



Gandhinagar Institute of Technology

Academic Regulation & Curriculum

for

Diploma Engineering

in

Computer Engineering

D.TECH. PROGRAMME

w.e.f. 2026-27

Preamble

We, the members of the Computer Engineering Department, are committed to promoting knowledge, innovation, and technical excellence in the field of Computer engineering. We aim to create a positive learning environment where students are encouraged to think creatively, work collaboratively, and develop practical skills for real-world challenges.

The curriculum for the D.Tech. in Computer Engineering program has been revised according to the guidelines of UGC, AICTE and NCERT along with the New Education Policy (NEP) under Academic Regulation 2022 and blended with IEEE effective from the academic **session 2026–2027**. The program follows an Outcome-Based Curriculum (OBC) with a Choice-Based Credit System (CBCS), helping students build strong professional and technical skills through a multidisciplinary approach that meets the needs of industry, higher studies, and accreditation bodies such as NBA and NAAC.

To align with current industry trends and emerging technological advancements, several contemporary subjects have been incorporated into the revised diploma curriculum. The syllabus now includes modern and application-oriented courses such as Advanced Python, Basic and Advanced Object-Oriented Programming, Database Management System, Introduction to Data Structures, Software Engineering, Computer Peripheral Networking, and Operating Systems. In addition, the curriculum emphasizes practical and skill-based learning through laboratory sessions and project-oriented approaches, enabling students to build strong foundations in programming, software development, networking, and problem-solving skills. These enhancements are designed to prepare students for evolving opportunities in the fields of computer science, information technology, and emerging digital industries.

Students are encouraged to take MOOC courses of their choice to earn honors and gain additional knowledge in advanced technologies.

The course coding system has been updated from the respective academic sessions, as suggested by the Office of the Controller of Examinations. This change helps clearly distinguish the revised curriculum from previous versions.

The curriculum and syllabi are continuously updated through a structured feedback mechanism involving stakeholders such as faculty members, experts, industry experts, alumni and parents. This ensures that the program remains relevant, practical, and future-oriented.

With a focus on continuous learning, innovation, and adaptability, the department aims to develop skilled computer engineers, software developers, researchers, and future technology leaders who can contribute effectively to society and the rapidly evolving world of computer engineering, information technology, artificial intelligence, and emerging digital technologies.

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1.
Institutional Vision & Mission

VISION:

To create a flexible and learner-focused engineering ecosystem that builds strong technical skills, practical knowledge, and innovative thinking, preparing graduates to adapt, perform, and lead in a rapidly evolving technological and societal environment.

MISSION:

To provide a holistic learning environment that develops technical skilled, innovative, and socially responsible engineers capable of addressing industrial, technological, and societal needs.

2. Program Objectives

Here are 8 Program Aims for Diploma in Computer Engineering in point-wise format:

1. Basic and Discipline specific knowledge: Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems.
2. Problem analysis: Identify and analyse well-defined engineering problems using codified standard methods.
3. Design/ development of solutions: Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.
4. Engineering Tools, Experimentation and Testing: Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.
5. Engineering practices for society, sustainability and environment: Apply appropriate technology in context of society, sustainability, environment and ethical practices.
6. Project Management: Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.
7. Life-long learning: Ability to analyse individual needs and engage in updating in the context of technological changes.

3. Program Educational Objectives (PEOs)

PEO 1 – Technical Knowledge

Apply fundamental knowledge of computer engineering to solve problems related to software, hardware, networking, and database systems.

PEO 2 – Professional Competency

Work effectively as skilled diploma engineers in IT industries, government organizations, and technical service sectors.

PEO 3 – Higher Education & Lifelong Learning

Pursue higher studies, professional certifications, and continuous learning in emerging technologies.

PEO 4 – Ethics, Communication & Teamwork

Demonstrate professional ethics, effective communication skills, leadership, and teamwork in multidisciplinary environments.

PEO 5 – Innovation & Social Responsibility

Develop innovative and sustainable technical solutions with awareness of societal needs, environmental responsibility, and entrepreneurship.

4. Program Details

4.1 Program Structure & Duration

- Duration & Intake: 3 Years & 60 Seats
- Semesters: 6
- Mode: Full Time
- Credit Structure: As per NEP/AICTE / University norms
- Medium of Instruction: English

4.2 Eligibility Criteria for Admission

As per the ACPDC Gujarat government rules and regulations candidates who have passed the Secondary School Certificate (SSC/10th Standard) examination from a recognized Board with Mathematics, Science, and English as compulsory subjects, or equivalent qualification as approved by the competent authority, shall be eligible for admission to the Diploma in Computer Engineering program. Eligibility criteria shall be applicable as per AICTE, State Government, and University norms in force from time to time.

4.3 Admission Procedure

Admission to the Diploma in Computer Engineering program may be granted on the basis of merit obtained in the qualifying examination and/or as per the admission guidelines prescribed by the University and the competent regulatory authorities from time to time.

Candidates seeking admission may be required to complete the application process as notified by the University. Admission shall be offered based on eligibility, merit, document verification, and fulfillment of the prescribed admission requirements.

The University reserves the right to revise the admission procedure in accordance with applicable rules, regulations, and policy guidelines issued from time to time.

4.4 Credit Summary for Diploma in Computer Engineering Course with effect from 2026–2027

Sl. No.	Course Type	CE Credit
1.	Humanities and Social Sciences including Management Courses	10
2.	Basic Science Courses	12
3.	Engineering Science Courses including Workshop, Drawing, Basics of Electrical / Mechanical / Computer, etc.	12
4.	Program Core Courses	60

5.	Program Elective Course Courses relevant to chosen Specialization / Branch	21
6.	Project Work, Seminar and Internship in industry or elsewhere	12
7.	Mandatory course Courses (Non-credit) [Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Traditional Knowledge]	0
8.	Total	127

Definition of Credit (as per UGC / AICTE):

- 1 Hour Lecture (L) per Week = 1 Credit
- 1 Hour Tutorial (T) per Week = 1 Credit
- 1 Hour Practical (P) per Week = 0.5 Credits
- 2 Hours Practical (Lab) per Week = 1 Credit

Range of Credits (as per UGC / AICTE):

- ✓ A total of 127 credits will be necessary for a student to be eligible to get D.Tech.degree.
- ✓ A student will be eligible to get D.Tech.degree if he/she completes an additional 20 credits.
- ✓ These could be acquired through MOOCs.
- ✓ Any student completing any course through MOOC will have to submit an appropriate certificate to earn the corresponding credit.
- ✓ For any additional information, the student may contact the concerned HODs.

5.
Curriculum Structure

(Gandhinagar Institute of Technology 01)								
Program Name: Diploma Engineering			Branch Name (Code): CE (119)					
Semester / Year : 01 / 01								
NCrF LEVEL	Subject Code	Course Type	Subject Name	Credit	Hours per week			
					L	T	P	Total
NCR – 3.5	100000101	Basic Science Courses	Mathematics	4	3	1	0	4
	100000102	Humanities and Social Science, including Management Courses	Communication Skills in English	3	2	1	0	3
	100000103	Basic Science Courses	Applied Physics	4	3	0	2	5
	101190101	Professional Core Courses	Computer Application	4	2	0	4	6
	100000104	"Humanities (Mandatory Non-Credit Courses – Audit Course)	Sports and Yoga	0	0	0	2	2
	101230101	Skilling Based Course	Engineering Workshop Practice	2	0	0	4	4
	101190102	Professional Core Courses	Introduction of C Programming	3	2	0	2	4
			Total	24				28
Program Name: Diploma Engineering			Branch Name (Code): CE (119)					
Semester / Year: 02 / 01								
NCrF LEVEL	Subject Code	Course Type	Subject Name	Credit	Hours per week			
					L	T	P	Total
NCR – 3.5	100000201	Basic Science Courses	Applied Mathematics	4	3	1	0	4

	100000202	MOPECS (Mandatory Non-Credit Courses – Audit Course)	Indian Constitution	0	2	0	0	2
	100000203	IKS	Essence of Indian knowledge and Tradition	2	2	0	0	2
	101180201	Engineering Science Courses	Environment and Sustainability	2	2	0	0	2
	101200201	Professional Core Courses	Fundamental of Electrical and Electronic Engineering	4	3	0	2	5
	101190201	Professional Core Courses	Fundamental of Python	4	3	0	2	5
	101230201	Professional Core Courses	Engineering Graphics	4	2	0	4	6
			Total	20				26

Program Name: Diploma Engineering			Branch Name (Code): CE (119)					
Semester / Year : 03 / 02								
NCrF LEVE L	Subject Code	Course Type	Subject Name	Credi t	Hours per week			
					L	T	P	Total
NCR – 4.0	101240301	Program Core	Advance Python	4	3	0	2	5
	101220301	Program Core	Database Management System	4	3	0	2	5
	101190301	Program Core	Basics of Operating System	4	3	0	2	5
	101190302	Program Core	Introduction of Data Structures	4	3	0	2	5
	101240302	Program Core	Basic Object-Oriented Programming	4	3	0	2	5
	100000301	Student Induction Program	Universal Human Values	3	2	1	0	3
			Total	23				28

Program Name: Diploma Engineering			Branch Name (Code): CE (119)					
Semester / Year : 04 /02								
NCrF LEVEL	Subject Code	Course Type	Subject Name	Credit	Hours per week			
					L	T	P	Total
NCR – 4.0	101240401	Program Core	Advanced Object Oriented Programming	4	3	0	2	5
	101190401	Program Core	Introduction to Software Engineering	4	3	0	2	5
	101220401	Program Core	Computer Peripheral Networking	4	3	0	2	5
	101240403	Program Core	Introduction to Web Technologies	4	3	0	2	5
		Professional Elective	Professional Elective-I	4	3	0	2	5
	100000401	Audit Course	Audit Course-I	0	2	0	0	2
		IKS	Vedic Mathematics	2	2	0	0	2
		Total		22				29
		Professional Elective						
		101240402	Professional Elective-I	Fundamentals of Artificial Intelligence and its application				
		101190402	Professional Elective-I	Cyber Security				
	Audit Course							
		101240404	Audit Course-I	Contributor Personality Development				
		101190403	Audit Course-I	Integrated Personality Development Course				
Institute Name (Code): Gandhinagar Institute of Technology (01)						Branch Name (Code): CE (119)		
Program Name: Diploma Engineering			Branch Name (Code): CE (119)					
Semester / Year : 05 / 03								

NCrF LEVE L	Subject Code	Course Type	Subject Name	Credi t	Hours per week			
					L	T	P	Total
NCR – 4.5	101190501	Program Core	Introduction to Machine Learning	5	3	0	4	7
	101240502	Program Core	Mobile Application Development using Android	3	2	0	2	4
	101240503	Minor Project	Project-I	3	0	0	6	6
		Professional Elective	Professional Elective-II	4	3	0	2	5
		Professional Elective	Professional Elective-III	4	3	0	2	5
	101220502	Summer Internship	Summer Internship-II	3	0	0	6	6
			Total	22				33
	Professional Elective							
	101240504	Professional Elective-II	Introduction to Web Development					
	101240505	Professional Elective-II	Advance Computer Network					
	Professional Elective							
	101190502	Professional Elective-III	Fundamental of IOT					
	101190503	Professional Elective-III	Introductiion to Cloud Computing					
Program Name: Diploma Enginerring			Branch Name (Code): CE (119)					
Semester / Year : 06 / 03								
NCrF LEVE L	Subject Code	Course Type	Subject Name	Credi t	Hours per week			
					L	T	P	Total
NCR – 4.5	101220601	Program Core	Introduction of Block chain	5	3	0	4	7
	101240602	Major Project	Project-II	6	0	0	12	12
		Professional Elective	Professional Elective-IV	5	3	0	4	7

	Professional Elective	Professional Elective-V	4	3	0	2	7
		Total	20				33
Professional Elective							
101240603	Professional Elective-IV	Basic of Digital Forensics					
101190601	Professional Elective-IV	Introduction to Data Analysis					
Professional Elective							
101190602	Professional Elective-V	Data Mining & Warehousing					
101190603	Professional Elective-V	Advance Java					

6.

Teaching, Learning & Evaluation

6.1 Teaching Methodology

The program shall adopt:

- Classroom Teaching
- Laboratory Practical Sessions
- Tutorial Sessions
- Programming Practice
- Case Studies
- Expert Lectures
- Workshops / Seminars
- Project-Based Learning
- Mini Projects
- Industrial Visits
- Internship / Industrial Training
- AI-based Learning Tools
- Blended and Digital Learning

6.2 Attendance Rules

- Minimum 75% attendance shall be mandatory in each course.
- Students below prescribed attendance may not be permitted to appear in the examination.
- Additional attendance requirements may apply for laboratory work, industrial training, internships, and project work.

6.3 Examination and Evaluation System

6.3.1 Evaluation Components

- The evaluation may consist of Continuous Internal Evaluation (CIE) and End Semester Examination (ESE).
- Continuous Internal Evaluation (CIE) may include:
 - Mid-Semester Examination
 - Assignments
 - Programming Assignments
 - Practical Performance
 - Class Tests

- Quiz / Viva Voce
- Laboratory Work
- Mini Project / Project Work
- Presentation / Seminar

6.4 Suggested Weightage

- Continuous Internal Evaluation (CIE): 30%
- End Semester Examination (ESE): 70%

6.5 Passing Standards

- Minimum 50% marks in each component where applicable.
- Minimum 35% aggregate for passing the course/program or as prescribed by the University from time to time.
- Separate passing may be required in theory and practical examinations.

6.6 Grading System

The program shall follow the University grading norms as applicable from time to time.

6.6.1 Grade Table

Grade	Grade Points	From Marks	To Marks
AA	10	91	100
AB	9	81	90
BB	8	71	80
BC	7	62	70
CC	6	53	61
CD	5	44	52
DD	4	35	43
FF	0	0	34

6.7 Project Work / Industrial Training

Students shall undertake Project Work / Industrial Training / Internship as part of the curriculum.

Requirements may include:

- Project Proposal Presentation
- Periodic Review
- Practical Demonstration

- Final Report Submission
- Viva Voce Examination

The project work / industrial training shall be evaluated by internal and/or external examiners as per University norms.

7.

Rules and Regulations

7.1 Rules for Promotion

A student shall be promoted to the next semester as per the University rules subject to fulfilment of academic requirements, minimum attendance, successful completion of prescribed coursework, practical work, and earning the required credits of the semester.

7.2 Maximum Duration for Completion

The maximum duration for completing the Diploma in Computer Engineering program shall be 6 years from the date of admission or as prescribed by the University from time to time.

7.3 Internship Guidelines

7.3.1 Students shall undergo mandatory internship / industrial training in:

- Software Companies
- IT Support Companies
- Web Development Companies
- Networking Companies
- Database Management Companies
- Government IT Departments
- Private IT Departments
- Start-up Companies

7.3.2 Students must submit:

- Internship Report
- Work Diary / Logbook
- Completion Certificate
- Presentation / Viva Voce

7.4 Discipline Rules

Students shall maintain discipline, professional ethics, and proper conduct within the institution during laboratory sessions, workshops, industrial visits, internships, project work, examinations, and all academic activities.

Students are expected to attend classes regularly, follow institutional rules and regulations, respect faculty members, staff, fellow students, and institutional property, and maintain academic integrity in assignments, practicals, projects, and examinations.

Any form of misconduct, ragging, indiscipline, use of unfair means in examinations, damage to institutional property, harassment, cyber misconduct, or behaviour affecting the academic environment shall be treated seriously and may result in disciplinary action including warning, suspension, cancellation of examination, withholding of results, or expulsion from the program as per University rules and applicable regulations.

Students shall also comply with all laboratory safety norms, ethical use of technology, and professional standards prescribed by the institution from time to time.

7.5 Anti-Ragging Policy

The program shall strictly follow:

- UGC / AICTE Anti-Ragging Regulations
- Anti-Ragging Affidavit requirements
- Institutional disciplinary procedures
- Ragging in any form is strictly prohibited inside or outside the campus

7.6 Ethical Use of Technology and AI Tools

Students are encouraged to use:

- Programming Software
- Development Tools
- Database Tools
- Networking Software
- AI Learning Platforms
- Testing Tools
- Cloud Computing Tools
- Project Management Tools

8.

Student Support

8.1 Industry Collaboration

The department shall actively promote collaboration with software development companies, IT service organizations, web development firms, networking companies, cyber security organizations, government IT departments, private enterprises, and technology-based start-ups to enhance practical exposure and industry relevance of the Diploma in Computer Engineering program. Such collaborations may include internships, industrial training, live projects, expert lectures, workshops, industrial visits, consultancy assignments, skill development programs, certification activities, and placement support. The institution may also establish Memoranda of Understanding (MoUs) with industry partners and professional organizations for academic enrichment, technology support, innovation, and collaborative initiatives aimed at improving employability, entrepreneurship, and technical competency among students.

8.2 Research and Consultancy

The department shall encourage faculty members and students to actively engage in research, innovation, consultancy, and applied studies related to computer engineering, software development, networking, database management, cyber security, cloud computing, artificial intelligence, and emerging technologies. Students may undertake mini projects, software development projects, system design assignments, technical surveys, and practical studies as part of their academic and professional training. The institution may also undertake consultancy assignments for industries, businesses, government organizations, and private agencies in areas such as software solutions, web application development, networking solutions, database design, IT support services, and digital transformation projects. Participation in seminars, workshops, coding competitions, conferences, technical events, and collaborative research activities shall be encouraged to promote innovation and industry-oriented learning.

8.3 Library and Laboratory Facilities

Adequate library, laboratory, and digital learning facilities shall be made available to support effective teaching, practical training, research, and skill development under the Diploma in Computer Engineering program. The department shall facilitate access to relevant books, journals, e-resources, programming manuals, technical publications, online learning platforms, and software documentation related to computer engineering and emerging technologies.

Necessary computing facilities, programming software, development tools, database systems, networking laboratories, internet access, cloud-based tools, and other technical resources required for practical and project-based learning shall also be provided to enhance technical knowledge, research capability, and professional competency among students.

8.4 Student Support and Mentoring

A structured system for student support, academic mentoring, and professional guidance shall be implemented for students enrolled in the Diploma in Computer Engineering program. The department shall facilitate academic counselling, mentoring, career guidance, project guidance, and skill development activities to assist students in their academic progression and professional growth. Students may also be provided opportunities for interaction with industry experts, participation in workshops, seminars, technical events, industrial visits, training programs, and extracurricular activities aimed at enhancing employability, leadership qualities, communication skills, and overall personality development. Necessary support mechanisms for addressing academic and personal concerns shall also be made available as per institutional policies.

8.5 Placement and Career Development

The department shall promote placement assistance and career development activities for students through industry interaction, professional networking, technical training, internships, and campus engagement initiatives. Efforts shall be made to establish linkages with software companies, IT organizations, networking firms, web development companies, government departments, and technology-based enterprises to facilitate internships, live projects, industrial exposure, and employment opportunities for students. Career development activities such as aptitude training, resume preparation, interview skills, coding practice, soft skill development, entrepreneurship guidance, certification programs, expert sessions, and placement-oriented workshops may also be organized to enhance professional competency and employability of students.

9.

Program Credibility

9.1 Executive Summary

The Diploma in Computer Engineering program is designed to develop technically skilled and industry-ready professionals with knowledge in programming, software development, database management, networking, web technologies, cyber security, and emerging computing technologies aligned with current industry requirements.

Every subject in the program is delivered by qualified faculty members and industry experts with academic and practical experience in the field of computer engineering, ensuring students gain both theoretical knowledge and practical exposure.

Faculty members from Computer Engineering and allied departments deliver specialized modules related to programming, software engineering, database systems, computer hardware, networking, cloud computing, artificial intelligence, and modern digital technologies.

Practical training is supported through laboratory work, project-based learning, internships, workshops, coding activities, industrial visits, and expert sessions from professionals working in the IT and software industry.

The curriculum is designed to meet current academic standards and industry expectations while building strong technical, analytical, problem-solving, and professional skills among students.

Graduates of the program are academically and professionally prepared for employment in software development, IT services, networking, technical support, database administration, web development, and related technology sectors, as well as for higher studies in engineering and computer applications.

The program is industry-oriented and focuses on practical learning, innovation, employability, entrepreneurship, and professional competency required in the modern digital and information technology environment.

9.2 Scope and Career Opportunities

Graduates of the program may work in:

- Software Development Companies
- IT Companies
- Web Development Firms
- Networking Companies
- Cyber Security Organizations

- Database Management Companies
- Government IT Departments
- Private IT Organizations
- Start-up Companies
- Technical Support Services
- Software Testing Companies

9.3 Potential Job Roles

- Software Developer
- Computer Programmer
- Web Developer
- Network Technician
- Database Assistant
- IT Support Executive
- System Administrator
- Software Tester
- Technical Support Engineer
- Hardware and Network Technician
- Junior Application Developer
- Computer Operator

9.4 Higher Study & Professional Opportunities

Students may pursue:

- B.Tech / B.E. in Computer Engineering or related fields
- BCA or other higher education programs in Computer Applications
- Advanced Diploma in specialized IT fields
- Professional Certifications in Programming, Networking, Cloud Computing, or Cyber Security
- Entrepreneurship / Start-up Opportunities in IT and Software Services

10.

Collaborative Experimental Work

10.1 Basic Programming Practice

Students shall write, compile, and execute basic programs using C, C++, Java, Python, or other programming languages prescribed in the syllabus. Practical exercises may include variables, operators, loops, arrays, functions, file handling, and simple problem-solving programs. Students shall maintain practical records with program code and output.

10.2 Website Design Practice

Students shall design and develop simple web pages using HTML, CSS, and JavaScript. Activities may include creating web page layouts, forms, hyperlinks, tables, menus, image integration, and basic responsive design. Students shall submit website files along with screenshots and documentation.

10.3 Database Practical

Students shall perform practical exercises using database software such as MySQL, Oracle, or MS Access. Activities may include creating databases, tables, inserting records, updating data, deleting records, applying filters, joins, forms, and reports using SQL queries. Submission shall include database files and practical journal work.

10.4 Computer Hardware Identification

Students shall identify and study internal and external computer hardware components such as motherboard, processor, RAM, storage devices, monitor, keyboard, mouse, printer, and network devices. Students may prepare observation sheets based on hardware specifications and functions.

10.5 Computer Assembly and Disassembly

Students shall perform assembly and disassembly of a computer system in the laboratory under supervision. Activities may include connecting internal components, checking ports and cables, installing RAM and storage devices, and basic troubleshooting of hardware issues.

10.6 Operating System Installation

Students shall install operating systems such as Windows or Linux and perform system configuration. Practical work may include disk partitioning, formatting, software installation, user account creation, device configuration, and system maintenance.

10.7 Networking Practical

Students shall perform basic computer networking activities such as LAN setup, IP addressing, network sharing, cable connection, internet configuration, router settings, and troubleshooting of network issues. Networking practical may also include use of simulation software.

10.8 Software Installation Practice

Students shall install and configure programming software, IDEs, compilers, database tools, browsers, utility software, and other applications required for academic work. Students may also learn software updating, troubleshooting, and maintenance.

10.9 Mini Project Development

Students shall develop a small practical project individually or in groups based on software, web development, database applications, or computer hardware. Example projects may include calculator applications, library management systems, billing software, portfolio websites, or student record systems. Project work shall include coding, testing, documentation, and presentation.

10.10 Internet and Cloud Tools Practice

Students shall use internet-based platforms and cloud tools for practical learning. Activities may include email communication, online collaboration tools, cloud storage, online coding platforms, version control systems, digital documentation, and virtual project sharing.

10.11 Seminar / Technical Presentation

Students shall prepare and deliver presentations on emerging topics related to computer engineering such as Artificial Intelligence, Cyber Security, Cloud Computing, Data Science, Internet of Things, Web Technologies, or Software Development. Students may submit presentation files and seminar reports.

10.12 Industrial Visit / Internship

Students shall visit software companies, IT departments, hardware firms, networking organizations, or complete internship/industrial training to gain practical industry exposure.

Students shall submit an internship report, training certificate, and presentation based on their learning experience.

10.13 Project Demonstration and Viva Voce

Students shall demonstrate their mini project or final project before faculty members or evaluation panel. Students shall explain the project objective, design, implementation, output, and technical concepts involved. Viva voce shall be conducted to assess practical knowledge, technical understanding, communication skills, and project execution ability.

11. Market Survey

A comprehensive market survey was conducted to evaluate the present and future demand for professionals in the field of Computer Science and Engineering. The survey findings indicate that computer science has become a fundamental driver of innovation and digital transformation across industries such as banking, healthcare, education, manufacturing, telecommunications, e-commerce, entertainment, and government sectors.

With rapid advancements in software development, cloud computing, artificial intelligence, data science, cybersecurity, mobile computing, and web technologies, the demand for skilled computer science professionals is continuously increasing. Organizations are actively adopting digital platforms, automation systems, and intelligent applications, resulting in a strong need for technically qualified manpower.

The survey reveals that industries require professionals with knowledge of programming, database management, operating systems, computer networks, software engineering, web technologies, cybersecurity, and emerging computing tools. Diploma graduates with practical technical skills are highly preferred for entry-level roles in software development, IT support, networking, quality assurance, and system administration.

Leading organizations such as Infosys, Tata Consultancy Services, Wipro, Accenture, and various technology startups continue to create substantial employment opportunities for computer science professionals.

Government initiatives including Digital India, Startup India, Smart Cities Mission, e-Governance, and Industry 4.0 have further accelerated the adoption of digital technologies and increased the requirement for skilled computer science engineers in India.

Based on the market survey findings, offering a Diploma program in Computer Science and Engineering is highly relevant and justified. The program will equip students with strong theoretical knowledge, practical skills, and industry-oriented competencies required to meet the growing demands of the information technology and software sectors.

12. Review and Revision of Regulation

The University reserves the right to interpret, modify, revise, amend, or update any provision, rule, regulation, curriculum structure, evaluation pattern, academic requirement, or operational guideline related to the program from time to time in accordance with University regulations, statutory requirements, industry developments, and academic needs.

