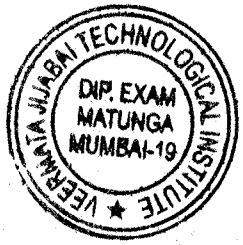
II. RATIONALE

The course aims to provide students with a thorough understanding of optical fiber communication systems, including the fundamental principles of light propagation in fibers and associated losses. Students will gain knowledge about fiber structure, types, and transmission characteristics, as well as optical sources and detectors. They will explore fiber splicing and connector technologies, alongside fault detection methods. The course will also cover advanced multiplexing techniques, such as WDM and DWDM, to equip students with the skills necessary to work with modern optical communication systems.

III. COURSE OUTCOMES (COS)

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

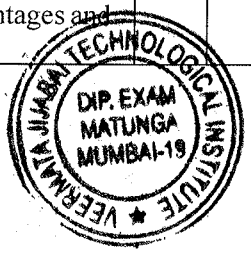
CO1:	Recognize the basic components and principals involved in optical fiber communication systems.
CO2:	Interpret how various factors influence the behavior and performance of optical fiber communication.
CO3:	Demonstrate the ability to utilize optical fiber technology in practical scenarios, optimizing system performance and troubleshooting issues.



IV. COURSE CONTENTS WITH SPECIFICATION TABLE

SECTION-I								
Unit & Sub-Unit		**Topics/Sub-topics**	**Hrs**	**Marks**	**CO**	**R Level**	**U Level**	**A Level**
1		**Fundamentals of Optical Fiber Communication**	**10**	**13**		**50%**	**50%**	**-**
	1.1	Historical development, The general system, Structure of fiber, Block Diagram of optical fiber communication system, Advantages, disadvantages and applications of optical fiber communication,			1			
	1.2	Definition and concept of reflection, refraction, dispersion, diffraction, absorption and scattering with the help of wave theory.			1			
	1.3	Law of reflection, Snell's law			1			
	1.4	Concept of Critical angle and Numerical aperture, Acceptance Angle.			2,3			
2		**Transmission characteristics of optical fiber**	**10**	**14**		**40%**	**30%**	**20%**
	2.1	Fiber cables types and characteristics			1,2			
	2.2	Attenuation, Material absorption losses, Linear scattering losses, Nonlinear scattering losses			2,3			
	2.3	Fiber bend loss, Dispersion, Chromatic dispersion, Intermodal dispersion: Multimode step index fiber.			2,3			
3		**Optical Sources**	**04**	**8**		**50%**	**30%**	**20%**
	3.1	Optical Sources: Specifications, Different Light Sources, LED (Construction, working, characteristics, advantages and disadvantages)			1			
	3.2	LASER: Absorption, Spontaneous Emission and Stimulated Emission			1,2			
	3.3	Comparison Between LED and LASER			2			

Unit & Sub-Unit								
4		**Optical Detectors**	**08**	**12**		**30%**	**50%**	**20%**
	4.1	Optical Detectors: Conventional, PIN, Avalanche (Construction, working, characteristics, advantages and disadvantages)			1,2			
	4.2	Photodetector Characteristics: Responsivity, Quantum Efficiency and Dark current			2			
	4.3	Optical Detectors: Conventional, PIN, Avalanche (Construction, working, characteristics, advantages and disadvantages)			2,3			



5		**Optical Fiber Connectors and Splicers**	**09**	**12**		**30%**	**40%**	**30%**
	5.1	Fiber alignment and joint loss, Fiber splices: Fusion Splices, Mechanical splices			1,2			
	5.2	Fiber connectors: Cylindrical ferrule connectors, Duplex and Multiple fiber connectors			1,2			
	5.3	Fiber couplers: three and four port couplers, star couplers, Optical Isolators and Circulators			2,3			
6		**Fault Detection and Multiplexing techniques**	**07**	**11**		**40%**	**30%**	**20%**
	6.1	Attenuation Measurements: OTDR (Block Diagram, Working Principle), OTDR Trace.			2,3			
	6.2	Introduction to WDM, DWDM.			1			
	6.3	Types of WDM and WDM systems, DWDM systems			2,3			

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

Notes: *This specification table shall be treated as a general guideline and actual distribution of marks may slightly vary from table. But the questions from each topic should be asked as per marks weightage. Numerical questions are to be asked only if specified.*

