

Revised Scheme and Syllabus
of
Diploma in Computer Science and Engineering
As Per National Education Policy (NEP 2020) & AICTE Guidelines
(Effective from: A.Y. 2026-27)
By
Skill Department of Computer Science/IT
Under
Skill Faculty of Engineering and Technology



Shri Vishwakarma Skill University
Dudhola, Palwal-121102, Haryana

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Section 1: Vision, Mission, and Program Institutional Framework

1.1 Vision & Mission

- **Vision of the University:** To emerge as one of the foremost institutions of quality in skill education acknowledged by industry, nationally and internationally.
- **Mission of the University:** To focus on quality of skill education, aspired by students and admired by industry, nationally and internationally.
- **Vision of the Department:** To build highly skilled and competent professionals with a futuristic outlook for research and innovation who can also generate sustainable employment with virtuous professional values.
- **Mission of the Department:**
 1. To impart skill education and training as per industry needs in the domain of Computer Science & Engineering.
 2. To develop and maintain the state of art infrastructure for building a sustainable skilled IT ecosystem in the domain.
 3. To cultivate an environment for fostering new ideas, research, and innovations leading to the emergence of skilled entrepreneurs, leaders, innovators, and professionals.

1.2 Program Outcomes (POs)

Learners completing this diploma program will achieve the following core competencies:

- **PO1: Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **PO2: Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO3: Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, along with cultural, societal, and environmental considerations.
- **PO4: Assistance in Design/development of solutions:** Assist Engineers or seniors to design for complex engineering problems and design system components or processes.
- **PO5: Higher Education:** To provide a sufficient level of knowledge and skill that enables them to pursue a bachelor's degree in the same field.
- **PO6: Modern tool usage:** Identify, select, and apply appropriate techniques, resources, and modern engineering and IT tools to solve engineering problems.
- **PO7: The engineer and society:** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to professional engineering practice.
- **PO8: Environment and sustainability:** Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- **PO9: Ethics:** Apply ethical principles and commit to professional ethics, responsibilities, and norms of engineering practice.
- **PO10: Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

- **PO11: Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- **PO12: Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

1.3 Program Specific Outcomes (PSOs)

- **PSO1:** Solve problems analytically and logically via programming.
- **PSO2:** Apply acquired knowledge and practical skills to develop computer applications and start new business ventures.
- **PSO3:** Communicate effectively orally or in writing.
- **PSO4:** Work under close supervision with some responsibility defined within limits.

1.4 Program Educational Objectives (PEOs)

- **PEO1:** To impart science-based engineering education in addition to professional and entrepreneurship skills that will prepare students for immediate employment or to be employers in the IT sector, and to pursue higher education in the field.
- **PEO2:** To develop an ability to work in teams, innovate, design, and implement projects; communicate effectively, work under close supervision, assist seniors, and prepare reports as per requirements.
- **PEO3:** To understand responsibility towards society, environment, and sustainability while remembering professional ethics.

1.5 Competency & Matrix Mapping Framework

Mapping codes: 0: No mapping; 1: Low mapping; 2: Average mapping; 3: Complete mapping.

Table 1: PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PSO1	1	0	3	0	2	0	0	0	0	0	0	0
PSO2	1	2	0	0	3	0	0	0	0	0	2	0
PSO3	0	0	0	0	0	0	0	0	2	3	0	0
PSO4	0	0	0	0	0	1	1	1	3	0	0	2

Table 2: PO and PEO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEO1	3	2	3	1	3	0	0	0	0	0	0	0
PEO2	0	0	0	0	0	0	0	3	3	3	0	1
PEO3	0	0	0	0	0	1	2	0	0	0	0	0

Section 2: Credit Structure & Multi Entry Multi Exit

2.1 Program Structure

The program is structured around a total target allocation of **120 Credits** to accommodate multi-exit certifications.

Sr. No.	Course Category	Suggested AICTE Breakup	SVSU Credit Scheme
1	Humanities & Social Sciences Courses (HS)	8	8
2	Basic Science Courses (BS)	19	14
3	Engineering Science Courses (ES)	15	15
4	Program Core Courses (Branch Specific - PC)	45	45
5	Program Elective Courses (Branch Specific - PE)	12	12
6	Open Elective Courses (OE)	9	9
7	Project Work, Seminars, & Industry Internships (PR)	12	20
8	Audit / Value-Added Courses (AU)	Non-Credit	Non-Credit (Pass)
	Total Curricular Program Credits	120	123

2.2 Multiple Entry–Multiple Exit Table:

Entry Level	Eligibility for Admission	NCrF Level (Entry)	Exit Option	Qualification Awarded	Conditions for Exit	NCrF Level (Exit)
Entry Level 1 (Year 1)	Passed 10th Standard	Level 3.0	Exit Option 1 (After Year 1)	Certificate in Vocation in Computer Science & Engineering (C. Voc. in CSE)	• Successful completion of Semester I and II. • Completion of minimum 40 credits. • Additional 4 Credits through 4-6 weeks of Internship/OJT.	Level 3.5
Entry Level 2 (Year 2)	A candidate completing 10 th + 1 year of C. Voc. or equivalent vocational training with NCrF level 3.5 in relevant course	Level 3.5	Exit Option 2 (After Year 2)	Diploma of Vocation in Computer Science & Engineering (D. Voc. in CSE)	• Successful completion of first two years (4 Semesters). • Completion of minimum 80 credits. • Additional 4 Credits through 4-6 weeks of Internship/OJT.	Level 4.0
Entry Level 3 (Year 3)	A candidate completing 10 th + 2 years with Diploma of Vocation or 12 th (10+2) or equivalent vocational training with NCrF level 4 in relevant course	Level 4.0	Exit Option 3 (After Year 3)	Diploma in Computer Science & Engineering	• Successful completion of all six Semesters. • Completion of 120 credits.	Level 4.5