In case of any ambiguity or dispute regarding interpretation of any provision of this manual, the decision of the University/Competent Authority shall be final and binding on all stakeholders. Any amendments, additions, or revisions approved by the appropriate academic or statutory bodies of the University shall automatically become applicable to the program.



Annexure I: Detail Syllabus

GANDHINAGAR INSTITUTE OF TECHNOLOGY DIPLOMA 1st SEMESTER

Civil Engineering / Mechanical Engineering / Electrical Engineering / Electronics
and Communication Engineering / Computer Engineering / Information
Technology / Computer Science and Engineering / Artificial Intelligence and
Machine Learning / Cyber Forensic and Information Security

DOC NO: 4061

Subject Code: 100000101	Subject Title: Mathematics
Pre-requisite: Concept of Numbers, sets, and functions.	

Course Objective:

- (1) This course is designed to give a comprehensive coverage at an introductory level to the subject of functions and sets Basic elements of algebra.
- (2) The subject is classified under Basic Sciences and students are intended to know about the basic concepts and principles of Mathematics as a tool to analyze the Engineering problems.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
03	01	-	04	70	30	-	-	100

Subject Contents

Sr. No	Topic	Total Hours	Weight (%)
1	Concept of Numbers, Sets, Types of set, Basic Functions and its properties, operation on sets and functions, solve simple problems using concepts of Logarithms, exponential Functions.	6	15
2	Units of Angles (degrees, grades and radians and their conversions), Allied & Compound Angles, Sum, difference formulae and their applications, Multiple –Submultiples angles, Graph of Sine and Cosine, Periodic function, sum and factor formulae, Inverse trigonometric function	8	20

3	Vector Algebra: Definition notation and rectangular resolution of a vector. Addition and subtraction of vectors. Scalar and vector products of 2 vectors. Simple problems related to work, moment and angular velocity.	10	25
4	Complex Numbers: Complex Numbers: Definition, real and imaginary parts of a Complex number, polar and Cartesian, representation of a complex number and its conversion from one form to other, conjugate of a complex number, modulus and amplitude of a complex number Addition, Subtraction, Multiplication and Division of a complex number. De-moivre's theorem, its application.	10	20
5	Determinant and Matrix, Addition/Subtraction, Product, consistency of equations, Inverse up to 3X3 matrix, Crammer's rule, Solution of Simultaneous Equations (up to three variables)	8	20

Course Outcome: After completion of this course, student will be able to

1. Understand the core concept of sets and functions.
2. To acquire necessary background in Trigonometry to appreciate the importance of the geometric study as well as for the calculation and the mathematical analysis.
3. To get acquainted with concepts to vector algebra.
4. To study complex numbers that enter studies of physical phenomena in ways that most people cannot imagine. Apply the basic principles of probability theory in problem solving situations.
5. To acquire necessary background in Determinants and Matrices so as to appreciate the importance of the Determinants are the factors that scale different parameterizations so that they all produce same overall integrals, i.e. they are capable of encoding the inherent geometry of the original shape.

List of Textbooks:

1. W R Neelkanth, Applied Mathematics-I, Sapna Publication.
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
3. G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995.

List of Reference Books:

1. Anthony croft and others, Engineering Mathematics (third edition), Pearson Education
2. Reena Garg, Engineering Mathematics, Khanna Publishing House, New Delhi (Revised Ed. 2018)
3. V. Sundaram, R. Balasubramanian, K.A. Lakshminarayanan, Engineering Mathematics, 6/e., Vikas Publishing House.

GANDHINAGAR INSTITUTE OF TECHNOLOGY
DIPLOMA 1st SEMESTER

Civil Engineering / Mechanical Engineering / Electrical Engineering / Electronics and Communication Engineering / Computer Engineering / Information Technology / Computer Science and Engineering / Artificial Intelligence and Machine Learning / Cyber Forensic and Information Security

DOC NO: 4061

Subject Code: 100000102	Subject Title: Communication Skills in English
Pre-requisite: Basic Communication Skills	

Course Objective:

- To develop an extensive vocabulary, enhancing their comprehension, communication, and critical thinking skills.
- To make the students understand the importance and appropriate use of Communication.
- To familiarize the students with basic LSRW as well as Communication Skills.
- To develop presentation skills and technical writing skills.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
2	1	0	3	70	30	00	00	100

Subject Contents				
Sr. No	Topic	Total Hours	Weight (%)	
1	Vocabulary: Definition and ways to build vocabulary, word formation and its types, antonyms and synonyms, one word substitutions	5	15	
2	Communication: Definition of communication, types of communication, importance of communication, process of communication, barriers of communication.	5	15	
3	Basics of Listening and Reading Skills: Listening Skills: Definition of listening and hearing, types of listening, barriers of listening, ways to improve listening, traits of a good listener. Reading Skills: Definition of reading, purpose of reading, types of reading, ways to improve reading skills	7	25	
4	Basics of Speaking and Writing Skills: Speaking Skills: Definition of speaking, barriers of speaking, ways to improve speaking, qualities of a good speaker. Writing Skills: Definition of writing, things one should keep in mind while writing, ways to improve writing skills. Technical Writing: Letter writing, E-mail writing	10	30	

5	Presentation Skills: Defining the purpose of presentation, how to make an effective presentation: analyzing audience and locale, organizing content and preparing an outline, importance of body language in presentations, Do's and Don'ts. of presentation	5	15
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Course Outcome: After completion of this course, student will be able to

- Understand the importance of vocabulary in everyday use.
- Develop strategies to communicate effectively and appropriately.
- Develop listening and reading skills that help to excel in the professional field.
- Develop general speaking fluency and writing skills.
- Master effective presentation techniques, improving their ability to communicate ideas clearly and engage their audience.

List of References:

1. Technical English, Dr. M. Hemamalini, Wiley. 2014.
2. Communication Skills, Sanjay Kumar and Pushp Lata, Oxford University Press. 2011.
3. Technical Communication – Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.
4. English Communication for Polytechnics- S. Chandrashekhar & Others, Orient BlackSwan 2013-ISBN : 8125037462

Open e-Resource:

- <https://learnenglish.britishcouncil.org>
- <http://www.free-english-study.com/>
- <http://www.english-online.org.uk/course.htm>
- <http://www.english-online.org.uk/>
- <http://www.talkenglish.com/>
- <http://www.learnenglish.de/>
- <https://www.cambridgeenglish.org/exams-and-tests/linguaskill/>
- <https://dictionary.cambridge.org/dictionary/english/>
- <https://www.oxfordlearnersdictionaries.com/definition/academic/>
- <https://learnenglishkids.britishcouncil.org/>

List of Suggested Exercise:

1. Vocabulary Building: Practice
2. Role Play
3. Listening Skill: Practice
4. Speaking Skill: Practice
5. Reading Practice: Reading of Paragraphs
6. Writing Practice: Letter and Email Writing
7. Presentation Practice

**GANDHINAGAR INSTITUTE OF
TECHNOLOGY DIPLOMA 1st SEMESTER**

**Civil Engineering / Mechanical Engineering / Electrical Engineering / Electronics and
Communication Engineering / Computer Engineering / Information Technology / Computer Science
and Engineering / Artificial Intelligence and Machine Learning / Cyber Forensic and Information
Security**

DOC NO: 4061

Subject Code: 100000103	Subject Title: Applied Physics
Pre-requisite: Students must comprehend motion, force, and units fundamentally.	

Course Objective:

- The goal of applied physics is to provide an understanding of the environment around us through both observation and behavior prediction.
- The course material has a strong emphasis on the practical application of physical principles and analysis in a range of engineering and technology domains.
- The training will assist diploma engineers in using fundamental ideas and principles to address a variety of engineering challenges and comprehend various technology-based applications.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
03	-	02	04	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	SI Units & Measurements Need of measurement and unit in engineering and science, definition of unit , requirements of standard unit, systems of units-CGS,MKS and SI, fundamental and derived quantities and their units, Least count and range of instrument, least count of vernier caliper, micrometer screw gauge, Definition of accuracy, precision and error, estimation of errors -absolute error, relative error and percentage error, rules and identification of significant figures.	6	14

2	Force and Motion: Recapitulation of equations of motion, Newton's 1 st law of motion, Force, basic forces in motion, gravitational force, electrostatic force, electromagnetic force, nuclear force, Inertia, types of inertia (inertia of rest, inertia of motion, inertia of direction), Momentum, Newton's 2 nd law of motion, measurement of force using second law, simple problems on $F = ma$ and equations of motion, Impulse of force, Impulse as the product of force and time, impulse as the difference of momentum, examples of impulse,	10	24
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	simple problems on impulse, Newtons 3 rd law of motion and its examples. Law of conservation of momentum, Statement, simple problems (Numerical on above topics)		
3	Electricity and Magnetism: Concept of charge, Coulomb's inverse square law, Electric field, intensity, potential and potential difference, Electric current, Ohm's law, laws of series and parallel combination of resistance, D.C. circuits, Kirchhoff's law, heating effect & chemical effect of current, Magnetic field and its units, magnetic intensity, magnetic lines of force, magnetic flux and their units, Dia, Para, Ferro magnetic materials, Electromagnetic Induction, Lenz's law and its Applications, Alternating current and its waveform	10	24
4	Waves and Acoustics of Building: Definition of wave motion, amplitude, period, frequency, and wavelength, relation between velocity, frequency and wavelength, longitudinal and transverse wave, principle of superposition of waves, definition of stationary wave, node and antinode, definition of resonance with examples, Formula for velocity of sound in air. Importance of Reverberation, Reverberation time, Optimum time of Reverberation, Coefficient of absorption of Sound, Sabine's formula for Reverberation time, Factors affecting Reverberation time and acoustics of building.	10	24
5	Radioactivity: Radioactivity Definition, Natural & Artificial radioactivity, Units and Laws of Radioactivity, Half Life, Average Life & Decay Constant, Radioactive Rays, Properties and uses of alpha particles, beta particles and gamma rays (Numericals on Above topics)	6	14

Course Outcome: After completion of this course, student will be able to

- Explain Physical Quantities and their units.
- Measure given dimensions by using appropriate instruments accurately and calculate error in the Measurement.
- Differentiate among various forces in nature
- Define inertia, momentum and impulse of force and State Newton's laws of Motion and law of conservation of momentum.
- State Coulomb's law, Ohm's law and Kirchhoff's law.
- Explain Electric field, potential, potential difference, field intensity, electric current, resistance, heating and Chemical effect of current and apply laws of series and parallel combination to electrical circuit.
- Explain electromagnetic induction and its uses.
- Distinguish between dia, para and ferro magnetic materials.
- Distinguish between transverse and longitudinal waves.

- Define period, frequency, amplitude and wavelength
- Explain principle of superposition of waves
- Comprehend the Importance of Reverberation time using Sabine's formula and factors affecting Reverberation time.

- Explain ultrasonic waves and its applications.
- Define radio activity and Distinguish between Natural & Artificial radioactivity
- State relation between Half Life, Average Life & Decay Constant.
- Describe properties of Alpha, Beta and Gamma rays.

List of References:

1. University Physics by Sears and Zeemansky, Pearson Publication.
2. Conceptual Physics by Paul G Hewitt, Pearson Publication.
3. Engineering Physics by G Vijayakumari 4th Edition, Vikas-Gtu Students' Series.
4. Engineering Physics by Dattu R Joshi, McGraw hill Publications.
5. Resnick, Halliday and Krane, Physics part I and II, 5th Edition John Wiley India Publications (2002).
6. Physics for scientists and engineers with modern physics by Jewett & Serwey, Cengage publications.
7. Physics Part 1 and 2, NCERT.
8. Concepts of Physics by H C Verma, Bharti bhavan Publications (2nd Edition).

Open e-Resource:

1. The Feynman Lectures series on Physics Vol 2, Pearson Education India
2. www.physicsclassroom.com
3. www.physics.org
4. www.fearofphysics.com
5. www.sciencejoywagon.com/physicszone
6. www.science.howstuffworks.com

List of Suggested Experiments:

1. To find the numerical aperture of an optical fiber.
2. To determine the band gap in a semiconductor using a junction diode.
3. To determine the wavelength of laser using diffraction grating.
4. To find the efficiency of a solar cell.
5. To Study the characteristics of a Zener diode and a LED.
6. To study the "Hall effect" by measuring the voltage and magnetic field, keeping current constant.
7. Determination of radii of curvature of lens using the Newton's ring formula.
8. Analysis of errors using Least square fitting.
9. Determine the dielectric constant of Solid Materials.
10. Determine the ultrasonic velocity using ultrasonic interferometer.

**GANDHINAGAR INSTITUTE OF
TECHNOLOGY DIPLOMA 1st SEMESTER**

**Civil Engineering / Mechanical Engineering / Electrical Engineering / Electronics and
Communication Engineering / Computer Engineering / Information Technology / Computer Science
and Engineering / Artificial Intelligence and Machine Learning / Cyber Forensic and Information
Security**

DOC NO: 4061

Subject Code: 100000104	Subject Title: Sports and Yoga
Pre-requisite: Zeal to learn	

Course Objective:

- Apply sports and yoga activities to keep the body physically and mentally fit.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
0	0	2	0	0	0	50	0	50

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Perform following Yoga Asanas under the guidance of yoga trainer :-Surya Namaskar (Sun Salutation) Tadasana (Mountain pose) Vrikshasana (Tree pose) Vajrasana (Hand under foot pose) Pada-hasthasana (Hand under foot pose) Ushtrasana (Camel pose) Dhanurashana.(Bow Pose) Bhjangasana (Snake pose) Halasana (Plough pose) Shavasana/Yoga Nidra Bhastrikai Pranayam Kapalbhati Pranayam Anulom Vilom Pranayam Bhramari Pranayam	12	40

2	Participate in any sports activities of your choice: Indoor sports/games (Badminton, Chess, Carrom, Table Tennis) Outdoor sports/games (Cricket, Kabaddi, Volleyball, Basketball, Football, Hockey)	14	40
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3	Prepare report on any sports events including associated rules, playground specification, rules for judgement, etc.)	2	20
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Course Outcome: After completion of this course, student will be able to

- Practice physical activities and yoga for strength, flexibility and relaxation.
- Use techniques for increasing concentration and decreasing anxiety for stronger academic performance.
- Perform yoga exercises in various combination and forms.
- Improve personal fitness through participation in sports and yoga activities.
- Follow sound nutritional practices for maintaining good health and physical performance.

List of References:

1. Modern Trends and Physical Education class 11 & class 12 Ajmer Singh Kalyani Publication, New Delhi ISBN : 9789327264319
2. Light on Yoga B.K.S. Iyengar Thomson's Publication, New Delhi ISBN: 8172235011
3. Health and Physical Education V.K.Sharma NCERT Books; Class11,12 □ Saraswati House Publication, New Delhi
4. Yoga and Stress Management Acharya Yatendra Fingerprint Publishing ISBN: 938905303X
5. Patanjali Yoga Sutras Swami Vivekanand Fingerprint Publishing ISBN: 9389567351
6. Pranayam Rahasya Ramdev Patanjali-Divya Prakashan, Haridwar ISBN: 978-8189235017
7. Yoga its Philosophy & Practice Ramdev Divya Prakashan, Haridwar

Open e-Resource:

1. <https://youtu.be/dAqQqmaI9vY>
2. <https://youtu.be/c8hjhRqIwHE>
3. <https://youtu.be/MrR04m1zoJ8>
4. <https://youtu.be/P-jwGj7YqNM>

List of Suggested Experiments/activities:

- a) Prepare a list of specifications for various tools/equipment/machines used in gymnasium/indoor sports complex.
- b) Undertake a market survey of local dealers for procurement of sports items/ equipment/machines.
- c) Visit the sports shop and collect all relevant information about any sport item and submit the detailed report.
- d) Download video clips showing correct practices for yogasanas, pranayam and any sports/games.
- e) Prepare a chart showing different types of yogasanas.
- f) Prepare a chart showing different types of pranayams.

**GANDHINAGAR INSTITUTE OF
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**Civil Engineering / Mechanical Engineering / Electrical Engineering / Electronics and
Communication Engineering / Computer Engineering / Information Technology / Computer Science
and Engineering / Artificial Intelligence and Machine Learning / Cyber Forensic and Information
Security**

DOC NO: 4061

Subject Code: 101190101	Subject Title: Computer Applications
Pre-requisite: Zeal to learn	

Course Objective:

- To understand various Basics of Computer System
- To understand the concept of Using MS -Word 2007
- To gain knowledge of MS - Excel 2007
- To gain basic knowledge of MS – PowerPoint 2007

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
2	0	4	4	0	50	30	20	100

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Basics of Computer System: Concept of Hardware and Software, Computer block diagram, Input Output unit, CPU, Control Unit, Arithmetic logic Unit (ALU), Memory Unit, Concept of Monitor, Printers: Dot matrix, Laser, Inkjet, Plotters, Scanner, System software and Application Software, Operating system concepts, purpose and functions, Operations of Windows OS, Creating and naming of file and folders, Copying file, renaming and deleting of files and folders, Searching files and folders, installation application, creating, shortcut of application on the desktop, Overview of control Panel, Taskbar.	3	9
2	Using MS - Word 2007 : Overview of Word processor, Basics of Font type, size, colour, Effects like Bold, italic , underline, Subscript and superscript, Case changing options, Inserting, deleting, undo and redo, Copy and Moving (cutting) text within a document, Formatting Paragraphs and Lists, Setting line spacing; single, Page settings and margins including header and footer,	3	24



	Spelling and Grammatical checks, Table and its options, Inserting rows or columns, merging and splitting cells, Arithmetic Calculations in a Table, Working with pictures, Inserting Pictures from Files, Drawings and WordArt; Lines and Shapes, Modifying Drawn Objects, Formatting Drawn Objects, options for Creating and Modifying a WordArt Object		
3	Using MS - Excel 2007: Introduction to Excel 2007, Introduction to data, Cell address, Excel Data Types, Concept of, hyperlink, Introduction to formatting, number, text and date formatting, Concept of worksheet and workbook, Understanding formulas, Operators in Excel 2007, Operators Precedence, Understanding Functions, Common Excel Functions such as sum, average, min, max, date, transpose, In, And, or, sqrt, power, upper, lower, Types of graphics : Word art, auto shapes, Images Introduction to charts, overview of different types of charts, available with Excel, Concept of print area, margins, header, footer and other page, setup options	3	12
4	Using MS - PowerPoint 2007: Outline of an effective presentations, Starting a New Presentation Files, Saving work, Creating new Slides, Working with textboxes. Changing a slides Layout, Applying a theme, Changing Colours, fonts and effects, Creating and managing custom Colour & font theme, Changing the background Managing slides master, Managing theme. Changing the font, font size, font colour, text fill, Adjusting character spacing and line spacing Formatting text boxes. Word arts, styles, Formatting bulleted lists and numbered list, Finding and replacing text, Correcting your spelling, Creating a new and editing a table's structure, Selecting, deleting, moving, copying, resizing and arranging, objects, Working with drawing tools, Applying shape or picture styles, Applying object borders, object fill, object effects, Working with clip art collection and modifying clip art, Embed a video, Link to a video, Size a video, Video playback options, Configuring a sound playback, Assigning sound to an object, Adding a digital music sound track, Transition effects and timings, Creating hyperlinks, Using action buttons	5	9

Course Outcome: After completion of this course, student will be able to

- Hands-on experience on different application software used for office automation like MS-Word
- write, Draw, Tabulate, Report, Store and Retrieve and also print on Computer using various Hardware and Software.
- Hands-on experience on different application software used for office automation like MS-Power point
- Hands-on experience on different application software used for office automation like MS-Excel

List of References:

1. R Taxali Computer Course Tata McGraw Hills. New Delhi.
2. De Levie, Robert, “Advanced Excel for Scientific Data Analysis”, Oxford University Press, 2004.
3. Peng, Roger D, Matsui, Elizabeth, “The Art of Data Science: A Guide for Anyone who Works with Data”, Lulu.com, 2016.

Open e-Resource:

- (1) <https://support.microsoft.com/en-us/excel>
- (2) https://support.google.com/docs/topic/9054603?hl=en&ref_topic=2811805
- (3) <https://www.datacamp.com/>
- (4) <https://www.khanacademy.org/>
- (5) <https://exceljet.net/>

List of Suggested Experiments:

1. Identify the internal and external hardware/peripheral components
2. To work with the Google Workspace/ Google Products, to compose, mail and work with google drive / forms
3. To work with the basic features of MS Word.
4. To Create your Resume / Bio Data.
5. To work with the MS Word, Mail Merge.
6. To work with the basic features of MS Excel.
7. To work with the basic features of MS PowerPoint
8. To get an Introduction with Open Office.

**GANDHINAGAR INSTITUTE OF
TECHNOLOGY DIPLOMA 1st
SEMESTER**

**Electronics and Communication Engineering / Computer Engineering / Information
Technology /Computer Science and Engineering /Artificial Intelligence and
Machine Learning / Cyber Forensic and Information Security**

DOC NO: 4061

Subject Code: 101190102	Subject Title: Introduction of C Programming
Pre-requisite: Nil	

Course Objective:

- To understand the various steps in Program development.
- To understand the basic concepts and gain the knowledge in C Programming Language.
- To learn how to write modular and readable C Programs.
- To learn to write programs (using structured programming approach) in C to solve problems.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
2	0	2	3	70	30	30	20	150

Subject Contents				
Sr. No	Topic	Total Hours	Weight (%)	
1	Introduction: Basic block diagram and functions of various components of computer, Concepts of Hardware and software, Types of software, Compiler and interpreter, Concepts of Machine level, Assembly level and high level programming, Flowcharts and Algorithms	3	15	
2	Fundamentals: Introduction to C, structure of C Program, comments, header files, data types, constants, variables, declarations, expression statements, arithmetic operations, unary operations, relational and logical, conditional, library functions, single character input and output, entering and writing data, evaluation of expressions, type conversion, precedence and associativity, I/O functions.	4	20	
3	Control structure in C: Simple statements, Decision making statements, Looping statements, Nesting of control structures, break and continue, The case control structure switch and goto statement.	5	20	
4	Array & String: Concepts of array, processing an array, declaration and initialization of arrays, passing arrays to function, multidimensional array, string, string storage, Built-in string functions, command line arguments.	5	15	

5	Functions: Concepts of user defined functions, prototypes, definition of function, parameters, parameter passing, calling a function, recursive function: different way of solving problems, recursive program for finding factorial, Fibonacci series etc.	8	30
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Course Outcome: After completion of this course, student will be able to

- To formulate a flowchart/algorithm for a given a problem.
- To translate algorithm/flowchart into a c program using correct syntax and execute it.
- To develop a c program using the concept of array and structure.
- To decompose a problem into function.

List of References:

1. Programming in ANSI C, Balagurusamy, TMH
2. Lets C, Y. Kanitkar, BPB
3. Programming with C, Gottafried, Schaum Series
4. C The Complete Reference, Scholdt, TMH
5. Structured Programming Approach Using C, B. Forouzen, Thomas

Open e-Resource:

1. NPTEL C Programming: <https://nptel.ac.in/courses/106104128>
2. NPTEL Problem Solving through C: https://onlinecourses.nptel.ac.in/noc22_cs101/preview
3. https://www.w3schools.com/c/c_compiler.php
4. <https://www.geeksforgeeks.org/c-programming-language/>

List of Suggested Experiments:

1. Draw Flow Chart and write algorithm for at least four problems.
2. Write a minimum 5 programs using Constants, Variables & arithmetic expression in C.
3. Write programs to understand Data types, Type modifiers and Type conversion in C.
4. Write programs providing insight to formatted and unformatted input and output in C
5. Write minimum 5 programs providing understanding of Relational operators in C.
6. Write programs using logical and bitwise operators in C.
7. Make programs using If, If-else, If-else-if and Nested If statements.
8. Make programs using break, continue, goto and switch statements.
9. Write programs to understand simple for loop and nested loops.
10. Write programs using While Loop and do-while loop.
11. Write programs on arrays. (Sorting, merging, finding particular value etc.)
12. Write a program that defines the functions of add first n numbers.
13. Write a program using function to interchange two values in C.
14. Write a program to calculate the power using recursion in C.

