GANDHINAGAR UNIVERSITY

Gandhinagar Institute of Technology

Academic Regulation & Curriculum

for

Diploma Engineering

in

Cyber Forensics and Information Security (CFIS) Department

D.TECH. PROGRAMME

***w.e.f.* 2026-27**

Preamble

We, the members of the Cyber Forensics and Information Security Department, are committed to promoting knowledge, innovation, and technical excellence in the field of Cyber Forensics and Information Security. 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 Cyber Forensics and Information Security program has been revised according to the guidelines of UGC, AICTE and NCrF 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 Cyber Forensics and Information Security, 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(POs)

PO1: Basic and Discipline-Specific Knowledge
Apply knowledge of mathematics, science, computer fundamentals, networking, cyber security, and information security principles to solve engineering and security-related problems.

PO2: Problem Analysis
Identify, analyze, and troubleshoot well-defined cyber security, network security, and information security problems using standard methods and tools.

PO3: Design and Development of Solutions
Design and implement secure systems, networks, and applications to address identified security requirements and mitigate cyber threats.

PO4: Engineering Tools, Experimentation, and Testing
Use modern cyber security tools, security testing techniques, digital forensic tools, and industry-standard practices to assess and improve system security.

PO5: Engineering Practices for Society, Sustainability, and Ethics
Apply cyber security and information security practices while considering legal, ethical, privacy, societal, and environmental responsibilities.

PO6: Project Management and Teamwork
Function effectively as an individual and as a member or leader of multidisciplinary teams, applying project management principles to security-related projects.

PO7: Communication and Professional Skills
Communicate effectively with technical and non-technical stakeholders through reports, documentation, presentations, and discussions related to cyber security activities.

PO8: Life-Long Learning
Recognize the need for continuous learning and professional development to adapt to evolving cyber threats, emerging technologies, security standards, and industry practices.

3. Program Educational Objectives(PEOs)

PEO-I: Professional Competence

Prepare graduates with strong foundations in cyber security, information security, networking, and computing technologies to pursue successful careers or higher studies in related fields.

PEO-II: Technical and Analytical Skills

Equip graduates with the ability to identify, analyze, and solve cyber security and information security challenges using appropriate tools, techniques, and industry best practices.

PEO-III: Secure System Development and Innovation

Develop the capability to design, implement, and maintain secure systems and networks while adapting to emerging technologies and evolving security threats.

PEO-IV: Ethical and Social Responsibility

Instill professional ethics, legal awareness, and a sense of responsibility toward protecting information assets, privacy, and digital infrastructure for the benefit of society.

PEO-V: Lifelong Learning and Professional Growth

Encourage graduates to engage in continuous learning, professional development, industry certifications, and skill enhancement to remain current in the rapidly changing field of cyber security.

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 Cyber Forensics and Information Security 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 Cyber Forensics and Information Security 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.

5. Credit Summary for D.Tech. Course in CFIS with effect from 2026-2027

Sl. No.	Course Type	CFIS Cradit
1.	Humanities and Social Sciences including Management Courses	6
2.	Basic Science Courses	12
3.	Engineering Science Courses including Workshop, Drawing, Basics of Electrical / Mechanical / Computer, etc.	20
4.	Program Core Courses	52
5.	Program Elective Course Courses relevant to chosen Specialization / Branch	13

6.	Project Work, Seminar and Internship in industry or elsewhere	0
7.	Mandatory course Courses (Non-credit) [Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Traditional Knowledge]	19
8.	**Total**	122

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):

- **Program Core Courses contribute 42.62%**, which falls within AICTE recommended range of **40–50%**.
- **Program Electives contribute 10.66%**, aligned with recommended **10–15%** for specialization flexibility.
- **Project Work and Internship account for 15.57%**, slightly above but very close to ideal **10–15%**, showing strong practical orientation.
- **Engineering Science Courses contribute 16.39%**, well within recommended **15–20%** range.
- **Humanities (4.92%) and Basic Science (9.84%) are slightly below ideal norms**, but acceptable for specialized diploma programs such as CFIS.

5. Curriculum Structure

(Gandhinagar Institute of Technology 01)								
Program Name: Diploma Enginerring			**Branch Name (Code): CFIS**					
Semester / Year : 01 / 01								
NCrF LEVEL	**Subject Code**	**Course Type**	**Subject Name**	**Credit**	**Hours per week**			
					L	**T**	**P**	**Total**
NCR – 4.5	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): CFIS**					
Semester / Year: 02 / 01								
NCrF LEVEL	**Subject Code**	**Course Type**	**Subject Name**	**Credit**	**Hours per week**			
					L	**T**	**P**	**Total**
NCR – 4.5	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): CFIS**
Semester / Year : 03 / 02	

NCrF LEVEL	**Subject Code**	**Course Type**	**Subject Name**	**Credit**	**Hours per week**			
					L	**T**	**P**	**Total**
NCR – 5	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): CFIS**
Semester / Year : 04 /02	

NCrF LEVEL	**Subject Code**	**Course Type**	**Subject Name**	**Credit**	**Hours per week**			
					L	**T**	**P**	**Total**
NCR – 5.0	101270401	Program Core	Computer Networking	4	3	0	2	5

	101190401	Program Core	Introduction to Software Engineering	4	3	0	2	5
	101270402	Program Core	Machine Learning and Cyber Security	4	3	0	2	5
	101270403	Program Core	Secure Software Coding	4	3	0	2	5
	101270404	Program Core	Risk Management and Compliance	3	3	0	0	3
		Audit Course-I	Audit Course-I	0	2	0	0	2
	100000401	IKS	Vedic Mathematics	2	2	0	0	2
			Total	**21**				**27**
		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 (127)**
Program Name: Diploma Enginerring	**Branch Name (Code): CFIS (127)**
Semester / Year : 05 / 03	

NCrF LEVEL	**Subject Code**	**Course Type**	**Subject Name**	**Credit**	**Hours per week**			
					L	**T**	**P**	**Total**
NCR – 5.5	101270501	Program Core	Fundamental of Kali Linux	4	3	0	2	5
	101270503	Program Core	Firewall Concepts and Technologies	4	3	0	2	5
	101240503	Minor Project	Project-I	3	0	0	6	6
		Professional Elective	Professional Elective-I	4	3	0	2	5
	101220501	Program Core	Basic of Information Security	3	2	0	2	4
	101220503	Summer Internship	Summer Internship-I	3	0	0	6	6
			Total	**21**				**31**
	Professional Elective							

	101270502	Professional Elective-I	Digital Security in Social Networks
	101190502	Professional Elective-I	Fundamental of IOT

Program Name: Diploma Enginerring			**Branch Name (Code): CFIS (127)**					
Semester / Year : 06 / 03								
NCrF LEVEL	**Subject Code**	**Course Type**	**Subject Name**	**Credit**	**Hours per week**			
					L	**T**	**P**	**Total**
NCR – 5.5	101270601	Program Core	Social Engineering	3	3	0	0	3
	101240602	Major Project	Project-II	6	0	0	12	12
	101270602	Program Core	Fundamentals of Malware	4	3	0	2	5
		Professional Elective	Professional Elective-II	5	3	0	4	7
		Professional Elective	Professional Elective-III	4	3	0	2	5
			Total	**22**				**32**
	Professional Elective							
	101240603	Professional Elective-II	Basic of Digital Forensics					
	101270603	Professional Elective-II	Intrusion Detection System					
	Professional Elective							
	101270604	Professional Elective-III	Vulnarability Assessment and Penetration Testing					
	101270605	Professional Elective-III	Cyber Forensics					

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 Cyber Forensics and Information Security 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 Cyber Forensics and Information Security 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 Cyber Forensics and Information Security, 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 Cyber Forensics and Information Security program. The department shall facilitate access to relevant books, journals, e-resources, programming manuals, technical publications, online learning platforms, and software documentation related to Cyber Forensics and Information Security 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 Cyber Forensics and Information Security 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 Cyber Forensics and Information Security 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 Cyber Forensics and Information Security, ensuring students gain both theoretical knowledge and practical exposure.

Faculty members from Cyber Forensics and Information Security 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 Cyber Forensics and Information Security 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 Cyber Forensics and Information Security 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 assess the demand and career opportunities in the field of Cyber Forensics and Information Security. The survey findings reveal a significant rise in cybersecurity threats, cybercrimes, data breaches, identity theft, ransomware attacks, phishing incidents, and digital fraud across government, corporate, banking, healthcare, and educational sectors.

With the rapid digital transformation of organizations and increased dependence on cloud computing, online transactions, IoT devices, and digital communication platforms, the need for cybersecurity professionals and digital forensic experts has grown substantially. Organizations now prioritize data protection, network security, incident response, risk management, compliance, and cybercrime investigation.

The survey indicates strong demand for professionals skilled in ethical hacking, digital evidence collection, malware analysis, network security, cryptography, vulnerability assessment, penetration testing, and cyber law. Companies and institutions are actively recruiting candidates for roles such as Security Analyst, Cyber Forensics Investigator, Information Security Associate, SOC Analyst, Incident Response Analyst, and Network Security Administrator.

Leading organizations such as Cisco, Palo Alto Networks, Fortinet, IBM, and government cybersecurity agencies continue to invest significantly in information security infrastructure and cyber defense technologies.

National initiatives such as Digital India, Cyber Security Policy, e-Governance expansion, digital banking systems, and increasing regulatory compliance requirements have further strengthened the demand for skilled cybersecurity professionals in India.

Based on the market survey analysis, launching a Diploma program in Cyber Forensics and Information Security is highly relevant and justified. The program will prepare students with practical and industry-oriented skills required to address modern cyber threats, investigate digital crimes, and secure information systems effectively.

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 / Cyber Forensics and Information Security / 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)**				
				Theory		**Practical**		
Lecture	**Tutorial**	**Practical**	**Credit**	**University Assessment**	**Continuous Assessment**	**University Assessment**	**Continuous Assessment**	**Total**
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-movier'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.