Section 3: Semester-Wise Course Matrix & Schemes

3.1 Semester-wise scheme

Semester -I									
Course Code	Course Name	Hours Per Week			Credits L+T+P =C	Marks			Catg.
		L	T	P		Theory(T)			
						I	E	TO	
24DENG01	English Language and Communication Skills	1	0	0	1	15	35	50	HS
24DENG02	English Language and Communication Skills Practical	0	0	2	1	35	15	50	HS
24DYHS01	Yoga and Health Skills – I	2	0	0	2	30	70	100	HS
24DMTH03	Applied Mathematics – I	3	0	0	3	30	70	100	BS
24DPHY03	Applied Physics – I	3	0	0	3	30	70	100	BS
24DPHY04	Applied Physics - I Lab	0	0	2	1	70	30	100	BS
24DGEN05	Fundamentals of IT	3	0	0	3	30	70	100	ES
24DGEN06	Fundamentals of IT Lab	0	0	4	2	70	30	100	ES
24DGEN07	Computer Workshop	0	0	6	3	70	30	100	ES
24DGEN08	Electronics Workshop	0	0	4	2	70	30	100	ES
24DGEN09	Basics of Prompt Engineering	2	0	0	2	30	70	100	ES
TOTAL		Total Credits			23				
Semester -II									
24DMTH04	Applied Mathematics - II	3	0	0	3	30	70	100	BS
24DPHY05	Applied Physics - II	3	0	0	3	30	70	100	BS
24DPHY06	Applied Physics - II Lab	0	0	2	1	70	30	100	BS
24DGEN15	Engineering Graphics	0	0	6	3	70	30	100	ES
24DGEN10	Advances in IT	3	0	0	3	30	70	100	PC
24DGEN11	Advances in IT Lab	0	0	2	1	70	30	100	PC
24DGEN16	Multimedia Applications	3	0	0	3	30	70	100	PC
24DGEN17	Multimedia Applications Lab	0	0	4	2	70	30	100	PC
24DCSE39	Minor Project 1	0	0	4	2	70	30	100	PR
24DCSE66	Human Values and Ethics	2	0	0	2	30	70	100	HS / VAE
24DEVS01	Environmental Sciences (EVS)	2	0	0	0	30	70	100	AU (Non-Credit)
TOTAL		Total Credits			23				

Note: Students will undergo a Summer Internship of 4–6 weeks duration between the 2nd and 3rd semesters. The internship will be evaluated in the 3rd semester through a viva voce examination.

Semester -III									
Course Code	Course Name	Hours Per Week			Credits	Marks			Catg.
		L	T	P	L+T+P =C	Theory(T)			
						I	E	TO	
24DCSE18	Programming in C	3	0	0	3	30	70	100	PC
24DCSE19	Programming in C Lab	0	0	4	2	70	30	100	PC
24DCSE26	Basics of Computer Network	3	0	0	3	30	70	100	PC
24DCSE27	Basics of Computer Network Lab	0	0	2	1	70	30	100	PC
24DCSE28	Introduction to Operating System	3	0	0	3	30	70	100	PC
^^^	Program Elective - I	3	0	0	3	30	70	100	PE
^^^	Program Elective - I Lab	0	0	2	1	70	30	100	PE
^^^	Open Elective - I (MOOCs)	3	0	0	3	30	70	100	OE
24DCSE29	Summer Internship - I (4-6 Week) / Project	-	-	-	4	70	30	100	PR
24DCSE65	Indian Constitution	2	0	0	0	30	70	100	AU (Non-Credit)
TOTAL		Total Credits			23				
Semester -IV									
24DCSE38	Entrepreneurship Skills	2	0	0	2	30	70	100	HS
24DCSE44	Network Administration and Management	3	0	0	3	30	70	100	PC
24DCSE45	Network Administration and Management Lab	0	0	2	1	70	30	100	PC
24DCSE36	Python Programming Fundamentals	3	0	0	3	30	70	100	PC
24DCSE37	Python Programming Fundamentals Lab	0	0	4	2	70	30	100	PC
24DCSE40	Data Structures	3	0	0	3	30	70	100	PC
24DCSE41	Data Structures Lab	0	0	4	2	70	30	100	PC
^^^	Open Elective - II (MOOCs)	3	0	0	3	30	70	100	OE
24DCSE53	Minor Project 2	0	0	4	2	70	30	100	PR
24DCSE67	Essence of Indian Knowledge & Tradition (IKS)	2	0	0	0	30	70	100	AU (Non-Credit)
TOTAL		Total Credits			21				

Note: Students will undergo a Summer Internship of 4–6 weeks duration between the 4th and 5th semesters. The internship will be evaluated in the 5th semester through a viva voce examination.