**GANDHINAGAR INSTITUTE OF
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**Civil Engineering / Mechanical Engineering / Electrical Engineering / Electronics and
Communication Engineering / Computer Engineering / Information Technology / Computer Science
and Engineering / Artificial Intelligence and Machine Learning / Cyber Forensic and Information
Security**

DOC NO: 4061

Subject Code: 101230101	Subject Title: Engineering Workshop Practice
Prerequisite: Zeal to learn the subject	

Course Objective:

1. Workshop practice is the backbone of the real industrial environment which helps to develop and enhance relevant technical hand skills required by the technician working in the various engineering industries and workshops.
2. Irrespective of branch, the use of workshop practices in day to day industrial as well domestic life helps to dissolve the problems

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
0	0	4	2	0	0	80	20	100

Subject Contents			
Sr No	Topic	Total Hours	Weight (%)
1	Familiarization to workshop practices	6	6
2	Learning skills to use tools, machines, equipments and measuring instruments	6	13
3	Follow safety rules for safe handling of machines and tools	6	6
4	Practice exercise with hands on training in different workshop trades	24	44
5	Hands on training for Welding and practice Plumbing functioning	6	13
6	Hands on practice for Carpentry and Fitting operations	8	18

Course Outcome:

After completion of this course, student will be able to

CO1	Students will learn about different workshop trades
CO2	Students will identify and apply suitable tools and instruments for fitting, carpentry, smithy and basic electrical work
CO3	Students will learn about taking safety and precautionary measures of self and machines during operations
CO4	Students will have awareness about measure of different welding operations and plumbing skills
CO5	Students will be aware about conducting exercises with wooden job as well as metal specimen

List of References:

1. B S Raghuwanshi, "A course in Workshop Technology", Dhanpat Rai Publications
2. P.N. Rao, "Manufacturing Technology Vol-I and Vol-II", Tata McGraw Hill
3. Kalpakjian, "Manufacturing Engineering and Technology", Pearson
4. K Hajra Choudhury, A K. Hajra, "Elements of Workshop Technology: Vol- I and Vol - II", Media Promoters Pvt Ltd.
5. Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGraw Hill House, 2017

Open e-Resources:

1. <https://nptel.iitm.ac.in/courses.php>

List of Suggested Experiments:

1. Familiarization to different shops in workshop and its layout
2. To understand safety measures followed in workshop practice
3. Machine shop in Workshop
4. Hands on Practice and job making in Carpentry shop
5. Hands on Practice in Plumbing shop
6. Hands on Practice and job making in Fitting shop
7. Demonstration of Pattern Making by sand molding
8. Demonstration of different Welding operations

GANDHINAGAR INSTITUTE OF TECHNOLOGY

DIPLOMA 2nd SEMESTER

Civil Engineering / Mechanical Engineering / Electrical Engineering / Electronics and Communication Engineering / Computer Engineering / Information Technology / Computer Science and Engineering / Artificial Intelligence and Machine Learning / Cyber Forensic and Information Security/ Information and Communication Technology

DOC NO: 4061

Subject Code: 101230201	Subject Title: Engineering Graphics
Pre-requisite: Zeal to learn	

Course Objective:

- Strengthen the engineering structure by demonstrating various graphical projections.
- Transmitting link between ideas and realization.
- Improve analytical skills to understand design blueprints.
- Improve skills to prepare designs blueprints for mechanical parts.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
2	0	4	4	70	30	30	20	150

Subject Contents				
Sr. No	Topic	Total Hours	Weight (%)	
1	Introduction to Engineering Graphics: 1. Introduction to drawing instruments and accessories. 2. Types of lines, dimensioning and plane scale as per BIS-SP 46. 3. Draw polygons with various methods. <i>(In Exam, specific method not to be asked. Students can draw polygon by any method.)</i>	4	10	
2	Engineering Curves: 1. Applications of Engineering Curves, Construction of Conical curves. 2. Drawing of cycloidal Curves, Involute and Spirals. <i>(In Exam, specific method not to be asked. Students can draw these curves by any method.)</i>	5	20	
3	Projections of Points and Lines: 1. Introduction to principal planes of projections, Projections of points. 2. Projections of line with its inclination to HP and VP, True length.	5	20	
4	Projections of Planes: Inclination of square, hexagonal and circular plane with reference planes.	4	10	

5	Orthographic Projections: 1. Projections from the pictorial view of the object. 2. Draw front, top and side views of simple objects. 3. Free hand sketches of simple geometrical shapes like square, triangle, circle, semi-circle, hexagon and pentagon.	6	20
6	Isometric view: 1. Isometric view of simple objects and Isometric scale. 2. Free hand sketches of simple objects like prism, pyramid, cylinder and cone.	6	20

Course Outcome:

After completion of this course, student will be able to

1. Apply the conventions and methods of engineering drawing.
2. Construct engineering curves as per given dimensions.
3. Draw the projection of points, lines and planes under different conditions.
4. Draw orthographic projection from isometric views of simple objects.
5. Draw isometric views from orthographic projection of simple objects.

List of References:

1. A text book of Engineering Drawing by P.S.Gill, S.K.Kataria & sons, Delhi.
2. Elementary Engineering Drawing by N.D.Bhatt Charotar Publishing House, Anand.

Open e-Resource:

1. <https://nptel.ac.in/courses/112103019>
2. <https://nptel.ac.in/courses/112104172>

List of Suggested Experiments:

Students must draw all the problems in sketch book and then in drawing sheet.

1. Use of drawing instruments (Types of Lines, Dimensioning, Scale as per BIS, Angles, Polygons).
2. Drawing of Conical curves (Ellipse, Parabola, Hyperbola).
3. Drawing of Spiral, Involute and Cycloidal curves.
4. Projections of Points and Line.
5. Projections of Plane.
6. Draw Orthographic Projections of given Isometric View.
7. Draw Isometric View of given Orthographic Projection.

GANDHINAGAR INSTITUTE OF TECHNOLOGY
DIPLOMA 2nd SEMESTER

Electrical Engineering / Electronics and Communication Engineering / Computer Engineering / Information Technology / Computer Science and Engineering / Artificial Intelligence and Machine Learning / Cyber Forensic and Information Security/ Information and Communication Technology

DOC NO: 4061

Subject Code: 101200201	Subject Title: Fundamental of Electrical and Electronic Engineering (FEEE)
Pre-requisite: Nil	

Course Objective:

- To Impart the basic knowledge of electrical quantities and to understand the impact of technology in a global and social context.
- To provide knowledge of analog and digital electronics.
- To Introduce the basic knowledge of transformer and electrical machines and electrical safety.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	0	2	4	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	DC Circuits Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems.	8	20%
2	AC Circuit: Representation of sinusoidal waveforms, sinusoidal function- Terminology, Form Factor and Peak Factor, Phase and Phase Difference, Phasor representation of alternating quantities, Phasor addition and subtraction Behavior of purely resistive, inductive and capacitive circuits, Phase relation RL circuit, series RC circuits, series RLC circuit between voltage and current Active, Reactive and Apparent Power, Power Factor and Parallel and series- parallel AC circuits, Three-phase balanced circuits, voltage and current relations in star and delta connections.	10	23%

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3	Transformers and Electrical machines Construction and working principle of single phase and three phase transformers Equation, voltage and current Ideal and practical transformer, autotransformer. Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, single phase induction motor	6	14%
4	Analog Electronics and Applications: Semiconductor Diode & its characteristics, Half-Wave, Full-Wave & Bridge Rectifier, Zener Diode, Light-Emitting Diode (LED), Photo diode, Solar cell and Seven Segment Display. Bipolar Junction Transistor, Amplifier, Oscillator and Operational Amplifier.	8	20%
5	Digital Electronics: Number System, Basic Logic Gates, Building AND, OR & NOT Gate using Diodes and Transistors, Digital logic families, RTL, DTL, TTL.	4	9%
6	Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.	6	14%

Course Outcome: After completion of this course, student will be able to

- Analyze electrical circuits with different elements and describe qualitative comparison between AC and DC systems.
- Understand the construction, working and basic characteristics of transformer and Induction machine
- Learn about the working of Bread-Board, Multimeter, Power Supply, Function Generator, CRO/DSO, GCB/PCB.
- Apply Diodes, Transistors and Logic Gates in different circuits.
- Recognize the importance of protective devices and electrical safety measures.

List of References:

1. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.
2. Basic Electrical Engineering - Nagsarkar and Sukhija, Oxford University Press
3. B. L. Theraja, “Electrical Technology – Part I and II”, S. Chand and Co. 2012
4. V.N. Mittal, ‘Basic Electrical Engineering’, Tata McGraw-Hill, 2nd edition 2006.
5. D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.
6. A. Chakrabarti, S. Nath, C. Chanda, ‘Basic Electrical Engineering’, Tata McGrawHill Education India Pvt. Ltd, 2013.
7. Robert Boylestad and Louis Nashelsky, “Electronic Devices and Circuit Theory”, Pearson Education, 10th Edition, 2009.
8. Albert Malvino and David Bates, “Electronics Principles” Tata McGraw-Hill, 7th Edition, 2006.

9. Digital Logic and Computer Design By M Morris Mano, Prentice Hall Publication, Fourth Edition.

Open e-Resource:

1. <http://vlab.amrita.edu/index.php>
2. <https://www.facstaff.bucknell.edu/mastascu/eLessonsHTML/EEIndex.html>
3. <http://www.learnabout-electronics.org>
4. <http://www.electronics-tutorials.ws>
5. <https://www.coursera.org/course/eefunlab>
6. <https://www.coursera.org/course/introtoelectronics>
7. <http://www.electronicssandyou.com>
8. https://onlinecourses.nptel.ac.in/noc21_ee55/preview
9. PSpices and NGSpice (Open Source Software)

List of Suggested Experiments:

1. To verify ohm's law in an electric circuit.
2. To verify KCL and KVL in an electric circuit.
3. To verify the Network theorems
4. To determine power in a single phase circuit using wattmeter.
5. Determination of B-H curve of magnetic material.
6. Analysis series RLC circuit.
7. Demonstration of domestic installations like MCB, ELCB, MCCB
8. To determine power in a three phase circuit using two wattmeter.
9. Demonstration of cut-section models and charts of various machines.
10. Understanding of various electrical bills and calculation for energy consumption.
11. To study and perform the VI characteristics of P-N junction diode
12. To study and perform the VI characteristics of Zener diode.
13. To study and perform about the Half Wave and Full Wave Rectifier.
14. To study and perform the Input and Output characteristics of a Transistor.
15. To study and configure an op-amp as an inverting and non-inverting amplifier.
16. To study and verify digital logic gates.
17. To configure diodes and transistors as logic gates and verify the truth table.



GANDHINAGAR INSTITUTE OF TECHNOLOGY
DIPLOMA 2nd SEMESTER

Civil Engineering / Mechanical Engineering / Electrical Engineering / Electronics and Communication Engineering / Computer Engineering / Information Technology / Computer Science and Engineering / Artificial Intelligence and Machine Learning / Cyber Forensic and Information Security/ Information and Communication Technology

DOC NO: 4061

Subject Code: 101190201	Subject Title: Fundamental of Python
Pre-requisite: Programming Concepts, basic computer skills, strong math foundation, and the ability to install Python and set up your development environment.	

Course Objectives:

- Understand Python syntax, data types, and operators, Implementation of control structures (loops, conditions, functions) and work with lists, tuples, dictionaries, and sets.
- Learn file handling and data processing with read and write files using Python, also work with CSV, JSON, and XML data Perform data manipulation using Pandas
- Learn to apply the functions in Python Programming to solve the problem

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	0	2	4	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Introduction: Installation and working with Python, Variables and data types in python, perform computations and create logical statements using Python's operators: Arithmetic, Assignment, Comparison, Logical, Membership, Identity, Bitwise operators, list, tuple and string operations	10	22
2	Python Loops: Conditional: if, if... else and nested if, Loops: for, while, nested loops, Break and Continue Statement.	8	17
3	Python Functions & Recursion: Function calls, Type Conversion and Coercion, Math Functions, Adding new Function, Parameters and Argument, Recursion and its use, Lambda Functions and Anonymous Functions in Python.	10	22
4	Python File Operations: An introduction to file I/O, use text files, use CSV files, use binary files, handle a single exception, handle multiple exceptions, Illustrative programs, Exercises	10	22

5	Advance Libraries: Use of Libraries: Numpy, pandas, matplotlib, Pillow, Keras, TensorFlow, Introduction to different framework in python	8	17
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Course Outcome: After completion of this course, students will be able to

- To test and debug code written in python.
- To perform file operations to read and write data in files.
- Apply the basic concepts and understand the various data structures available in Python programming language.
- Apply the functions in Python Programming to solve the problems.

List of References:

1. R. Nageswara Rao, "Core Python Programming I", Dream tech Press
2. Y. Daniel Liang, "Introduction to Programming Using Python", Pearson
3. Reema Thareja, "Python Programming: Using Problem Solving Approach", Oxford University Press
4. Martin C Brown, "Python the Complete Reference", Tata Mcgraw Hill, India
5. Ashok Kamthane and Amit Ashok Kamthane, "Programming and Problem Solving with Python", Tata Mcgraw Hill, India.
6. John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India.

Open e-Resource:

1. <https://docs.python.org/3/tutorial/>
2. <https://www.coursera.org/>
3. <https://books.goalkicker.com/PythonBook>

List of Suggested Experiments:

1. Write a program to demonstrate different number data types in Python.
2. Write a program to perform different Arithmetic Operations on numbers in Python.
3. Write a python program to find largest of three numbers.
4. Write a program to create, append, and remove lists in python.
5. Write a program to demonstrate working with tuples in python.
6. Write a program to demonstrate working with dictionaries in python.
7. Write a Python program to convert temperatures to and from Celsius, Fahrenheit. [Formula: $c/5 = f-32/9$]
8. Write a python script to print the current date in the following format "Sun May 29 02:26:23 IST 2025"
9. Write a Python script that prints prime numbers less than 20.
10. Write a python program to find factorial of a number using Recursion.
11. Write a Python class to implement pow (x, n)
12. Write a Python class to reverse a string word by word.
13. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.
14. Write a python program to define a module and import a specific function in that module to another program.
15. Write a python program to define a module to find Fibonacci Numbers and import the module to another program

GANDHINAGAR INSTITUTE OF TECHNOLOGY
DIPLOMA 2nd SEMESTER
Civil Engineering / Mechanical Engineering

DOC NO: 4061

Subject Code: 101180202	Subject Title: Engineering Mechanics
Pre-requisite: Basic knowledge of Laws and Principles of Mathematics and Physics	

Course Objective:

- The primary purpose of the study of Engineering Mechanics is to develop the capacity to predict the effects of force while carrying out the creative design functions of engineering.
- The course addresses the modeling and analysis of static equilibrium problems with an emphasis on real world engineering applications and problem solving.
- It bridges the gap between physical theory and its application to technology.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	0	2	4	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Basics of Mechanics: Significance and relevance of Mechanics, Applied mechanics, Statics, Dynamics. Space, time, mass, particle, flexible body and rigid body. Scalar and vector quantity, Units of measurement (SI units) - Fundamental units and derived units. Force – unit, representation as a vector and by Bow's notation, characteristics and effects of a Force. Principle of transmissibility of force, Principle of Superposition Force system and its classification.	4	10
2	Coplanar Concurrent Forces: Resolution of a force - Orthogonal components of a force Equilibrium and Equilibrant, Free body and Free body diagram, conditions of equilibrium, Resultant of forces using analytical and graphical methods for the forces acting at a point: Law of Parallelogram Law of triangle Law of Polygon Lami's Theorem – statement and explanation, Application for various engineering problems	10	22

3	Moment of Force and Parallel Forces Moment of a force, Varignon's Theorem, Couple, application, properties of couple, conditions of equilibrium. Resultant of force, Equilibrium forces and its position using analytical methods for the coplanar non - concurrent force system. Types of beam, supports (simple, hinged, roller and fixed) and loads acting on beam (vertical and inclined point load, uniformly distributed load, couple). Beam reaction for cantilever, simply supported beam with or without overhang – subjected to combination of Point load and uniformly distributed load. Beam reaction graphically for simply supported beam subjected to vertical point loads only.	10	22
4	Centroid & Centre of Gravity Concept of Centroid, Centre of Gravity. Axis of reference and Axis of Symmetry. Centroid of One-Dimensional geometrical figures using principle of moment. Centroid of Two-Dimensional geometrical Plane figures (Square, Rectangle, Triangle, Circle, Semi-circle, Quarter-circle) & Composite figures (not more than three figures) using first moment of area. Centre of Gravity of Simple solids (Cube, Cuboid, Cone, Cylinder, Sphere, Hemisphere) & Composite solids (not more than two solids) using first moment of mass.	06	13
5	Friction Friction, Types of Friction and laws of friction, limiting equilibrium, limiting friction. Coefficient of friction, angle of friction, angle of repose, relation between coefficient of friction and angle of friction. Equilibrium of bodies on level surface subjected to force parallel and inclined to plane. Equilibrium of bodies on inclined plane subjected to force parallel to the plane only.	06	13
6	Simple Lifting Machines Simple lifting machine, load, effort, mechanical advantage, applications and advantages. Velocity ratio, efficiency of machines. Application of law of machine. Ideal machine, friction in machine, maximum Mechanical advantage and efficiency. Reversible and non-reversible machines, conditions for reversibility. Velocity ratios of Simple wheel and axle, Differential axle and Wheel and, Worm and worm wheel, Single purchase and double purchase crab winch, Simple screw jack. Relevant problems on simple lifting machines.	09	20

Course Outcome: After completion of this course, student will be able to

- Apply basics of mechanics to identify the force systems and determine unknown force for coplanar concurrent force system.
- Apply principle of moment to analyses coplanar non-concurrent force system.
- Find the centroid and center of gravity of various components in engineering systems.
- Apply principle of friction to analyses static equilibrium of coplanar concurrent force system.
- Select relevant simple lifting machine(s) for given purpose.

List of References:

1. Title: Engineering Mechanics Author: R. S.Khurmi Publisher: S. Chand , New Delhi. (2019)
2. Title: Engineering Mechanics Author: D. S. Kumar Publisher: S. K. Kataria& Sons, New Delhi (2021 reprint)
3. Title: Engineering Mechanics 7th edition Author: Bear &Johnston Publisher: New media-McGraw Hill (India), Noida (1999)
4. Title: Applied Mechanics Author: Dr. H. J. Shah & S.B. Junnarkar Publisher: CHAROTAR Publication, Anand (2013)
5. Title: Engineering Mechanics Author: D.S. Bedi Publisher: Khanna Publications, New Delhi (2019)

Open e-Resource:

1. <https://youtube.com/playlist?list=PLD85An3RPybx5psW5HwPtUGH7AXtBjhLm> (Bisag Video Lectures by DTE, Gujarat)
2. https://youtube.com/playlist?list=PLyqSpQzTE6M_MEUdn1izTMB2yZgP1NLfs (NPTEL Video Lectures by IIT, Kanpur)
3. <https://nptel.ac.in/courses/122/104/122104015/> (NPTEL Video Lectures by IIT, Madras)
4. www.vlab.co.in
(Virtual Lab by Ministry of Education, Government of India)

List of Suggested Experiments:

1. Equilibrium of Coplanar Concurrent Forces
2. Equilibrium of Coplanar Non-Concurrent Forces
3. Determination of Reactions of Simply Supported Beam
4. Determination of angle of repose & Co-Efficient of Static Friction
5. Verification of principle of moment: Bell crank lever
6. Determination of Parameters of Machines

GANDHINAGAR INSTITUTE OF TECHNOLOGY
DIPLOMA 2nd SEMESTER

Civil Engineering / Mechanical Engineering / Electrical Engineering / Electronics and Communication Engineering / Computer Engineering / Information Technology / Computer Science and Engineering / Artificial Intelligence and Machine Learning / Cyber Forensic and Information Security/ Information and Communication Technology

DOC NO: 4061

Subject Code: 101180201	Subject Title: Environment and Sustainability
Pre-requisite: Zeal to learn	

Course Objectives:

- To create environmental awareness among the students.
- To gain knowledge of different types of pollution in the environment.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
2	0	0	2	70	30	00	00	100

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Ecology & Ecosystems (Structure and Function): Introduction to Ecology & Environmental Sciences; Principles and Scope, Ecosystems, Forest, Desert, Wetlands, River, Oceanic and Lake. Biodiversity: Types, Value; Hot spots; Threats and Conservation of biodiversity, Forest Wealth, and Deforestation.	4	20
2	Advances in Energy Systems (Merits, Demerits, Global Status and Applications): Hydrogen, Solar, OTEC, Tidal and Wind. Natural Resource Management (Concept and case-studies): Disaster Management, Sustainable Mining, case studies, and Carbon Trading.	4	20
3	Environmental Pollution (Sources, Impacts, Corrective and Preventive measures, Relevant Environmental Acts, Case-studies): Surface and Ground Water Pollution; Noise pollution; Soil Pollution and Air Pollution. Waste Management & Public Health Aspects: Bio-medical Wastes; Solid waste; Hazardous wastes; E-waste; Industrial and Municipal Sludge.	6	20
4	Global Environmental Concerns (Concept, policies and case-studies): Ground water depletion/recharging, Climate Change; Green House Effect; Global Warming; Acid Rain; Ozone Layer Depletion; Resettlement and rehabilitation of people, Environmental Toxicology.	6	20

5	Latest Developments in Environmental Pollution Mitigation Tools (Concept and Applications): G.I.S. & Remote Sensing, Environment Impact Assessment, Environmental Management Systems, ISO14001; Environmental Stewardship- NGOs. Field work: Visit to an Environmental Engineering Laboratory or Green Building or Water Treatment Plant or Wastewater treatment Plant.	8	20
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Course Outcome: After completion of this course, students will be able to

- Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.
- Develop critical thinking and/or observation skills and apply them to the analysis of a problem or question related to the environment.
- Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components.
- Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.

List of References:

1. Environmental studies, Benny Joseph, Tata Mcgraw-Hill 2nd edition 2012
2. Environmental studies, S M Prakash, pristine publishing house, Mangalore 3rd edition-2018
3. Benny Joseph, Environmental studies, Tata Mcgraw-Hill 2nd edition 2009
4. M.Ayi Reddy Textbook of environmental science and Technology, BS publications 2007
5. Dr. B.S Chauhan, Environmental studies, University of science press 1st edition

Open e-Resource:

1. https://onlinecourses.nptel.ac.in/noc23_hs155/preview

Activities:

- Prepare and analyze a case study on any polluted city of India.
- Prepare a note based on the field visit to the solid waste management department of the municipal corporation / local authority.
- Record the biodiversity of your institute/garden in your city mentioning types of vegetation and their numbers.
- Visit any functional hall/cultural hall /community hall / College Canteen to study the disposal techniques of kitchen waste and prepare a report suggesting sustainable waste management tool.
- Watch a video related to air pollution in India and present the summary.

GANDHINAGAR INSTITUTE OF TECHNOLOGY DIPLOMA
2nd SEMESTER

Civil Engineering / Mechanical Engineering / Electrical Engineering / Electronics and Communication Engineering / Computer Engineering / Information Technology / Computer Science and Engineering / Artificial Intelligence and Machine Learning / Cyber Forensic and Information Security/ Information and Communication Technology

DOC NO: 4061

Subject Code: 100000203	Subject Title: Essence of Indian knowledge and Tradition
Pre-requisite: National education Policy 2020, has given ample emphasis on Indian Knowledge system. The significance of teaching of Indian knowledge and Tradition is very much required as for centuries this great tradition had been trampled under the feet of invaders. Even after Independence, Indian Knowledge System had been neglected and only Western parameters have been considered as standard. The essence of Indian culture has been carried through centuries only because of its scientific and humanitarian approach. It is the need of the hour that young students learn the significance of the contribution made by Indian Knowledge Systems and contribute to the world with pride and confidence even in the field of Science and technology which had been mastered centuries ago but was perished by invaders. This course will provide an opportunity to the students the hidden secrets of the great heritage of knowledge that existed thousands of years ago in Indian Tradition.	

Course Objective:

- Study of IKS will enable students to respect and relish the greatness of our tradition. The awareness of IKS will make them feel proud about their own culture.
- The knowledge of Indian knowledge will enable and empower them with the firsthand knowledge of India's great heritage, culture and traditions.
- This will create a scope and awareness amongst the foreigners regarding India and its contribution to the world.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
2	0	0	2	70	30	00	00	100

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Ancient Indian Astronomy: Development of Astronomy: • Consideration of Purnima and Amavasya • Beginning of The New Year- Vasant Ritu- (Vernal Equinox) • Ancient Indian Calender • Science Behind "Adhikmaas" • Uttarayan and Dakshinaya	5	19

2	Knowledge about Constellations / planets / distance between planets etc.: - Saptarushi – seven Seers- Significant Knowledge of star and constellations - Knowledge of Speed of Light – Rigveda (1.50.04) - Distance between Earth and Sun (Hanuman Chalisa)	5	19
3	Advances in Mathematics and Geometry in Ancient India: A) Sulbha- Sutra (Kalpa Sutra) composed by Baudhayana, Manava, Apastamba and Katyayana B) Contribution of Ancient Rushis to Mathematics - Bodhayana's value of pie - Lilavati - Bhaskaracharya - Arya Bhatt.	6	21
4	Town Planning in Ancient India: - Roads in Ancient India – Uttarpath by Chandra Gupta - Ancient Indian Trade Routs/ Waterways - Ship- Building in Ancient India - Temple Architecture (Nagar Style/ Dravida style/ Vesara style)	4	14
5	Atomic Theory of Kanada: - Concept of Seven Padartha and Nine Dravyas - Theory of Gurutva - Characteristics of Atom	3	10
6	Metallurgical Discoveries in Ancient India: - Lime a Mortar - Bronze - Gold & Silver - Glass / Iron - Nagarjuna's Contribution in making Alloys	2	7
7	Vimanshastra - Airbourne Vehicles: - References of Vimana- Flying Machines in Rigveda, Mahabharat and Ramayana - BhardwajSutra- Chapter-1 Rasyagnoadhikari	3	10

Course Outcome: After completion of this course, student will be able to

- Students will attain awareness regarding the significance of IKS.
- The syllabus will enhance their confidence in Indian traditional knowledge system and enable them to perceive at the problems with Indian perspective.
- This will also enable them to analyze the issues on their own and enable them for critical thinking.
- The knowledge about the ancient Indian Scientific traditions will generate more confidence in themselves.
- This will lead them to make research and innovative thinking which can result in global contribution at later stage.

*Revised Bloom's Taxonomy (RBT)

List of References:

1. History of Science, Arts & Technology By Dr. Shripad Dattatrya Kulkarni, Bhishma Prakashan, Mumbai -1998.
2. Introduction to Indian Knowledge System: Concepts and Applications by B. Mahadevan, Vinayak Rajat Bhat, Nagendra Pavana, PHI Learning Pvt. Ltd., Delhi
3. Town Planning in Ancient India by Binode Bihari Dutt, Thacker, Spink & Co.
4. ભારતનો વૈજ્ઞાનિક વારસો લેખક- J.J Raval University

Open e-Resource:

- <https://nptel.ac.in/courses/101104065>
- <http://nptel.ac.in/courses/121106003>

List of Suggested Practical / Project:

- The student can visit any historical / monumental sights like Adalaj step well or Rani Ki Vav – Patan and study about architectural skills of Indians in past.