V. LIST OF PRACTICALS/ASSIGNBMENTS/TUTORIALS

Sr. No.	Unit	Practical/Assignment	Approx. Hours	Relevant COS
1	1	To construct and test different types of optical fiber cables (single-mode and multimode) and measure parameters like core diameter, cladding thickness, and fiber performance.	2	1,2
2	2	To measure the attenuation and loss in optical fibers over different lengths using an Optical Power Meter and Light Source, and to analyze material absorption, scattering losses, and fiber bend impact.	2	2,3
3	5	To practice fusion splices and mechanical splicing techniques on optical fibers and evaluate splice losses, alignment, and joint efficiency.	2	1,2
4	6	To operate an Optical Time Domain Reflectometer (OTDR) for fiber testing and fault detection, and to interpret OTDR traces to locate faults and assess fiber performance.	2	2,3
5	3	To characterize Light Emitting Diodes (LEDs) and Laser Diodes (LDs) by analyzing their output power, wavelength, and the effect of different operating conditions on their performance.	2	1
6	5	To install and test fiber optic connectors (including cylindrical ferrule connectors), and to assess the insertion loss and return loss in an optical system.	2	1,2
7	1	To measure the Numerical Aperture (NA) and Acceptance Angle of optical fibers and understand their effect on light acceptance and transmission.	2	1,2
8	6	To set up a basic Wavelength Division Multiplexing (WDM) system, transmitting multiple wavelengths over a single optical fiber, and evaluate the system's capacity and efficiency.	2	2
* Minimum 7 and maximum 8 practicals/experiment sessions to be included in a course in a term				

VI. ASSESMENTS METHODOLOGIES /TOOLS

Formative assessment (Assessment for Learning)

- Midterm Test Exam
- Term Work

Summative Assessment (Assessment of Learning)

- End Term Exam
- Practicals

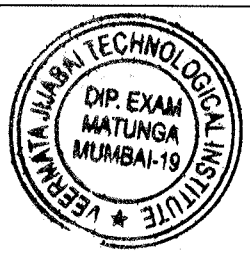
VII. SUGGESTED COS-POS MATRIX FORM

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
CO1	3	2	1	1	1	1	2	3	1	2
CO2	3	3	2	1	1	2	1	3	3	2
CO3	3	3	2	1	1	2	1	3	2	2

Legends :- High:03, Medium:02,Low:01, No Mapping: - 0

VIII. SUGGESTED LEARNING MATERIALS TEXTBOOKS/REFRENCE BOOKS/WEBSITES

Sr. No	Author	Title	Publisher
1	John M. Senior	Optical Fiber Communications: Principles and Practice	Pearson Education
2	Govind P. Agrawal	Fiber-Optic Communication Systems	Wiley
3	Alan Bononi	Understanding Optical Fiber Communications	Artech House
4	S.C. Gupta	Textbook on Optical Fiber Communication and Its Applications	PHI Learning
5	Fiber Optic Communications	Palais Joseph C.	Pearson



XI. LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://onlinecourses.nptel.ac.in/noc20_ph07/preview	Basic Concepts of Optical Fiber Communication
2	https://archive.nptel.ac.in/courses/108/106/108106167/	Optical Communication System
3	https://archive.nptel.ac.in/content/storage2/courses-/117101002/downloads/handouts/lec26.pdf	WDM and DWDM Systems

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

BOS VJTI Approval Dt. 23/05/2025

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE DIP. EXAM MATUNGA MUMBAI-19

PROGRAMME	**DIPLOMA IN ELECTRONICS ENGINEERING**
PROGRAMME CODE	**: DElnE**
SEMESTER	**: SIX**
COURSE TITLE	**: PROJECT II**
COURSE CODE	**: 233EX65**

I. TEACHING AND EXAMINATION SCHEME

TEACHING SCHEME						ASSESSMENT SCHEME											
CL	TL	LL	Self-learning	CR	Total IKS Hrs for Sem	PAPER HRS	FA-TH (MST)	SA-TH (ESE)	TOTAL		Based on LL & TL Practical				Based on Self-learning		TOTAL MARKS
											FA-PR (CA)		SA-PR (PR/OR)		SLA		
							Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
-	-	-	4	4	-	-	-	-	-	-	100@	40	100#	40			200

II. RATIONALE

Students are introduced to the subject of Project to improve their confidence and fluency levels. The project provides an opportunity to read research papers and orient themselves for presentations, research paper writing and interact verbally and present their work in front of a gathering with expert help. Seminar presentation boosts the confidence of the students and prepares them precisely for facing the interview panels and group discussions. Through this subject on Project, students will develop new ideas and perspectives of the subject /themes of emerging technologies and services of their area of studies. Projects may even lead to innovations and startups due to their deep study in their chosen subject during the term.