Semester -V									
Course Code	Course Name	Hours Per Week			Credits L+T+P =C	Marks			Catg.
		L	T	P		Theory(T)			
					I	E	TO		
24DCSE48	Introduction to Database Management Systems	3	0	0	3	30	70	100	PC
24DCSE49	Introduction to Database Management Lab	0	0	4	2	70	30	100	PC
24DCSE50	Basics of Data Analytics	3	0	0	3	30	70	100	PC
24DCSE51	Basics of Data Analytics Lab	0	0	4	2	70	30	100	PC
^^^	Program Elective – II	3	0	0	3	30	70	100	PE
^^^	Program Elective - II Lab	0	0	2	1	70	30	100	PE
^^^	Program Elective - III	3	0	0	3	30	70	100	PE
^^^	Program Elective - III Lab	0	0	2	1	70	30	100	PE
^^^	Open Elective – III (MOOCs)	3	0	0	3	30	70	100	OE
24DCSE52	Summer Internship - II (4-6 Week)/ Project	-	-	-	4	70	30	100	PR
TOTAL		Total Credits			25				
Semester - VI									
24DCSE56	Internship/Project	-	-	-	8	140	60	200	PR
TOTAL		Total Credits			8				

It is mandatory to conduct a One – week workshop during the winter break after fifth semester on professional/industry/entrepreneurial orientation.

It is mandatory to organize at least one expert lecture per semester for each branch by inviting resource persons from domain specific industry.

3.2 Comprehensive List of Program Electives (^^^ Code Guide)

To promote modular specialization as recommended by NEP 2020, students select elective combinations paired with their respective core practical laboratories:

Course Code	Course Name	Program Elective
24DCSE20	<u>Artificial Intelligence Fundamentals</u>	PE-I
24DCSE21	<u>Artificial Intelligence Fundamentals Lab</u>	
24DCSE22	Data Mining and Data Warehousing	
24DCSE23	Data Mining and Data Warehousing Lab	
24DCSE24	Cloud Computing	
24DCSE25	Cloud Computing Lab	
24DCSE30	Server Configuration and Security	PE-II
24DCSE31	Server Configuration and Security Lab	
24DCSE32	Web Programming using Python	
24DCSE33	Web Programming using Python Lab	
24DCSE34	Java Programming	
24DCSE35	Java Programming Lab	
24DCSE42	Cryptography and Network Security	PE- III
24DCSE43	Cryptography and Network Security Lab	
24DCSE46	Software Engineering	
24DCSE47	Software Engineering Lab	

3.3 Comprehensive List of Open Electives (^^^ Code Guide)

Course Code	Course Name	Open Elective
24DOFM08	Soft Skills	OE -I OE - II OE -III
DCE- 303	Internet Of Things	
25DCSE01	Economic Policies In India	
25DCSE02	Renewable Energy Technologies	
25DCSE03	Mechatronics	
25DCSE04	Artificial Intelligence & Machine Learning	

3.4 Evaluation scheme across all semester for three-year Diploma Programs

Evaluation Scheme of Diploma Program							
Type of Exam	Internal		External		Total		
Theory Subject	30		70		100		
Practical Subject	70		30		100		
Division of Theory Internal Marks – 30 Marks							
Sessional 1	Sessional 2	Class Attendance		Assignment/Class Performance/ Presentation	Total		
5	5	10		10	30		
Division of Practical Internal Marks – 70 Marks							
Class Performance (Continuous Assessment)		Lab File	Lab Attendance	Internal Viva - Voice	Total		
20		20	10	20	70		
Division of Practical External Marks – 30 Marks							
Performance in Lab during Exam		File/Written Work		External Viva -Voice	Total		
10		10		10	30		
Division of Minor Project –I, II / Summer Internship-I,II Internal Marks -70							
Mid Term Viva	Internal Mid Term Project/ Seminar Report		Internal End Term Viva	Presentation	Final Project/ Seminar Report	Total	
10	20		10	10	20	70	
Division of Minor Project –I, II / Summer Internship-I,II External Marks -30							
Final Project/ Seminar Report		External Viva-Voice			Total		
10		20			30		
Division of Internship/ Project Internal Marks -140							
Mid Term Viva	Internal Mid Term Internship/ Project Report		Internal End Term Viva	Presentation	Final Internship/ Project Report		Total
20	40		20	20	40	140	
Division of Internship/ Project External Marks -60							
Final Internship/ Project Report			External Viva-Voice			Total	
20			40			60	

The University system of grading for all (irrespective of no. of students) based on absolute marks percentage (after applying moderation if any) will be applicable.

Section 4: Detailed Structural Syllabus Content

Semester –I

5

English Language and Communication Skills

Course Code: 24DENG01

Course Credit: 01(1–0)

Max. Marks: 50(15I+35E)

Objectives:

- To enhance the language and communication competence of learners with an emphasis on English for Specific Purposes (ESP) through communication skills related activities.

Learning Outcomes: After this course, the learners will be able to

1. Communicate effectively in diverse situations.
2. Frame sentences for their professional and personal communication needs.
3. Draft meticulous resumes, letters, minutes and presentations.
4. Comprehend and understand intermediate level of passages and audios.