GANDHINAGAR INSTITUTE OF TECHNOLOGY
DIPLOMA 2nd SEMESTER

Civil Engineering / Mechanical Engineering / Electrical Engineering / Electronics and Communication Engineering / Computer Engineering / Information Technology / Computer Science and Engineering / Artificial Intelligence and Machine Learning / Cyber Forensic and Information Security/ Information and Communication Technology

DOC NO: 4061

Subject Code: 100000202	Subject Title: Indian Constitution
Pre-requisite: Zeal to learn	

Course Objective:

- Enrich the knowledge of the Indian Constitution.
- Fundamental Concepts of the Indian Constitution.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
2	0	0	0	-	-	-	50	50

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Meaning of Constitution Law and Constitutionalism Constitutional Law, Constitutionalism Historical Perspective of the Constitution of India History of Constitution of India, Indian Constitution, Elements of Constitution of India Features and Characteristics of the Constitution of India Features of Constitution of India, Characteristics of Constitution of India	4	13
2	Fundamental Rights Introduction, Right to Equality (Article 14-18), Right to Freedom (Article 19-22), Right Against Exploitation (Article 23 & 24), Right to Freedom of Religion (Article 25-28), Cultural and Educational Rights (Article 29-30), Right to Constitutional Remedies (Article 32), Right to Privacy, Features of Fundamental Rights Right to Equality under Article – 14 to 18 Right to Equality, Equality Rights (Article 14-18): Article 14 – Equality before Law, Article 15 – Prohibition of Discrimination on the Grounds of Religion, Race, Caste,		

	Sex of Place of Birth, Article 16 – Equality of Opportunities in Matters of Public Employment, Article 17 – Abolition of Untouchability, Article 18 – Abolition of titles Right to certain freedom under Article – 19 to 22 Article 19 – Protection of Certain Rights Regarding Freedom of Speech, Freedom Rights (Article 19-22) Scope of the right to life and personal liberty under Article 21 Scope of Right to life and Personal Liberty – Article 21, Meaning and Concept of 'Right to Life'	8	26
3	Fundamental Duties and its Legal Status Nature of Fundamental Duties, The Relationship between the Fundamental Rights, Directive Principles and Fundamental Duties, Legal Status The Directive Principles of State Policy Directive Principles of State Policy, Classification of Directive Principles of State Policy (DPSP), Features of Directive Principles of State Policy, New Provisions of Directive Principles after Amendment	4	14
4	Federal structure and distribution of legislative and financial powers between the Union and the States Federal System – Features of Federal Government, Legislative Relations (Article 245-255) – Centre's Control Over State Legislation, Financial Relations (Article 268-293)	2	7
5	Parliamentary form of Government in India – The constitution powers and status of the President of India Parliamentary System: Rajya Sabha, Lok Sabha, Article 74 – Council of Ministers to Aid and Advise President, Article 75 – Other Provisions as to Ministers, Merits and Demerits of Parliamentary System: Merits of Parliamentary System, Demerits of Parliamentary System, Status of President,	3	10
6	Amendments of the Constitutional Powers and Procedure Constitutional Amendment: Ways of Constitution Amendment, Article 368 – Power of Parliament to Amend the Constitution and Procedure, Procedure for Amendment The Historical Perspective of the Constitutional Amendments in India Important Amendments of the Indian Constitution	3	10
7	Emergency Provisions: National Emergency, President Rule, Financial Emergency Emergency Provisions: Types of Emergencies, Meaning of Emergency, History of Emergency in India, Reasons for Incorporating Emergency Provisions, National Emergency – Article 352: Sub-Types of National Emergency, Effects on Fundamental Rights in National Emergency, Code of Conduct for Press in Emergency – 1971, State Emergency – Article 356: Difference between National Emergency and President's Rule, Financial Emergency – Article 360: Effects of Financial Emergency	3	10

8	Local Self Government – Constitutional Scheme in India Local Self Government: Role of Local Government, Constitution (73rd Amendment) Act 1992: Panchayat, Gram Sabha, Village Level Panchayat, Intermediate Level Panchayat, District Level Panchayat, Social Auditing, Constitution (74th Amendment) Act – 1992	3	10
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Course Outcome: After completion of this course, student will be able to

- Enhance human values, create awareness about law enactment and importance of the Constitution.
- To observe the fundamental rights and fundamental duties of the Indian citizen to instill morality, social values, honesty, dignity of life and their social responsibilities.
- Create awareness of their surroundings, society, social problems, and their suitable solutions while keeping rights and duties of the citizens keeping in mind.
- Comprehend distribution of powers and functions of local self-Government.
- Envisage the national emergency, financial emergency, and their impact on the economy of the country.

List of References:

1. Constitutional law of India, Dr. J N Pandey, Central Law Agency.
2. Introduction to the Constitution of India, Durga Das Basu, LexisNexis.
3. Indian Constitutional Law, M P Jain, LexisNexis.
4. V N Shukla's Constitution of India, Mahendra Pal Singh, Eastern Book Company.
5. Constitutional Law – 1 Structure, Udai Raj Rai, Eastern Book Company.

Open e-Resource:

1. https://onlinecourses.nptel.ac.in/noc23_lw03/preview

GANDHINAGAR INSTITUTE OF TECHNOLOGY

DIPLOMA 2nd SEMESTER

Civil Engineering / Mechanical Engineering / Electrical Engineering / Electronics and Communication Engineering / Computer Engineering / Information Technology / Computer Science and Engineering / Artificial Intelligence and Machine Learning / Cyber Forensic and Information Security/ Information and Communication Technology

DOC NO: 4061

Subject Code: 100000201	Subject Title: Applied Mathematics
Pre-requisite: Trigonometry, Geometry and Calculus and Basics of Algebra	

Course Objective:

- (1) This course is designed to give comprehensive coverage at an introductory level to the subject of geometry, Algebra, differential and integral calculus.
- (2) In this course students can understand the advanced concepts and applications based on calculus, Differential equations understand and solve engineering problems.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	1	0	4	70	30	00	00	100

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Co-Ordinate Geometry: Equation of straight line in various standard forms (without proof), inter section of two straight lines, angle between two lines. Parallel and perpendicular lines, perpendicular distance formula. General equation of a circle and its characteristics. To find the equation of a circle, given: Centre and radius, three points lying on it and Coordinates of end points of a diameter; Definition of conics (Parabola, Ellipse, Hyperbola), their standard equations without proof. Problems on conics when their foci, directories or vertices are given.	10	25
2	Differential Calculus: Concept of limits, Continuity and Derivatives, Differentiation of all basic functions: trigonometric, inverse trigonometric,	8	20

	Logarithmic and Exponential functions; Rule of differentiation: sum, product, composition and quotient of functions and simple examples based on it.		
3	Application of derivatives: Equation of tangent line and normal, Maxima & Minima. Differential Equations: Definition, Order and Degree of Differential Equation, formation of DE; Solution of first order and first degree: By Variable Separable, Homogeneous and Integrating Factor methods (simple problems).	10	20
4	Integral Calculus: Concept, Integral of Standard Functions, Working Rules of Integration, Integration by Parts, Integration by Substitution Method, Definite Integral and its properties. Partial Fractions: Definition of partial fractions, proper & improper fractions and partial fraction with denominator containing non-repeated linear factors, repeated linear factors and irreducible non-repeated quadratic factors.	8	20
5	Applications of Integration: Simple problems on evaluation of area bounded by a curve and axes, area bounded by two intersecting curves, Calculation of Volume of a solid formed by revolution of an area about axes. (Simple problems).	6	15

Course Outcome: After completion of this course, students will be able to

1. To understand the coordinate geometry this provides a connection between algebra and geometry through graphs of lines and curves.
2. To understand the effects of changing conditions on a system and to understand rate of change.
3. To know the application of derivatives to analyze and interpret the solutions of physical problems by differential equations.
4. To study the cumulative effect of the original quantity or equation is the integration, one can perform the partial fraction decomposition that provides an algorithm for computing the antiderivative of a rational function.
5. To Apply integration for finding Area and Volume to solve real world applied problems.

List of Textbooks:

1. W R Neelkanth, Applied Mathematics-I, Sapna Publication.
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
3. G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995.
4. Pandya N R Advanced Mathematics for Polytechnic, Macmillan Publishers India Ltd., 2012.

List of Reference Books:

1. Anthony croft and others, Engineering Mathematics (third edition), Pearson Education.



2. Reena Garg, Engineering Mathematics, Khanna Publishing House, New Delhi (Revised Ed. 2018).
3. V. Sundaram, R. Balasubramanian, K.A. Lakshminarayanan, Engineering Mathematics, 6/e, Vikas Publishing House.
4. Prakash D S, Polytechnic Mathematics S Chand, 1985.

Gandhinagar Institute of Technology
Diploma All Engineering Branch
Semester 3

Subject Code: 100000301	Subject Title: Universal Human Values
Pre-requisite :- Zeal to learn the subject	

Course Objective:

1. To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuou s Assessment	
2	1	0	3	-	-	50	-	50

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1.	Course Introduction - Need, Basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education, Self-Exploration–what is it? - its content and process; ‘Natural Acceptance’ and Experiential Validation- as the mechanism for self-exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations, Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfill the above human aspirations: understanding and living in harmony at various levels	9	20
2.	Understanding Harmony in the Human Being - Harmony in Myself!: Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’, Understanding the needs of Self (‘I’) and ‘Body’ - Sukh and Suvidha, Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer), Understanding the characteristics and activities of ‘I’ and harmony in ‘I’, Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure	8	17



	Sanyam and Swasthya - Practice Exercises and Case Studies will be taken up in Practice Sessions.		
3.	Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship: Understanding Harmony in the family – the basic unit of human interaction, Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship, Understanding the meaning of Vishwas; Difference between intention and competence, Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship, Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha)- from family to world family! - Practice Exercises and Case Studies will be taken up in Practice Sessions.	11	25
4.	Understanding Harmony in the Nature and Existence - Whole existence as Co-existence: Understanding the harmony in the Nature, Interconnectedness and mutual fulfillment among the four orders of nature-recyclability and self-regulation in nature, Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence - Practice Exercises and Case Studies will be taken up in Practice Sessions.	7	15
5.	Implications of the above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in professional ethics: (a) Ability to utilize the professional competence for augmenting universal human order, (b) Ability to identify the scope and characteristics of people-friendly and ecofriendly production systems, (c) Ability to identify and develop appropriate technologies and management patterns for above production systems, Case studies of typical holistic technologies, management models and production systems, Strategy for transition from the present state to Universal Human Order: (a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers, (b) At the level of society: as mutually enriching institutions and organizations	10	23

Course Outcome: After completion of this course, student will be able to

1. Understand the significance of value inputs in a classroom, distinguish between values and skills, understand the need, basic guidelines, content and process of value education, explore the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society.
2. Distinguish between the Self and the Body, understand the meaning of Harmony in the Self the



Co-existence of Self and Body.

3. Understand the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a harmonious society.
4. Understand the harmony in nature and existence and work out their mutually fulfilling participation in the nature.
5. Distinguish between ethical and unethical practices and start working out the strategy to actualize a harmonious environment wherever they work.

List of References:

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA.
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991.
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome’s report, Universe Books.
5. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
6. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
7. A N Tripathy, 2003, Human Values, New Age International Publishers.
8. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantraShodh, Amravati.
9. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers , Oxford University Press.
10. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
11. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
12. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

Open e-Resource:

1. Value Education websites, <http://uhv.ac.in>, <http://www.uptu.ac.in>
2. Story of Stuff, <http://www.storyofstuff.com>
3. Al Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charlie Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology – the Untold Story
6. Gandhi A., Right Here Right Now, Cyclewala Productions

List of Suggested Tutorial:

1. Introduce yourself in detail. What are the goals in your life? How do you set your goals in your life? How do you differentiate between right and wrong? What have been your achievements and shortcomings in your life? Observe and analyze them.
2. Now-a-days, there is a lot of voice about many techno-genic maladies such as energy and natural resource depletion, environmental pollution, global warming, ozone depletion, deforestation, soil degradation, etc. – all these seem to be man-made problems threatening the survival of life on Earth – What is the root cause of these maladies & what is the way out in your opinion? On the other hand, there is rapidly growing danger because of nuclear proliferation, arms race, terrorism, criminalization of politics, large scale corruption, scams, breakdown of relationships, generation gap, depression & suicidal attempts, etc. – what do you think, is the root cause of these threats to human happiness and peace – what could be the way out in your opinion?

3. Observe that each one of us has Natural Acceptance, based on which one can verify right or not right for him. Verify this in case of What is Naturally Acceptable to you in a relationship- Feeling of respect or disrespect? What is Naturally Acceptable to you – to nurture or to exploit others? Is your living the same as your natural acceptance or different? Out of the three basic requirements for fulfillment of your aspirations- right understanding, relationship and physical facilities, observe how the problems in your family are related to each. Also observe how much time & effort you devote to each in your daily routine.
4. List down all your desires. Observe whether the desire is related to Self (I) or Body. If it appears to be related to both, see which part of it is related to Self (I) and which part is related to Body.
5. Observe that any physical facility you use follows the given sequence with time: Necessary & tasteful → unnecessary & tasteful → unnecessary & tasteless → intolerable. In contrast, observe that any feeling in you is either naturally acceptable or not acceptable at all. If naturally acceptable, you want it continuously and if not acceptable, you do not want it any moment! List down all your activities. Observe whether the activity is of 'I' or of Body or with the participation of both 'I' and Body. Observe the activities within 'I'. Identify the object of your attention for different moments (over a period of say 5 to 10 minutes) and draw a line diagram connecting these points. Try to observe the link between any two nodes.
6. Chalk out programs to ensure that you are responsible to your body- for the nurturing, protection and right utilization of the body. Find out the plants and shrubs growing in and around your campus. Find out their use for curing different diseases. Observe on how many occasions you are respecting your related ones (by doing the right evaluation) and on how many occasions you are disrespecting by way of under evaluation, over-evaluation or otherwise evaluation. Also observe whether your feeling of respect is based on treating the other as yourself or on differentiations based on body, physical facilities or beliefs.
7. Write a note in the form of story, poem, skit, essay, narration, dialogue to educate a child. Evaluate it in a group. Develop three chapters to introduce 'social science- its need, scope and content' in the primary education of children. List down units (things) around you. Classify them in four orders. Observe and explain the mutual fulfillment of each unit with other orders.
8. Make a chart for the whole existence. List down different courses of studies and relate them to different units or levels in existence. Choose any one subject being taught today. Evaluate it and suggest suitable modifications to make it appropriate and holistic.
9. Choose any two current problems of different kind in society and suggest how they can be solved on the basis of natural acceptance of human values. Suggest steps you will take in present conditions. Suggest ways in which you can use your knowledge of Technology/Engineering/ Management for universal human order, from your family to the world family. Suggest one format of humanistic constitution at the level of nation from your side.
10. The course is going to be over now. Evaluate your state before and after the course in terms of thought, behavior, work and realization. Do you have any plans to participate in the transition of society after graduating from the institute? Write a brief note on it.

Gandhinagar Institute of Technology
Diploma Computer Engineering /Computer Science & Engineering /Information Technology
Semester 3

Subject Code: 101190301	Subject Title: Basics of Operating System
Pre-requisite:	

Course Objective:

1. Differentiate the terms: Data, Information, Records, Fields, Metadata, Data warehouse, Data dictionary
2. Describe & practice Transaction Control Data Control Language
3. Develop programs using text files
4. Perform queries on 'Group by', 'Having' and 'Order by' clause and subquery
5. Write and execute PL/SQL programs in SQL*Plus
6. Solving problems of normalization

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	-	2	4	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Introduction of Operating System: Fundamental Goals of Operating system Overview of Operating Systems, Multi programming, Time Sharing, Real Time Multithreading, Distributed, Operating System services,	6	10
2	Process Management: Overview of the Process & threads, Process Life Cycle/ Process States, Process Control Block, Process Scheduling: Scheduling Criteria, Scheduling Algorithms, First Come First Serve, Shortest Job First, Round Robin, Overview of Schedulers, Scheduling Queues, Context Switch Process Synchronization: Critical Section, Mutual Exclusion, Deadlock: Conditions for Deadlock, Resource allocation graph	12	20

3	Memory Management: Logical and physical address map, Swapping, Contiguous memory allocation, Fixed and variable partition, and External Fragmentation, compaction Internal, Memory relocation and protection, Allocation techniques – First Fit, Best Fit and Worst Fit, Non Contiguous Memory allocation, Overview of Paging, Address translation using, basic method of paging, Overview of Segmentation, Page replacement algorithm, FIFO, LRU	10	16
4	File Management System: Files Attributes, File Operations, File Types, Directory Structures, Protection, Allocation Methods – Contiguous, Linked, Disk Structure, Disk Scheduling Algorithm – SCAN, CSCAN	06	10
5	Linux Basics: Linux Introduction, Basic architecture of Unix/Linux, Introduction to shell and commands, Commands: pwd, cd, mkdir, rmdir, ls, cat, cp, rm, mv, wc, split, cmp, comm, diff, head, tail, grep, sort, Editing files with “vi”, “vim”, “gedit”, “gcc”, Linux Basic shell scripts: Read using command line argument, the logical operators, Evaluate expression using test and [...], Branching : if, case, Basic of Looping : while, for	8	14

Course Outcome:

1. Differentiate operating systems based on their features.
2. Apply scheduling algorithms to calculate turnaround time and average waiting time.
3. Interpret various memory management techniques.
4. Apply File management techniques.
5. Execute basic Linux commands and Shell scripts

List of Textbooks:

1. Operating System Concepts, 9th Edition by Abraham Silberschatz, Peter B Galvin, Gerg Gagne WILEY, 2016, ISBN - 978-8126554270

List of Reference Books:

1. Unix Concepts And Application, 4th Ed by Sumitabha Das MGH, ISBN – 0-07-063546-2.
2. Modern Operating System 3rd Ed Andrew Tanenbaum, Herbert Bos 2015, Pearson, ISBN – 9780133591620
3. Operating System, 2nd Ed Milan Milenkovic 2014, MGH, ISBN-13: 978-0-07- 463272-7

Open e-Resource:

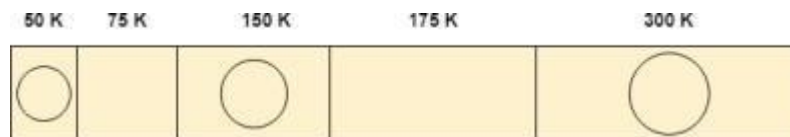
1. <https://boonsuen.com/process-scheduling-solver>
2. <http://cpuburst.com/ganttcharts.html>
3. <https://codepen.io/faso/pen/zqWGQW>
4. <https://www.tutorialspoint.com>
5. www.w3schools.com
6. <https://nptel.ac.in/courses/106106144>

List of Suggested Experiments:

1. Compare windows and Linux OS. (latest version)
2. Solve below given example with SJF, FCFS and Round robin algorithm. Draw Gantt chart.

Process	Arrival Time	Execution Time	Service Time
P0	0	5	0
P1	1	3	5
P2	2	8	8
P3	3	6	16

3. Process requests are given as: 25 K , 50 K , 100 K , 75 K



Solve above example using following algorithms:

1. First fit
2. Best fit
3. Worst fit
4. A. First in First out (FIFO) - Consider page reference string 1, 3, 0, 3, 5, 6, 3 with 3 page frames. Find the number of page faults.
B. Least Recently Used – Consider the page reference string 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2 with 4 page frames. Find number of page faults.
5. Disk Scheduling Algorithms
A. Scan: Suppose the requests to be addressed are- 82,170,43,140,24,16,190. And the Read/Write arm is at 50, and it is also given that the disk arm should move “towards the larger value”.
B. CScan: Suppose the requests to be addressed are- 82,170,43,140,24,16,190. And the Read/Write arm is at 50, and it is also given that the disk arm should move “towards the larger value”.
6. Test and run basic unix commands.
7. Test and run Advanced unix commands.
8. Test commands related with File editing with Vi, Vim, gedit, gcc.
9. Create a shell script to read from command line and print “Hello”.
10. Create a Shell script to read and display content of a file. And append content of one file to another.
11. Create a Shell script to accept a string in lower case letters from a user, & convert to upper case letters.
12. Create a Shell script to add two numbers.

Gandhinagar Institute of Technology
Diploma Computer Engineering /Computer Science & Engineering /Information Technology
Semester 3

Subject Code: 101190302	Subject Title: Introduction of Data Structures
Pre-requisite:	

Course Objective:

1. Differentiate primitive and non-primitive data
2. Implement programs to represent array in row major and column major order Develop programs using text files
3. Design and Implement search algorithms
4. Implement different operations on a Queue
5. Define the basic terms of a tree data structure
6. Implement basic operations on a binary tree

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	-	2	4	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Basic Concepts of Data Structures: Data Structure Basic Concepts, Types of data structures, Primitive and non-primitive data structures, Introduction to Algorithms, Key features of an algorithm Analysis Terms (for the definitions purpose only): Time Complexity, Space Complexity Asymptotic Notations: Big Oh Notation, Big Omega Notation, Big Theta Notation, Best case Time Complexity, Average case Time Complexity, Worst case Time Complexity,	6	10
2	Stack and Queues: Linear and Non-Linear Data Structures, Stack : Array representation of Stack, PUSH- POP Operations on Stack, Implementation of Stack, Application of Stack, Infix, Prefix and Postfix Forms of Expressions, Recursive Functions (Factorial, greatest common divisor, Fibonacci series), Queue: Array representation of Queue Operations on a Queue (Add an element, delete an element, display all elements of a queue), Implementation of a Queue,	10	18

	Limitation of a Single Queue, Concepts of Circular Queue ,Applications of a queue, Differentiate circular queue and simple queue		
3	Linked List: Pointers Revision, Revision of Structure, Revision of structure using pointers ,Dynamic Memory Allocation, Linked list Presentation ,Types of Linked List, Basic operations on singly linked list : Insertion of a new node in the beginning of the list, at the end of the list, after a given node, before a given node, in sorted linked list, Deleting the first and last node from a linked list, Searching a node in Linked List, Count the number of nodes in linked list, Concepts of circular linked list, Difference between circular linked list and singly linked list, Doubly linked list: Representation, Difference between Doubly linked list and singly linked list ,Applications of the linked list	9	14
4	Trees: Non-linear data structures: Tree, Graph, Basic Terms: General Tree, Forest, Binary trees, level number, degree, in-degree and out-degree, root node, leaf node, directed edge, path, depth Binary tree: Complete Binary Tree, Strict Binary Tree, Conversion of General Tree to Binary Tree, Binary Search Tree : Insertion of a node in binary tree, Deletion of a node in binary tree, Searching a node in binary tree ,Binary Tree Traversal : Inorder, Preorder, Postorder ,Applications of binary tree	7	14
5	Sorting and Hashing : Sorting Methods : Bubble Sort, Selection Sort, Quick Sort, Insertion Sort, Merge Sort, Radix Sort ,Hashing Concepts Hash functions: Division Method, Middle Square Method, Folding Method	10	14

Course Outcome:

1. Perform basic operations on arrays and strings.
2. Demonstrate algorithms to insert and delete elements from the stack and queue data structure.
3. Apply basic operations on the linked list data structure.
4. Illustrate algorithms to insert, delete and search a node in tree.
5. Apply different sorting and searching algorithms to the small data sets.

List of Textbooks:

1. An Introduction to Data Structures with Applications by Jean-Paul Tremblay & Paul G. Sorenson Tata McGraw Hill

List of Reference Books:

1. Data and File Structures using C Thareja, Reema Oxford University Press New
2. Data Structures Chitra, A Rajan, P T Tata McGraw Hill, New delhi,
3. Data Structures using C & C++ Tenen Baum Prentice-Hall International
4. Classic Data Structures Samanta, D. PHI Learning, New Delhi

Open e-Resource:

1. <https://www.programiz.com/dsa>
2. <https://nptel.ac.in/courses/106102064> (Introduction to data structures and algorithms, IIT Delhi)
3. <https://nptel.ac.in/courses/106106133> (Programming, Data structures and Algorithms, IIT Madras)
4. <https://www.codecademy.com/learn/linear-data-structures>

5. <https://www.udacity.com/course/data-structures-and-algorithms-in-python--ud513>
6. <https://www.edx.org/learn/data-structures>

List of Suggested Experiments:

1. Define various terms such as algorithm, various approaches to design an algorithm, time complexity, space complexity, best case, average case and worst-case time complexity etc.
2. Implement array using row major order and column major order
3. Implement Sequential search algorithms.
4. Implement Binary search algorithms.
5. Implement various string algorithms.
6. Implement push and pop algorithms of stack using array
7. Implement recursive functions.
8. Implement insert algorithms of queue using array.
9. Implement delete algorithms of queue using array.
10. Implement simple structure programs using pointers.
11. Implement insertion of node in the beginning of the list in singly linked list.
12. Implement insertion of node at the end of list in singly linked list.
13. Implement insertion of node in sorted linked list.
14. Implement insertion of node at any position in linked list.