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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)**				
				Theory		**Practical**		
Lecture	**Tutorial**	**Practical**	**Credit**	**University Assessment**	**Continuous Assessment**	**University Assessment**	**Continuous Assessment**	**Total**
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 kind 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

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

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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)**				
				Theory		**Practical**		
Lecture	**Tutorial**	**Practical**	**Credit**	**University Assessment**	**Continuous Assessment**	**University Assessment**	**Continuous Assessment**	**Total**
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 1st 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 2nd 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

	simple problems on impulse, Newtons 3rd 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.

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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)**				
				Theory		**Practical**		
Lecture	**Tutorial**	**Practical**	**Credit**	**University Assessment**	**Continuous Assessment**	**University Assessment**	**Continuous Assessment**	**Total**
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) Vajrasan (Hand under foot pose) Pada-hastasana (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

3	Prepare report on any sports events including associated rules, playground specification, rules for judgement, etc.)	2	20

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 SutrasSwami 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.

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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)**				
				Theory		**Practical**		
Lecture	**Tutorial**	**Practical**	**Credit**	**University Assessment**	**Continuous Assessment**	**University Assessment**	**Continuous Assessment**	**Total**
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.

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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)**				
				Theory		**Practical**		
Lecture	**Tutorial**	**Practical**	**Credit**	**University Assessment**	**Continuous Assessment**	**University Assessment**	**Continuous Assessment**	**Total**
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

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.

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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-1and 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 Promotors 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

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DIPLOMA 2nd SEMESTER

Civil Engineering / Mechanical Engineering / Electrical Engineering / Electronics and Communication Engineering / Cyber Forensics and Information Security / 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)**				
				Theory		**Practical**		
Lecture	**Tutorial**	**Practical**	**Credit**	**University Assessment**	**Continuous Assessment**	**University Assessment**	**Continuous Assessment**	**Total**
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. ***(In Exam, specific method not to be asked. Students can draw polygon by any method.)***	4	10
2	**Engineering Curves:** 1. Applications of Engineering Curves, Construction of Conical curves. 2. Drawing of cycloidal Curves, Involutes and Spirals. ***(In Exam, specific method not to be asked. Students can draw these curves by any method.)***	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

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

3. https://nptel.ac.in/courses/112103019
4. 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 / Cyber Forensics and Information Security / 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)**				
				Theory		**Practical**		
Lecture	**Tutorial**	**Practical**	**Credit**	**University Assessment**	**Continuous Assessment**	**University Assessment**	**Continuous Assessment**	**Total**
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%

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.electronicsandyou.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 / Cyber Forensics and Information Security / 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)**				
				Theory		**Practical**		
Lecture	**Tutorial**	**Practical**	**Credit**	**University Assessment**	**Continuous Assessment**	**University Assessment**	**Continuous Assessment**	**Total**
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

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 ||", 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)**				
				Theory		**Practical**		
Lecture	**Tutorial**	**Practical**	**Credit**	**University Assessment**	**Continuous Assessment**	**University Assessment**	**Continuous Assessment**	**Total**
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 axleand 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 / Cyber Forensics and Information Security / 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)**				
				Theory		**Practical**		
Lecture	**Tutorial**	**Practical**	**Credit**	**University Assessment**	**Continuous Assessment**	**University Assessment**	**Continuous Assessment**	**Total**
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

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.

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Civil Engineering / Mechanical Engineering / Electrical Engineering / Electronics and Communication Engineering / Cyber Forensics and Information Security / 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)**				
				Theory		**Practical**		
Lecture	**Tutorial**	**Practical**	**Credit**	**University Assessment**	**Continuous Assessment**	**University Assessment**	**Continuous Assessment**	**Total**
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 વૈ□ાનનક 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.

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Civil Engineering / Mechanical Engineering / Electrical Engineering / Electronics and Communication Engineering / Cyber Forensics and Information Security / 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)**				
				Theory		**Practical**		
Lecture	**Tutorial**	**Practical**	**Credit**	**University Assessment**	**Continuous Assessment**	**University Assessment**	**Continuous Assessment**	**Total**
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 tiles **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

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, Mahndra 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 / Cyber Forensics and Information Security / 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)**				
				Theory		**Practical**		
Lecture	**Tutorial**	**Practical**	**Credit**	**University Assessment**	**Continuous Assessment**	**University Assessment**	**Continuous Assessment**	**Total**
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 Cyber Forensics and Information Security /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)				
				Theory		Practical		
Lecture	Tutorial	Practical	Credit	University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	Total
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 caseTime 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 Prenctice-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 liked list.

Gandhinagar Institute of Technology
Diploma Cyber Forensics and Information Security /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)**				
				Theory		**Practical**		
Lecture	**Tutorial**	**Practical**	**Credit**	**University Assessment**	**Continuous Assessment**	**University Assessment**	**Continuous Assessment**	**Total**
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), Numeric Functions (abs, power, mod, round, trunc, sqrt),Character Fucntions (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	8	14

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 minimum10 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,
6. 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
8. 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,
10. 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,
18. Correlated) (write minimum 3 level subquery)
19. Perform queries to Create, alter and update views
20. Implement Practical-1 again with Domain Integrity, Entity
21. 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 Cyber Forensics and Information Security /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)**				
				Theory		**Practical**		
Lecture	**Tutorial**	**Practical**	**Credit**	**University Assessment**	**Continuous Assessment**	**University Assessment**	**Continuous Assessment**	**Total**
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:

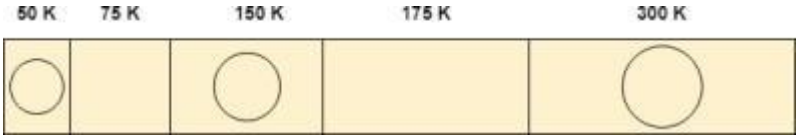
1. https://boonsuen.com/process-scheduling-solver
2. http://cpuburst.com/ganttcharts.html
3. https://codepen.io/faso/pen/zqWGQW
4. https://www.tutorialspoint.com
5. www.w3schools com
6. https://nptel.ac.in/courses/106106144

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 CFIS
Semester 3

Subject Code: 101270301	**Subject Title:** Basics of Cryptography
Pre-requisite: Basic knowledge of computer network and security.	

Course Objective:

1. Explain the importance and application of each of confidentiality, integrity, authentication and availability
2. Understand various cryptographic algorithms.
3. Understand the basic categories of threats to computers and networks
4. Understand Intrusions and intrusion detection
5. Discuss Web security and Firewalls

Teaching Scheme (Hours per week)				**Evaluation Scheme (Marks)**				
				Theory		**Practical**		
Lecture	**Tutorial**	**Practical**	**Credit**	**University Assessment**	**Continuous Assessment**	**University Assessment**	**Continuous Assessment**	**Total**
3	0	2	4	60	40	30	20	150

Subject Contents			
Sr. No	**Topic**	**Total Hours**	**Weight (%)**
1	Security Concepts Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security	07	15
2	Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.	09	20
3	Symmetric key Ciphers Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream ciphers, RC4.	10	22
4	Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, Knapsack Algorithm.	09	20
5	Cryptographic Hash Functions Message Authentication, Secure Hash Algorithm (SHA-512), Message authentication codes: Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme.	09	23

Course Outcome:

1. Classify the various classical encryption techniques.
2. Compare various public key cryptographic techniques.
3. Evaluate authentication and hash algorithms
4. Choose intrusion detection and its solutions to overcome the attacks.
5. Develop strong password methods

List of Textbooks:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, Mc Graw Hill, 3rd Edition

List of Reference Books:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, Mc Graw Hill, 3rd Edition
3. Introduction to Network Security: Neal Krawetz, Cengage Learning
4. Network Security and Cryptography: Bernard Menezes, Cengage Learning

List of Suggested Experiments:

10-12 experiments based on the syllabus covered above will be performed and evaluated on a continuous basis.

Gandhinagar Institute of Technology
Diploma CFIS
Semester 3

Subject Code: 101270302	**Subject Title:** Cyber Ethics, Privacy and Legal Issues
Prerequisite: Basic understanding of information technology concepts and awareness of ethical, privacy, and legal concerns in cyberspace.	

Course Objective:

1. **Understand the categories of cybercrimes and the evolution of cyber law in India, particularly the IT Act, 2000 and its amendments.**
2. **Examine the roles and powers of various authorities under the IT Act and assess key penalties, offences, and jurisdictional issues.**
3. **Analyze the legal framework of E-commerce, digital signatures, and data protection, including sensitive personal data under Indian law.**
4. **Explore intellectual property rights in cyberspace, including domain names, trademarks, copyrights, and patent issues.**
5. **Evaluate cyber ethics, net neutrality, privacy, surveillance, and the global perspective on cyber laws through case laws and case studies.**

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

Subject Contents			
Sr. No	**Topic**	**Total Hours**	**Weight (%)**
1	Cyber Crimes Categories and kinds, Evolution of the IT Act, IT Act, 2000, various authorities under IT Act and their powers. Penalties & Offences, amendments.	10	24
2	Case Laws on Cyber Space Jurisdiction and Jurisdiction issues under IT Act, E –commerce and Laws in India, Digital / Electronic Signature in Indian Laws.	10	24
3	Intellectual Property Rights, Domain Names and Trademark Disputes, Copyright in Computer Programmes, Concept of Patent Right, Sensitive Personal Data or Information in Cyber Law, Cyber Law an International Perspective.	10	24

4	Cyber Ethics and Code, Net Neutrality, Free speech and Censorship in Cyberspace, Intellectual Property in Cyberspace, Privacy Rights and Surveillance.	10	24
5	Case Studies and Case Laws	2	4

Course Outcome:

1. Demonstrate comprehensive knowledge of cybercrime categories and critically analyze the evolution and framework of the Information Technology Act, 2000, including its amendments.

2. Identify and interpret the powers and functions of statutory authorities under the IT Act and apply legal principles to assess cyber offences and penalties.