III. COURSE OUTCOMES (COs)

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

- CO1 - Collect relevant and updated research-based data and information to prepare a statement of purpose for the project.
- CO2 - Establish the action plan for the successful completion of the project under the guidance of an expert guide in the department.
- CO3 - Use various presentation tools and skills for presenting the project work in front of an expert panel.

IV. GENERAL GUIDELINES FOR PROJECT PREPARATION, PRESENTATION AND SUBMISSION OF THE FINAL PROJECT REPORT

a) Batches of students/sometimes individuals shall be formed for projects as decided by the Project Supervisor. The Project Supervisor shall be a faculty of the respective department.

b) Students shall Identify the problem statement and finalise the topic for the project in consultation with their faculty supervisors.

c) Students shall study and assess the feasibility of different solutions and the financial implications.

d) Students should collect relevant data from different sources books / internet / market / suppliers / experts through surveys / interviews). Students shall prepare required drawings/ designs and detailed plans for the successful execution of the work.

e) Students shall present their work on the project at the end of the term in front of the expert panel as framed by the department. They shall submit their ppts to their Project Supervisors for records.

f) Students shall submit two copies of their final Project Reports bound in Maroon colour hardbound book format to their Project Supervisor. One copy shall be retained by the Supervisor and the other copy shall be kept with the Department Head. Students may prepare multiple copies for their own records as required.

1. Organisation of the Project report

The report shall be presented in a number of chapters, starting with Introduction and ending with Summary and Conclusions. Each of the other chapters will have a precise title reflecting the contents of the chapter.

A chapter can be subdivided into sections, subsections and sub-subsections so as to present the content discretely and with due emphasis.

When the work comprises two or more mutually independent investigations, the report may be divided into two or more parts, each with an appropriate title. However, the numbering of chapters will be continuous right through, for example Part 1 may comprise Chapters 2-5, Part Two, Chapters 6-9.

The report shall be presented in following sequence:

1. Title sheet
2. Dedication sheet (if desired)
3. Declaration of the Candidate
4. Approval Sheet
5. Abstract
6. Table of contents
7. List of tables (if desired)
8. List of Figures (if desired)
9. Abbreviations / Notations / Nomenclature (if desired)
10. Chapter One : Introduction
11. Chapter Two: Literature Review
12. Chapter/s : Report of Materials and Methods used in the Project work
13. Chapter : Results & Discussions
14. Chapter : Summary & Conclusions
15. Appendix / Appendices (if any)
16. References
17. Acknowledgements

Maroon Hard Binding / Spiral Binding Front Cover

The front cover shall contain the following details:

- Full title of report in 6 mm 22 point's size font properly centered and positioned at the top.
- Full name of the candidate/s in 4.5 mm 15 point's size font properly centered at the middle of the page.
- A 40 mm dia replica of the Institute emblem followed by the name of department, name of the Institute and the year of submission, each in a separate line and properly centered and located at the bottom of page.
- All lettering shall be embossed in gold.

Side of the Hardbound Cover

- The Diploma awarded e.g. DCE / DEE / DELNE / DME / DCHE / DTE , the name of the candidate and the year of submission shall also be embossed on the bound (side) in gold.

- Blank Sheets In addition to the white sheets (binding requirement) two white sheets shall be put at the beginning and the end of the thesis.

1. Title Sheet

This shall be the first printed page of the report and shall contain the submission statement:
The Project Report submitted in partial fulfillment of the requirements of the Diploma in (name of the Diploma awarded), by (the name of candidate) and Roll No. (of the candidate), name(s) of the Project Supervisor / Co- supervisor (s) / Co-Guide(s) (if any), Department, Institute and year of submission.

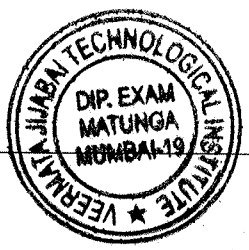
Sample copy of the 'Title Sheet' is appended (Specimen 'A')

2. Dedication Sheet

If the candidate so desires(s) he may dedicate his/her thesis, which statement shall follow the title page. If included, this shall form the page 1 of the auxiliary sheets but shall not have a page number.

3. Declaration of the Candidate

A declaration of Academic honesty and integrity is required to be included along with every report before the approval sheet.



The format of this declaration is given in Specimen `B' attached.