Gandhinagar Institute of Technology
Diploma Computer Engineering /Computer Science & Engineering /Information Technology
Semester 3

Subject Code: 101220301	Subject Title: Database Management Systems
Pre-requisite:	

Course Objective:

1. Differentiate the terms: Data, Information, Records, Fields, Metadata, Data warehouse, Data dictionary
2. Describe & practice Transaction Control Data Control Language
3. Develop programs using text files
4. Perform queries on 'Group by', 'Having' and 'Order by' clause and subquery
5. Write and execute PL/SQL programs in SQL*Plus
6. Solve problems of normalization

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	-	2	4	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Introduction to Database System and SQL commands: Concepts and Definitions: Database and database systems and database environment, Data, Information, Data Item or Fields, Records, Files, Metadata, Data dictionary and it's components, Schemas, Sub-schemas, and Instances, Data types Database Language commands: Data Definition Language (DDL): CREATE, ALTER, TRUNCATE, DROP, Database Language: Data Manipulation Language (DML): INSERT, SELECT, UPDATE, DELETE, Transactional Control: Commit, Save point, Rollback, DCL Commands: Grant and Revoke	10	16
2	SQL in built functions and Joins: Operators Arithmetic, Comparison, Logical SQL functions- Single row function, Single row function, Date functions (add-months, months-between, round, truncate),	8	14

	Numeric Functions (abs, power, mod, round, trunc, sqrt), Character Functions (initcap, lower, upper, ltrim, rtrim, replace, substring, instr) Conversion Functions (to-char, to-date, to-number), Groupby, Having and Order by clause, Joins: Simple, Equi-join, Non-equi, Self-Joins, Outer-joins		
3	Database Integrity Constraints & Objects: Domain Integrity constraints: Not null, Check, Referential Integrity constraints: Foreign key, referenced key, on delete cascade, Views – Create, Alter, drop views Synonym: Create, drop synonym, Sequences: Create, alter, Drop sequences, Index: Unique and composite – Create, Drop	8	14
4	PL/ SQL : Basics of PL / SQL, Data types, Advantages of PL/SQL over SQL, Control Structures: Conditional, Iterative, Sequential, Exceptions: Predefined Exceptions, User defined exceptions, Cursors: Static (Implicit & Explicit), Dynamic, Procedures & Functions, Fundamentals of Database	10	16
5	Normalization: Basics of Normalization, Normal Forms, First Normal Form(1NF), Second Normal Form(2NF), Third Normal Form(3NF) Advantages and disadvantages of Normalization	6	10

Course Outcome:

1. Perform queries on datasets using SQL*Plus
2. Perform joins, subqueries and nested queries on multiple tables using SQL*plus
3. Apply rules on datasets using SQL*Plus constraints
4. Apply various Normalization techniques.
5. Write PL/SQL block using concepts of Cursor Management, Error Handling, Package and Triggers

List of Textbooks:

1. SQL/PL/SQL by Bayross, Ivan BPB, NewDelhi, 2010.

List of Reference Books:

1. Database Systems Concepts, design and Applications 2/e Pearson Education, New Delhi,
2. An Introduction to Database Systems by C J Date Pearson Education, New Delhi, 2006
3. Database System Concepts, Korth, Henry McGrawHill, Delhi, 2011

Open e-Resource:

1. DBMS: <http://nptel.iitm.ac.in/video.php?subjectId=106106093>
2. SQL Plus Tutorial: <http://holowczak.com/oracle-sqlplus-tutorial/>
3. Database Tutorials: <http://www.roseindia.net/programming-tutorial/Database-Tutorials>
4. SQL Basic Concepts: <http://www.w3schools.com/sql/>
5. SQL Tutorial: <http://beginner-sql-tutorial.com/sql.htm>

List of Suggested Experiments:

1. Implement SQL queries to perform various DDL Commands. (Create minimum 5 tables with different data types and operate upon them)
2. Implement SQL queries to perform various DML Commands. (Insert minimum 10 rows using different insert methods, edit and remove data using update and delete commands)

3. Retrieve data using SELECT command and various SQL operators.
4. Perform queries for TCL and DCL Commands
5. Implement SQL queries using Date functions like add-months, months-between, round, nextday, truncate etc
7. Implement SQL queries using Numeric functions like abs, ceil, power, mod, round, trunc, sqrt etc. and Character Functions like initcap, lower, upper, ltrim, rtrim, replace, substring, instr etc.
9. Implement SQL queries using Conversion Functions like to- char, to-date, to-number and Group functions like Avg, Min, Max, Sum, Count, Decode etc.
11. Implement SQL queries using Group by, Having and Order by
12. clause
13. Implement SQL queries using simple Case Operations and using
14. Group functions and Case operations for getting summary data
15. Retrieve data spread across various tables or same table using
16. various Joins.
17. Retrieve data from multiple tables using Subqueries (Multiple, Correlated) (write minimum 3 level subquery)
19. Perform queries to Create, alter and update views
20. Implement Practical-1 again with Domain Integrity, Entity Integrity and Referential Integrity constraints.
22. Perform queries to Create synonyms, sequence and index
23. Implement PL/SQL programs using control structures
24. Implement PL/SQL programs using Cursors
25. Implement PL/SQL programs using exception handling.

Gandhinagar Institute of Technology
Diploma Computer Engineering /Computer Science & Engineering /Information Technology
Semester 3

Subject Code: 101240301	Subject Title: Advance Python
Pre-requisite:	

Course Objective:

1. Develop programs using variables, operators and input-output functions
2. Develop programs using Loops
3. Develop program using Structured types – Tuples, Lists, Sets and Dictionaries
4. Develop programs using function, recursion, built-in functions
5. Develop programs using text files

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	-	2	4	70	30	30	20	150

Subject Contents				
Sr. No	Topic	Total Hours	Weight (%)	
1	Fundamentals of Python: Introduction to Python, History of Python, Python Features, Python Applications ,Installing Python , Basic Structure of Python program ,Keywords and Identifiers, Data types and Variables, Type Casting , Input-Output functions: input, print, Operators	7	10	
2	Control Flow Structures: Introduction to Control Structures Decision Making Structures, if, if-else statements, Nested if-else and if-elif-else Statements, switch statement, Loops, for loop, while loop, Nested loops, break, continue and pass, statement	9	14	
3	Lists, Tuples, Sets and Dictionaries: Lists and operations on Lists ,Tuples and operations on Tuples ,Sets and operations on Sets, Dictionaries and operations on Dictionaries	8	14	
4	Functions and Modules: Introduction to Python User defined Function , Passing parameters to a function and returning values from a function, Recursion , Standard Library: Built-in ,Functions, Modules and Packages	9	16	

	rand module - Random numbers ,generators, math module – Mathematical Functions ,datetime module - Date and time ,functions, matplotlib module – Plotting,functions, Create and import custom user defined module		
5	String Processing and File Handling: Introduction to String, Access String elements using index operator, String functions, Basic functions: len, max, min Testing functions: isalnum, isalpha, isdigit, isidentifier, islower, isupper, and isspace Searching functions: endswith, startswith, find, rfind, count Manipulation functions: capitalize, lower, upper, title, swapcase, replace, lstrip, rstrip, strip , Formatting functions: format, center, ljust, rjust Introduction to Text files ,File Handling functions: Basic functions: open, close ,Reading file: read, readline, readlines, Writing file: write, append, writelines	9	16

Course Outcome:

1. Develop programs to solve the given simple computational problems.
2. Apply control flow structures to solve the given problems.
3. Implement data structures lists, tuples, sets and dictionaries to solve the given problems.
4. Apply modular programming approach to solve given problems using user-defined functions
5. Perform string manipulation and file operations to solve a given problem

List of Textbooks:

1. Introduction to Computer Science Using Python: A Computational Problem–Solving Focus by Charles Diesbach John Wiley & Sons (25 January 2013) ISBN-10: 0470555157 ISBN-13: 978-0470555156

List of Reference Books:

1. Python Programming: An Introduction to Computer Science by Franklin, Beedle & Associates, Inc. Pap/Cdr edition (1 December 2003) ISBN-10 : 1590280288 ISBN-13 : 978-1887902991
2. Introduction to Programming Using Python by Liang Y. Daniel Pearson Education; First edition (26 February 2017) ISBN-10: 9332551847 ISBN-13: 978-9332551848

Open e-Resource:

1. <https://www.python.org>
2. <https://www.learnpython.org>
3. <https://www.python-course.eu>
4. <https://nptel.ac.in>

List of Suggested Experiments:

1. Write a program to read your name, contact number, email, and birthdate and print those details on the screen.
2. Write a program to convert temperature from Celsius to Fahrenheit. Equation to convert Celsius to Fahrenheit:
 $F = (9/5) * C + 32$.
3. Write a program to calculate simple and compound interest.

4. Write a program to get change values in Quarter, Dime, Nickels and Pennies, and calculate the value of change in Dollars. Consider Quarter = 0.25 \$, Dime = 0.10 \$, Nickels = 0.05 \$ and Penny = 0.01 \$.
5. Write a program to find a maximum of given three numbers (Use ternary operator).
6. Write a program to calculate area and volume of Sphere.
7. A year is a Leap year if it is divisible by 4, unless it is a century year that is not divisible by 400 (1800 and 1900 are not leap years, 1600 and 2000 are leap years). Write a program that calculates whether a given year is a leap year or not.
8. Many companies pay time-and-a-half for any hours worked above 40 hours in a given week. Write a program to input the number of hours worked and hourly rate and calculate the total wages for the week.
9. Write a program to read the marks and assign a grade to a student. Grading system: A (≥ 90), B (80-89), C (70-79), D (60-69), E (50-59), F (< 50). (Use the Switch case).
10. Write a program to read n numbers from users and calculate the average of those n numbers.
11. Write a program that prompts the user to enter 10 integers and displays all the combinations of picking two numbers from the 10.
12. Write programs to print below patterns:

*	1
* *	1 2
* * *	1 2 3
* * * *	1 2 3 4
* * * * *	1 2 3 4 5

13. Write a program that displays an ASCII character table from ! to ~. Display the ASCII value of a character in decimal and hexadecimal. Display five characters per line.
14. A positive integer is called a perfect number if it is equal to the sum of all of its positive divisors, excluding itself. For example, 6 is the first perfect number, because $6 = 3 + 2 + 1$, the next is $28 = 14 + 7 + 4 + 2 + 1$. There are four perfect numbers that are less than 10,000. Write a program to find these four numbers.
15. Write a program to perform the below operations on the list:
 - Create a list.
 - Add/Remove an item to/from a list.
 - Get the number of elements in the list.
 - Access elements of the list using the index.
 - Sort the list.
 - Reverse the list.
16. Write a program to read n numbers from a user and print:
 - Number of positive numbers.
 - Number of negative numbers.
 - Number of zeros.
 - Number of odd numbers.
 - Number of even numbers.
 - Average of all numbers.

17. Write a program that counts the occurrences of each digit in a string. The program counts how many times a digit appears in the string. For example, if the input is "12203AB3", then the output should output 0 (1 time), 1 (1 time), 2 (2 times), 3 (2 times).
18. Write a program to eliminate duplicate values in the list.
19. Write a program to randomly fill in 0s and 1s into a 4x4 2- dimension list, print the list and find the rows and columns with the most number of 1s.
20. Write a program to perform below operations on tuple:
 - Create a tuple with different data types.
 - Print tuple items.
 - Convert tuple into a list.
 - Remove data items from a list.
 - Convert list into a tuple.
 - Print tuple items.
21. Write a program to perform below operations on set:
 - Create two different sets with the data.
 - Print set items.
 - Add/remove items in/from a set.
 - Perform operations on sets: union, intersection, difference, symmetric difference, check subset of another set.
22. Write a program to perform below operations on dictionary:
 - Create a dictionary.
 - Print dictionary items.
 - Add/remove key-value pair in/from a dictionary.
 - Check whether a key exists in a dictionary.
 - Iterate through a dictionary.
 - Concatenate multiple dictionaries.
23. Write a program that is given a dictionary containing the average daily temperature for each day of the week, and prints all the days on which the average temperature was between 40 and 50 degrees.
24. Write a program to repeatedly prompt the user to enter the capital of a state. Upon receiving the user's input, the program reports whether the answer is correct. Assume the states and their capitals are stored in dictionaries as keyvalue pairs.
25. Write a program that defines a function (shuffle) to scramble a list into a random order, like shuffling a deck of cards.
26. Write a program that defines a function to return a new list by eliminating the duplicate values in the list.
27. Write a program to print Fibonacci sequence up to n numbers using recursion.
28. **Write a program that defines a function to determine whether input number n is prime or not. A positive whole number $n > 2$ is prime, if no number between 2 and $\sqrt{n}$ (inclusive) evenly divides n. If n is not prime, the program should quit as soon as it finds a value that evenly divides n.**
29. Write a program that defines a function to find the GCD of two numbers using the algorithm below. The greatest common divisor (GCD) of two values can be computed using Euclid's algorithm. Starting with the values m and n, we repeatedly apply the formula: $n, m = m, n \% m$ until m is 0. At that point, n is the GCD of the original m and n (Use Recursion).
30. Write a program that lets the user enter the loan amount, number of years, and interest rate, and defines a function to calculate monthly EMI, total payment and display the amortization schedule for the loan.

31. Write a program that defines functions (mean and deviation), that computes mean and standard deviation of given numbers. The formula for the mean and standard deviation of n numbers is given as:

$$\text{mean} = \sum_{i=1}^n x_i = \frac{x_1 + x_2 + \dots + x_n}{n}$$

$$\text{deviation} = \sqrt{\frac{\sum_{i=1}^n (x_i - \text{mean})^2}{n - 1}}$$

32. Write a program to print the dates of all the Sundays in a given year.
33. Write a program to create a list representing the results of 100 students in a test, where each element represents a student's marks (between 0 to 10), and display a histogram for the result.
34. Create a user defined module with simple functions for: addition, subtraction, multiplication, division, modulo, square, factorial. Write a program to import the module and access functions defined in the module.
35. Write a program to check whether a given string is palindrome or not.
36. Write a program to read a string containing letters, each of which may be in either uppercase or lowercase, and return a tuple containing the number of vowels and consonants in the string.
37. Write a program to read a date in the format DD/MM/YYYY and print the same date in MM-DD-YYYY format.
38. Write a program that checks whether two words are anagrams. Two words are anagrams if they contain the same letters. For example, silent and listen are anagrams.
39. Write a program that allows users to enter six-digit RGB color codes and converts them into base 10. In this format, the first two hexadecimal digits represent the amount of red, the second two the amount of green, and the last two the amount of blue. For example: If a user enters FF6347, then the output should be Red (255), Green (99) and Blue (71).
40. Numerologists claim to be able to determine a person's character traits based on the "numeric value" of a name. The value of a name is determined by summing up the values of the letters of the name, where "a" is 1 "b" is 2 "c" is 3 and so on up to "z" being 26. For example, the name "Python" would have the value 16 + 25 + 20 + 8 + 15 + 14 = 98. Write a program that calculates the numeric value of a name provided as input.
41. Write a program to perform the below operations on files:
- Create a text file and write a string to it.
 - Read an entire text file.
 - Read a text file line by line.
 - Write a string to a file.
 - Write a list of strings to a file.
 - Count the number of lines, words in a file.
42. Write a program that reads a text file and counts the occurrences of each alphabet in the file. The program should prompt the user to enter the filename.
43. Write a program that reads a text file and displays all the numbers found in the file. iv. Write an automated censor program that reads the text from a file and creates a new file where all of the four-letter words have been replaced by "*****". You can ignore punctuation, and you may assume that no words in the file are split across multiple lines.
44. Write a program that reads a text file and calculates the average word length and sentence length in that file.



45. Write a program that reads two strings stored in two different text files and prints a string containing the characters of each string interleaved. Remove white spaces from both strings before string interleaving. For example, Two strings “Hello World” and “Sky is the Limit” should generate output “HSeKlyliosWtohreLdimit”.

Gandhinagar Institute of Technology
Diploma Computer Engineering /Computer Science & Engineering /Information Technology
Semester 3

Subject Code: 101240302	Subject Title: Basic Object-Oriented Programming
Pre-requisite:	

Course Objective:

1. Understand fundamental OOP concepts.
2. Implement classes, objects, inheritance, and polymorphism.
3. Apply encapsulation principles for data abstraction.
4. Utilize pointers, dynamic memory allocation, and exception handling.
5. Develop simple applications, demonstrating proficiency in problem-solving and algorithmic thinking.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	-	2	4	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Overview of Object Oriented Programming: Introduction to Object Oriented Programming, Procedure Oriented and Object Oriented, Difference Between C and C++, C++ Output/ Input, Keywords in C++, New style of header file specification, Comments in C++, Variables in C++, Reference Variables in C++, The Data type, Importance of function prototyping in C++, Function Overloading, Default Arguments, Inline Function, Scope Resolution Operator Classes And Object,	4	7
2	Structures in C++: Structures in C, Structure in C++, Access Specifier, Classes, Objects in C++, Characteristics of Access Specifier, Function outside a class, Initialization of variable in C++, 'this' pointer.	4	7

3	More on Classes and Objects: Member Functions and Data Members, Friend Functions, Friend Class, Array of Class Object, Passing Class Objects to Function, Returning Objects from Functions, Nested Classes, Namespaces, Dynamic Memory Management, Introduction, Dynamic Memory Allocation Using “new”, Dynamic Memory Deallocation, “Set_New_Handler” Function, Constructor and Destructor, Constructor-Characteristics of Constructor, Types of Constructors, Destructor - Characteristics of Destructor.	7	13
4	Inheritance: Introduction, Advantages of Inheritance, ‘Protected’ Access specifier, Inheritance using different access specifier, Initialization of Base class members through derived class object, Different forms of Inheritance, Function Overriding. Virtual Functions and Inheritance – Introduction, Pointers to derived class, Rules for virtual function, Internals of Virtual Functions, Pure virtual function, Virtual Base class, Virtual destructor, Abstract class, Limitations of virtual Function, Early binding v/s Late binding.	10	15
5	Operator Overloading: Introduction, Operators that can be overloaded, Overloading Unary Operator using member Functions, Overloading Unary Operator using friend Functions, Overloading Binary Operator using member Functions, Overloading Binary Operator using friend Functions, Why to Overload Operators using friend function?, Rules for Operator Overloading, Constructor- Destructor Invocation – Introduction, Order of Invocation of Constructors and destructors, Destructors in Action, Type Conversions.	9	16
6	Exception Handling: Introduction to Exception Handling, Exception Handling Mechanism, Try- catch block, Throwing in One function and catching in the other, single try block and multiple catch blocks, catching all the exceptions in a Single Catch Block, Finally Block, Re-throwing an Exception, Creating our own Exception	8	12

Course Outcome:

1. Understand fundamental OOP concepts.
2. Implement classes, objects, inheritance, and polymorphism.
3. Apply encapsulation principles for data abstraction.
4. Utilize pointers, dynamic memory allocation, and exception handling.
5. Develop simple applications, demonstrating proficiency in problem-solving and algorithmic thinking.

List of Textbooks:

1. K U Subhash, Object Oriented Programming with C++, Pearson

List of Reference Books:

1. Somashekara M.T., Programming in C++, PHI.
2. Kamthame Ashok N., Programming in C++, 2nd Edition, Pearson.
3. Balaguruswamy E, Object Oriented Programming in C++, TMH

Open e-Resource:

1. <https://www.programiz.com/cpp-programming>
2. https://onlinecourses.nptel.ac.in/noc19_cs38/preview
3. <https://www.codecademy.com/learn/learn-c-plus-plus>
4. <https://www.udacity.com/course/c-for-programmers--ud210>
5. <https://www.edx.org/learn/c-programming/codio-c-programming-basic-skills>

List of Suggested Experiments:

1. Create your account on github and save simple C++ program in github.
2. Develop minimum 5 programs using cin and cout.
3. Develop programs using scope resolution operator, simple manipulators, and enumeration.
4. Develop programs using call by reference and return by reference, default arguments, constant arguments, inline and function overloading.
5. Develop programs using structures.
6. Define minimum 5 different classes such as student, distance, shape, employee, account, inventory, vector, movie-ticket booking, time, point, etc. with data member & member functions. Also Develop programs to test those classes functionality.
9. Develop Programs using array of objects and static member function
10. Develop programs to pass object as an argument and Returning object.
11. Develop programs using friend function and Friend class.
12. Apply the concepts of constructors and destructors in the Programs developed in unit-2 and test those programs.
13. Develop programs using single, multilevel, multiple Inheritance.
14. Develop programs using Constructors in base and derive classes.
15. Develop a program to show use of this pointer.
16. Develop a program using runtime polymorphism.
17. Develop at least 2 programs using file operations.

Gandhinagar Institute of Technology
Diploma Computer Engineering
Semester 4

Subject Code: 10119402	Subject Title: Cyber Security
Pre-requisite:	

Course Objective:

1. Demonstrate effective use of software tools for data analysis, visualization, and documentation.
2. Employ version control systems (e.g., Git) for collaborative project development.
3. Use integrated development environments (IDEs) and productivity tools to streamline coding and workflow.
4. Apply project management and communication tools in professional and academic settings.
5. Integrate various tools to create efficient, reproducible, and well-documented solutions.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	0	2	4	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Introduction: Definition and Origin of the Word, Cyber Crime and Information Security, Who are Cyber Criminals, Classification of cyber crimes, E-mail Spoofing, Spamming, Forgery, Hacking, Online Fruads, Software Piracy, Computer Sabotage Email Bombing, Computer Network Intrusion, Password Sniffing, Credit Card Frauds, Phishing, vishing, Identity Theft, Social Engineering, CPU Hijackers, Darknets and Dark Markets. Cyber Attacks: Virus and Warms, Trojan and backdoors, Steganography, DOS and DDOS attack, SQL injection, Buffer	7	10
2	Systems Vulnerability Scanning: Overview of vulnerability scanning, Open Port / Service Identification, Banner / Version Check, Traffic Probe, Vulnerability Probe, Vulnerability Examples, OpenVAS, Metasploit. Networks Vulnerability Scanning - Netcat, Socat, understanding Port and Services tools - Datapipe, Fpipe, WinRelay, Network Reconnaissance – Nmap, THC-Amap and System tools. Network Sniffers and Injection tools – Tcpdump and Windump, Wireshark, Ettercap, Hping Kismet	10	25

3	Network Defense tools Firewalls and Packet Filters: Firewall Basics, Windows Host based Firewall, Windows Firewall Control, Linux Host based Firewall, Packet Filter Vs Firewall, Packet Characteristic to Filter, Stateless Vs Stateful Firewalls, Network Address Translation (NAT) and Port Forwarding, Snort: Introduction Detection Systems-iptables	10	25
4	Web Application Tools Scanning for web vulnerabilities tools: Nikto, W3af, HTTP utilities - Curl, OpenSSL and Stunnel, Application Inspection tools – Zed Attack Proxy, Sqlmap. DVWA, Webgoat, Password Cracking and Brute-Force Tools – John the Ripper, L0htcrack, Pwdump, HTC-Hydra	10	20
5	Cyber Crime : The Legal Perspectives, The Cyber Crime Indian Perspectives, The Cyber Crime And Indian ITA 2000/2001, Hacking and Indian Laws, Global Perspective on Cyber Crime , Cyber Crime and extended Enterprise, Cybercrime and punishment, Cyber Crime Era : Survival Mantra for Netizens.	8	20

Course Outcome:

1. To identify and describe the major types of cybercrime
2. Describe system and web vulnerability
3. To Configure firewalls on all platforms for all types of attack scenarios.
4. Evaluate network defense tools and web application tools.
5. Investigate a cybercrime, prepare report and apply laws for the case

List of Textbooks:

1. Cyber Security A Complete Guide - 2024 Edition by Gerardus Blokdyk - 2024
2. The New Outstanding 2024 Guide To Cybersecurity: Everything You Need To Know by Kaylee Bryant - 2024
3. Cyber Security for Next-Generation Computing Technologies Inam Ullah Khan, Mariya Ouaisa, Mariyam Ouaisa · 2024

List of Reference Books:

1. See Yourself in Cyber: Security Careers Beyond Hacking Ed Adams- 2024
2. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole and Sunit Belpure, Publication Wiley

Open e-Resource:

1. https://onlinecourses.nptel.ac.in/noc23_cs127/preview
2. https://onlinecourses.swayam2.ac.in/nou19_cs08/preview
3. <https://www.coursera.org/specializations/cyber-security>
4. <https://www.coursera.org/specializations/cybersecurity-attack-and-defense>

List of Suggested Experiments:

1. Demonstration of email phishing attack and preventive measures.
2. Installation and configuration of computer Anti-virus.
3. Introduction to kali linux and its tools.
4. Packet capturing and filtering using Wireshark tool.
5. TCP scanning and Port scanning using NMAP tool
6. TCP / UDP connectivity using Netcat

7. Network vulnerability using OpenVAS
8. Web application testing using DVWA
9. Manual SQL injection using DVWA
10. Automated SQL injection with SqlMap

Gandhinagar Institute of Technology

Diploma All Engineering Branch Semester 4

Subject Code: 100000401	Subject Title: Vedic Mathematics
Pre-requisite: - Zeal to learn	

Course Objective: The main objective of this course is to make students appreciate the amazing computational power of Vedic Sutras and help them to develop skill for doing faster and accurate calculations.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
2	-	-	2	25	25	-	-	50

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Vinculum: Introduction, Conversion, Application, Addition and Subtraction, Beejank Multiplication: Introduction -Vertically and Crosswise, Base number/sub base number, Sum and difference of Products Division: Introduction –Nikhilam, Paravartya Yojayet, Flag Digit (Vertically and Crosswise), Mixed Operations Indices: Introduction -Meru Prastar, Square, Cube, Fourth and Fifth Power, Mixed Operations Roots: Introduction -up to Fifth Root (Vilokanam), Square root and Cube root, Mixed Operations Divisibility: Introduction -Osculator (vestanam) LCM/HCF: Introduction -different methods Recurring Decimals: Introduction -Denominator ending with 1, 3, 7, 9 Numerical Code (Devnagari script) : Introduction –Word, Consonant, Letter	15	50 %

2	Algebra : Introduction Multiplication (Quadratic and cubic expressions of 1 or 2 variables): Introduction - Vertically and Crosswise, Sum and difference of Products Division algorithm and application (Expressions of 1 variable and divisor of degree upto 3): Introduction -Paravartya Yojayet, Mixed Operations Expansion: Introduction -Meru Prastar -upto fifth Power, Mixed Operations Factorisation (Cubic expression) -Remainder Theorem, use of Differentiation,LCM/HCF Partial Fractions, Anurupye sunyamanyat (3 elementary methods) Solution of Equations, (Quadratic equations /simultaneous equations of 2 or 3 variables)	15	50 %
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Course Outcome:

After Completion of this Course Students will be able to:

- Understand and apply basic principles of Vedic mathematics such as Vinculum, Beejank Multiplication, Nikhilam and Paravartya methods for performing fast and efficient computations involving addition, subtraction, multiplication, and division.
- Analyze and solve numerical problems involving powers, roots, divisibility rules, LCM/HCF, and recurring decimals using traditional Vedic techniques such as Meru Prastar and Osculator methods.
- Apply Vedic methods to algebraic expressions and equations for operations like multiplication, division, expansion, factorization, and partial fractions with quadratic and cubic expressions.
- Solve quadratic and simultaneous equations involving two or more variables using Vedic strategies like Paravartya Yojayet and Anurupye Shunyamanyat, and demonstrate the efficiency of these methods in comparison to conventional approaches.