3. Evaluate legal provisions related to E-commerce, digital/electronic signatures, and protection of sensitive personal data in India.

4. Analyze intellectual property issues in cyberspace, including domain name disputes, copyright in software, and patent rights.

5. Critically assess global perspectives on cyber law, including cyber ethics, net neutrality, privacy, surveillance, and freedom of expression, using case laws and case studies.

List of Textbooks:

1 “Cyber law and intellectual property rights” by R Raghav from Cybertech

2 intellectual property rights and Cyber law by Joan Ruttenberg from Havard University

List of Reference Books:

1 Sushma Arora, Raman Arora, Cyber Crimes & Laws, 4th Edition 2021, Publisher: Taxmann, ISBN-10: 9390712491

2 N S Nappinai, Technology Laws Decoded, 1st Edition, Publisher: Lexis Nexis, ISBN: 9789350359723

3 Suresh T. Vishwanathan, The Indian Cyber Law, Bharat Law House New Delhi

4 P.M. Bukshi and R.K. Suri, Guide to Cyber and E –Commerce Laws, Bharat Law House, New Delhi

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)				
				Theory		Practical		
Lecture	Tutorial	Practical	Credit	University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	Total
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 Sanyam and Swasthya - Practice Exercises and Case Studies will be taken up in Practice Sessions.	8	17
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 Cyber Forensic and Information Security/ Artificial Intelligence and Machine Learning
Semester 4

Subject Code: 101270401	**Subject Title: Computer Networking**
Pre-requisite:	

Course Objective:

1. To familiarize students with the fundamental concepts of computer networks, including network architecture and layered models such as OSI and TCP/IP.
2. To develop a thorough understanding of data transmission techniques, networking protocols, addressing methods, routing, and switching concepts.
3. To enhance practical skills in network design, configuration, troubleshooting, and basic client–server communication using socket programming.
4. To enable students to evaluate the performance and efficiency of networking protocols and understand core network security principles.
5. To empower students to design and implement simple network-based applications using socket programming.

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

Subject Contents			
Sr. No	**Topic**	**Total Hours**	**Weight (%)**
1	**Basics of Computer Networks:** Introduction to computer networks, including their definition and necessity; classification of computer networks based on scope and connection methods; line configuration and network topologies; overview of standardization organizations and networking protocols; applications and key features of various types of servers.	07	20
2	**Reference Models for Network Communication:** Study of the OSI model and the functions of each of its layers; overview of the TCP/IP model and the roles of its layers; and a comparative analysis of the OSI and TCP/IP models.	07	30
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	20
4	**IP Protocol:** Introduction to Internet Protocol with emphasis on IPv4 and IPv6, including their features, functioning, and a comparative study of 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. CompareIPv4 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. To study and understand the network layers of the OSI model.
3. To prepare and test straight-through and crossover UTP cables.
4. To study and examine various networking devices available in the department/institute, such as 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 Cyber Forensics and Information Security/ Computer Science & Engineering/ Information Technology/Cyber Forensic and Information Security/ Artificial Intelligence and Machine Learning
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)**				
				Theory		**Practical**		
Lecture	**Tutorial**	**Practical**	**Credit**	**University Assessment**	**Continuous Assessment**	**University Assessment**	**Continuous Assessment**	**Total**
3	0	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

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 Rambaugh, 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 CFIS
Semester 4

Subject Code: 101270402	**Subject Title:** Machine Learning and Cyber Security
Prerequisite: Must have completed the course on Introduction to Linear Algebra and have basic familiarity with probability theory.	

Course Objective:

1. To introduce the fundamentals of machine learning and its role in enhancing cyber security.
2. To explore time series analysis and ensemble modeling for predicting and detecting cyber-attacks.
3. To examine techniques for identifying and classifying malicious URLs using heuristics and ML models.
4. To analyze the use of neural networks and AI in defeating CAPTCHA systems.
5. To apply data science methods for detecting email fraud, spam, and network anomalies using various ML algorithms.

Teaching Scheme (Hours per week)				**Evaluation Scheme (Marks)**				
				Theory		**Practical**		**Total**
Lecture	**Tutorial**	**Practical**	**Credit**	**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 Machine Learning in Cyber security-** Definitions of machine learning and use cases, delving into machine learning in the cyber security world, Different types of machine learning systems, Different data preparation techniques, Machine learning architecture, A more detailed look at statistical models and machine learning models, Model tuning to ensure model performance and accuracy, Machine learning tools.	10	23
2	**Time Series Analysis and Ensemble Modeling -** Time series and its different classes, Time series decomposition, Analysis of time series in cyber security, Prediction of DDoS attack, Ensemble learning methods and voting ensemble methods to detect cyber-attacks.	08	18
3	**Segregating Legitimate and Lousy URLs -** Understanding URLs and how they fit in the internet address scheme, introducing malicious URLs, looking at the different ways malicious URLs propagate, using heuristics to detect malicious URLs, using machine learning to detect malicious URLs.	08	18
4	**Knocking Down CAPTCHAs** - Characteristics of CAPTCHAs, using artificial intelligence to crack CAPTCHAs, Types of CAPTCHAS, Solving CAPTCHAs with neural networks	04	9
5	Using Data Science to Catch Email Fraud and Spam and Efficient Network Anomaly Detection Using k-means - Fraudulent emails and spoofs, Types of email fraud, Spam detection using the Naive Bayes algorithm, Featurization techniques that convert text-based emails into numeric values, Spam detection with logistic regression, Get hold of information, Modify information, Disrupt services, Perform distributed denial of service to and from the server where information is stored, Exploit using malware and viruses, Privilege escalation and credential compromise	14	32

Course Outcome:

1. Design and implement machine learning models tailored for cyber security tasks.
2. Apply time series and ensemble methods to predict and mitigate threats like DDoS attacks.
3. Detect malicious URLs and understand their propagation mechanisms using ML and heuristics

4. Understand and crack CAPTCHA mechanisms using artificial intelligence techniques.
5. Develop and deploy models for spam detection, email fraud analysis, and anomaly detection in networks.

List of Textbooks:

1 Clarence Chio and David Freeman (2018). Machine Learning and Security: Protecting Systems with Data and Algorithms O'REILLY Publications.
2 McKinney, W Brij B. Gupta and Quan Z. Sheng. (2019). Machine Learning for Computer and Cyber Security: Principle, Algorithms, and Practices (Cyber Ecosystem and Security), CRC Press Publication

List of Reference Books:

1 **Clarence Chio and David Freeman (2018).** *Machine Learning and Security: Protecting Systems with Data and Algorithms*. O'REILLY Media.
2 **Rajvardhan Oak (2023).** *10 Machine Learning Blueprints You Should Know for Cybersecurity*. Packt Publishing.
3 **Yassine Maleh, Mamoun Alazab, and Soufyane Mounir (2023).** *Computational Intelligence for Cybersecurity Management and Applications*. CRC Press.
4 **Bojan Kolosnjaji, Huang Xiao, Peng Xu, and Apostolis Zarras (2024).** *Artificial Intelligence for Cybersecurity*. Packt Publishing.

List of Suggested Experiments:

10-12 experiments based on the syllabus covered as above will be performed and evaluated on a continuous basis.

Gandhinagar Institute of Technology
Diploma Cyber Forensic and Information Security
Semester 4

Subject Code: 101270403	**Subject Title: Secure Software Coding**
Pre-requisite: Basic knowledge of programming, operating systems, computer networks, and fundamental cyber security concepts.	

Course Objective:

1. Demonstrate effective use of secure coding tools and environments for analysis, testing, documentation, and vulnerability detection.
2. Employ version control systems (e.g., Git) to support collaborative development, secure code management, and change tracking.
3. Use integrated development environments (IDEs) and productivity tools to streamline coding workflow, debug securely, and follow secure coding standards.
4. Apply project management and communication tools to coordinate secure software development tasks in academic and professional settings.
5. Integrate various security tools and methodologies to create efficient, reproducible, and well-documented secure software solutions.

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

Subject Contents			
Sr. No.	**Topic**	**Total Hours**	**Weight (%)**
1	**Introduction to Secure Software Development**: Definition of secure coding, need and importance, common software vulnerabilities, CIA triad, threat modeling, secure SDLC, attack surface, overview of OWASP & CERT secure coding guidelines.	**7**	**10**
2	**Secure Coding Practices (C/C++ & Python)**: Input validation & sanitization, safe handling of data types, pointers & memory, preventing buffer overflow, race conditions, error & exception handling, secure file handling, logging, avoiding insecure functions, secure library usage.	**10**	**20**
3	**pplication Secure Coding**: OWASP Top 10, SQL Injection, XSS, CSRF, OS nd injection, secure session management, authentication & authorization, rd hashing, secure API coding, secure cookie handling, preventing insecure bject references (IDOR).	**11**	**25**
4	**Cryptography for Secure Coding**: Symmetric & asymmetric encryption, hashing & salting, digital signatures, certificates, secure key generation & management, using cryptographic libraries (Python/C), TLS/SSL basics, secure communication coding practices.	**9**	**20**
5	**Secure Software Testing & Code Review**: Static & dynamic analysis,	**8**	**25**

	penetration testing for applications, fuzz testing, automated tools (SonarQube, Bandit, Flawfinder), code auditing process, threat validation, secure documentation, vulnerability fixing.		

Course Outcomes (COs)

1. Identify and describe major types of cybercrimes and their impact on software systems.
2. Describe system, network, and web application vulnerabilities and their exploitation techniques.
3. Configure and manage firewalls on different platforms for various attack scenarios.
4. Evaluate and use network defense tools and web application security tools to detect and prevent attacks.
5. Investigate a cybercrime case, prepare proper documentation/report, and apply relevant cyber laws.