4. Approval Sheet

In the absence of a dedication sheet this will form the first page and in that case shall not have a page number. Otherwise, this will bear the number two in Roman lower case "ii" at the center of the footer. Sample copy of the 'Approval Sheet' is appended (Specimen `C')

5. Abstract

The 500 word abstract shall highlight the important features of the report and shall correspond to the electronic version to be submitted to the Library for inclusion in the website. The Abstract in the project report, however, shall have two more parts, namely, the layout of the thesis giving a brief chapter wise description of the work and the key words.

6. Table of Contents

The contents shall follow the Abstract and shall enlist the titles of the chapters, section and subsection using decimal notation, as in the text, with corresponding page number against them, flushed to the right.

7. List of Figures and Tables

Two separate lists of Figure captions and Table titles along with their numbers and corresponding page numbers against them shall follow the Contents.

8. Abbreviation Notation and Nomenclature

In general no abbreviations should be used in the text except for Technical terms. A complete and comprehensive list of all abbreviations, notations and nomenclature including Greek alphabets with subscripts and superscripts shall be provided after the list of tables and figures. (As far as possible, generally accepted symbols and notation should be used).

9. Introduction

The title of Chapter 1 shall be Introduction. It shall justify and highlight the problem posed, define the topic and explain the aim and scope of the work presented in the thesis. It may also highlight the significant contributions from the investigation.

10. Review of Literature

This shall normally form Chapter 2 and shall present a critical appraisal of the previous work published in the literature pertaining to the topic of the investigation. The extent and emphasis of the chapter shall depend on the nature of the investigation.

11. Report of Materials and Methods used in the Project work

The reporting on the investigation shall be presented in one or more chapters with appropriate chapter titles. Due importance shall be given to experimental setups, procedures adopted, techniques developed,

methodologies developed and adopted.

While important derivations / formulae should normally be presented in the text of these chapters, extensive and long treatments, copious details and tedious information, detailed results in tabular and graphical forms may be presented in Appendices.

- Representative data in tables and figures may, however, be included in appropriate chapters.
- Figures and tables should be presented immediately following their first mention in the text. Short tables and figures (say, less than half the writing area of the

page) should be presented within the text, while large tables and figures may be presented in separate pages.

- Equations should form separate lines with appropriate paragraph separation above and below the equation line, with equation numbers flushed to the right.

12. Results and Discussions

This shall form the penultimate chapter of the thesis and shall include a thorough evaluation of the investigation carried out and bring out the contributions from the study. The discussion shall logically lead to inferences and conclusions as well as scope for possible further future work.

13. Summary and Conclusions

This will be the final chapter of the thesis. A brief report of the work carried out shall form the first part of the Chapter. Conclusions derived from the logical analysis presented in the Results and Discussions Chapter shall be presented and clearly enumerated, each point stated separately. Scope for future work should be stated lucidly in the last part of the chapter.

14. Appendix

Detailed information, lengthy derivations, raw experimental observations etc. are to be presented in the separate appendices, which shall be numbered in Roman Capitals (e.g. "Appendix IV"). Since reference can be drawn to published / unpublished literature in the appendices these should precede the "Literature Cited" section.

15. References / Literature Cited

This should follow the Appendices, if any, otherwise the Summary and Conclusions Chapter. The candidates shall follow the style of citation and style of listing in one of the standard journals in the subject area consistently throughout his / her thesis, for example, IEEE in the Department of Electrical Engineering, Materials Transactions in Department of Metallurgical Engineering and Materials Science. However, the names of all the authors along with their initials and the full title of the article /monogram / book etc. have to be given in addition to the journals / publishers, volume, number, pages(s)and year of publication. Citation from websites should include the names(s) of author(s) (including the initials), full title of the article, website reference and when last accessed. Reference to personal communications, similarly, shall include the author, title of the communication (if any) and date of receipt.

Publications by the candidate, articles, technical notes etc. in the topic of the thesis published by the candidate may be separately listed after the literature cited. This may also be included in the contents.

The candidates may also include reprints of his / her publications after the literature citation.

Format for Entry in reference / Bibliography:

For paper published in Journal:

Name/s of Author/s, (Year of Publication), "Title of the paper", Title of the Journal,

Volume No, page no e.g.

Berny, J. (1889), "A new distribution function for risk analysis", Journal of the Operational Research Society, Vol. 40, pp.1121-7

For text/reference book:

Name/s of Author/s, (Year of Publication), Title of the book, Name of Publisher, Place e.g.