Units	Topics
I Communication Skills	Meaning, Process and Types of Communication; Principles of Effective Communication;
II Grammar and Vocabulary	Use of Tenses, Articles, Prepositions, Conjunctions, Subject-verb concord, Word formation: Base, Prefixes, Suffixes Synonyms, Antonyms, One-word substitutes
III Listening Skills	Process and types of listening, deterrents to listening process, Essentials of good listening. Listening Comprehension and Note-Taking
IV Writing Skills	Report writing, Agenda and Minutes; Letter Writing: Business letters, Cover letters, Electronic mail; Resume Writing
V Speaking Skills	Preparing for interviews- Types of interviews, Group discussion; Effective ways of performing well in interviews; Public Speaking

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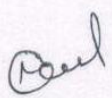
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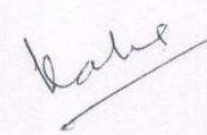
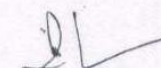
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Recommended Readings:

- Joseph, C. J., Myall, E. G., and A. Biswas, eds. *A Comprehensive Grammar of Current English*. New Delhi: Inter University P, 2014.
- Lata, Pushp, and Sanjay Kumar. *Communication Skills*. 2nd ed. New Delhi: OUP, 2019.
- Monippally, Matthukutty, M. *Business Communication: From Principles to Practice*. New Delhi: McGraw Hill Pub., 2018.
- Mukerjee, H. S. *Business Communication: Connecting at Workplace*. New-Delhi: Oxford University Press, 2012.
- Murphy, H. A., Hildebrandt, H.W., and Thomas, J.P. *Effective Business Communication*. Boston: McGraw-Hill Companies, 1997.
- Ramesh, Gopaldaswamy, and Mahadevan Ramesh. *The Ace of Soft Skills: Attitude, Communication and Etiquette for Success*. Noida: Pearson, 2019.
- Sandra, M. O. *Handbook of Corporate Communication and Strategic Public Relations: Pure and Applied*. New Delhi: Routledge, 2004.
- Sinha, K. K. *Taxmann's Business Communication*. 4th Revised ed. New Delhi: Taxmann's Pub., 2018.
- Sinha, R. P. *Current English and Usage with Composition*. New Delhi: OUP, 2013.
- Taylor, Grant. *English Conversation Practice*. Indian ed. Chennai: McGraw Hill Education Pvt. Ltd., 2017.



English Language and Communication Skills Practical

Course Code: 24DENG02

Course Credit: 01(0-1-0)

Max. Marks: 50(35I+15E)

Course Objective: This course is designed to strengthen the communication abilities of the learners by providing them hands-on practice.

Learning Outcomes: After completing this course, the learners will be able to

- 1) Demonstrate knowledge and understanding of a range of professional or public communication situations.
- 2) Perform effectively in diverse professional and public communication situations like interviews and negotiations, drafting emails and resume etc.

Details:

1. Situational Conversations
2. Listening Skills
3. Resume Writing
4. Mock Interviews
5. Group Discussion
6. Presentation Skills
7. Negotiation Skills
8. Email Writing
9. Public Speaking

Note: The teacher should play the role of the facilitator and allow the learners maximum time to practice these activities. The focus should be primarily on helping the learners overcome the LSWR barrier and gradually move towards honing these skills to enable the learners use them in professional communication situations.

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(UG Certificate) For D. Voc/Diploma

Course Title – Yoga and Health Skills- I

Course Credit: 02 (2-0-0)

Course Code: 24DYHS01
Max. Marks: 100(30I+70E)

Objectives:

- To enable the student to have knowledge of Yoga.
- To possess emotional stability.
- To attain higher level of consciousness.

Learning Outcomes: After the completion of the course, the learners will be able to

- 1: Know and understand about basic Yoga.
- 2: Apply the knowledge of about different school of yoga to practice it traditionally.
- 3: Explaining the importance of health.
- 4: Apply knowledge of yoga asana for mental, physical and social well- being.
- 5: Understand the need of mediation techniques to practice it on daily basis.

Unit	Statement
1 Introduction to Yoga	Yogic Prayer Mantra, Meaning and Definition of Yoga, Aim and Objectives of Yoga, Misconceptions of Yog. Importance of Yoga in modern era.
2 Yoga Practices	Raja Yoga (AshtangaYoga), Bhakti Yoga, Karma Yoga, Hatha Yoga.
3 Health	Meaning, definition, yogic lifestyle, importance of yoga in health protection, measures to increase immunity.
4 Yogic Management in Health Problems	Cervical, Back Pain, Diabetes and Stress.
5 Meditation	Meaning, Types, Importance, General Instructions And Suggestions For Meditation, Physical, Mental and Spiritual Effects Of Meditation.

TEXT BOOKS

1. Yoga & yogic chikitsa - Singh Prof. Ramharsh , Chaukhamba Sanskrit pratishthan, Edition 2011
2. Swami Vivekananda: Jnana Yoga, Bhakti Yoga, Karma Yoga, Raja Yoga, Advaita Ashrama, Calcutta, 2002.
3. Prof. Ramharsh Singh -SwasthavrittaVigyan, Chaukhambha Sanskrit Prakashan, Varanasi, 1998.
4. Sriram Sharma Acharya- JivemSharadahShatam, AkhandJyoti Mathura 1998.
5. Prof. Ramharsh Singh-Yogewam Yogic Chiktsha, Chaukhambha Sanskrit Prakashan, Varanasi, 1998.
6. SwasthaVrittaVigyanewam Yogic Chiktsha- Dr. RakeshGiri, SikhshaBharti, Uttrakhand.

REFERENCE BOOKS

1. Swami Kuvalyananda: Asana, Kaivalyadhama, Lonavla, 1993
2. Swami Satyananda Saraswati: Asana, Pranayama, Bandha, Mudra, Bihar School of Yoga, Munger, 2006
3. Basavaraddi, I.V. & others: YOGASANA: A Comprehensive description about Yogasana, MDNIY, New Delhi, 2011.
4. Basavaraddi, I.V. & others: Yogic Sukshma Evam Sthula Vyayama, MDNIY, New Delhi, 2011.