List of Textbooks

1. Cyber Security A Complete Guide, 2024 Edition, Gerardus Blokdyk, 2024
2. The New Outstanding 2024 Guide to Cybersecurity: Everything You Need to Know, Kaylee Bryant, 2024
3. Cyber Security for Next-Generation Computing Technologies, Inam Ullah Khan, Mariya Ouaissa, Mariyam Ouaissa, 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, Nina Godbole & Sunit Belpure, Wiley Publication

Open e-Resources

1. NPTEL Online Course – Cyber Security
   https://onlinecourses.nptel.ac.in/noc23_cs127/preview
2. SWAYAM Online Course – Cyber Security
   https://onlinecourses.swayam2.ac.in/nou19_cs08/preview
3. **Coursera – Cyber Security Specialization**
   https://www.coursera.org/specializations/cyber-security
4. **Coursera – Cybersecurity: Attack and Defense**
   https://www.coursera.org/specializations/cybersecurity-attack-and-defense

List of Suggested Experiments / Practicals

1. Demonstration of email phishing attack and preventive measures.
2. Installation and configuration of anti-virus software.
3. Introduction to Kali Linux and its basic tools.
4. Packet capturing and filtering using Wireshark.
5. TCP scanning and port scanning using Nmap.
6. TCP/UDP connectivity testing using Netcat.
7. Network vulnerability assessment using OpenVAS.
8. Web application security testing using DVWA.
9. Manual SQL Injection using DVWA.
10. Automated SQL Injection using SQLMap.

Gandhinagar Institute of Technology
Diploma Cyber Forensic and Information Security
Semester 4

Subject Code: 101270404	Subject Title: Risk Management and Compliances
Pre-requisite: Basic understanding of cyber security concepts, threats, and organizational security needs.	

Course Objective:

1. Understand the fundamentals of risk, threats, vulnerabilities, and risk assessment methodologies.
2. Identify organizational security requirements and apply risk mitigation strategies.
3. Explain major cybersecurity laws, regulations, standards, and compliance frameworks.
4. Apply governance, policy development, and auditing practices in cybersecurity environments.
5. Evaluate and implement industry-recognized risk management and compliance processes.

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

Subject Contents			
Sr. No.	**Topic**	**Total Hours**	**Weight (%)**
1	**Introduction to Risk Management:** Definition of risk, threat and vulnerability, risk types, risk factors, risk assessment concepts, risk calculation, risk appetite, risk tolerance, overview of NIST Risk Management Framework (RMF).	**8**	**20%**
2	**Risk Assessment Methods & Processes:** Qualitative & quantitative analysis, asset valuation, impact analysis, likelihood assessment, risk prioritization, risk treatment (avoid, accept, transfer, mitigate), Business Continuity Planning (BCP), Disaster Recovery Planning (DRP).	**10**	**25%**
3	**Compliance & Regulatory Requirements:** Overview of major laws & regulations – IT Act 2000 & Amendments, GDPR, HIPAA, PCI-DSS, SOX, ISO 27001/27002 standards, audit processes, documentation requirements, cyber forensics compliance.	**9**	**20%**
4	**Governance, Policies, and Frameworks:** Security policies, procedures, guidelines, governance models, NIST CSF, COBIT, organizational compliance strategies, third-party risk management, supply chain risk.	**9**	**20%**
5	**Risk Monitoring & Reporting:** Continuous monitoring, incident handling procedures, audit reporting, compliance verification, gap assessment, remediation planning, security metrics and dashboards.	**9**	**15%**

Course Outcome:

1. Identify and categorize various types of risks, threats, and vulnerabilities in an organization.
2. Conduct basic risk assessments using standard risk management models.
3. Describe compliance standards such as ISO 27001, GDPR, HIPAA, and PCI-DSS.
4. Apply governance and policy frameworks to improve organizational security posture.

5. Prepare audit reports and recommend appropriate risk mitigation strategies.

List of Textbooks:

1. Cyber Security A Complete Guide, 2024 Edition Gerardus Blokdyk (2024)
2. The New Outstanding 2024 Guide to Cybersecurity Kaylee Bryant (2024)
3. Cyber Security for Next-Generation Computing Technologies
4. Inam Ullah Khan, Mariya Ouaissa, Mariyam Ouaissa (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** – Nina Godbole & Sunit Belpure (Wiley)

Open e-Resource:

1. https://www.coursera.org/learn/ethical-hacking-with-kali-linux Coursera
2. https://www.coursera.org/specializations/kali-linux-ethical-hacking-pentesting Coursera
3. https://www.coursera.org/learn/packt-an-introduction-to-ethical-hacking-with-kali-linux-rxfou Coursera
4. https://www.coursera.org/learn/kali-linux Coursera
5. https://learn.cybergita.com/courses/kali-linux-full-course/ learn.cybergita.com

List of Suggested Experiments:

1. Installation of Kali Linux on VirtualBox/VMware.
2. Basic Linux command-line operations and file handling.
3. User and group management; file permissions & access control.
4. Network configuration and troubleshooting using Linux tools.
5. Scanning and enumeration using Nmap.
6. Packet analysis using Wireshark.
7. Vulnerability assessment using OpenVAS.
8. Web application testing using Burp Suite (basic).
9. Password attacks using Hydra / John the Ripper.
   Introduction to Metasploit Framework basics.

Gandhinagar Institute of Technology
Diploma Cyber Forensics and Information Security/ Computer Science & Engineering/ Information Technology/Cyber Forensic and Information Security/ Artificial Intelligence and Machine Learning
Semester 4

Subject Code: 101240404	**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)**				
				Theory		**Practical**		
Lecture	**Tutorial**	**Practical**	**Credit**	**University Assessment**	**ContinuousAssessment**	**University Assessment**	**ContinuousAssessment**	**Total**
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 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	10	30

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 Cyber Forensics and Information Security/ Computer Science & Engineering/ Information Technology/Cyber Forensic and Information Security/ Artificial Intelligence and Machine Learning
Semester 4

Subject Code: 101190403	**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)**				
				Theory		**Practical**		
Lecture	**Tutorial**	**Practical**	**Credit**	**University Assessment**	**Continuous Assessment**	**University Assessment**	**Continuous Assessment**	**Total**
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	10	30

	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		
3	**Remaking Yourself:** Students learn how self-improvement enables them to secure a bright future for themselves. They will learn 6 powerful thoughtprocesses 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 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)**				
				Theory		**Practical**		
Lecture	**Tutorial**	**Practical**	**Credit**	**University Assessment**	**Continuous Assessment**	**University Assessment**	**Continuous Assessment**	**Total**
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 %

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 Cyber Forensic and Information Security
Semester 5

Subject Code: 101270501	**Subject Title: Fundamental of Kali Linux**
Pre-requisite: Basic understanding of operating systems, computer networks, and introductory cybersecurity concepts.	

Course Objective:

1. Understand the fundamentals of Kali Linux and its role in cybersecurity.
2. Explore Linux architecture, command-line operations, and system management.
3. Use essential Kali Linux tools for reconnaissance, scanning, and information gathering.
4. Perform basic penetration testing tasks using built-in security tools.
5. Apply Kali Linux utilities to create structured, efficient, and well-documented security workflows.

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

Subject Contents			
Sr. No.	**Topic**	**Total Hours**	**Weight (%)**
1	**Introduction to Kali Linux:** Overview of Linux distributions, Kali Linux history & features, installation methods (bare metal, VM, live boot), file system hierarchy, desktop environments, Linux permissions.	**8**	**20%**
2	**Linux Fundamentals:** Basic commands, file operations, directory navigation, user & group management, process control, package management (APT), system logs, Bash scripting basics, system monitoring tools.	**10**	**25%**
3	**Networking in Kali Linux:** Network configuration, IP addressing, routing, networking commands (ping, netstat, ifconfig, ip, traceroute), SSH, FTP, firewall basics (UFW), network troubleshooting.	**9**	**20%**
4	**Kali Linux Security Tools:** Introduction to Metasploit, Nmap, Wireshark, Nikto, OpenVAS, Burp Suite basics, password-cracking tools (Hydra, John the Ripper), social engineering tools.	**10**	**25%**
5	**Penetration Testing Workflow:** Information gathering, scanning, enumeration, exploitation basics, post-exploitation concepts, reporting, ethical hacking guidelines and responsible disclosure.	**8**	**10%**

Course Outcome:

1. Explain the architecture, components, and working of Kali Linux.
2. Use Linux commands for file handling, process management, networking, and system administration.
3. Employ Kali Linux tools for scanning, enumeration, and vulnerability assessment.
4. Perform basic penetration testing tasks using Kali Linux environments.

5. Document findings and create structured reports based on security testing activities.

List of Textbooks:

1. Kali Linux Revealed: Mastering the Penetration Testing Distribution Raphael Hertzog, Jim O'Gorman
2. The Hacker Playbook – Practical Guide to Penetration Testing Peter Kim
3. Linux Basics for Hackers OccupyTheWeb

List of Reference Books:

1. Penetration Testing: A Hands-On Introduction to Hacking – Georgia Weidman
2. Linux Command Line and Shell Scripting Bible – Richard Blum & Christine Bresnahan
3. Metasploit: The Penetration Tester's Guide – David Kennedy et al.

Open e-Resource:

1. https://www.coursera.org/learn/ethical-hacking-with-kali-linux Coursera
2. https://www.coursera.org/specializations/kali-linux-ethical-hacking-pentesting Coursera
3. https://www.coursera.org/learn/packt-an-introduction-to-ethical-hacking-with-kali-linux-rxfou Coursera
4. https://www.coursera.org/learn/kali-linux Coursera
5. https://learn.cybergita.com/courses/kali-linux-full-course/ learn.cybergita.com

List of Suggested Experiments:

1. Installation of Kali Linux on VirtualBox/VMware.
2. Basic Linux command-line operations and file handling.
3. User and group management; file permissions & access control.
4. Network configuration and troubleshooting using Linux tools.
5. Scanning and enumeration using Nmap.
6. Packet analysis using Wireshark.
7. Vulnerability assessment using OpenVAS.
8. Web application testing using Burp Suite (basic).
9. Password attacks using Hydra / John the Ripper.
   Introduction to Metasploit Framework basics.