Canavos, G.C. (1984), Applied probability and statistical methods, Little, Brown & Company, Boston

For Thesis / Dissertation:

Name of the researcher, (Year of submission), Name of University, Place e.g.

Dey, P.K. (1997), "Symbiosis of organizational re-engineering for effective implementation of projects" Doctoral thesis, Jadavpur University, Calcutta

16. Acknowledgements

The acknowledgments by the candidate shall follow the citation of literature, signed by him/her, with date.

1 THESIS FORMAT

1.1 Paper

1.1.1 Quality

The thesis shall be printed / xeroxed on white bond paper, whiteness 95% or above, weight 70 gram or more per square meter.

1.1.2 Size

The size of the paper shall be standard A 4; height 297 mm, width 210 mm.

1.1.3 Type, Setting, Text Processing and Printing

The text shall be printed with Portrait orientation employing laser-jet or Inkjet printer, the text having been processed using a standard text processor. The standard font shall be Times New Roman of 12 pts with 1.5 line spacing and Justified alignment.

1.1.4 Page Format

The Printed Sheets shall have the following written area and margins: Top Margin 15 mm

Head Height 3 mm Head Separation 12 mm Bottom Margin 22 mm Footer 3 mm

Foot Separation 10 mm Text Height 245 mm Text Width 160mm

When header is not used the top margin shall be 30 mm. Left and Right

margins

The candidates shall have the options of single or double sided printing.

- Single sided/odd number page (in double sided printing) Left Margin 30mm
  Right Margin 20 mm
- Double sided even numbered page Left Margin 20mm
  Right Margin 30mm

1.1.5 Pagination

Page numbering in the text of the thesis shall be Hindu Arabic numerals at the center of the footer. But when the candidate opts for header style the page number shall appear at the right and left top corner for the odd and even number pages, respectively.

Page number "1" for the first page of the Introduction chapter shall not appear in print, only the second page will bear the number "2".

The subsequent chapters shall begin on a fresh page (fresh odd number page in case of double sided printing). When header style is chosen the first page of each chapter will not have the header and the page number shall be printed at the center of the footer.

Pagination for pages before the Introduction chapter shall be in lower case Roman numerals, e.g., "iv".

1.1.6 Header

When the header style is chosen, the header can have the Chapter number and Section number (e.g., Chapter 2, Section 3) on even numbered page headers and Chapter title or Section title on the odd numbered page header.

1.1.7 Footer

The Footer shall contain title, student name and page numbers in following format

Report Title *Student Name* *Page Number*

1.1.8 Paragraph format

Vertical space between paragraphs shall be about 2.5 line spacing. The first line of each paragraph should normally be indented by five characters or 12mm. A candidate may, however, choose not to indent if (s) he has provided sufficient paragraph separation.

A paragraph should normally comprise more than one line. A single line of a paragraph shall not be left at the top or bottom of a page (that is, no windows or orphans should be left). The word at the right end of the first line of a page or paragraph should, as far as possible, not be hyphenated.

1.2 Chapter and Section Format

1.2.1 Chapter

Each chapter shall begin on a fresh page (odd number page in case of double sided printing) with an additional top margin of about 75mm. Chapter number (in Hindu Arabic) and title shall be printed at the center of the line in 6mm font size (18pt) in bold face using both upper and lower case (all capitals or

small capitals shall not be used). A vertical gap of about 25mm shall be left between the Chapter number and Chapter title lines and between chapter title line and the first paragraph.

1.2.2 Sections and Subsections

A chapter can be divided into Sections, Subsections and Sub-subsections so as to present different concepts separately. Sections and subsections can be numbered using decimal points, e.g. 2.2 for the second section in Chapter 2 and 2.3.4 for the fourth Subsection in third Section of Chapter 2. Chapters, Sections and Subsections shall be included in the contents with page numbers flushed to the right. Further subsections need not be numbered or included in the contents.

The Section and Subsection titles along with their numbers in 5 and 4mm (16 and 14 pt) fonts, respectively, in bold face shall be flushed to the left (not centered) with 15 mm space above and below these lines.

In further subdivisions character size of 3 and 3.5 with bold face, small caps, all caps and italics may be used for the titles flushed left or centered. These shall not feature in the contents.

1.2.3 Table / Figure Format

As far as possible tables and figures should be presented in portrait style. Small size table and figures (less than half of writing area of a page) should be incorporated within the text, while larger ones may be presented on separate pages. Table and figures shall be numbered chapter wise. For example, the fourth figure in chapter 5 will bear the number Figure 5.4 or Fig 5.4

Table number and title will be placed above the table while the figure number and caption will be located below the figure. Reference for Tables and Figures reproduced from elsewhere shall be cited in the last and separate line in the table and figure caption,

e.g. (after McGregor [12]).