List of Reference Books:

1. Bharatiya Krishna Teerth : Vedic Mathematics (Motilal Banarasidas New Delhi, 2001).
2. V.G. Heroor : The History mathematics and Mathematicians of India.
3. V.G. Unkalkar : Magical world of Mathematics, (Vandana Publishers Bangalore, 2008).
4. Dr. Vyawahare-Chouthaiwale- Borgaonkar: Introduction to Vedic Mathematics.

Gandhinagar Institute of Technology
Diploma Computer Engineering/ Computer Science & Engineering/ Information Technology
Semester 4

Subject Code: 101190401	Subject Title: Introduction to Software Engineering
Pre-requisite:	

Course Objective:

1. Understanding of fundamental principles, methodologies, and tools of software engineering.
2. Apply software development methodologies to solve practical problems.
3. Develop and document software systems using modern engineering tools.
4. Collaborate effectively in teams to deliver software projects.
5. Recognize the importance of ethics, sustainability, and quality in software development.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	-	2	4	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Software Process Models: Defining software, Software Application Domain, Software Engineering – A layered Approach, Generic Process Model, Generic Framework Activity, Umbrella activity, Software Development Models, Agile Development Model, Types of widely used Agile Models.	10	18
2	Software Requirement Analysis and Design: Requirement Gathering and Analysis, Software Requirement Specification(SRS), Software Requirement Specification(SRS), Software Design, Cohesion & Coupling, Data Flow Diagram(DFD), Use case Diagram, Class Diagram, Sequence Diagram, Activity Diagram.	14	20
3	Software Project Estimation & Scheduling: Responsibility of software project Manager, Metrics for Size Estimation, Project Estimation Techniques using COCOMO model, Project Scheduling, Risk Management.	10	18

4	Software Coding and Testing: Coding standards and guidelines, Code review, Software Documentation, Testing Fundamentals, Functional Testing – Black box testing, Structural Testing – White box testing, Overview of Alpha & Beta Testing, Overview of Unit testing & Integration testing, Test Documentation.	08	14
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Course Outcome:

1. Compare various software development process models.
2. Prepare software analysis and design using SRS, DFD and object oriented UML diagrams.
3. Prepare software development plan using project scheduling.
4. Prepare test-cases to test software functionalities.

List of Textbooks:

1. Software Engineering: A Practitioner's Approach, Roger S. Pressman, Tata McGraw Hill, 2010.

List of Reference Books:

1. Fundamentals of Software Engineering, Rajib Mall, PHI, 2018.
2. Object Oriented Modeling and design with UML, Michael R Blaha and James R Rumbaugh, Pearson Prentice Hall, 2009

Open e-Resource:

1. <https://www.javatpoint.com/>
2. <https://www.geeksforgeeks.org/>
3. <https://www.tutorialspoint.com/>
4. www.w3schools.com
5. <https://www.techtarget.com/searchsoftwarequality/definition/agile-software-development>

List of Suggested Experiments:

1. Describe various software development models with appropriate Diagram.
2. Write problem statement to define the project title with bounded scope of the project.
3. Select relevant process model to define activities and related tasks set for assigned project.
4. Gather application specific requirements- Requirement gathering.
5. Prepare broad SRS (software requirement software) for the above selected project.
6. Develop data designs using DFDs (data flow diagram) and E-R (entity- relationship) diagram.
7. Prepare use-cases and draw use case diagram.
8. Develop a class diagram for selected project.
9. Develop Sequence diagram for selected project.
10. Develop the activity diagram to represent flow from one activity to another for software development.
11. Evaluate size of the project using Function point metric for the assigned project.
12. Estimate cost of the project using COCOMO (Constructive Cost Model) / COCOMO II approach for the assigned project.
13. Use flow chart and Gantt charts to track progress of the assigned project. (Use Sprint burn down chart if agile model is selected).
Prepare various test case for selected projects.

Gandhinagar Institute of Technology
Diploma Computer Engineering/ Computer Science & Engineering/ Information Technology
Semester 4

Subject Code: 101240406	Subject Title: Integrated Personality Development Course
Pre-requisite:	

Course Objective:

1. enable students to develop a constructive mindset toward challenges and failures by learning from the experiences of eminent personalities like Walt Disney, Abraham Lincoln, and Amitabh Bachchan.
2. To instill core human values and ethics as essential qualities for success across personal, academic, and professional domains, helping students become responsible citizens and dependable individuals.
3. To inspire students through real-life case studies of Indian legends such as Sachin Tendulkar and Ratan Tata, and encourage them to emulate such traits in everyday situations.
4. To nurture a sense of national identity and cultural pride by exploring India's ancient wisdom, heritage, and contributions to global civilization.
5. To empower students with practical life skills including self-discipline, digital responsibility, leadership, networking, and selfless service, for their holistic growth and future readiness.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
2	-	0	0	0	0	0	50	50

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Facing Failures: This lecture enables students to revisit the way in which they approach challenges. Through the study of successful figures such as Disney, Lincoln and Bachchan, students will learn to face difficulties through a positive perspective, Failure is a student's daily source of fear, negativity, and depression. Students will be given the constructive skills to understand failure as formative learning experiences. The Need for Values: Students will learn about the need for values as part of their holistic development to become successful in their many roles - as ambitious students, reliable employees, caring family members, and considerate citizens	10	30

2	Learning from Legends: Students will learn from the inspirational lives of India's two legends, Sachin Tendulkar and Ratan Tata. They will implement these lessons through relatable case studies My India My Pride: India's ancient Rishis, scholars, and intellectuals have made tremendous contributions to the world, they developed an advanced, sophisticated culture and civilization which began thousands of years ago. Students will learn the importance of studying India's glorious past so that they could develop a strong passion and pride for our nation	10	30
3	Remaking Yourself: Students learn how self-improvement enables them to secure a bright future for themselves. They will learn 6 powerful thought processes that can develop their physical, intellectual, emotional, and spiritual quotients, Power of Habit, Handling Social Media Soft Skills: Networking & Leadership, Students are taught the means of building a professional network and developing a leadership attitude, Project Management Selfless Service: Seva, Students will learn that performing seva is beneficial to one's health, wellbeing, and happiness. It also benefits and inspires others.	10	40

Course Outcome:

1. To provide students with a holistic value-based education that will enable them to be successful in their academic, professional, and social lives.
2. To give the students the tools to develop effective habits, promote personal growth, and improve their wellbeing, stability, and productivity.
3. To allow students to establish a stronger connection with their family through critical thinking and devolvement of qualities such as unity, forgiveness, empathy, and effective communication.
4. To enhance awareness of India's glory and global values, and to create considerate citizens who strive for the betterment of their family, college, workforce, and nation.
5. To provide students with soft skills that complement their hard skills, making them more marketable when entering the workforce.

List of Textbooks:

1. Steve Jobs: The Exclusive Biography Paperback by Walter Isaacson,
2. The Wit and Wisdom of Ratan Tata by Ratan Tata
3. Seven Habits of Highly Effective Teens by Sean Covey, Simon & Schuster

List of Reference Books:

1. Predictably Irrational, Revised and Expanded Edition: The Hidden Forces That Shape Our Decisions by Dan Ariely, Harper Perennial
2. Playing It My Way: My Autobiography by Sachin Tendulkar, Hodder & Stoughton

Open e-Resource:

1. <https://www.thebetterindia.com/102551/small-way-serveahmedabad-seva-cafe/>
2. <https://www.theatlantic.com/health/archive/2015/12/altruism-for-a-better-body/422280/>

Gandhinagar Institute of Technology
Diploma Computer Engineering/ Computer Science & Engineering/ Information Technology
Semester 4

Subject Code: 101220401	Subject Title: Computer Peripheral Networking
Pre-requisite:	

Course Objective:

1. To introduce the fundamental concepts, architecture, and layered models (OSI and TCP/IP) of computer networks.
2. To provide an in-depth understanding of data transmission, network protocols, addressing schemes, routing, and switching mechanisms.
3. To develop practical skills in network design, configuration, troubleshooting, and basic client-server application development using socket programming.
4. To analyze the performance and efficiency of networking protocols and explore essential network security principles and practices.
5. To equip students with the ability to write simple network applications using socket programming.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	-	2	4	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Basics of Computer Network: Definition & need of networks, Categories of Computer Networks base on scope and connection, Line Configuration, Network Topology, Standard Organizations and Protocols, Applications and features of different types of servers.	07	15
2	The Reference Model for network communication: OSI model & function of each Layer, TCP/ IP model& function of each Layer, Comparison of OSI & TCP/IP Models.	07	09
3	Transmission Media & Network devices: Types of Transmission Media, Guided Media, Un Guided Media, Network Devices, Difference between Layer 2 and Layer 3 Switches.	10	16

4	IP Protocol: IPProtocol–IPv4, IPProtocol–IPv6, Difference between IPv4 and IPv6.	09	20
5	Network Security Aspects: Security Basics, Threats to security, Firewalls.	09	10

Course Outcome:

1. Classify various types of networks base on their construction, usage and scope
2. Differentiate OSI and TCP/IP models
3. Select proper transmission media and devices based on network requirements.
4. Compare IPv4 and IPv6 addressing scheme
5. Identify various types of network security threats.

List of Textbooks:

1. Computer Networks, Andrew S Tannebaum & David J Wetherall, Pearson, 2012
2. Computer Networks, Bhushan Trivedi, OxfordUniversityPress,2013

List of Reference Books:

1. Fundamentals Data Communication & Networking, Forouzen, Tata Mc Graw Hill.
2. Data & Computer Communication, Williams Stallings, Prentice Hall of India.
3. Networks for Computer Scientists and Engineers, Youlu Zheng & Shakil Akhtar, Oxford University Press, 2012.

Open e-Resource:

1. http://vlabs.iitb.ac.in/vlabs-dev/labs_local/computer-networks/labs/explist.php
2. <https://www.javatpoint.com/computer-network-tutorial>
3. <https://www.geeksforgeeks.org/basics-computer-networking>
4. <https://nptel.ac.in/courses/106106091>
5. https://www.cisco.com/c/en_in/products/security/what-is-network-security.html
6. [Network Simulator Tool: GNS3v0.8.5, NetSimK](#)

List of Suggested Experiments:

1. Connect computer using given topology with wired media. Assume six devices are arranged, if in:
 - a) bus topology
 - b) ring topology
 - c) star topology
 - d) mesh topology
 sFind out number of cables(links), ports needed in each device and total number of ports needed in entire network for each of above stated topology.
2. Study about OSI model network Layers.
3. Prepare and Test Straight UTP Cable and Cross UTP Cable.
4. Study and Test various Network devices available at Department/Institute. (Repeater, Hub, Switch, Bridge, Router and Gateway).
5. Determine whether following IPv4 address are valid or invalid. If valid IPv4 address then find class, Network and Host ID of an IPv4 address. If invalid IPv4 address then write reason for the same.

a) 1.4.5.5	b) 75.45.301.14
c) 111.56.045.78	d) 192.226.12.11
e) 130.45.151.154	f) 11100010.23.14.67

- g) 221.34.7.8.20 h) 240.230.220.89
6. Subnet the IP address 216.21.5.0 into 30 hosts in each subnet.
 7. Study of firewall in providing network security.
 8. Run basic utilities and network commands: ipconfig, ping, tracert, netstat, pathping, route
 9. Basic network setup in Cisco Packet Tracer / real hardware – Connect 2 or more PCs using a switch.

Gandhinagar Institute of Technology
Diploma Computer Engineering/ Computer Science & Engineering / Information Technology
Semester 4

Subject Code: 101240401	Subject Title: Advanced Object Oriented Programming
Pre-requisite:	

Course Objective:

1. Understanding of Core OOP Concepts
2. Design and Implement Complex Object-Oriented Systems
3. Implementing Unit Testing in OOP
4. Handling Exception and Error Management in OOP
5. Understanding the Relationship Between OOP and Other Paradigms

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	-	2	4	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Introduction to Java Programming Language: Introduction to Java and Brief history, Java components, Java environment setup, Primitive Data Types, Identifiers, Declarations of constants & variables, Type Conversion and Type Casting, Scope of variables, Arrays of Primitive Data Types, Types of Arrays, Different Operators, Decision & Control Statements.	08	14
2	Object Oriented Programming Concepts: Procedure-Oriented vs. Object-Oriented Programming concept, Basics of OOP, Defining classes, fields and methods, creating objects, Accessing rules, this keyword, static keyword, final keyword, Constructors, method overloading, constructor overloading, Wrapper Classes, String Class and its methods, User Input	11	18
3	Inheritance, Packages & Interfaces: Basics of Inheritance, Types of inheritance, method overriding, Object class and overriding its methods, Defining interface, implementing interface, multiple inheritance using	11	18

	interface, Abstract class and final class, Creating package, importing package, access rules for packages.		
4	Exception Handling & Multithreading: Types of errors, exceptions, try...catch statement, multiple catch blocks, throw and throws keywords, finally clause, uses of exceptions, user defined exceptions, Concept of Multithreading, Creating thread, extending Thread class, implementing Runnable interface, life cycle of a thread, Thread priority, Thread exception handling in threads.	06	10
5	File Handling and Collections Framework: Stream classes, class hierarchy, useful I/O classes, Creation of text file, reading and writing text files, Collections Framework overview, Collection classes- ArrayList, LinkedList, HashSet, Map class.	06	10

Course Outcome:

1. Write simple java programs for a given problem statement.
2. Use object oriented programming concepts to solve real world problems.
3. Develop an object-oriented program using inheritance and package concepts for a given problem statement.
4. Develop an object oriented program using multithreading and exception handling for a given problem statement.
5. Develop an object-oriented program by using the files and collection framework.

List of Textbooks:

1. Programming with Java| 6th Edition, E Balagurusamy, Tata McGraw Hill

List of Reference Books:

1. Java: The Complete Reference, Twelfth Edition, Herbert Schildt, Tata McGraw Hill
2. Programming in JAVA, Second Editio, Sachin Malhotra & Saurabh Choudhary, Oxford
3. Head First Java: A Brain-Friendly Guide, Third Edition, Kathy Sierra, Bert Bates, Trisha Gee, Shroff/O'Reilly

Open e-Resource:

1. <https://www.w3schools.com/java/>
2. <https://www.codecademy.com/learn/learn-java>
3. <https://nptel.ac.in/courses/106105191>
4. <https://www.youtube.com>
5. <https://java-iitd.vlabs.ac.in/>

List of Suggested Experiments:

1. Install JDK, write a simple “Hello World” or similar java program, compilation, debugging, executing using java compiler and interpreter.
2. Write a program in Java to find maximum of three numbers using conditional operator.
3. Write a program in Java to reverse the digits of a number using while loop
4. Write a program in Java to add two 3*3 matrices
5. Write a program in Java to generate first n prime numbers

6. Write a program in Java which has a class Student having two instance variables enrollmentNo and name. Create 3 objects of Student class in main method and display student's name.
7. Write a program in Java which has a class Rectangle having two instance variables height and weight. Initialize the class using constructor.
8. Write a program in Java which has a class Shape having 2 overloaded methods area(float radius) and area(float length, float, width). Display the area of circle and rectangle using overloaded methods.
9. Write a program in Java to demonstrate the constructor overloading.
10. Write a program in Java to demonstrate hierarchical inheritance
11. Write a program in Java to demonstrate method overriding.
12. Write a program in Java which has a class Car having two instance variables topSpeed and name. Override toString() method in Car class. Create 5 instances of Car class and print the instances.
13. Write a program in Java which has an abstract class Shape having three subclasses: Triangle, Rectangle, and Circle. Define method area() in the abstract class Shape and override area() method to calculate the area.
14. Write a program in Java to develop user defined exception for 'Divide by Zero' error.
15. Write a program in Java to develop Banking Application in which user deposits the amount Rs 25000 and then start withdrawing of Rs 20000, Rs 4000 and it throws exception "Not Sufficient Fund" when user withdraws Rs. 2000 thereafter.
16. Write a program that executes two threads. One thread displays "Thread1" every 1000 milliseconds, and the other displays "Thread2" every 2000 milliseconds. Create the threads by extending the Thread class.
17. Write a program in Java to perform read and write operations on a Text file.

Gandhinagar Institute of Technology
Diploma Computer Science & Engineering/Information Technology
Semester 4

Subject Code: 101240402	Subject Title: Fundamentals of Artificial Intelligence and its application
Pre-requisite:	

Course Objective:

1. To learn Logic, problem-solving
2. To understand how Knowledge representation is implemented in the system
3. To understand how to utilize planning to achieve the desired goal
4. To learn how facts and predicate logic is used and implemented in the basic AI system
5. How reasoning is used in the basic AI system.
6. To understand game theory and its algorithms

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	-	2	4	70	30	30	20	150

Subject Contents				
Sr. No	Topic	Total Hours	Weight (%)	
1	Introduction: The AI Problems, The Underlying Assumption, AI techniques, The Level of The Model, Criteria For Success	2	5	
2	Problems, State Space Search & Heuristic Search Techniques: Defining The Problems As A State Space Search, Production Systems, Production Characteristics, Production System Characteristics and Issues in the Design of Search Programs, Generate-And-Test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.	8	18	
3	Knowledge Representation: Representations And Mappings, Approaches To Knowledge Representation, Representation Simple Facts In Logic, Representing Instance And Isa Relationships, Computable Functions and	7	10	

	Predicates, Resolution, Procedural versus Declarative Knowledge, Logic Programming, Forward versus Backward Reasoning		
4	Symbolic Reasoning Under Uncertainty: Introduction To Nonmonotonic Reasoning, Logics For Non-monotonic Reasoning.	4	10
5	Probabilistic Reasoning: Probability And Bays' Theorem, Certainty Factors And RuleBase Systems, Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic	5	10
6	Game Playing: Overview, MiniMax Search Procedure, Alpha-Beta Cut-offs, Refinements, Iterative deepening.	9	19
7	Planning: The Blocks World, Components Of a Planning System, Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical Planning, Reactive Systems	7	19
8	Introduction to Prolog: Syntax and Numeric Function, Basic List Manipulation Functions In Prolog.	3	9

Course Outcome:

1. Understand the search technique procedures applied to real world problems
2. Understand and use various types of logic and knowledge representation schemes.
3. Understand various Game Playing techniques and apply them in programs.
4. Gain knowledge in AI Applications and advances in Artificial Intelligence.
5. Use Prolog Programming language using predicate logic.

List of Textbooks:

1. "Artificial Intelligence" -By Elaine Rich And Kevin Knight Tata Mcgraw-Hil

List of Reference Books:

1. Artificial Intelligence: A Modern Approach, Stuart Russel, Peter Norvig, PHI
2. Nils J Nilsson, Artificial Intelligence: A New Synthesis, Morgan Kaufmann Publications
3. "PROLOG Programming For Artificial Intelligence" -By Ivan Bratko(Addison-Wesley.
4. "Programming with PROLOG" –By Klocksinn and Mellish

Open e-Resource:

1. <https://www.technologyreview.com/s/534871/our-fear-of-artificial-intelligence>
2. <http://www.sanfoundry.com/artificial-intelligence-mcqs-inductive-logic-unification-lifting-1/>

List of Suggested Experiments:

1. To study the turbo prolog editor and implement basic facts.
2. To study about family relationship tree in Prolog.
3. To study the rules implemented in prolog.
4. To study how to implement recursion in Prolog.



5. To study the use of GCD in Prolog.
6. To study the use of list in Prolog.
7. To study how to implement water jug problem in Prolog using BFS.
8. To study how to implement N-Queens problem in Prolog.
9. To study how to implement 8 puzzle problem in Prolog.
10. To study how to implement travelling salesman problem using Prolog.

Gandhinagar Institute of Technology
Diploma Computer Science & Engineering/Information Technology
Semester 4

Subject Code: 101240403	Subject Title: Introduction to Web Technologies
Pre-requisite:	

Course Objective:

1. To comprehend the basics of the internet and web terminologies
2. To introduce scripting language concepts for developing client-side applications.
3. To practice server-side programming features – PHP, JSP.
4. To know the usefulness of web services.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	-	2	4	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Introduction to WEB: Basics of WWW, HTTP protocol, Client Server architecture, Introduction to web server installation and configuration.	4	7
2	Web Design: Concepts of effective web design, Web design issues including Browser, Bandwidth and Cache, Display resolution, Look and Feel of the Website, Page Layout and linking, User centric design, Sitemap, Planning and publishing website, Designing effective navigation.	4	8
3	Basics of HTML and CSS: Structure of HTML page, HTML tags for data formatting, tables, links, images, meta tags, frames, html form tags, media, APIs, HTML5 tags and validation. Need for CSS, Syntax and structure, CSS rules for Backgrounds, Colors and properties, Manipulating texts, Fonts, borders and boxes, Margins,Padding Lists, CSS Positioning. Animations, Tool-Tips, Style images, Variables, Media	8	15

	Queries, Wildcard Selectors (*, ^ and \$) in CSS, Working with Gradients, Pseudo Class, Pseudo elements, basic of frameworks like Bootstrap.		
4	Client Side Scripting using JavaScript: Syntax of JavaScript, Execution of JavaScript, Internal, Embedded and External Javascript, JavaScript : variables, arrays, functions, conditions, loops, Pop up boxes, JavaScript objects and DOM, JavaScript inbuilt functions, JavaScript validations and Regular expressions, Event handling with JavaScript, Callbacks in Javascript, Function as arguments in JavaScript, Introduction to JSON.	10	20
5	Server Side Programming with PHP: Difference between Client side and Server side scripting, Structure of PHP page, PHP Syntax: variables, decision and looping with examples, PHP and HTML, Arrays and Functions, String, Form processing, File uploads, Dates and time zone, Working with Regular Expressions, Exception Handling , Basic concepts of Session and State, State management using query string, hidden form controls, Cookies, Session variables.	10	25
6	Database programming with PHP and MySQL: Basic MySQL commands, PHP functions for database connectivity, Implementation of CRUD operations using PHP, Prepared Statement and stored procedure execution in PHP.	4	10
7	Advanced Web Programming concepts: Asynchronous Web Programming, Difference between synchronous and asynchronous web programming, AJAX, and JQuery, Web service and API development using PHP	8	15

Course Outcome:

1. Use the various HTML tags with appropriate styles to display the various types of contents effectively.
2. Develop the dynamic web pages using HTML, CSS and JavaScript applying web design principles to make pages effective.
3. Develop the server side PHP scripts using various features for creating customized web services.
4. Write the server side scripts for designing web based services with database connectivity.
5. Develop a web application using advanced web programming features including AJAX and JQuery using concepts of Web API.

List of Textbooks:

1. HTML 5 Black Book 2Ed, Kogent Learning Solutions Inc, dreamtech

List of Reference Books:

1. Web Design, Joel Sklar, Cengage Learning
2. Learning PHP, MySQL, JavaScript, CSS & HTML5, 3rd Edition, Robin Nixon, O'Reilly
1. A Step-by-Step Guide to Creating Dynamic Websites By Robin Nixon Publisher: O'Reilly Media

2. Internet and World Wide Web How to program, P.J. Deitel & H.M. Deitel, Pearson
3. JavaScript for impatient programmers, Dr. Axel Rauschmayer
4. PHP: The Complete Reference By Steven Holzner, McGrawhill

Open e-Resource:

1. <https://www.w3schools.com/>
2. <https://www.tutorialspoint.com/html/index.htm>
3. <https://www.manning.com/books/css-in-depth>
4. <https://javascript.info/>
5. <https://github.com/getify/You-Dont-Know-JS>

List of Suggested Experiments:

1. Study of Formatting and fonts, commenting code, color, hyperlink, lists, tables, images.
2. Study about HTML Frame and Framesets.
3. To study About HTML Forms.
4. To study about Cascading Style Sheets (CSS).
5. To study about Basic Javascript.
6. Install XAMPP in Ubuntu or Windows
7. Introduction and basic syntax of PHP.
8. To study about PHP Form Processing, Files, Cookies and Sessions.
9. To study about PHP and MySQL Basic commands and data base operation (Update and Delete)
10. To study advanced concepts of AJAX and jQuery in PHP.

Gandhinagar Institute of Technology
Diploma Computer Engineering/ Computer Science & Engineering/ Information Technology
Semester 4

Subject Code: 101240405	Subject Title: Contributor Personality Development
Pre-requisite:	

Course Objective:

1. To develop self-awareness and a contributor mindset that emphasizes responsibility, ethical behavior, and purposeful action in personal and professional life.
2. To cultivate essential soft skills such as effective communication, teamwork, adaptability, and resilience for becoming a value-driven individual.
3. To instill a sense of ownership and initiative by encouraging students to take accountability for their actions and contribute positively to society and workplace.
4. To foster goal-oriented thinking and time management abilities that enable students to plan, prioritize, and achieve meaningful personal and professional objectives.
5. To apply contributor values through real-life projects that enhance leadership, problem-solving, and decision-making skills with a focus on social and environmental responsibility.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
2	-	0	0	0	0	0	50	50

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Understanding the Contributor Mindset : Case studies of contributor personalities (e.g., Dr. A.P.J. Abdul Kalam, Mother Teresa), Situational examples: workplace, social service, education, Building Self-Awareness, SWOT analysis of personality, Identifying personal strengths, values, and beliefs, Emotional intelligence and self-assessment tools, Ethics and Integrity, Importance of ethics in personal and professional life, Decision-making with integrity, Real-life ethical dilemmas and resolutions	10	30
2	Developing Contributor Qualities : Responsibility and Ownership, Taking initiative and being accountable, From problem identifier to solution provider, Communication and Collaboration, Verbal and non-verbal communication, Teamwork and active listening, Goal Setting and Time Management, SMART	10	30

	goals, Prioritization matrix, Tools for time management and productivity, Resilience and Adaptability, Coping with change and setbacks, Growth mindset and lifelong learning attitude, Conflict resolution through collaboration		
3	Applying Contributor Personality in Real Life: Personal Vision and Purpose, Crafting a personal mission statement, Aligning career and life goals with contribution, Social and Environmental Contribution, Civic sense, community work, Sustainability and environmental responsibility, Professional Contribution, Ethics in the workplace, Leadership with empathy and vision, Case Studies of professionals making an impact, Project and Presentation, Group or individual projects on community/social contribution, Presentation of learnings and personal growth reflections, Peer review and self-assessment	10	40

Course Outcome:

1. Demonstrate self-awareness and a contributor mindset by identifying personal strengths, values, and ethical responsibilities.
2. Apply effective communication, teamwork, and problem-solving skills in academic, professional, and social settings.
3. Develop goal-oriented behavior and contribute meaningfully to society through responsible, resilient, and purposeful actions.