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Course Title	Applied Mathematics-I	Course Code	24DMTH03		
Specialization	Basic Sciences	Structure (LPC)	3	0	3
Offered for	Diploma	Status	Core	Elective	
Faculty	Skill Faculty of Applied Sciences	Type	New	Modification	
Pre-requisite		To take effect from			
Submission date		Date of approval by BoS			
Course Objective:	The aim of this course is to develop in students an understanding of some of the key mathematical concepts usually taught at the class XI level.				
Course Outcome:	By the end of this course, the student will be able to: CO1. Illustrate the geometric shapes used in engineering problems by Co-ordinate Geometry and Trigonometry. CO2. Formulate engineering problems into mathematical formats with the use matrices, co-ordinate geometry and trigonometry. CO3. Calculate the approximate value of roots of certain expressions in engineering problems by application of binomial theorem. CO4. Explore the idea of location, graph, and linear relationships between two variables. CO5. Discuss the purposes of measures of central tendency and calculate the measures of central tendency (mode, median, mean) for a set of data..				
Contents of the course	Unit 1: Algebra Complex Numbers: definition of complex number, real and imaginary parts of a complex number. Polar and Cartesian Form and their inter conversion, Conjugate of a complex number, modulus and amplitude. Addition subtraction, multiplication and division of complex numbers. Logarithms and its basic properties. Unit 2: Trigonometric Functions Concept of angle, measurement of angle in degrees, grades, radians and their conversions. Trigonometric Ratios of Allied angles, Sum, Difference formulae and Product formulae and their applications Applications of Trigonometric terms in engineering problems such as to find an angle of elevation, height, distance etc. Unit 3: Binomial Theorem, Determinants and Matrices Binomial theorem for positive integral index. First Binomial approximation with application to engineering problems. Determinants and Matrices – Evaluation of determinants (upto 2nd order), Solution of equations (upto 2 unknowns) by Crammer's rule, Definition of Matrices				

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	and its types, addition, subtraction and multiplication of matrices (upto 2nd order). Unit 4: Statistics Measures of Central Tendency: Mean, Median, Mode Measures of Dispersion: Mean deviation, Standard deviation Unit 5: Co-ordinate Geometry Cartesian and Polar co-ordinates (two dimensional), Distance between two points, mid-point, centroid of vertices of a triangle. Slope of a line, equation of straight line in various standards forms. Intersection of two straight lines, concurrency of lines, angle between straight lines, parallel and perpendicular lines, perpendicular distance formula, conversion of general form of equation to the various forms.
Textbook	1. R. D. Sharma, "Applied Mathematics – I & II for Diploma Courses", Dhanpat Rai Publications. 2. "Mathematics for Class XI", NCERT Publication, New Delhi. 3. "Mathematics for Class XII", NCERT Publication, New Delhi.
References	1. H. K Dass, "Applied Mathematics for Polytechnics", CBS Publishers & Distributors. 2. A Ganesh and G Balasubramanian, "Textbook of Engineering Mathematics – I", CBS Publisher, New Delhi. 3. A Ganesh and G Balasubramanian, "Textbook of Engineering Mathematics –II", CBS Publisher, New Delhi. 4. G. B. Thomas, R. L. Finney, "Calculus and Analytic Geometry", Addison Wesley, Ninth Edition. 5. B S Grewal, "Elementary Engineering Mathematics", Khanna Publishers, Delhi

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Applied Physics / Engineering Physics - I						
Diploma (Common for all Branches)						
L	T	P	Credits	Core Course	Internal Examination	: 30
3	0	0	3	24DPHY03	External Examination	: 70
Effective from Session:				2024-25	Total	: 100
Date of BoS approval:				23-07-2024	Duration of Exam	: 3 Hrs
Prerequisite						
Instruction for Paper Setter:						
- There should be 11 questions in the End Term examinations question paper. - The first (1st) question should be compulsory and cover the entire syllabus. This question should be objective, single line answers or short answer type question of total 20 marks. - Apart from question 1 which is compulsory, rest of the paper shall consist of 5 units as per the syllabus. Every unit shall have two questions each of 10 marks each. However, the student shall be asked to attempt only one of the two questions in the unit. Individual questions may contain sub-parts / sub-questions. - Each Unit shall have a marks weightage of 14. - The questions are to be framed keeping in view the learning outcomes of the course / paper. The standard / level of the questions to be asked should be at the level of the prescribed textbook. - The requirement of (scientific) calculators / log-tables / data – tables may be specified if required.						

Course Objectives:

The course aims to inculcate skills among students with following objectives:

- Identify and measure physical quantities with accuracy.
- Represent physical quantities, understand the concepts of energy conservation and its applications.
- Acquire scientific skills to solve problems.
- Comprehend matter and environmental effects on it.
- Apply physical principles in different fields.

Course Outcomes:

After completing this subject, student should be able to:

CO1. Information About Indian knowledge system, describe physical quantities, select their units and make measurements with accuracy.

CO2. List physical quantities as scalar and vector and identify type of motions, various forms of energy.

their conversion and applications.

CO3. Solve problems related to scientific work, energy and power, norms of friction.

CO4. Explain properties of matter and effect of temperature on various matter and phenomenon.

CO5. Demonstrate competency in phenomena of electrostatics and electricity.

Detailed Contents:

UNIT I: Unit and Dimensions

1.1 Definition of Physics, physical quantities- fundamental and derived

1.2 Units: fundamental and derived

1.3 System of units: CGS, FPS, MKS, SI

1.4 Dimension, dimensional formulae and SI units of physical quantities-distance, displacement, area, volume, density, velocity, acceleration, linear momentum, force, impulse, work, power, energy, pressure, surface tension, stress, strain)

- 1.5 Dimensional equations, principle of homogeneity of dimensional equation
- 1.6 Application of dimensional analysis: checking the correctness of physical equation, conversion of system of unit (force, work, acceleration).