2 Auxiliary Format

2.1 Binding

The evaluation copies of the thesis / dissertation / report may be spiral bound or soft bound. The final hard bound copies to be submitted after the viva-voce examination will be accepted during the submission of report with the Maroon colour binding.

Typographical guidelines for Project Report:

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

a) The project 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 project report must be hardbound in maroon colour. 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.

Specimen 'A': Title Sheet

Title of the diploma programme: (examples)

Diploma in Civil Engineering (DCE), Diploma in Electrical Engineering (DEE), Diploma in Electronics Engineering (DElnE), Diploma in Mechanical Engineering (DME), Diploma in Chemical Engineering (DChE), Diploma in Textile Engineering (DTE)

Project Report Titled
(Title of the Report)

submitted in partial fulfillment of
the requirements of

Diploma in (branch)

by

(Name of the student)
(Registration number)

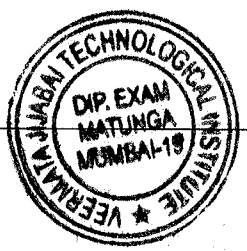
under the guidance of
(Name of the Supervisor)

(Name of the Department)

Veermata Jijabai Technological Institute

Mumbai 400 019

(Year of Submission)



Specimen `B' Declaration of the Candidate

Declaration of the Candidate

I declare that this written submission represents my ideas in my own words, where others' ideas or words have been included. I have adequately cited and referenced the original sources.

I also declare that I have adhered to all principles of academic honesty, integrity and have not misrepresented or fabricated or falsified any idea/ data/ fact/ source in my submission.

I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Signature of the candidate :_____

Name of the candidate:_____

Registration Number: _____

Date:_____

Specimen `C' Approval Sheet

CERTIFICATE

This is to certify that (Name of the Student), a student of (name of the Programme), has completed the Project report entitled "(Title of the project)" to our satisfaction.

The project report submitted by (Name of the student) is approved for the Diploma in (branch) Engineering (short form of branch).

(Name & Signature)
Supervisor

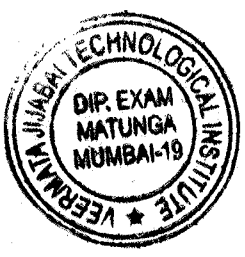
(Name & Signature)
External Examiner

(Name & Signature)
Co- Supervisor

(Name & Signature)
Head, Name of Department

Date:_____

Place:_____



I. ASSESSMENTS METHODOLOGIES /TOOLS

1. Formative assessment (Assessment for Learning)

A. Suggestive RUBRICS for assessment

Academic year : 20___-20___
Title of the Project: _____
Marks : Max 100, Min 40

Based on the following criteria

Sr No	Criteria	Marks 100
1	Selection of Topic	10
2	Literature review and data collection	10
3	Quality of preparation during the Project period	20
4	Time Management	10
5	Innovativeness of the Topic	10
6	Stages of development of the action plan	20
7	Seminar Presentation report	20

Name of Supervisor : _____

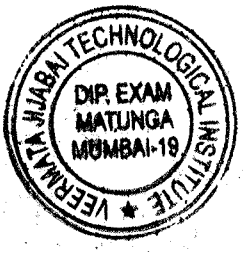
Signature of Supervisor : _____

B. Suggestive RUBRICS for summative assessment

Academic year : 20___-20___
Title of the Project: _____
Marks : Max 100, Min 40

Based on the following

The summative assessment of the students shall be based on the Presentation of the Project at the End of the Term in the form of Power point presentation, Project report and Assessment by the External Examiner. Out of the Total 100 marks 50 marks shall be allotted by the Supervisor and 50 marks will be awarded by the External Examiner on the basis of the following criteria. The total marks of 20 shown in the column below shall be equally divided between the Supervisor and the External Examiner.



Sr No	Criteria	Marks 100
1	Quality of information/Knowledge/Creativity/Innovation presented in the Project Work.	20
2	Type of the project (Industrial / Practically implemented / Study etc.)	20
3	Response to the question during the presentation	20
4	Response to the question during seminar presentation	20
5	Quality / Timely submission of the Final Project report	20

Name of Supervisor : _____ Name of External Examiner: _____

Signature of Supervisor : _____ Signature of External Examiner: _____

II. 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
CO1									
CO2									
CO3									

Legends :- High:03, Medium:02,Low:01, No Mapping: -

PSO1: Ability to apply knowledge of selecting raw materials, machines and process parameters using standard methods and engineering tools for designing solutions to meet specific needs of the textile industry.