List of Textbooks:

1. The 7 Habits of Highly Effective People by Stephen R. Covey
2. You Can Win by Shiv Khera

List of Reference Books:

1. Wings of Fire by Dr. A.P.J. Abdul Kalam
2. Emotional Intelligence: Why It Can Matter More Than IQ by Daniel Goleman

Open e-Resource:

1. [NPTEL – "Human Values" \(IIT Kanpur\)](#)
2. [Coursera – "Emotional Intelligence" by UC Davis](#)
3. [TutorialsPoint – Corporate Social Responsibility \(CSR\)](#)



Gandhinagar Institute of Technology
Diploma Computer Engineering
Semester 5

Subject Code: 101190501	Subject Title: Introduction to Machine Learning
Pre-requisite: Fundamentals of Programming, Basic Mathematics and Statistics concepts such as averages, graphs, and simple equations, Basic understanding of data structures such as arrays and lists.	

Course Objective:

1. To provide students with a basic understanding of Machine Learning concepts, terminology, and real-world applications.
2. To provide students with knowledge of data collection, data preprocessing, and dataset preparation required for machine learning models.
3. To provide students with an introduction to basic classification algorithms such as K-Nearest Neighbor, Decision Tree, and Naïve Bayes.
4. To provide students with the ability to understand and implement simple regression techniques for prediction problems.
5. To provide students with basic exposure to clustering techniques and simple machine learning model evaluation methods using beginner-level tools.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	-	4	5	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Introduction to Machine Learning: Introduction to Artificial Intelligence and Machine Learning, Difference between AI, ML, and Data Science, Applications of Machine Learning in real-world scenarios, Types of Machine Learning, Basic Machine Learning Terminology – Dataset, Feature, Label, Model,	06	10

	Concept of Training Data and Testing Data, Overview of the Machine Learning workflow		
2	Data Handling and Preprocessing: Introduction to datasets, Types of data - Numerical data, Categorical data, Structure of datasets (rows, columns, attributes), Data collection basics, Data preprocessing concepts, Handling missing values, Data normalization and scaling, Splitting datasets into training and testing sets, Introduction to Python libraries used in Machine Learning – NumPy, Pandas, Matplotlib	10	25
3	Basic Classification Techniques : Introduction to classification problems, Types of classification problems, K-Nearest Neighbor (KNN) - Basic concept, Working principle, Simple example, Decision Tree – Concept, Tree structure, Basic working, Naïve Bayes classifier - Basic idea, Simple application, Model training and testing, Confusion Matrix (concept and structure), Model evaluation using accuracy, Applications of classification - Email spam detection, Student result classification	10	25
4	Basic Regression Techniques: Introduction to regression, Difference between classification and regression, Linear Regression – Concept, Regression line, Prediction using regression models, Applications of regression - House price prediction, Sales prediction, Basic model evaluation - Mean Squared Error	09	20
5	Introduction to Clustering: Introduction to unsupervised learning, Concept of clustering, Types of clustering techniques, K-Means clustering - Basic concept, Working steps, Visualization of clusters, Applications of clustering - Customer segmentation, Document grouping, Advantages and limitations of clustering	07	20

Course Outcome:

1. Explain basic ML concepts and applications.
2. Perform data preprocessing and dataset preparation.
3. Apply classification algorithms for simple problems.
4. Implement regression models for prediction.
5. Apply clustering techniques and interpret results.

List of Textbooks:

1. Machine Learning for Absolute Beginners – Oliver Theobald, Scatterplot Press.
2. Introduction to Machine Learning with Python – Andreas C. Müller and Sarah Guido, O'Reilly Media.
3. Python Machine Learning Basics – Sebastian Raschka and Vahid Mirjalili, Packt Publishing.

List of Reference Books:

1. Hands-On Machine Learning with Scikit-Learn and TensorFlow – Aurélien Géron, O'Reilly Media.
2. Machine Learning: A Probabilistic Perspective – Kevin P. Murphy, MIT Press.
3. Pattern Recognition and Machine Learning – Christopher M. Bishop, Springer.
4. Data Science from Scratch – Joel Grus, O'Reilly Media.

Open e-Resource:

1. <https://www.coursera.org/specializations/machine-learning-introduction>
2. https://www.edx.org/learn/machine-learning?utm_source=chatgpt.com
3. <https://www.kaggle.com/learn>
4. <https://swayam.gov.in/>
5. <https://openlearning.mit.edu/>

List of Suggested Experiments:

1. Installation and setup of Python environment (Anaconda / Jupyter Notebook / Google Colab) for Machine Learning.
2. Introduction to Python libraries
3. Loading and exploring datasets using Pandas
4. Data preprocessing using Pandas (handling missing values and basic data cleaning).
5. Data visualization techniques using Matplotlib (bar chart, line chart, scatter plot).
6. Dataset splitting into training and testing sets using Scikit-learn.
7. Implementation of Simple Linear Regression for prediction using a sample dataset.
8. Visualization of regression results using scatter plots and regression line.
9. Implementation of K-Nearest Neighbor (KNN) classification algorithm.
10. Implementation of Decision Tree classification algorithm.
11. Implementation of Naïve Bayes classifier for a simple classification problem.
12. Evaluation of classification models using confusion matrix and accuracy.
13. Implementation of K-Means clustering algorithm.
14. Visualization and interpretation of clusters obtained from K-Means.
15. Mini Machine Learning Project
 - (i) Dataset selection
 - (ii) Data preprocessing
 - (iii) Model implementation
 - (iv) Result analysis and visualization



Gandhinagar Institute of Technology
Diploma Computer Engineering
Semester 5

Subject Code: 101190501	Subject Title: Introduction to Machine Learning
Pre-requisite: Fundamentals of Programming, Basic Mathematics and Statistics concepts such as averages, graphs, and simple equations, Basic understanding of data structures such as arrays and lists.	

Course Objective:

1. To provide students with a basic understanding of Machine Learning concepts, terminology, and real-world applications.
2. To provide students with knowledge of data collection, data preprocessing, and dataset preparation required for machine learning models.
3. To provide students with an introduction to basic classification algorithms such as K-Nearest Neighbor, Decision Tree, and Naïve Bayes.
4. To provide students with the ability to understand and implement simple regression techniques for prediction problems.
5. To provide students with basic exposure to clustering techniques and simple machine learning model evaluation methods using beginner-level tools.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	-	4	5	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Introduction to Machine Learning: Introduction to Artificial Intelligence and Machine Learning, Difference between AI, ML, and Data Science, Applications of Machine Learning in real-world scenarios, Types of Machine Learning, Basic Machine Learning Terminology – Dataset, Feature, Label, Model, Concept of Training Data and Testing Data, Overview of the Machine Learning workflow	06	10
2	Data Handling and Preprocessing: Introduction to datasets, Types of data - Numerical data, Categorical data, Structure of datasets (rows, columns, attributes), Data collection basics, Data preprocessing concepts, Handling missing values, Data normalization and scaling, Splitting datasets into training	10	25

	and testing sets, Introduction to Python libraries used in Machine Learning – NumPy, Pandas, Matplotlib		
3	Basic Classification Techniques : Introduction to classification problems, Types of classification problems, K-Nearest Neighbor (KNN) - Basic concept, Working principle, Simple example, Decision Tree – Concept, Tree structure, Basic working, Naïve Bayes classifier - Basic idea, Simple application, Model training and testing, Confusion Matrix (concept and structure), Model evaluation using accuracy, Applications of classification - Email spam detection, Student result classification	10	25
4	Basic Regression Techniques: Introduction to regression, Difference between classification and regression, Linear Regression – Concept, Regression line, Prediction using regression models, Applications of regression - House price prediction, Sales prediction, Basic model evaluation - Mean Squared Error	09	20
5	Introduction to Clustering: Introduction to unsupervised learning, Concept of clustering, Types of clustering techniques, K-Means clustering - Basic concept, Working steps, Visualization of clusters, Applications of clustering - Customer segmentation, Document grouping, Advantages and limitations of clustering	07	20

Course Outcome:

1. Explain basic ML concepts and applications.
2. Perform data preprocessing and dataset preparation.
3. Apply classification algorithms for simple problems.
4. Implement regression models for prediction.
5. Apply clustering techniques and interpret results.

List of Textbooks:

1. Machine Learning for Absolute Beginners – Oliver Theobald, Scatterplot Press.
2. Introduction to Machine Learning with Python – Andreas C. Müller and Sarah Guido, O'Reilly Media.
3. Python Machine Learning Basics – Sebastian Raschka and Vahid Mirjalili, Packt Publishing.

List of Reference Books:

1. Hands-On Machine Learning with Scikit-Learn and TensorFlow – Aurélien Géron, O'Reilly Media.
2. Machine Learning: A Probabilistic Perspective – Kevin P. Murphy, MIT Press.
3. Pattern Recognition and Machine Learning – Christopher M. Bishop, Springer.
4. Data Science from Scratch – Joel Grus, O'Reilly Media.

Open e-Resource:

1. <https://www.coursera.org/specializations/machine-learning-introduction>
2. https://www.edx.org/learn/machine-learning?utm_source=chatgpt.com
3. <https://www.kaggle.com/learn>
4. <https://swayam.gov.in/>
5. <https://openlearning.mit.edu/>

List of Suggested Experiments:

1. Installation and setup of Python environment (Anaconda / Jupyter Notebook / Google Colab) for Machine Learning.
2. Introduction to Python libraries
3. Loading and exploring datasets using Pandas
4. Data preprocessing using Pandas (handling missing values and basic data cleaning).
5. Data visualization techniques using Matplotlib (bar chart, line chart, scatter plot).
6. Dataset splitting into training and testing sets using Scikit-learn.
7. Implementation of Simple Linear Regression for prediction using a sample dataset.
8. Visualization of regression results using scatter plots and regression line.
9. Implementation of K-Nearest Neighbor (KNN) classification algorithm.
10. Implementation of Decision Tree classification algorithm.
11. Implementation of Naïve Bayes classifier for a simple classification problem.
12. Evaluation of classification models using confusion matrix and accuracy.
13. Implementation of K-Means clustering algorithm.
14. Visualization and interpretation of clusters obtained from K-Means.
15. Mini Machine Learning Project
 - (i) Dataset selection
 - (ii) Data preprocessing
 - (iii) Model implementation
 - (iv) Result analysis and visualization

Gandhinagar Institute of Technology
Diploma Computer Engineering
Semester 5

Subject Code: 101190503	Subject Title: Introduction to Cloud Computing
Pre-requisite: Basic knowledge of Computer Networks, Internet and Operating Systems.	

Course Objective:

1. To introduce students to the fundamental concepts and evolution of Cloud Computing.
2. To understand cloud architecture, service models and deployment models.
3. To explain the role of virtualization in cloud environments.
4. To provide knowledge about major cloud platforms and cloud storage systems.
5. To develop practical skills for using cloud services and managing basic cloud resources.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuou s Assessment	University Assessment	Continuou s Assessment	
3	-	2	4	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Introduction to Cloud Computing: Concept of Cloud Computing, History and Evolution of Cloud Computing, Need of Cloud Computing, Characteristics of Cloud Computing, Advantages and Disadvantages, Traditional Computing vs Cloud Computing, Applications of Cloud Computing in Education, Business and Industry.	08	15
2	Cloud Architecture and Service Models: Cloud Architecture Overview, Components of Cloud Computing, Service Models: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), Comparison of Service Models, Benefits of Cloud Services, Examples of Cloud Service Providers.	09	20

3	Cloud Deployment Models: Public Cloud, Private Cloud, Hybrid Cloud, Community Cloud, Advantages and Limitations of Deployment Models, Selection of Deployment Models, Use cases of deployment models in organizations.	07	15
4	Virtualization in Cloud Computing: Introduction to Virtualization, Types of Virtualization, Virtual Machines, Hypervisors (Type-1 and Type-2), Server Virtualization, Storage Virtualization, Network Virtualization, Benefits of Virtualization, Role of Virtualization in Cloud Infrastructure.	09	20
5	Cloud Platforms and Cloud Storage: Introduction to Cloud Platforms, Overview of popular cloud providers (AWS, Microsoft Azure, Google Cloud), Cloud Storage Concepts, File Storage, Object Storage, Cloud Databases, Backup and Recovery in Cloud.	07	15
6	Cloud Security and Future Trends: Cloud Security Concepts, Data Privacy Issues, Security Challenges in Cloud Computing, Identity and Access Management, Disaster Recovery in Cloud, Emerging Trends: Edge Computing, Serverless Computing, AI and Cloud Integration.	05	15

Course Outcome:

1. Explain the basic concepts and benefits of Cloud Computing.
2. Identify different cloud service models and cloud architecture.
3. Describe cloud deployment models and their applications.
4. Understand virtualization and its role in cloud infrastructure.
5. Use basic cloud services and storage platforms.

List of Textbooks:

1. Cloud Computing – A Practical Approach by Toby Velte
2. Cloud Computing Basics by Rajkumar Buyya
3. Introduction to Cloud Computing by K. Chandrasekaran

List of Reference Books:

1. Cloud Computing: Concepts, Technology & Architecture by Thomas Erl
2. Mastering Cloud Computing by Rajkumar Buyya
3. Cloud Computing Bible by Barrie Sosinsky

Open e-Resource:

1. <https://aws.amazon.com/getting-started>
2. <https://cloud.google.com/training>
3. <https://learn.microsoft.com/en-us/training>
4. <https://nptel.ac.in>
5. <https://swayam.gov.in>

List of Suggested Experiments:

1. Study different cloud service providers and compare their services.
2. Create and manage a cloud storage account (Google Drive / OneDrive).
3. Demonstrate virtualization using VirtualBox or VMware.
4. Create and configure a Virtual Machine.
5. Upload, download and share files using cloud storage.
6. Study IaaS, PaaS and SaaS with real examples.
7. Configure basic security settings in a cloud platform.
8. Demonstrate backup and restore using cloud storage.
9. Deploy a simple static website using a cloud platform.
10. Prepare a report on future trends in cloud computing.

Gandhinagar Institute of Technology
Diploma Computer Engineering
Semester 5

Subject Code: 101240502	Subject Title: Mobile Application Development using Android
Pre-requisite: Basic knowledge of Programming (C/Java), Basic understanding of Object Oriented Concepts	

Course Objective:

1. To understand the basics of Android operating system.
2. To develop simple Android applications using Android Studio.
3. To design mobile user interfaces using layouts and widgets.
4. To implement basic data storage and multimedia features in Android applications.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
2	0	2	3	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Introduction to Android: Introduction to Mobile Computing, Overview of Mobile Operating Systems, Introduction to Android, Features of Android, Android Architecture, Android Development Environment, Installation of Android Studio, Android Project Structure, Android Application Components (Activity, Service, Broadcast Receiver, Content Provider).	07	24
2	Android User Interface: Introduction to User Interface Design, Views and View Groups, Layouts (Linear Layout, Relative Layout), Basic UI Controls (TextView, EditText, Button, ImageView, CheckBox, RadioButton), Event Handling, Toast Messages, Dialog Boxes.	09	28
3	Activities and Intents: Activity Life Cycle, Creating Activities, Intents and Intent Filters, Explicit Intents, Passing Data between Activities, Introduction to Menus (Options Menu, Context Menu).	08	24

4	Data Storage and Multimedia: SharedPreferences, Internal Storage, Introduction to SQLite Database, Basic CRUD Operations, Playing Audio and Video in Android Applications.	08	24
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Course Outcome:

1. Understand the basic architecture of the Android operating system.
2. Design simple user interfaces using Android layouts and widgets.
3. Develop Android applications using activities and intents.
4. Implement basic data storage and multimedia features in Android applications.

List of Textbooks:

1. Android Programming for Beginners – John Horton
2. Head First Android Development – Dawn Griffiths & David Griffith

List of Reference Books:

1. Professional Android Application Development – Reto Meier
2. Android Application Development All-in-One – Barry Burd

Open e-Resource:

1. <https://developer.android.com>
2. <https://www.w3schools.com/android>
3. <https://nptel.ac.in>
4. <https://www.youtube.com>

List of Suggested Experiments:

1. Install Android Studio and create a Hello World application.
2. Design a simple UI using Linear Layout.
3. Create an application using the Button click event.
4. Develop an application using Toast Message.
5. Create an application using Intent to switch between activities.
6. Develop an application using RadioButton and CheckBox.
7. Create an application using SharedPreferences to store user data.
8. Develop an application using SQLite database.
9. Create an application to play audio or video.
10. Develop a simple Android application integrating multiple activities.

Gandhinagar Institute of Technology
Diploma Computer Engineering/ Computer Science and Engineering/ Information
Technology
Semester 5

Subject Code: 101240504	Subject Title: Introduction to Web Development
Pre-requisite: Basic Computer Knowledge	

Course Objective:

1. To understand the structure and working of the World Wide Web and web technologies.
2. To learn HTML and CSS for creating well-structured and styled web pages.
3. To use JavaScript for adding interactivity and dynamic behavior to web pages.
4. To understand the basics of responsive web design and Bootstrap framework.
5. To get an introduction to server-side web development concepts and deployment.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	0	2	4	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Introduction To Web Technologies: Overview of the Internet and World Wide Web (WWW), Web browsers, Web Servers, and how the web works, Client-side vs Server-side technologies, HTTP/HTTPS- request- response model, Introduction to web development tools- text editor, browser dev tools, Domain names, hosting, and website deployment (basic overview).	10	25
2	HTML-Structure of design: Introduction to HTML (tags, elements, attributes), Basic structure (DOCTYPE, html, head, body), Text formatting tags (headings, paragraphs, lists, links), Images, Tables and Forms in HTML, HTML Semantic Elements (header, footer, nav, section, article), Multimedia (audio and video embedding).	14	25
3	CSS-Styling and Layout: Introduction to CSS (Inline, Internal and External CSS, CSS Selectors, Properties and Values, Box Model (margin, border, padding, content), Text Styling (fonts, colours, alignment, text-decoration),	10	25

	CSS layouts (flexbox and grid basic usage), Introduction to responsive web design and media queries, Introduction to Bootstrap framework for responsive layouts.		
4	JavaScript and Web Deployment: Introduction to JavaScript (variables, datatypes and operators), Control statements, Functions, DOM Manipulation, Events (onclick, onmouseover, onsubmit), Form validation using JavaScript, Introduction to Git and version control basics, Web hosting, Deploying a static website.	08	25

Course Outcome:

1. Explain the fundamentals of the web, HTTP protocol, and client-server model.
2. Design and develop structured web pages using HTML semantic elements.
3. Apply CSS to style and create responsive layouts for web pages.
4. Write JavaScript programs to add interactivity and validate web forms.
5. Build a complete static website integrating HTML, CSS, and JavaScript.
6. Perform form validation and deploy a basic website using Git or online tools.

List of Textbooks:

1. HTML and CSS: Design and Build Websites – Jon Duckett, 2011.
2. JavaScript and JQuery: Interactive Front-End Web Development – Jon Duckett, 2014.
3. Learning Web Design – Jennifer Niederst Robbins, 5th Edition, 2018.

List of Reference Books:

1. Web Technology: A Developer's Perspective – Uttam K. Roy, Oxford University Press, 2014.
2. Head First HTML and CSS – Elisabeth Robson and Eric Freeman, O'Reilly, 2nd Edition, 2012.

Open e-Resource:

1. [Web development- free code camp](#)
2. [W3Schools-HTML, CSS, JavaScript](#)
3. [Coursera – HTML, CSS, and JavaScript for Web Developers by Johns Hopkins University](#)
4. [Bootstrap Documentation](#)
5. [WsCube Tech – HTML, CSS, JavaScript Tutorials](#)

List of Suggested Experiments:

1. Create a simple web page displaying your name, photo, and hobbies using basic HTML tags.
2. Create a webpage using text formatting tags: bold, italic, underline, headings (h1-h6), and horizontal rule.
3. Design a simple HTML table to display a student timetable or mark sheet.
4. Create a basic HTML form with text fields, radio buttons, checkboxes, dropdown list, and a submit button.
5. Apply Inline and Internal CSS to change font style, color, and background color of a webpage.
6. Use External CSS to style a webpage: change fonts, add borders, set padding and margin for elements.
7. Create a simple photo gallery page using HTML images and CSS to add borders and hover effects.
8. Design a basic navigation menu using HTML list tags and CSS to style it horizontally.



9. Write a JavaScript program to display an alert, take user input using a prompt, and show output on the page.
10. Create a webpage with a button that changes the background color and text content using JavaScript.
11. Write a JavaScript program to validate a registration form: check empty fields and validate email format.
12. Build a simple webpage using Bootstrap: add a navbar, a jumbotron/hero section, and a 3-column card layout.

Gandhinagar Institute of Technology
Diploma Computer Engineering
Semester 5

Subject Code: 101240505	Subject Title: Advance Computer Network
Pre-requisite: Basic knowledge of Computer Networks, Understanding of Internet and Communication Concepts	

Course Objective:

1. To understand the advanced concepts of computer networking.
2. To study network protocols and communication models.
3. To understand network security and wireless networking concepts.
4. To develop knowledge about network management and modern networking technologies.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	0	2	5	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Introduction to Computer Networks: Basic Concepts of Networking, Types of Networks (LAN, MAN, WAN), Network Topologies, OSI Reference Model, TCP/IP Model, Comparison of OSI and TCP/IP Model, Network Devices (Hub, Switch, Router, Bridge, Gateway).	10	24
2	Network Protocols and Communication: IP Addressing (IPv4), Subnetting Basics, Introduction to IPv6, ARP, RARP, ICMP, TCP and UDP Protocols, Ports and Sockets, DNS and DHCP Concepts.	12	28
3	Wireless and Modern Networking: Introduction to Wireless Networks, Wi-Fi Standards, Bluetooth, Mobile Networks Basics, Introduction to Cloud Networking, Virtual Private Network (VPN), Internet of Things (IoT) in Networking.	10	24

4	Network Security and Management: Basic Network Security Concepts, Types of Network Attacks, Firewalls, Encryption Basics, Network Monitoring, Introduction to Network Management Tools.	10	24
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Course Outcome:

1. Understand the basic architecture and models of computer networks.
2. Identify and configure different network protocols and addressing schemes.
3. Understand wireless networking and modern networking technologies.
4. Apply basic network security and network management concepts.

List of Textbooks:

1. Computer Networks – Andrew S. Tanenbaum
2. Data Communications and Networking – Behrouz A. Forouzan

List of Reference Books:

1. Computer Networking: A Top-Down Approach – James F. Kurose & Keith W. Ross
2. Data and Computer Communications – William Stallings

Open e-Resource:

1. <https://nptel.ac.in>
2. <https://www.cisco.com>
3. <https://www.geeksforgeeks.org/computer-network-tutorial>
4. <https://www.youtube.com>

List of Suggested Experiments:

1. Study of network devices (hub, switch, router).
2. Configure a LAN using network cables and switches.
3. Identify IP address and MAC address of a system.
4. Perform IP configuration using command prompt (ipconfig / ifconfig).
5. Use the ping command to test network connectivity.
6. Study of DNS and DHCP configuration.
7. Configure a simple wireless network using a router.
8. Study of network monitoring tools.
9. Demonstration of basic firewall configuration.
10. Study of VPN concept and configuration basics.

Gandhinagar Institute of Technology
Diploma Computer Engineering/ Computer Science and Engineering/ Information
Technology
Semester 6

Subject Code: 101190601	Subject Title: Introduction to Data Analysis
Pre-requisite: Basic Computer Knowledge, Introduction to Programming (C/Python)	

Course Objective:

1. To understand the fundamentals of data, data types, and the data analysis process.
2. To learn data collection, cleaning, and preparation techniques for analysis.
3. To perform basic statistical analysis and summarize data using descriptive statistics.
4. To use Python and its libraries (NumPy, Pandas, Matplotlib) for data analysis.
5. To create meaningful data visualizations and draw insights from data.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	0	2	4	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Introduction to Data and Data Analysis: What is Data, Types of Data (structured, unstructured, semi-structured), Data vs Information vs Knowledge, Introduction to Data Analysis (definition, importance, applications), Data Analysis lifecycle (collection, cleaning, analysis, visualization, reporting), Overview of tools used in Data Analysis, Real world applications of data analysis.	10	25
2	Data Collection and Data Cleaning: Sources of data (primary and secondary data sources), Data collection methods (surveys, web scraping, APIs, CSV file), Introduction to datasets, Common data quality issues (missing values, duplicates, inconsistencies), Data cleaning techniques (handling missing data, removing duplicates), Data types in python, Introduction to python.	14	25

3	Descriptive Statistics and Data Exploration: Measures of central tendency (mean, median, mode), Measures of spread (range, variance, standard deviation), Data distribution (basic distribution), Correlation, Exploratory Data Analysis (EDA), Using NumPy for numerical operations and Pandas for data exploration, Grouping and aggregating data using Pandas.	10	25
4	Data Visualization: Importance of data visualization in analysis, Types of charts (bar charts, line charts, pie charts, histograms, scatter plots), Data visualization using Seaborn and Matplotlib in Python, Creating visualizations (plots, labels, titles and legends), Interpreting graphs and drawing conclusions from visual data.	08	25

Course Outcome:

1. Explain the concept of data, types of data, and the data analysis lifecycle.
2. Collect data from various sources and perform data cleaning using Pandas.
3. Apply descriptive statistics to summarize and explore datasets.
4. Use Python libraries (NumPy, Pandas, Matplotlib) for data analysis tasks.
5. Create appropriate charts and visualizations to represent data insights.
6. Prepare a basic data analysis report with findings and observations.