Gandhinagar Institute of Technology
Diploma Cyber Forensic and Information Security
Semester 5

Subject Code: 101270503	**Subject Title: Firewall Concepts and Technologies**
Pre-requisite: Basic understanding of networking concepts, IP addressing, and Linux command-line operations.	

Course Objective:

1. Understand the fundamental concepts of firewalls and their role in network security.
2. Configure and manage firewalls, including VPN integration and policy enforcement.
3. Troubleshoot and resolve firewall-related issues using diagnostic tools.
4. Implement advanced firewall technologies like IDS/IPS and next-generation firewalls
5. Stay updated with emerging trends in firewall technologies, such as Zero Trust and cloud-based firewalls.

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

Subject Contents			
Sr. No	**Topic**	**Total Hours**	**Weight (%)**
1	**Basics of Network Security:** Network Security, Importance of Network Security, Overview of security model: CIA (Confidentiality, Integrity, Availability), Network security threats, Privacy and Surveillance Threats, MalwareDos attacks.	7	10
2	**Architecture of firewall and its Types**: Definition, History of Firewalls,Role of firewalls, How firewall works, Importance of firewall, Benefits of firewall, Types of firewall : Network based, Host based, Hybrid, Next Generation Firewalls	10	25
3	**Firewall management and configuration:** Firewall rules and policies, audit and optimize firewall configuration,Integrating VPN with firewalls, firewall monitoring and logging	10	25
4	**Advance firewall technologies and Intrusion Detection System :** Introduction of Intrusion detection system,Difference between IDS and IPS, Firewall in cloud computing and virtualization Environments, Firewall performance optimization	10	20
5	**Emerging trends, Security best practices :** Emerging trends in firewall technologies, zero trust architecture with firewalls,Firewall trouble shooting and incident response, Security consideration for firewalls in IOT,Firewall and compliance regulations	8	20

Course Outcome:

1. Configure and manage basic and advanced firewalls.
2. Integrate VPNs with firewalls for secure communication.
3. Troubleshoot and optimize firewall performance.
4. Implement next-generation firewall features, including DPI and application control.
5. Understand emerging trends in firewalls, such as Zero Trust and cloud security.

List of Textbooks:

1. Network Security Essentials William Stallings
2. Firewalls and Internet Security: Repelling the Wily Hacker
3. CMastering pfSense David Zientek

List of Reference Books:

1. Network Security: Private Communication in a Public World Charlie Kaufman, Radia Perlman, Mike Speciner
2. The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws Dafydd Stuttard, Marcus Pinto
3. Practical Guide to Firewalls and Network Security David Kim, Michael C. F.
4. KHands-On Network Security with Pfsense: A Practical Guide to Implementing a Secure Network with pfSense S. K. Padhy, S. K. Biswal.
5. Cisco Certified Network Associate (CCNA) Security Study Guide Todd Lammle

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/specializ
4. https://www.coursera.org/specializations/cybersecurity-attack-and-defense

List of Suggested Experiments:

1. Basic Firewall Configuration.
2. Configuring a Simple Packet Filter using `iptables'
3. Set up a Basic VPN using OpenVPN
4. Configuring a Stateful Firewall
5. Implementing Port Forwarding
6. TCP scanning and Port scanning using NMAP tool
7. Using NMAP for Network Scanning
8. Firewall Log Analysis and Monitoring
9. Configuring Intrusion Detection System (IDS) with Snort To test and optimize firewall performance for high-traffic environments.

Gandhinagar Institute of Technology
Diploma Cyber Forensic and Information Security
Semester 5

Subject Code: 101270502	**Subject Title: Digital security in Social Networks**
Pre-requisite: Basic knowledge of computers, internet usage, and familiarity with common social media platforms.	

Course Objective:

1. Understand cyber security concepts.
2. Understand the fundamentals and security concepts of networking.
3. Learn the strategy behind different types of network attacks & their prevention by using open source tools.
4. Understand the types & working of various mobile networks.
5. Understand the categorization of various offences & penalties

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

Subject Contents			
Sr. No	**Topic**	**Total Hours**	**Weight (%)**
1	**Introduction to Social Networks & Digital Security:**Overview of social networking platforms,Digital identity, online footprint, and reputation,basic concepts of security,CIA Model,AAA security, Services and mechanism,Importance of security in Social Networks	7	10
2	**Security Threats and Attacks**: Phishing, Social Engineering, DoS attack, On-path attack, Man in the middle attack, Eavesdropping, Spamming, Identity theft, Password attacks,Cyber Stalking: types of Stalkers, Cyber Cafe and Cyber Crimes, Botnets,Malware and harmful files,Cyberbullying, trolling, harassment.	10	25
3	**Data Protection and Privacy Concerns in Digital Security:** Privacy settings in social networks,Access controls & permissions,Legal framework of data protection,GDPR,Privacy concerns of cyberspace,Constitutional framework of privacy	10	25
4	**Digital Devices Security, Tools and Technologies :**End Point device and Mobile phone security, Password policy, Security patch management,Digital signature, Data backup, Downloading and management of third party software, Device security policy, Cyber Security best practices, Significance of host firewall and Ant-virus, Management of host firewall and Anti-virus,	10	20
5	**Cyber Law, Ethics and practices :** Cybercrime and legal landscape around the world, IT Act,2000 and its Students after completing this module Page 8 of 10 amendments. Limitations of IT Act, 2000. Cybercrime and punishments, Cyber Laws and Legal and ethical aspects related to new technologiesAI/ML, IoT, Blockchain, Darknet and Social media,	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 Ouaissa, Mariyam Ouaissa · 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
3. Chad Steel, "Windows Forensics: The field guide for conducting corporate computer investigations", Wiley India Publications, December, 2006

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/specializ
4. https://www.coursera.org/specializations/cybersecurity-attack-and-defense

List of Suggested Experiments:

1. Study of Social Networking Platforms & Security Options
2. Identifying Phishing Emails & Fake Links
3. Detecting Fake Profiles & Online Scams
4. Cyberbullying / Cyberstalking Case Study
5. Packet capturing and filtering using Wireshark tool.
6. TCP scanning and Port scanning using NMAP tool
7. Configuring Privacy Settings on Social Media.
8. Installing & Using Antivirus and Firewall
9. Checking App Permissions & Identifying Unsafe Apps
10. Cyber Law Case Study (IT Act 2000)

Gandhinagar Institute of Technology
Diploma Cyber Forensics and Information Security
Semester 5

Subject Code: 101190502	**Subject Title: Fundamental of IOT**
Pre-requisite: Basic knowledge of Computer Networks and Programming	

Course Objective:

1. To understand the basic concepts and architecture of the Internet of Things.
2. To learn about sensors, actuators and IoT hardware platforms.
3. To understand communication technologies used in IoT systems.
4. To develop simple IoT applications using microcontroller platforms.
5. To understand cloud integration and data visualization in IoT applications.

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

Subject Contents			
Sr. No	**Topic**	**Total Hours**	**Weight (%)**
1	**Introduction to IoT:** Definition and characteristics of IoT, Evolution of IoT, IoT ecosystem, IoT architecture and components, Overview of sensors, actuators and embedded systems, Applications of IoT in smart homes, smart cities, healthcare and agriculture.	09	20
2	**Sensors and Actuators:** Introduction to sensors and actuators, Types of sensors (temperature, humidity, motion, light), Working principles of sensors, Interfacing sensors with microcontrollers, Data acquisition basics.	09	20
3	**IoT Hardware Platforms:** Introduction to microcontrollers and embedded systems, IoT development boards such as Arduino Uno and Raspberry Pi, GPIO pins, analog and digital inputs/outputs, basic hardware interfacing techniques.	09	20
4	**IoT Communication Technologies:** Networking basics for IoT, IoT communication protocols such as MQTT, HTTP and CoAP, Wireless communication technologies – Wi-Fi, Bluetooth, Zigbee.	09	20
5	**IoT Cloud and Applications:** Data collection and processing, IoT cloud platforms such as ThingSpeak and Blynk, Data visualization dashboards, Basic security considerations in IoT applications, Case studies of IoT systems.	09	20

Course Outcome:

1. Explain the concepts and architecture of IoT systems.
2. Identify and use sensors and actuators in IoT applications.
3. Interface microcontroller platforms like Arduino with sensors.
4. Implement basic IoT communication protocols.
5. Develop simple IoT projects with cloud data monitoring.

List of Textbooks:

1. Internet of Things: A Hands-On Approach – Arshdeep Bahga, Vijay Madisetti, Universities Press.
2. Getting Started with the Internet of Things – Cuno Pfister, O'Reilly Media.
3. Internet of Things (IoT) Fundamentals – David Hanes, Cisco Press.

List of Reference Books:

1. Building the Internet of Things – Maciej Kranz, Wiley Publications.
2. Designing the Internet of Things – Adrian McEwen and Hakim Cassimally, Wiley.

Open e-Resource:

1. IoT tutorials – W3Schools.
2. IoT courses – Coursera.
3. Arduino Documentation.
4. Thing Speak Documentation.

List of Suggested Experiments:

1. Study of IoT system architecture and components of the Internet of Things.
2. Study of the Arduino Uno board and its pin configuration.
3. Write a simple program to blink an LED using the Arduino Uno.
4. Interface a push button with Arduino to control an LED.
5. Interface a temperature sensor with Arduino and display the readings on serial monitor.
6. Interface an LDR (Light Dependent Resistor) sensor and detect light intensity.
7. Interface a motion sensor (PIR sensor) to detect movement.
   Send sensor data to cloud using ThingSpeak platform.

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

Subject Code: 101220501	**Subject Title: Basic of Information Security**
Pre-requisite:	

Course Objective:

1. To Prepare Students to understand Security basics
2. Understand Cryptography and comprehensive study of the principles and practices of computer system security
3. Understand operating system security, network security, software security and web security.
4. Understand common attacking techniques such as virus, rojan, worms and common security policies and the basic cryptography.
5. Understand ethical issues in computer security.