PSO2: Understand the impact of textile processes in societal and environmental context and demonstrate the knowledge for sustainable development through teamwork and effective communication for lifelong learning.

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

BOS VJTI Approval Dt. 23/05/2025

VJTI MUMBAI TECHNOLOGICAL INSTITUTE DIP. EXAM MATUNGA MUMBAI-19

DIPLOMA PROGRAMME	: DIPLOMA IN ELECTRONICS ENGINEERING
PROGRAMME CODE	: DEInE
SEMESTER	: SIXTH
COURSE TITLE	: DIGITAL MARKETING
COURSE CODE	: 233EX66

I. TEACHING AND EXAMINATION SCHEME

TEACHING SCHEME					EXAMINATION SCHEME											
CL	TL	LL	Self-learning	CR	PAPER HRS	FA-TH (MST)	SA-TH (ESE)	TOTAL		Based on LL & TL Practical				Based on Self-learning		TOTAL MARKS
										FA-PR (CA)		SA-PR (PR/OR)		SLA		
						Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
3	1	-	1	2.5	-	-	-	-	-	-	-	-	-	25@	10	25

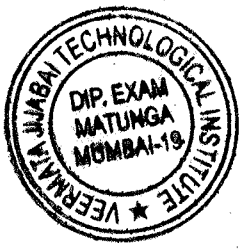
II. RATIONALE

Digital marketing helps businesses to grow and reach a global audience. It breaks geographical barriers too. Compared to traditional marketing methods, digital marketing is often more affordable and gives a higher return on investment. The course allows students to learn digital marketing basics and various tools used in digital marketing.

III. COURSE OUTCOMES (COs)

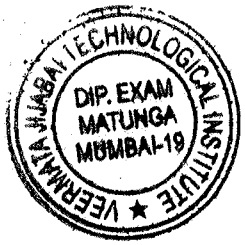
Students will be able to achieve the following COs on completion of course based learning

- CO1- Describe the traditional and digital marketing also create website
- CO2- Improve website's visibility on search engines and also create content for marketing
- CO3- Use social media and E-mail for marketing purposes



IV. COURSE CONTENTS WITH SPECIFICATION TABLE

SECTION - I							
Unit & Sub-Unit	**Topics/Sub-topics**	**Hours**	**Marks**	**CO**	**R Level**	**U Level**	**A Level**
1	**Introduction to Digital Marketing**	**8**	**12**	**1**	**30%**	**30%**	**40%**
1.1	Introduction and Importance of digital marketing. Difference between traditional and digital marketing.						
1.2	Digital Marketing Channels: SEO, search advertising, display advertising, social media marketing, affiliate marketing, email marketing, content marketing, and mobile marketing						
1.3	Recent trends and current scenario of the industry						
2	**Planning and Creating a Website**	**8**	**11**	**1**	**30%**	**30%**	**40%**
2.1	Website development basics: How Websites Work: Learn about web servers, browsers, and how they interact. Domain Names and Hosting: Understand how to register a domain and choose a hosting provider.						
2.2	Content Management Systems (CMS): WordPress: The most popular CMS, great for beginners. Other CMS Options: Joomla, Drupal, etc.						
2.3	Responsive Design: Mobile-Friendly Design: Ensure your website looks good on all devices. Media Queries: Techniques to apply different styles based on device characteristics. User experience (UX) design:						



	Principles of UX Design, UI Design Basics						
3	**Search Engine Optimisation (SEO)**	**8**	**12**	**2**	**30%**	**30%**	**40%**
3.1	Introduction to Search Engine Optimisation, Search Engine working						
3.2	On-page SEO – concepts like content research, keyword research, meta tags Off-page SEO – link building.						
3.3	Keyword Research Factors affecting the rank of a webpage Keyword Research: Creating Ads, Setting Up Campaigns, Bidding and Budgeting, Targeting, Ad Auctions, Monitoring and Optimization and Tools and Platforms						

SECTION - II							
Unit & Sub-Unit	**Topics/Sub-topics**	**Hours**	**Marks**	**CO**	**R Level**	**U Level**	**A Level**
4	**Content creation and Use of graphic design tool**	**8**	**12**	**2**	**30%**	**30%**	**40%**
4.1	Content creation: concept Content bucketing						
4.2	Creating a social media content calendar for a brand						
4.3	Introduction to Canva, create visual content using Canva						
5	**E-mail marketing**	**8**	**12**	**3**	**30%**	**30%**	**40%**
5.1	Introduction to concept of E-mail marketing, How to build the right subscriber list.						