UNIT II: Force and Motion

- 2.1 Scalar and vector quantities- definition and examples, representation of vector, types of vector (unit vector, position vector, co-initial vector, collinear vector, co-planar vector)
- 2.2 Vector algebra- addition of vectors, Triangle & Parallelogram law
- 2.3 Scalar and vector product (statement and formula only)
- 2.4 Force and its units, resolution of force
- 2.5 Newton's laws of motion
- 2.6 Linear momentum, Law of conservation of linear momentum, Impulse
- 2.7 Circular motion: definition of angular displacement, angular velocity, angular acceleration, frequency, time period; Relation between linear and angular velocity, centripetal and centrifugal forces, application of centripetal force in banking of road
- 2.8 Rotational motion: definition with examples
- 2.9 Definition of torque, angular momentum, moment of inertia and its physical significance

UNIT III: Work, Power and Energy

- 3.1 Work- definition, symbol, formula and SI unit, types of work (zero work, positive work and negative work) with example
- 3.2 Friction- definition and its simple daily life applications
- 3.3 Power- definition, formula and units
- 3.4 Energy- definition and its SI unit, examples of transformation of energy.
- 3.5 Kinetic energy- definition, examples, formula and its derivation
- 3.6 Potential energy- definition, examples, formula and its derivation
- 3.7 Law of conservation of mechanical energy for freely falling bodies.
- 3.8 Simple numerical problems based on formula of Power and Energy

UNIT IV: Properties of Matter

- 4.1 Elasticity and plasticity- definition, deforming force, restoring force, example of elastic and plastic body
- 4.2 Definition of stress and strain, Hooke's law, modulus of elasticity
- 4.3 Pressure- definition, atmospheric pressure, gauge pressure, absolute pressure, Pascal's law
- 4.4 Surface tension- definition, SI unit, applications of surface tension, effect of temperature on surface tension
- 4.5 Viscosity: definition, unit, examples, effect of temperature on viscosity

UNIT V: Electrostatics and Electricity

- 5.1 Electric charge, unit of charge, conservation of charge
- 5.2 Coulomb's law of electrostatics
- 5.3 Electric field, electric lines of force, electric field intensity due to a point charge
- 5.4 Definition of electric flux, Gauss law
- 5.5 Capacitor and capacitance
- 5.6 Electric current and its SI Unit, direct and alternating current
- 5.7 Resistance, conductance
- 5.8 Series and parallel combination of resistances
- 5.9 Ohm's law

Text Books:

1. "Text Book of Physics for Class XI (Part-I, Part-II)", N.C.E.R.T., Delhi.
2. "Text Book of Physics for Class XII (Part-I, Part-II)", N.C.E.R.T., Delhi.

Recommended Books:

1. Dr. HH Lal, "Applied Physics, Vol. I and Vol. II", TTTI Publications, Tata McGraw Hill, Delhi.
2. AS Vasudeva, "Applied Physics – I", Modern Publishers, Jalandhar.
3. R A Banwait, "Applied Physics – I", Eagle Prakashan, Jalandhar.
4. E-books/e-tools/relevant software to be used as recommended by AICTE/HSRTE/ NITTTR.
5. C. L. Arora, "Practical Physics", S Chand Publication.

Applied Physics / Engineering Physics – I Lab							
Diploma (Common for all Branches)							
L	T	P	Credits	Core Course	Internal Examination	:	70
0	0	2	1	24DPH1Y04	External Examination	:	30
Effective from Session:				2024-25	Total	:	100
Date of BoS approval:				23-07-2024	Duration of Exm	:	3 Hrs

Course Objectives:

The course aims to inculcate skills among students with following objectives:

- to be familiarized with the physical property measuring tools.
- reading values and understanding their parts.
- to read values from the measuring tools.
- to compute physical properties of objects.
- to verify the laws of force.
- to compute atmospheric properties
- to compute force constant, Elastic constant, moment of inertia.
- to apply physical principles in different fields.

Course Outcomes:

After completing this subject, student should be able to:

CO1: Recognize the tool to measure the physical properties of the objects.

CO2: Use tools such as Vernier calliper, screw gauge, spherometer, etc. to measure physical properties of objects.

CO3: Investigate parallelogram law of force, viscosity of liquid, moment of inertia.

CO4: Investigate the force constant, Elastic constants, atmospheric pressure, room temperature, etc.

CO5: Solve problems to convert temperature into different scales, Test ohms' law and laws of resistance.

PRACTICAL EXERCISES

1. Familiarization of measurement instruments and their parts (for example - Vernier calliper, screw gauge, spherometer, travelling microscope etc.), and taking a reading. (compulsory to all students)
2. To find diameter of solid cylinder using a vernier calliper
3. To find internal diameter and depth of a beaker using a vernier calliper and hence find its volume.
4. To find the diameter of wire using screw gauge
5. To find thickness of paper using screw gauge.
6. To determine the thickness of glass strip using a spherometer
7. To determine radius of curvature of a given spherical surface by a spherometer.
8. To verify parallelogram law of force.
9. To determine force constant of spring using Hooke's law

10. Measuring room temperature with the help of thermometer and its conversion in different scale.

11. Determine the moment of inertia of a flywheel.

12. Find the viscosity of a given liquid (Glycerin) by Stoke's law.

13. Find the elastic constants (Young's modulus, modulus of rigidity, bulk modulus and Poisson's ratio) for the material of a wire by Searle's method.