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

Subject Contents			
Sr. No	**Topic**	**Total Hours**	**Weight (%)**
1	**Introduction to Information Security:** Introduction to Information Security, Need for Security, Security Attacks : Active, Passive and Denial of Service, Security Basics : Confidentiality, Integrity and Availability, Services and Mechanisms.	06	08
2	**Conventional and Symmetric Cryptography:** Introduction: Plain text, Cipher text, Cryptography, Cryptanalysis, Cryptology, Encryption and Decryption, Substitution and Transposition Techniques: Monoalphabetic Cipher, Caesar Cipher, Polyalphabetic Cipher, Playfair Cipher, Hill Cipher, One Time Pad, Rail fence, Steganography: Introduction, Types of steganography techniques, Symmetric Cryptography : Data Encryption Standard- Structure, Advantages and Disadvantages	12	20
3	**Public key Cryptography:** Principles of public-key cryptosystems, Applications of Public-key cryptosystems, The RSA algorithm: Description of the Algorithm, Computational aspects, Security of RSA, Public key infrastructures : basics digital signatures, digital certificates, certificate authorities, registration authorities, steps for obtaining a digital certificate, steps for verifying authenticity and integrity of a certificate	10	16
4	**Network Security:** Security topologies – security zones, DMZ, Internet, Intranet, VLAN, Security implication, Tunneling, Firewalls: Need of Firewall, Working of Firewall, Types of Firewall: Packet Filtering, Stateful Inspection, Application Level Gateway, Circuit-Level Gateway and Next-Generation Firewall, Intrusion detection systems (IDS): Intruders, Components of IDS, Host based IDS: Host based IDS, Advantages and Disadvantages of HIDS, Network based IDS: Network IDS, advantages and disadvantages of NIDS	10	16

5	**Cyber Security:** Introduction to Cyber Security, Cyber Threats, Types of Cyber Attacks, Vulnerabilities, Intruders and Hackers, Threats: Worms, Virus, Ad- ware, Spy-ware, Trojans and covert channels, Backdoors, Bots, IP Spoofing, ARP spoofing, Session Hijacking, Cyber Crimes, Types of Cybercrime, Hacking, Attack vectors, Cyberspace and Criminal Behavior, Traditional Problems Associated with Computer Crime	04	10

Course Outcome:

1. Describe fundamentals of information security.
2. Demonstrate substitution, transposition technique and symmetric cryptography algorithm.
3. Demonstrate the public key encryption with public key cryptography.
4. Apply measures to protect the network communication from attacks using firewalls and intrusion detection systems.
5. Describe the basics of cyber security, cyber attacks, cyber crime.

List of Textbooks:

1. Cryptography and Network Security Principal and Practices, Atul Kahate, Tata-McGraw-Hill

List of Reference Books:

1. Cryptography and Network Security Principles and Practices, Williams Stallings, Pearson Education, Third Edition
2. Cryptography and Network Security, B A Forouzan, Tata-McGraw-Hill
3. Computer Security Basics, Deborah Russell G.T. Gangenisr, O'Reilly publication
4. Computer Security, Dieter Gollman, Wiley India Education.

Open e-Resource:

1. https://www.sans.org/information-security/
2. https://nptel.ac.in/
3. https://www.coursera.org/
4. https://www.w3schools.com/cybersecurity/
5. Software: Wireshark Traffic Analysis/Packet Sniffing Tool, Snort Packet Sniffing tool

List of Suggested Experiments:
(Any of the Language C/C++/Java/Python)

1. Execute Basic TCP/IP utilities and commands. (eg: ping, ipconfig, tracert, arp, tcpdump, whois, host, netstat, nslookup, ftp, telnet etc...)
2. Write a Program to implement Caesar Cipher for basic encryption and decryption.
3. Write a Program to implement Hill Cipher for basic encryption techniques.
4. Write a Program to implement the Play-Fair Cipher Technique for encryption.
5. Write a Program to implement the Rail Fence Technique for encryption.
6. Write a Program to implement RSA algorithm for asymmetric key encryption.
7. Demonstrate traffic analysis of different network protocols using tools. i.e. Wireshark.
8. Simulate the concept of Virtual LAN using Cisco Packet Tracer
9. Simulate the concept of demilitarized zone network (DMZ) using Cisco Packet Tracer.
10. Simulate the working of Firewall using Cisco Packet Tracer.
11. Study cyber security fundamentals, including common threats and mitigation strategies.
12. Study of Kali Linux Operating System for cybersecurity.

Gandhinagar Institute of Technology
Diploma Cyber Forensic and Information Security
Semester 6

Subject Code: 101270601	**Subject Title: Social Engineering**
Pre-requisite:	

Course Objective:

1. To introduce students to the concept of social engineering and its role in cybersecurity.
2. To understand psychological principles used by attackers to manipulate people.
3. To identify various types of social engineering attacks and techniques.
4. To develop awareness about prevention and defense mechanisms against such attacks.
5. To train students to follow ethical and secure communication practices in digital environments.

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

Subject Contents			
Sr. No	**Topic**	**Total Hours**	**Weight (%)**
1	**Introduction to Social Engineering:** Definition and Concept of Social Engineering**,** Importance of Human Factor in Cybersecurity**,** History and Evolution of Social Engineering Attacks**,** Types of Social Engineering (Human-based and Computer-based)**,** The Social Engineering Lifecycle (Information Gathering, Relationship Development, Exploitation, Exit)**,** Real-world examples of social engineering attacks	08	15
2	**Psychological Principles in Social Engineering:** Human Psychology and Manipulation Techniques**,** Principles of Persuasion: Authority, Urgency, Scarcity, Social Proof, Liking, Reciprocity**,** Trust Exploitation and Emotional Manipulation**,** Behavioral Traits Targeted by Attackers**,** Social Media Influence in Social Engineering**,** Case Studies of Psychological Manipulation in Cyber Attacks	11	25
3	**Types of Social Engineering Attacks:** Phishing and Spear Phishing. Vishing (Voice Phishing), Smishing (SMS Phishing)**,** Pretexting and Impersonation**,** Baiting and Quid Pro Quo Attacks**,** Tailgating and Shoulder Surfing**,** Dumpster Diving	11	20

4	**Detection and Prevention Techniques:** Identifying Social Engineering Attacks, Security Awareness and User Education, Password Security and Multi-Factor Authentication, Safe Email and Internet Practices, Organizational Security Policies, Incident Reporting and Response.	06	20
5	**Ethical, Legal and Security Awareness:** Ethical Issues in Social Engineering**,** Cyber Laws and Legal Implications, Organizational Security Policies and Standards**,** Risk Assessment and Security Awareness Programs**,** Role of Employees in Preventing Social Engineering**,** Future Trends in Social Engineering Attacks	06	20

Course Outcome:

1. Understand the concept and importance of social engineering in cybersecurity.
2. Identify psychological techniques used in social engineering attacks.
3. Recognize different types of social engineering threats.
4. Apply preventive measures to protect individuals and organizations from attacks.
5. Follow ethical and legal practices in cybersecurity awareness.

List of Textbooks:

1. Christopher Hadnagy, Social Engineering: The Science of Human Hacking.
2. Paul Wilson, The Art of Human Hacking.
3. Kevin Mitnick, The Art of Deception: Controlling the Human Element of Security.

List of Reference Books:

1. Kevin Mitnick, Ghost in the Wires.
2. Christopher Hadnagy, Unmasking the Social Engineer.
3. Jon Erickson, Hacking: The Art of Exploitation.

Open e-Resource:

1. https://nptel.ac.in
2. https://swayam.gov.in
3. https://www.khanacademy.org
4. https://owasp.org

List of Suggested Experiments:

1. Identify different types of phishing emails and analyze their characteristics.
2. Demonstration of password security and password cracking awareness.
3. Case study analysis of famous social engineering attacks.
4. Creating awareness posters or presentations on social engineering threats.
5. Simulation of phishing detection using sample emails.
6. Study of social media profiles to identify possible information leakage.

7. Demonstration of multi-factor authentication and secure login practices.
8. Preparing a security awareness report for an organization.

Gandhinagar Institute of Technology
Diploma Cybersecurity & Artificial Intelligence
Semester 6

Subject Code: 101270602	**Subject Title:** Fundamentals of Malware
Pre-requisite: Computer fundamentals, Operating systems (Windows/Linux basics), Computer networks, Basic programming	

Course Objective:

1. Introduce the concept and evolution of malware.
2. Explain the various categories, characteristics, and behavior of modern malware.
3. Provide hands-on skill development to analyze malware in a controlled environment.
4. Teach basic malware detection, debugging, and defense techniques.
5. Create awareness about cyber security ethics and safe handling practices.

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

Subject Contents

Sr. No.	**Topics**	**Total Hours**	**Weight (%)**
1	**Introduction to Malware:** Definition and Understanding of Malware, History and Evolution of Malware, Types of Attackers: Script Kiddies, Hackers, Cybercriminals, APT Groups, Common Terminologies: Payload, Infection Vector, Exploit, Obfuscation, Real-world Case Studies: WannaCry, Petya/NotPetya, Zeus	8	10
2	**Malware Classification and Techniques:** Classification of Malware: Viruses, Worms, Trojans, Rootkits, Spyware, Adware, Ransomware. Malware Propagation Methods: Email attachments, USB, Drive-by downloads,Phishing.Common Evasion Techniques: Polymorphism, Metamorphism,Packing,Encryption.Understanding Command and Control (C2) Models	8	25
3	**Malware Analysis Fundamentals:** Types of Malware Analysis: Static Analysis, Dynamic Analysis, Behavioral Analysis Malware Analysis Environment Setup: Virtual Machine setup (VirtualBox/VMware), Sandboxing, Networking isolation. Tools Overview: PE Explorer, Dependency Walker, Process Monitor, Process Hacker, Wireshark	8	25
4	**Debugging and Reverse Engineering Basics:** Introduction to Reverse Engineering, Windows Executable (PE) File Format Basics, Memory and Assembly Language Basics, Overview of Debugging Tools: OllyDbg, x64dbg, Ghidra, Basic Reverse Engineering Workflow	8	20

5	**Malware Detection, Prevention, and Mitigation:** Signature-based Detection vs. Behavior-based Detection, Antivirus and EDR Fundamentals, Sandboxing & Threat Intelligence, Security Best Practices for Systems and Networks, Fundamentals of Incident Response & Reporting	8	20

Course Outcomes:

1. Understand malware concepts, evolution, and terminology.
2. Classify and differentiate between various types of malware and propagation techniques.
3. Analyze malware statically and dynamically using standard tools.
4. Apply basic debugging and reverse engineering methods to study malware behavior.
5. Implement basic defense strategies to detect, prevent, and mitigate malware threats.