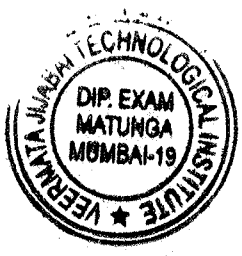
5.2	Build a database by segmenting based on demographics, mode of acquisition, target group, Finessing email marketing tools and software						
5.3	Designing email copies & automating emails, Extracting information from email campaign analytics						
6	**Social Media Marketing and Google Analytics**	**8**	**11**	**3**	**30%**	**30%**	**40%**
6.1	Benefits and Key Platforms for Social Media Marketing						
6.2	Creating a Social Media Marketing Strategy						
6.3	Basics of Google Analytics: Features, Metrics and Dimensions, Benefits and Limitations						

V. SUGGESTED SELF LEARNING ASSIGNMENTS/MICRO PROJECT/ACTIVITIES

- Assignments on each chapter which include basic questions
- Presentation

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
CO1	3	3	3	3	1	3	1	3	3	3
CO2	3	2	2	2	1	2	1	3	2	1
CO3	3	-	3	3	1	1	-	-	-	3
Legends :- High:03, Medium:02,Low:01, No Mapping: -										



VII. SUGGESTED LEARNING MATERIALS TEXTBOOKS/REFRENCE BOOKS/WEBSITES

No	Author	Title	Publisher
1	Ryan Deiss and Russ Henneberry	Digital Marketing for Dummies	NA
2	Babu KG Raja Sabarish Anbazhagan	Digital Marketing	Sultan Chand & Sons
3	Mathur Vibha	Digital Marketing	PHI Publication

VIII. LEARNING WEBSITES AND PORTALS:

Sr. No	Link /Portal
1	https://www.reliablesoft.net/
2	https://digitalmarketinginstitute.com/

Curriculum Coordinator

Head of the Department

Dean Diploma

BOS VJTI Approval Dt. 23/05/2025

VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE DIP. EXAM MATUNGA MUMBAI-19

DIPLOMA PROGRAMME	: DIPLOMA IN ELECTRONICS ENGINEERING
PROGRAMME CODE	: DElnE
SEMESTER	: SIXTH
COURSE TITLE	: INSTITUTE INDUSTRY INTERACTION
COURSE CODE	: 233EX67

I. TEACHING AND EXAMINATION SCHEME

TEACHING SCHEME					EXAMINATION SCHEME											
CL	TL	LL	Self-learning	CR	PAPER HRS	FA-TH (MST)	SA-TH (ESE)	TOTAL		Based on LL & TL Practical				Based on Self-learning		TOTAL MARKS
										FA-PR (CA)		SA-PR (PR/OR)		SLA		
						Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
2	-	-	1	1.5	-	-	-	-	-	-	-	-	-	25@	10	25

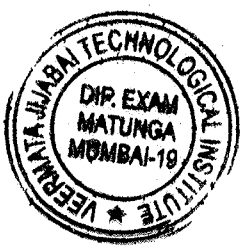
II. COURSE OBJECTIVES:

After studying this subject, students will be able to,

1. Better interaction between technical institutions and industry is the need of the hour. This will have great bearing on the engineering curriculum, exposure of industrial atmosphere to diploma students.
2. With the advent of globalization and opening up of Indian economy to outside world, competition among industries have become stiff. To solve their engineering problems they look up now to engineering institutions. Similarly, there is urgent need to prepare engineering students for jobs in multinational companies, by exposing them to newer technologies and engineering methodologies. These objectives can only be achieved well by bridging gap between industry and academic institute.

III. COURSE CONTENT:

1. Organise workshops, conferences with joint participation of faculty and the industry
2. Encourage engineers from industry to visit engineering institute to deliver lectures
3. Industrial testing
4. Visits of industry executives and practicing engineers to the institute for discussions and delivering lectures on industrial practices, trends and experiences.



5. Practical training of students in industries.
6. Scholarships/fellowships instituted by industries at the institute for students.
7. Guidance to students for technical paper writing.
8. Human resource development programmes by the faculty for practicing engineers.
9. Short-term assignment to students in industries.

Note: Students should prepare a report on each topic covered by experts. Marks will be given based on the report.

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