14. To verify Ohm's laws by plotting a graph between voltage and current.

15. To verify laws of resistances in series combination.

16. To verify laws of resistance in parallel combination.

Note- Experiment may be added as per the curriculum and ability.

Note: Minimum 10 Experiments to be performed

Reference Book:

1. B.Sc. Practical Physics, Geeta Sanon
2. B.Sc. Practical Physics, C. L. Arora
3. NCERT Class XI Practical Physics.
4. NCERT Class XII Practical Physics.

24DGEN05: Fundamentals of IT						
Diploma in Computer Science and Engineering						
Semester — I						
L	T	P	Credits	Core Course	Internal Examination	30
3	0	0	3		External Examination	70
Effective from Session:				w.e.f. 2024-25	Total	100
Date of BOS approval:				23.07.2024	Duration of Exam	3 Hrs

Course Objectives:

The course aims to inculcate skills among students with following objectives:

- Acquire the basic knowledge of computer system, internet and WWW.
- Handling of input/ output devices and installing Operating System.
- Connecting and configuring external devices to the computer.
- Use MS office applications for different jobs.
- Work with spreadsheets and prepare presentations.

Course Outcomes:

At the end of the course student will be able to

CO1: Explain the basic components of Computers, Internet and issues of abuses/ attacks on information and computers.

CO2: Describe handling of the Computer / Laptop / Mobiles / Internet Utilities and Install/Configure OS.

CO3: List steps to assemble a PC and connect it to external devices.

CO4: Explain features of Office practiced Automation Tools.

CO5: Understand Office tools to develop worksheets and Prepare presentations.

Detailed Contents:

UNIT I: Basics of Computer

- 1.1 Brief history of development of computers
- 1.2 Definition of Computer, Block diagram of a Computer, Hardware, Software,
- 1.3 Booting: Cold and Hot Booting
- 1.4 Interaction between the CPU and Memory with Input / Output devices
- 1.5 Function of CPU and major functional parts of CPU.
- 1.6 Memory, Bit, Nibble, Byte, KB, MB, GB, TB, PB, Functions of memory
- 1.7 use of storage devices in a Computer, List types of memory used in a Computer, Importance of cache memory, CPU speed and CPU word length.

UNIT II: Basic Internet Skills

- 2.1 Understanding browser, Introduction to WWW, efficient use of search engines, awareness about Digital India portals (state and national portals) and college portals.
- 2.2 Advantages of Email, Various email service providers, Creation of email id, sending and receiving emails, attaching documents with email and drive.
- 2.3 Effective use of Gmail, G-Drive, Google Calendar, Google Sites, Google Sheets, Online mode of communication using Google Meet & WebEx.

Unit III: Basic Logic building

- 3.1 Introduction to Programming
- 3.2 Steps involved in problem solving

3.3 Definition of Algorithm, Definition of Flowchart, Steps involved in algorithm development, differentiate algorithm and flowchart, symbols used in flowcharts, algorithms for simple problems, flowcharts for simple problems.

3.4 Practice logic building using flowchart/algorithms

Unit IV: Office Tools

4.1 Importance, methods and procedure of data entry

4.2 Office Tools like MSOffice.

4.3 MS Word-Typesetting Text and Basic Formatting, Inserting Images, Hyperlinks, Bookmarks, Tables and Table Properties in Writer

4.4 MS Excel: Working with Cells, Sheets, data, tables, using formulas and functions, using charts and graphics.

4.5 MS Power Point – Creating and Viewing Presentations, Inserting Pictures and Tables, Slide Master and Slide Design, Custom Animation.

Unit V: Social Media and Digital Marketing

5.1 Introduction to Digital Marketing – Why Digital Marketing, Characteristics of Digital Marketing, Tools for Digital Marketing

5.2 Effective use of Social Media like LinkedIn, Google+, Facebook, Twitter, etc.

5.3 Features of Social media, Advantages and Disadvantages of Social Media.

Text Books:

1. R.S. Salaria, “Computer Fundamentals” Khanna Publishing House
2. Ramesh Bangia, “PC Software Made Easy – The PC Course Kit” Khanna Publishing House

RECOMMENDED BOOKS

1. Online Resources, Linux man pages, Wikipedia
2. Mastering Linux Shell Scripting: A practical guide to Linux command-line, Bash scripting, and Shell programming, by Mokhtar Ebrahim, Andrew MallettVikas Gupta, “Comdex Hardware and Networking Course Kit” Dream Tech press, New Delhi, 2008
3. Sumitabha Das, “UNIX concepts and applications” Tata McGraw Hill, New Delhi, 4th Edition, 2008

24DGEN06: Fundamentals of IT Lab						
Diploma in Computer Science and Engineering						
Semester — I						
L	T	P	Credits	Core Course	Internal Examination	70
0	0	4	2		External Examination	30
Effective from Session:				w.e.f. 2024 -2025	Total	100
Date of BOS approval:				23.07.2024	Duration of Exam	3Hrs

Course Objectives:

The course aims to inculcate skills among students with following objectives:

- Acquire the basic knowledge of computer system, internet and WWW.
- Handling of input/ output devices and installing Operating System.
- Connecting and configuring external devices to the computer.
- Use MS office applications for different jobs.
- Work with spreadsheets and prepare presentations.