List of Reference Books:

1. Practical Malware Analysis , Michael Sikorski & Andrew Honig
2. Malware Analyst's Cookbook, Michael Hale Ligh
3. The Art of Memory Forensics, Michael Hale Ligh, Andrew Case
4. Rootkits and Bootkits, Alex Matrosov, Eugene Rodionov
5. Reversing: Secrets of Reverse Engineering, Eldad Eilam
6. Applied Incident Response, Steve Anson

Open e-Sources

1. Hybrid Analysis Sandbox — https://www.hybrid-analysis.com
2. VirusShare (Malware Samples Repository) — https://virusshare.com
3. MITRE ATT&CK Framework — https://attack.mitre.org
4. Malware Traffic Analysis Lab — https://www.malware-traffic-analysis.net
5. ANY.RUN Interactive Malware Sandbox — https://any.run
6. Wireshark Official Documentation — https://www.wireshark.org/docs
7. REMnux Malware Analysis Toolkit (Documentation) — https://docs.remnux.org

List of suggested experiments :

1. Setup a secure malware analysis environment using VirtualBox/VMware.
2. Perform static analysis of a suspicious executable (hashing, PE structure).
3. Analyze network behavior of malware using Wireshark.
4. Use Process Monitor to identify registry and file modifications by malware.
5. Perform dynamic analysis in a sandbox environment.
6. Use x64dbg/OllyDbg to debug a malware sample and observe assembly instructions.
7. Implement simple signature-based detection using YARA rules.
8. Demonstrate ransomware behavior using a simulated payload.
9. Reverse engineer a packed executable and unpack it.
10. Document a complete malware analysis report of a provided sample.

Gandhinagar Institute of Technology
Diploma Cyber Forensics and Information Security/ 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)**				
				Theory		**Practical**		
Lecture	**Tutorial**	**Practical**	**Credit**	**University Assessment**	**Continuous Assessment**	**University Assessment**	**Continuous Assessment**	**Total**
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.

Gandhinagar Institute of Technology
Diploma Cyber Forensic and Information Security
Semester 6

Subject Code: 101270603	**Subject Title:** Intrusion Detection System
Pre-requisite: Fundamentals of networking (TCP/IP, OSI model), Operating systems basics (Windows/Linux), Fundamentals of cybersecurity or ethical hacking concepts, Basic command-line operations	

Course Objective:

1. Introduce the concept and evolution of malware.
2. Introduce the fundamental concepts and importance of intrusion detection.
3. Explain IDS types, architectures, and deployment strategies.
4. Train students on common IDS tools such as Snort, Suricata, and OSSEC.
5. Develop skills for log analysis, traffic monitoring, and intrusion alert interpretation.

Teaching Scheme (Hours per week)				**Evaluation Scheme (Marks)**				
				Theory		**Practical**		
Lecture	**Tutorial**	**Practical**	**Credit**	**University Assessment**	**Continuous Assessment**	**University Assessment**	**ContinuousAssessment**	**Total**
3	0	4	5	70	30	30	20	150

Subject Contents			
Sr. No.	**Topics**	**Total Hours**	**Weight (%)**
1	**Introduction to Intrusion Detection Systems:** Definition and Need for IDS, Evolution of Intrusion Detection Systems, Threat Landscape: Malware, Network Attacks, Insider Threats, IDS vs IPS: Differences and Use Cases, IDS Terminologies: Signatures, False Positives, Alerts, Logs	8	
2	**IDS Types and Architectures:** Classification of IDS: Host-Based IDS (HIDS), Network-Based IDS (NIDS), Hybrid IDS, IDS Deployment Models: Inline, Passive, Distributed, Detection Methods: Signature-Based, Anomaly-Based, Hybrid Detection Techniques	8	
3	**IDS Tools and Technologies:** Open-Source IDS Solutions: Snort, Suricata, OSSEC, Bro/Zeek Commercial IDS (Overview): CrowdStrike, McAfee, Cisco IDS, Rapid7 Log Management and SIEM: ELK Stack, Splunk, Wazuh Packet Capturing and Monitoring Tools: Wireshark, TCPDump, Tshark	8	
4	**IDS Configuration and Rule Writing:** Snort Architecture and Components, Snort Rule Syntax and Operators, Writing Custom Detection Rules, Understanding Alerts and Logging, Traffic Filtering, Thresholding, and Suppression, Suricata Rule Creation and YAML Configuration Basics	8	

5	**Incident Handling and IDS Response:** Alert Analysis and Event Correlation, False Positive Reduction Techniques, Security Hardening, Tuning, and Policy Design, Case Studies on Real-World Intrusion Scenarios, Introduction to Automation and Machine-Learning-based IDS, Reporting, Documentation, and Ethical Practices	8	

Course Outcomes:

1. Understand the role of Intrusion Detection Systems in cybersecurity.
2. Differentiate between IDS architectures, types, and detection methodologies.
3. Configure and use open-source IDS tools such as Snort and Suricata.
4. Analyze logs and network traffic to detect cyber threats.
5. Create IDS rules and evaluate system performance against real-time attacks.
6. Document intrusion events and demonstrate practical incident handling.

List of Reference Books:

1. Intrusion Detection Systems: A Survey and Taxonomy – NIST Publication
2. Network Intrusion Detection – Stephen Northcutt & Judy Novak
3. Practical Intrusion Detection – Ryan Trost
4. Applied Network Security Monitoring – Chris Sanders
5. Snort: IDS and IPS Toolkit – Brian Caswell & Jay Beale
6. Zeek Network Security Monitoring: A Hands-On Guide – Keith J. Jones

Open e-Sources

1. Snort Official Documentation — https://www.snort.org/documents
2. Suricata IDS Documentation — https://suricata.io/documentation
3. Zeek Network Monitoring Platform — https://zeek.org/documentation
4. OSSEC (Host-Based IDS) Documentation — https://www.ossec.net/docs
5. Kibana / ELK (SIEM Support Documentation) — https://www.elastic.co/guide
6. Wireshark Tutorial Portal — https://www.wireshark.org/docs
7. Hack The Box Academy – IDS Labs — https://academy.hackthebox.com

List of suggested experiments:

1. Install and configure a virtual lab environment (Kali Linux + Ubuntu Server + Attacker Machine).
2. Install and configure Snort in IDS mode.
3. Perform packet capturing and analysis using Wireshark and TCPDump.
4. Write and deploy basic Snort rules (e.g., ICMP/HTTP alert rules.
5. Generate alerts by performing port scanning using Nmap
6. Configure Suricata and analyze generated logs and alerts
7. Host-Based IDS experiment using OSSEC or Wazuh (file integrity & log monitoring
8. Simulate brute-force attack and detect intrusion alerts.
9. Integrate Snort/Suricata alerts with the ELK stack or SIEM tool.
10. Prepare an intrusion detection report based on captured traffic.

Gandhinagar Institute of Technology
Diploma Cyber Forensics and Information Security/ 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)**				
				Theory		**Practical**		
Lecture	**Tutorial**	**Practical**	**Credit**	**University Assessment**	**Continuous Assessment**	**University Assessment**	**Continuous Assessment**	**Total**
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.

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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.

Gandhinagar Institute of Technology

D. Tech – CFIS

Semester 6

Subject Code: 101270604	**Subject Title: Vulnerability Assessment and Penetration Testing**
Pre-requisite: Computer Networks Basics, Linux Fundamentals , Basic Cyber Security Knowledge	

Course Objective:

1. To understand concepts of vulnerabilities, exploits, and penetration testing methodologies.
2. To learn information gathering and reconnaissance techniques.
3. To perform vulnerability scanning using security assessment tools.
4. To conduct penetration testing on networks and web applications.
5. To prepare professional vulnerability assessment and penetration testing reports.