List of Textbooks:

1. Python for Data Analysis – Wes McKinney, O'Reilly, 3rd Edition, 2022.
2. Data Analysis with Python – Harish Gulati, BPB Publications, 2021.
3. Statistics for Data Science – James D. Miller, Packt Publishing, 2017.

List of Reference Books:

1. Pandas for Everyone – Daniel Y. Chen, Addison-Wesley, 2018.
2. Head First Data Analysis – Michael Milton, O'Reilly, 2009.

Open e-Resource:

1. [freeCodeCamp.org](https://www.freecodecamp.org/) – Data Analysis with Python Full Course
2. [Kaggle Learn](https://www.kaggle.com/learn/) – Free Pandas, Data Visualization, and Python courses
3. [W3Schools](https://www.w3schools.com/python/) – Python, NumPy, Pandas, and Matplotlib Reference
4. [Coursera](https://www.coursera.org/learn/data-science-in-python) – Introduction to Data Science in Python by University of Michigan
5. [NPTEL](https://www.nptel.ac/) – Python for Data Science (IIT Madras)

List of Suggested Experiments:

1. Install Python and explore basic data types: int, float, string, list, and dictionary.
2. Load a CSV file using Pandas and display the first 5 rows, column names, shape, and data types.
3. Identify and handle missing values in a dataset: find nulls, fill or drop missing data.
4. Remove duplicate records from a dataset and reset the index using Pandas.
5. Calculate mean, median, mode, and standard deviation of a dataset column using NumPy and Pandas.
6. Filter and sort a dataset based on given conditions (e.g., students with marks above 60).
7. Group data using groupby and calculate aggregate values (sum, count, average) for each group.



8. Create a Bar Chart to compare values across categories using Matplotlib.
9. Plot a Line Chart to show trends over time using Matplotlib.
10. Create a Pie Chart and Histogram to show data distribution and proportion.
11. Plot a Scatter Plot to study the relationship between two variables.
12. Perform a mini data analysis project: load a real dataset from Kaggle, clean it, explore it, and create at least 3 visualizations with a short written observation.

Gandhinagar Institute of Technology
Diploma Computer Engineering
Semester 6

Subject Code: 101190602	Subject Title: Data Mining and Warehousing
Pre-requisite:	

Course Objective

1. To understand the fundamental concepts of Data Mining and Data Warehousing and their role in decision support systems.
2. To learn techniques for data preprocessing, data integration, and data transformation for effective data analysis.
3. To understand and apply data mining techniques such as association rule mining, classification, and clustering.
4. To develop the ability to analyze large datasets using data mining algorithms and extract useful knowledge.
5. To explore real-world applications of data mining and data warehousing in business intelligence and decision making.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	-	2	4	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Introduction to Data Mining and Data Warehousing: Introduction to Data Mining, Definition and importance of Data Mining, Knowledge Discovery in Databases (KDD) Process, Data Mining functionalities, Data Mining applications, Introduction to Data Warehouse, Characteristics of Data Warehouse, Difference between Database and Data Warehouse, Data Warehouse architecture.	08	14
2	Data Preprocessing and Data Warehouse Modeling: Need for Data Preprocessing, Data Cleaning, Data Integration, Data Transformation, Data Reduction, Data Discretization, Concept of Data Cube, OLAP operations	11	18

	(Roll-up, Drill-down, Slice, Dice, Pivot), Star Schema, Snowflake Schema, Fact Constellation Schema.		
3	Data Mining Techniques and Association Analysis: Concept of Data Mining Techniques, Classification and Prediction, Clustering, Association Rule Mining, Market Basket Analysis, Support and Confidence, Basic concept of Decision Trees.	11	18
4	Classification and Clustering Methods: Classification techniques, Decision Tree Induction, Bayesian Classification, Rule-based Classification, Clustering Concepts, Partitioning Methods, Hierarchical Clustering	06	10
5	Advanced Data Mining Concepts and Applications: Outlier Analysis, Trend and Evolution Analysis, Web Mining, Text Mining, Spatial Data Mining, Applications of Data Mining in Business, Healthcare, Banking, Marketing, Fraud Detection, Challenges in Data Mining and Future Trends.	06	10

Course Outcome:

1. Understand the fundamental concepts of Data Mining and Data Warehousing and their importance in decision making
2. Apply data preprocessing and data warehouse modeling techniques for organizing and analyzing large datasets.
3. Use association rule mining and classification techniques to discover patterns and relationships in data. Develop an object-oriented program by using the files and collection framework.
4. Apply clustering and classification methods to analyze and categorize large datasets effectively.
5. Analyze real-world applications of data mining and use appropriate techniques for knowledge discovery and decision support systems.

List of Textbooks:

1. Data Mining: Concepts and Techniques, Jiawei Han, Micheline Kamber, Jian Pei, Morgan Kaufmann / Elsevier.
2. Data Warehousing in the Real World, Sam Anahory & Dennis Murray, Pearson Education.

List of Reference Books:

1. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Pearson Education.
2. Data Mining Techniques, Arun K. Pujari, Universities Press.
3. Data Warehouse Toolkit, Ralph Kimball & Margy Ross, Wiley India.

Open e-Resource:

1. <https://www.w3schools.com/>
2. <https://www.codecademy.com/learn/learn>
3. <https://nptel.ac.in/courses/106105191>
4. <https://www.youtube.com>

List of Suggested Experiments

1. Install and configure any Data Mining tool (WEKA / RapidMiner) and explore its interface. Load a sample dataset and perform basic data analysis.
2. Perform data preprocessing on a given dataset: handling missing values, normalization, and data transformation using a data mining tool.
3. Create a Data Warehouse schema (Star Schema) for a sample business scenario such as sales or retail management.
4. Perform OLAP operations such as Roll-up, Drill-down, Slice, and Dice on a sample dataset.
5. Implement Association Rule Mining using Apriori Algorithm on a market basket dataset and analyze support and confidence.
6. Perform Classification using Decision Tree Algorithm on a given dataset and interpret the generated tree.
7. Implement Naïve Bayes Classification on a dataset and analyze classification accuracy.
8. Perform Clustering using K-Means algorithm on a dataset and visualize the clusters.
9. Perform Hierarchical Clustering on a dataset and analyze cluster relationships.
10. Perform Outlier Detection and Data Analysis on a dataset and interpret the results.

Gandhinagar Institute of Technology
Diploma Computer Engineering/ Computer Science & Engineering / Information Technology
Semester 6

Subject Code: 101190603	Subject Title: Advance Java
Pre-requisite: Java Programming	

Course Objective:

1. Web applications based on Java use Servlet, JSP, JSF.
2. To store the data database connectivity and database JDBC component is needed.
Networking components are needed to transfer data over the network.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	-	2	4	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Java Applets: Applet Programming: local and remote applets, difference between applet and application, applet life cycle, developing executable applet code. Web Page Design: applet tag, adding applet to HTML file, running the applet, passing parameter to applet, various methods and component classes to develop basic applet	4	15
2	Abstract Window Toolkit (AWT): Abstract Window Toolkit(AWT): classes hierarchy, windows fundamentals Frame Windows : creating a frame window in applet, canvas, creating windows program. Graphics-AWT Controls: Labels, TextField, Push buttons ,Layout Managers (Flow Layout, Border Layout, Grid Layout, Card Layout) ,Developing Graphical User Interface using Swing: JApplet,JLabel,JTextField, JButton,JCheckBox, JRadioButton, JComboBox, Menus, Event Classes: MouseEvent Class , ActionEvent Class, WindowEvent Class, Event Listner Interface: MouseListener, ActionListener, WindowListener and KeyListner	8	25

3	JDBC Programming: The JDBC Connectivity Model, Database Programming: Connecting to the Database, creating a SQL Query, Getting the Results, Updating Database Data, Error Checking and the SQLException Class, The SQLWarning Class, The Statement Interface, PreparedStatement, CallableStatement the ResultSet Interface, Updatable Result Sets, JDBC Types, Executing SQL Queries, ResultSetMetaData, Executing SQL Updates.	6	10
4	Servlet API and Overview: Servlet Model: Overview of Servlet, Servlet Life Cycle, HTTP Methods Structure and Deployment descriptor ServletContext and ServletConfig interface, Attributes in Servlet, Request Dispatcher interface The Filter API: Filter, FilterChain, Filter Config Cookies and Session Management: Understanding state and session, Understanding Session Timeout and Session Tracking, URL Rewriting	8	25
5	Java Server Pages: JSP Overview: The Problem with Servlets, Life Cycle of JSP Page, JSP Processing, JSP Application Design with MVC, Setting Up the JSP Environment, JSP Directives, JSP Action, JSP Implicit Objects JSP Form Processing, JSP Session and Cookies Handling, JSP Session Tracking JSP Database Access, JSP Standard Tag Libraries, JSP Custom Tag, JSP Expression Language, JSP Exception Handling, JSP XML Processing	6	25

Course Outcome:

1. Develop Java Applet Programming using various techniques
2. Develop applications using Abstract Window Toolkit
3. Update and retrieve the data from the databases using JDBC-ODBC.
4. Develop server side programs using Servlets.
5. Develop Java Server Pages applications using JSP Tags

List of Textbooks:

1. Complete Reference J2EE by James Keogh mcgraw publication

List of Reference Books:

1. Black Book “Java server programming” J2EE, 1st ed., Dream Tech Publishers, 2008. 3. Kathy walrath .
2. Complete Reference J2EE by James Keogh mcgraw publication
3. Professional Java Server Programming by Subrahmanyam Allamaraju, Cedric Buest Wiley Publication
4. SCWCD, Matthew Scarpino, Hanumant Deshmukh, Jignesh Malavie, Manning publication
5. Core Java, Volume II: Advanced Features by Cay Horstmann and Gary Cornell Pearson Publication

Open e-Resource:

1. <http://docs.oracle.com/javase/tutorial/deployment/applet/index.html>
2. <http://math.hws.edu/javanotes/c6/index.html>
3. <http://www.tutorialspoint.com/awt/>
4. <http://www.oracle.com/technetwork/java/index-jsp-135475.html>
5. <http://www.oracle.com/technetwork/java/javaee/jsp/index.html>

List of Suggested Experiments:

1. Develop an applet that draws a circle. The dimension of the applet should be 500 x 300 pixels. The circle should be centered in the applet and have a radius of 100 pixels. Display your name centered in a circle.(using drawOval() method
2. Built an applet that displays a horizontal rectangle in its center. Let the rectangle fill with color from left to right.
3. Develop a program that has only one button in the frame, clicking on the button cycles through the colors: red->green- >blue and so on. One color changes per click.(use getBackGround() method to get the current color)
4. Create an application that displays a frame with a menu bar. When a user selects any menu or menu item, display that selection on a text area in the center of the frame
5. Develop a database application that uses any JDBC driver
6. Develop a simple servlet program which maintains a counter for the number of times it has been accessed since its loading, initialize the counter using deployment descriptor.
7. Create a web form which processes servlet and demonstrates use of cookies and sessions
8. Develop a simple JSP program for user registration and then control will be transfer it into second page.
9. Develop a simple JSP program for user login form with static and dynamic database
10. Develop a JSP program to display the grade of a student by accepting the marks of five subjects.

Gandhinagar Institute of Technology
Diploma Computer Engineering
Semester 6

Subject Code: 101220601	Subject Title: Introduction of Block chain
Pre-requisite: Basic knowledge of Computer Networks, Cryptography basics and Internet technologies.	

Course Objective:

1. To introduce students to the basic concepts and working principles of Blockchain technology.
2. To understand the structure and components of Blockchain networks.
3. To familiarize students with cryptography techniques used in Blockchain.
4. To develop basic understanding of cryptocurrency, smart contracts and distributed ledger systems.
5. To provide hands-on experience in Blockchain tools and simple Blockchain applications.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	-	4	5	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Introduction to Blockchain: Introduction to Blockchain Technology, Evolution of Blockchain, Need of Blockchain Technology, Distributed Ledger Technology, Centralized vs Decentralized Systems, Key Features of Blockchain (Transparency, Immutability, Security), Basic Terminologies: Block, Chain, Node, Transaction, Hash.	07	15
2	Blockchain Architecture and Components: Structure of a Block, Blockchain Network Components, Peer-to-Peer Network, Blockchain Working Process, Transaction Lifecycle, Blockchain Consensus Mechanisms: Proof of Work (PoW), Proof of Stake (PoS), Delegated Proof of Stake.	08	20
3	Cryptography in Blockchain: Introduction to Cryptography, Hash Functions, Digital Signatures, Public Key and Private Key Cryptography, Merkle Trees, Role of Cryptography in Blockchain Security.	08	20

4	Cryptocurrency and Blockchain Platforms: Introduction to Cryptocurrency, Bitcoin Overview, Ethereum Platform, Wallets and Digital Transactions, Mining Concepts, Blockchain Platforms and Ecosystems, Overview of Hyperledger.	08	15
5	Smart Contracts and Blockchain Applications: Introduction to Smart Contracts, Features of Smart Contracts, Smart Contract Platforms, Decentralized Applications (DApps), Blockchain Use Cases in Banking, Supply Chain, Healthcare, Government and Education.	07	15
6	Blockchain Security, Challenges and Future Trends: Security Issues in Blockchain, Privacy Concerns, Blockchain Limitations and Challenges, Scalability Issues, Legal and Regulatory Aspects, Future Trends of Blockchain Technology.	07	15

Course Outcome:

1. Explain the fundamental concepts and importance of Blockchain technology.
2. Describe Blockchain architecture and consensus mechanisms.
3. Understand the role of cryptography in Blockchain security.
4. Identify Blockchain platforms, cryptocurrencies and smart contracts.
5. Develop basic Blockchain applications and understand industry use cases.

List of Textbooks:

1. Blockchain Basics: A Non-Technical Introduction in 25 Steps by Daniel Drescher
2. Blockchain Technology Explained by Alan T. Norman
3. Introducing Blockchain with Python by Joseph Howlett

List of Reference Books:

1. Mastering Blockchain by Imran Bashir
2. Blockchain Revolution by Don Tapscott and Alex Tapscott
3. Blockchain Basics by Daniel Drescher

Open e-Resource:

1. <https://www.ibm.com/topics/blockchain>
2. <https://ethereum.org/en/developers/docs>
3. <https://nptel.ac.in/courses/blockchain>
4. <https://swayam.gov.in>
5. <https://www.hyperledger.org/resources>

List of Suggested Experiments:

1. Study and compare different Blockchain platforms.
2. Demonstrate hashing using SHA-256 algorithm.
3. Generate and verify digital signatures.
4. Create a simple Blockchain structure using Python.
5. Simulate a blockchain transaction process.
6. Create a cryptocurrency wallet and understand transaction processes.
7. Demonstrate mining concepts in Blockchain.
8. Explore Ethereum test network and basic operations.
9. Write a simple smart contract using Solidity.
10. Deploy a smart contract on a test blockchain network.
11. Create a simple decentralized application (DApp).
12. Analyze blockchain data using blockchain explorer tools.



13. Study Hyperledger Fabric architecture.
14. Demonstrate blockchain security concepts.
15. Prepare a mini project based on blockchain application.

Gandhinagar Institute of Technology
Diploma Computer Engineering/ Computer Science & Engineering / Information Technology /
Cyber Forensic & Information Security
Semester 6

Subject Code: 101240603	Subject Title: Basic of Digital Forensics
Pre-requisite: Basic knowledge of computer systems, operating systems, and file management. Familiarity with basic networking and cybersecurity concepts will be helpful.	

Course Objective:

1. Understand the basic concept of digital forensics
2. Learn how digital evidence is collected and preserved.
3. Identify different types of cybercrimes.
4. Learn basic digital investigation techniques.
5. Understand simple forensic tools used in cyber investigations.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	-	4	5	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Introduction to Digital Forensics: Meaning of digital forensics, need and importance of digital forensics, history of digital forensics, basic terminology, types of digital devices, introduction to digital evidence, role of forensic investigator, stages of digital forensic investigation.	08	15
2	Digital Evidence and Evidence Handling: Types of digital evidence, characteristics of digital evidence, identification of evidence, collection of evidence, preservation of evidence, chain of custody, evidence documentation, imaging and cloning of storage devices, write blockers, maintaining evidence integrity, evidence storage and transportation.	12	25
3	Computer Forensics Basics: Introduction to computer forensics, computer hardware basics, storage devices (hard disk, SSD, USB, memory cards), file systems basics, recovering deleted files, simple file analysis, basic log analysis.	10	20

4	Cybercrime and Investigation Basics: Introduction to cybercrime, types of cybercrime (hacking, phishing, identity theft, malware attacks), cybercriminals and their motives, cyber-attack techniques, investigation process of cybercrime, role of digital forensic experts, basic cyber laws and IT Act overview.	08	25
5	Basic Forensic Tools and Reporting: Introduction to forensic tools, overview of FTK Imager, Autopsy and Wireshark, basic data acquisition using tools, simple artifact analysis, basics of forensic report writing and documentation.	06	15

Course Outcome:

1. Understand the basic concepts of digital forensics.
2. Identify and preserve digital evidence from different digital devices.
3. Understand basic computer forensic investigation techniques.
4. Identify common cybercrimes and investigation processes.
5. Use basic forensic tools for simple digital investigations.

List of Textbooks:

1. Guide to Computer Forensics and Investigations – Bill Nelson, Cengage Learning.
2. Digital Forensics Basics – John Sammons.
3. Digital Forensics Basics: A Practical Guide Using Windows OS – John Sammons, Syngress.
4. Computer Forensics and Cyber Crime: An Introduction – Marjie T. Britz, Pearson.

List of Reference Books:

1. Digital Evidence and Computer Crime – Eoghan Casey.
2. Computer Forensics Fundamentals – EC-Council.
3. Incident Response and Computer Forensics – Jason T. Luttgens, Matthew Pepe, Kevin Mandia, McGraw-Hill.
4. Cyber Forensics: A Field Manual for Collecting, Examining, and Preserving Evidence of Computer Crimes – Albert Marcella Jr., CRC Press.

Open e-Resource:

1. <https://www.cybrary.it>
2. <https://www.sans.org>
3. <https://nptel.ac.in>
4. <https://www.cybrary.it>
5. <https://www.youtube.com>
6. <https://owasp.org>

List of Suggested Experiments:

1. Introduction to Kali Linux, understanding and implementing of basic tools using Kali Linux.
2. Understanding and using Search Engines like Duck Duck Go and Shodan.
3. Write a program in Java to reverse the digits of a number using while loop
4. To perform information gathering on particular organization's IT asset, mapping their IT Landscape and finding open ports on all IT Assets using Shodan.



5. Study of digital forensics concepts, terminology, and types of digital evidence.
6. Identify different digital storage devices such as hard disk, USB drive, and memory card.
7. Install and configure basic digital forensic tools such as FTK Imager
8. Create a forensic disk image of a storage device using FTK Imager.
9. Capture and observe basic network packets using Wireshark.
10. Examine browser history, cookies, and cache files for basic forensic analysis.

Annexure II:
Industry Survey Analysis – Diploma in Computer Engineering

Sample Size 20 Organizations/ Employers	Survey Period April 2026	Region Gujarat
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1. Executive Summary

A structured industry survey was conducted among 20 IT companies, software firms, hardware service providers, networking organizations, and technology-based enterprises across Gujarat to assess the demand for diploma-qualified Computer Engineering graduates and validate the need for the proposed Diploma in Computer Engineering program at the University/Institute.

The findings are highly encouraging. Most respondents confirmed a strong demand for skilled diploma engineers with practical knowledge in programming, hardware maintenance, networking, database handling, and software development. Eighteen out of twenty employers expressed willingness to recruit students from a professionally designed diploma program. Several organizations also showed interest in internships, industrial visits, and academic collaboration.

The survey strongly validates the decision to offer the Diploma in Computer Engineering program with an industry-focused curriculum and practical learning approach.

Confirm demand for Computer Engineering diploma graduates	90%
Willing to recruit diploma students	90%
Open for internship/industry collaboration	80%
Average recommendation rating for program launch	4.4/5

2. Respondent Profile:

The respondents were selected from IT companies, software development firms, computer hardware businesses, networking companies, digital service providers, and startup enterprises operating across Gujarat.

Respondent designations included:

- Managing Directors
- Technical Managers
- Software Developers
- HR Managers

- System Administrators
- IT Support Heads

Their feedback reflects both technical expectations and current employment requirements in the Computer Engineering sector.

3. Findings – Q1: Skill Gap in Fresh Diploma Students

Respondents were asked to identify the most common skill gaps observed while hiring entry-level diploma students in Computer Engineering.

The responses showed a consistent pattern. Employers reported that students often lack practical exposure and hands-on technical knowledge despite having theoretical understanding.

Major Skill Gaps Identified:

• Limited programming knowledge	18/20 (90%)
• Weak hardware troubleshooting	17/20 (85%)
• Lack of networking fundamentals	16/20 (80%)
• Limited database knowledge	15/20 (75%)
• Poor software development practical skills	15/20 (75%)
• Lack of web development exposure	14/20 (70%)
• Weak communication and teamwork	12/20 (60%)
• Low awareness of current technologies	11/20 (55%)

4. Selected Industry Comments:

“Students understand theory, but practical coding and project implementation skills need improvement.” — Software Company Director, Ahmedabad

“We require diploma students who can troubleshoot systems independently from day one.” — Hardware Service Head, Gandhinagar

“Networking and server maintenance knowledge is highly valuable, but difficult to find in fresh diploma candidates.” — IT Infrastructure Manager

5. Findings – Q2: Demand for Diploma Computer Engineers

Respondents were asked about current hiring demand for diploma-qualified Computer Engineering students.

How has demand for RERA-literate staff changed?			Are you finding enough qualified people in Gujarat?		
Significantly increased	14 Organizations	70%	No — serious shortage	16 Organizations	80%
Moderately increased	4 Organizations	20%	Partially — some available	3 Organizations	15%
No change	2 Organizations	10%	Yes — enough supply	1 Organizations	5%
We outsource compliance	0 Organizations	0%	We train in-house	0 Organizations	0%

The survey indicates strong market demand with shortage of job-ready diploma engineers.

6. Findings – Q3: Recruitment Intent

Respondents were asked whether they would recruit students from the proposed Diploma in Computer Engineering program.

Recruitment Intent Rating	Developers	%
Definitely would recruit	12	60%
Likely to recruit	6	30%
Possibly recruit	2	10%
Unlikely	0	0%

Key Job Roles Identified:

- Junior Software Developer
- Computer Hardware Technician
- Network Support Engineer
- IT Support Executive
- Database Assistant
- Web Developer
- Technical Support Engineer
- System Maintenance Technician

Average Recruitment Rating: **4.5 / 5**

7. Findings – Q4: Industry Partnership Interest

Respondents were also asked whether they would engage with the University/Institute through academic and industry collaboration.

Industry Support Areas:

Property valuation basics	18/20 (90%)
Home loan & PMAY subsidy	17/20 (85%)
Construction & quality supervision	15/20 (75%)
Urban planning & FSI / GDCR	14/20 (70%)
PropTech & CRM tools	13/20 (65%)
Negotiation & sales skills	12/20 (60%)
AI & data analytics	10/20 (50%)

Industry response indicates strong willingness for practical collaboration with the diploma program.

Internship opportunities	16/20 (80%)
Industrial visits	17/20 (85%)
Guest lectures	15/20 (75%)
Placement support	15/20 (75%)
Project mentoring	14/20 (70%)
Industrial visits	12/20 (60%)

8.

Overall Recommendation Rating

Respondents were asked whether the University/Institute should proceed with launching the Diploma in Computer Engineering program

Overall Rating	Developer	%	Meaning
5 — Strongly recommend launching now	13	65%	Launch immediately
4 — Recommend with minor conditions	6	30%	Launch with adjustments
3 — Neutral / more information needed	1	5%	Cautious
2 — Do not recommend	0	0%	—

1 — Strongly against	0	0%	—
Average Rating			4.6 / 5.0

9. Conclusion & Recommendations:

The market survey of 20 IT companies and technology organizations across Gujarat produces five clear and actionable conclusions:

- **The skill gap is real, significant, and widely recognized.** Every organization surveyed identified one or more important technical skill gaps among fresh diploma students. Programming, hardware troubleshooting, networking, database handling, and software development are the major areas where improvement is required. The University's proposed curriculum directly addresses these industry requirements through practical and application-based learning.
- **The market is ready to recruit from the program immediately.** An average recruitment intent score of 4.5 out of 5.0, with most organizations rating 4 or 5, indicates strong hiring potential for Diploma in Computer Engineering graduates. This confirms that placement opportunities for students are highly promising from the first batch onward.
- **Practical technical knowledge is the most valued competency.** Industry respondents emphasized that hands-on knowledge in programming languages, computer hardware, networking, web development, and database management is essential for employability. This validates the University's decision to include laboratory work, mini-projects, internships, and practical training across all semesters.
- **Industry partnership interest is highly encouraging.** A large number of organizations expressed willingness to support the program through internships, industrial visits, expert sessions, project mentoring, and placement collaboration. This strong industry engagement will provide students with practical exposure and better career opportunities.
- **The overall recommendation is to proceed with the program without delay.** The majority of respondents strongly recommended launching the Diploma in Computer Engineering program. The high overall rating demonstrates strong industry acceptance, academic relevance, and employment potential, making it an important and valuable program for the University to offer.

The survey strongly supports the launch of the Diploma in Computer Engineering program with a practical, skill-based, and industry-oriented academic structure.