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

Subject Contents			
Sr. No	**Topic**	**Total Hours**	**Weight (%)**
1	**Introduction to Cyber Security and Ethical Hacking:** Cyber Security concepts, CIA Triad, Threat, Vulnerability, Risk, Exploit, Ethical Hacking, Penetration Testing methodology, Types of Hackers, Security Testing Lifecycle	7	16
2	**Reconnaissance and Footprinting:** Information Gathering, Passive and Active Reconnaissance, WHOIS, DNS Enumeration, Email Enumeration, OSINT Techniques, Social Engineering basics, Host Discovery, Port Scanning	8	17
3	**Vulnerability Assessment:** Vulnerability lifecycle, Types of vulnerabilities, CVE, CVSS, CWE, Vulnerability scanning methods, Automated scanners, Risk assessment and prioritization, Report analysis	8	17

4	**Network Penetration Testing:** Network scanning, Enumeration, Password attacks, Service exploitation, Exploitation basics, Post exploitation concepts, Privilege escalation overview	8	17
5	**Web Application Penetration Testing:** Web application architecture, OWASP Top 10, SQL Injection, Cross Site Scripting (XSS), Authentication attacks, Session attacks, File inclusion vulnerabilities	8	17
6	**Reporting and Compliance:** VAPT reporting, Executive summary, Technical report writing, Vulnerability remediation, Patch management, Compliance standards, Legal and ethical issues	6	16

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 Reference Books:

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 Ouaissa, Mariyam Ouaissa · 2024
4. See Yourself in Cyber: Security Careers Beyond Hacking Ed Adams- 2024
5. 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 Practical Experiments:

1. Installation and setup of Kali Linux and virtual lab
2. Network scanning using Nmap
3. Vulnerability assessment using OpenVAS
4. Web testing using Burp Suite
5. Password auditing using John the Ripper
6. Exploitation basics with Metasploit Framework
7. SQL Injection testing
8. XSS testing
9. Network traffic analysis using Wireshark
10. Final VAPT report preparation

Gandhinagar Institute of Technology

D. Tech – CFIS

Semester 6

Subject Code: 101270605	**Subject Title: Cyber Forensics**
Pre-requisite: Basic Computer Knowledge, Internet Fundamentals, Operating System Basics	

Course Objective:

1. To understand fundamentals of cybercrime and cyber forensics.
2. To learn methods of collecting and preserving digital evidence.
3. To study investigation techniques for computer and network crimes.
4. To use basic forensic tools for analysis of digital evidence.
5. To understand cyber laws and reporting procedures.

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

Subject Contents			
Sr. No	**Topic**	**Total Hours**	**Weight (%)**
1	**Introduction to Cyber Forensics:** Cybercrime basics, Digital evidence, Cyber forensic process, Need of cyber forensics, Types of cybercrimes	7	16
2	**Computer Forensics Basics:** File systems, Storage devices, Data recovery concepts, Disk imaging, Deleted file recovery basics	8	17
3	**Network Forensics:** Basics of network investigation, Packet analysis, Log files, Email investigation, Network attack identification	8	17
4	**Mobile and Internet Forensics:** Mobile evidence basics, Browser history analysis, Cookies, Cache files, Social media investigation basics	8	17
5	**Forensic Tools and Techniques:** Introduction to forensic tools, Disk analysis tools, Password recovery tools, Network analysis tools	8	17
6	**Cyber Laws and Reporting:** Cyber laws basics, IT Act overview, Evidence documentation, Report writing and case documentation	6	16

Course Outcome:

1. Understand cybercrime and digital investigation concepts.
2. Collect and preserve digital evidence properly.
3. Analyze computer and network data for investigation.
4. Use basic forensic tools for evidence analysis.
5. Prepare investigation reports following cyber law basics.

List of Reference Books:

1. Computer Forensics Basics – John Sammons
2. Guide to Computer Forensics and Investigations – Bill Nelson
3. Cyber Security and Cyber Laws – Harish Chander
4. Digital Forensics Basics – Jason Sachowski

Open e-Resources:

1. NPTEL Cyber Security Courses
2. SWAYAM Digital Forensics Courses
3. Coursera Cybersecurity Basics
4. Government Cyber Security Awareness Portals

List of Practical Experiments:

1. Disk imaging and cloning basics
2. Deleted file recovery
3. Password recovery demonstration
4. Packet capture using Wireshark
5. Browser history analysis
6. Email header investigation
7. Log file analysis
8. Mobile data basics
9. Evidence documentation
10. Final cyber forensic report preparation

Annexure II:
Industry Survey Analysis – Diploma in Cyber Forensics and Information Security (CFIS)

Sample Size	20 Organizations / Employers
Survey Period	April 2026
Region	Gujarat

1. Executive Summary

A structured industry survey was conducted among 20 organizations including cyber security firms, digital forensic laboratories, IT security service providers, SOC (Security Operations Center) companies, banking and financial institutions, government agencies, and technology enterprises across Gujarat to assess the demand for diploma-qualified Cyber Forensics and Information Security professionals and validate the need for the proposed Diploma in Cyber Forensics and Information Security program at the University/Institute.

The findings indicate a strong and growing demand for skilled professionals capable of protecting digital assets, investigating cyber incidents, securing networks, and supporting information security operations. Most respondents highlighted the increasing frequency of cyber threats and the shortage of trained entry-level security personnel. Eighteen out of twenty employers expressed willingness to recruit graduates from a professionally designed diploma program. Several organizations also indicated their readiness to support internships, industrial training, cyber security workshops, and industry-academia collaboration.

The survey strongly validates the introduction of the Diploma in Cyber Forensics and Information Security program with a practical and industry-oriented curriculum.

Survey Outcome	Percentage
Confirm demand for CFIS diploma graduates	95%
Willing to recruit diploma students	90%
Open for internship/industry collaboration	85%
Average recommendation rating for program launch	4.6/5

2. Respondent Profile

The respondents were selected from cyber security companies, digital forensic organizations, banking institutions, IT security consulting firms, SOC providers, government agencies, managed security service providers, and technology enterprises operating across Gujarat.

Respondent Designations Included:

- Chief Information Security Officers (CISO)
- Cyber Security Managers
- Security Analysts
- Digital Forensic Experts
- SOC Managers
- IT Infrastructure Heads
- HR Managers
- Information Security Consultants

Their feedback reflects both technical requirements and emerging employment trends in the cyber security and digital forensics domain.

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

Respondents were asked to identify the most common skill gaps observed while hiring entry-level candidates in cyber security and information security roles.
The responses revealed that while students possess basic computer knowledge, they often lack practical security skills and hands-on exposure to modern cyber security tools.
Major Skill Gaps Identified:

Skill Gap	Response
Lack of practical cyber security skills	18/20 (90%)
Weak network security knowledge	17/20 (85%)
Limited awareness of cyber threats and attacks	17/20 (85%)
Insufficient digital forensics exposure	16/20 (80%)
Weak incident response and monitoring skills	15/20 (75%)
Limited knowledge of ethical hacking concepts	15/20 (75%)
Poor security tool handling skills	14/20 (70%)
Weak communication and reporting abilities	12/20 (60%)

4. Selected Industry Comments

"Students understand basic networking, but practical cyber security skills are often missing."
— Cyber Security Manager, Ahmedabad
"There is a growing demand for professionals who can assist in cyber incident investigations and forensic analysis."
— Digital Forensics Expert, Gandhinagar
"SOC operations require candidates with practical exposure to security monitoring tools and threat analysis."
— Information Security Consultant, Vadodara

5. Findings – Q2: Demand for Diploma CFIS Graduates

Respondents were asked about the current hiring demand for diploma-qualified Cyber Forensics and Information Security professionals.
How has demand for cyber security professionals changed?

Response	Organizations	%
Significantly increased	15	75%
Moderately increased	4	20%
No significant change	1	5%
Decreased	0	0%

Are you finding enough qualified people in Gujarat?

Response	Organizations	%
No — serious shortage	15	75%
Partially — some available	4	20%
Yes — enough supply	1	5%
We train in-house	0	0%

The survey clearly indicates a strong market demand and a shortage of job-ready cyber security professionals.

6. Findings – Q3: Recruitment Intent

Respondents were asked whether they would recruit students from the proposed Diploma in Cyber Forensics and Information Security program.

Recruitment Intent Rating

Response	Organizations	%
Definitely would recruit	13	65%
Likely to recruit	5	25%
Possibly recruit	2	10%
Unlikely	0	0%

Key Job Roles Identified

- Security Operations Center (SOC) Analyst
- Cyber Security Technician
- Information Security Associate
- Network Security Support Engineer
- Security Monitoring Executive
- Digital Forensics Assistant
- Vulnerability Assessment Assistant
- IT Security Support Executive
- Incident Response Support Technician
- Cyber Risk and Compliance Assistant

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

Area	Response
Cyber Security Fundamentals	18/20 (90%)
Network Security Practices	17/20 (85%)
Digital Forensics & Investigation	16/20 (80%)
Security Monitoring & SOC Operations	15/20 (75%)
Ethical Hacking Concepts	15/20 (75%)
Cyber Laws & Compliance	14/20 (70%)
Cloud Security & Emerging Technologies	13/20 (65%)

Industry Collaboration Interest

Activity	Response
Internship Opportunities	17/20 (85%)
Industrial Visits	16/20 (80%)
Guest Lectures	15/20 (75%)
Placement Support	15/20 (75%)
Project Mentoring	14/20 (70%)
Cyber Security Workshops	14/20 (70%)

Industry response indicates strong willingness to support practical and experiential learning activities.

8. Overall Recommendation Rating

Respondents were asked whether the University/Institute should proceed with launching the Diploma in Cyber Forensics and Information Security program.

Overall Rating	Organizations	%	Meaning
5 — Strongly recommend launching now	14	70%	Launch immediately
4 — Recommend with minor conditions	5	25%	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 cyber security and information security organizations across Gujarat produces five clear and actionable conclusions:

- **The cyber security skill gap is significant and growing.** Organizations consistently reported a shortage of candidates with practical knowledge of cyber security operations, network defense, digital forensics, and security monitoring. The proposed curriculum directly addresses these industry requirements through practical training and laboratory-based learning.
- **The market is ready to recruit from the program immediately.** An average recruitment intent score of 4.5 out of 5.0 demonstrates strong employment opportunities for Diploma in Cyber Forensics and Information Security graduates.
- **Hands-on security skills are the most valued competencies.** Industry respondents emphasized practical exposure to network security, digital forensics, vulnerability assessment, security monitoring, incident response, and cyber threat analysis. This validates the inclusion of laboratories, projects, internships, and industry-based training within the curriculum.
- **Industry partnership potential is highly encouraging.** Organizations expressed strong interest in providing internships, workshops, industrial visits, expert lectures, project mentoring, and placement assistance, creating a robust ecosystem for student development.
- **The overall recommendation is to proceed with the program without delay.** The majority of respondents strongly recommended launching the Diploma in Cyber Forensics and Information Security program. The high recommendation score reflects strong industry relevance, excellent employment prospects, and the increasing importance of cyber security professionals in the digital economy.