Course Outcomes:

At the end of the course student will be able to

CO1: Explain the basic components of Computers, Internet and issues of abuses/ attacks on information and computers.

CO2: Execute handling of the Computer / Laptop / Mobiles / Internet Utilities and Install/ Configure OS.

CO3: Assemble a PC and connect it to external devices.

CO4: Use and Manage Office practiced Automation Tools.

CO5: Apply knowledge of Office tools to develop worksheets and Prepare presentations.

Practical Exercises:

1. Browser features, browsing, using various search engines, writing search queries
2. Visit various e-governance/Digital India portals, understand their features, services offered.
3. Read Wikipedia pages on computer hardware components, look at those components inlab, identify them, recognize various ports/interfaces and related cables, etc.
4. Using Administrative Tools/Control Panel Settings of Operating Systems
5. Connect various peripherals (printer, scanner, etc.) to computer, explore various features of peripheral and their device driver software.
6. Explore features of Open Office tools and MS-Office, create documents, create presentation, create spread sheet, using these features, do it multiple times
7. Working with Conversion Software like PDF to Word, Word to PPT, etc.
8. Working with Mobile Applications – Searching for Authentic Mobile app, Installation and Settings, Govt. of India Mobile Applications
9. Creating email id, sending and receiving mails with attachments.
10. Using Google drive, Google calendar

24DGEN07: Computer Workshop						
Diploma in Computer Science and Engineering						
Semester — I						
L	T	P	Credits	Core Course	Internal Examination	70
0	0	6	3		External Examination	30
Effective from Session:				w.e.f. 2024-25	Total	100
Date of BOS approval:				23.07.2024	Duration of Exam	3Hrs

Course Objectives:

The course aims to inculcate skills among students with following objectives:

- Handling of computer devices and assembling of devices.
- Identify requirement of software.
- Configuring and installing required software.
- Troubleshooting for problems.
- maintaining laptops

Course Outcomes:

At the end of the course student will be able to

- CO1: Describe and Handle various hardware components.
CO2: Apply knowledge to install different types of software and use them appropriately.
CO3: Assemble computer components
CO4: Execute interfacing of various devices to PC/Laptop
CO5: Execute Troubleshooting and Maintenance of PC/Laptop

Practical Exercises

UNIT I: Introduction

1.1 Anatomy of a Computer, Foundations of Modern Information Technology, The Central Processing Unit, How Microprocessors and Memory Chips are Made, Memory, Buses for Input and Output, communication With Peripherals.

1.2 Desktop: Identification of desktop and its parts, Hardware, Software and Firmware

1.3 Introduction to Mother board, IO and memory expansion slots, Drives, front panel and rear panel Processors& Bus: Introduction and types of Processor, Introduction to BUS

1.4 Laptop: Introduction to Laptop, advantages over Desktops

1.5 Laptop components: Adapter – types, Battery – types, Laptop Keyboard and Touchpad

1.6 Power Supply: Introduction to online and offline UPS, Difference between online and offline UPS

1.7 SMPS: Introduction to SMPS, Study of SMPS Connectors

UNIT II: Memory Storage Devices

2.1 Primary Memory: Introduction and types of primary memory (SDRAM, DDRAM)

2.2 Secondary Storage: Hard Disk –Working Principle of IDE, HDD Partition

2.3 Formatting, Introduction to SATA and Solid-State Drives (SSD)

2.4 Removable Storage: Introduction to CD, DVD, reading & writing operations; Introduction to Blue-ray devices

2.5 Flash memory: Flash drives (pen drives), Memory cards and its types

UNIT III: I/O Devices and Interfacing

- 3.1 Inputting Text and Graphics, State of the Art, Input and Output, Pointing Devices
- 3.2 Foundations of Modern Output, Display Screens, Printers, Foundations of Modern Storage, Storage Media, Increasing Data Storage Capacity, Backing up your Data, The Smart Card
- 3.3 Keyboard: Types of keyboards (wired and wireless Keyboard), keyboards connectors, troubleshooting
- 3.4 Mouse: types, connectors, operation of Optical mouse and Troubleshooting.
- 3.5 Printers: Introduction – Types of printers- Dot Matrix, Inkjet, LaserJet, MFP (Multi-Function Printer), advantages, disadvantages, cables and connectors, Troubleshooting.
- 3.6 I/O Ports: Introduction and identification of Serial, Parallel, USB, HDMI.
- 3.7 Displays: Introduction to LED, LCD and TFT Displays, cables and connectors
- 3.8 Graphic Cards: Introduction to different types of Graphics cards

UNIT IV: Maintenance and Trouble Shooting of Desktop and Laptops

- 4.1 Bios-setup: Standard CMOS setup, Advanced BIOS setup, advanced chipset features, PC Bios communication, upgrading BIOS, Flash BIOS -setup.
- 4.2 POST and BOOTING: Definition, POST Test sequence – beep codes.
- 4.3 Diagnostic Software and Viruses: Computer Viruses, Precautions, Anti-virus Software, Working of Antivirus software's
- 4.4 General troubleshooting of various peripheral devices (printer, pc, laptop, keyboard, mouse, monitor, hard disk)

UNIT V: Assembling and Installation of Hardware/Software

- 5.1 Assembling and Disassembling of PC
- 5.2 Installation and Troubleshooting: Formatting, Partitioning and Installation of OS: Windows and Linux
- 5.3 Installation of peripheral devices: Printers, scanner
- 5.4 Installation of software's: application software, systems software

Text Books:

- 1. Stephen J, Bigelow, "Trouble shooting, maintaining and repairing PCs", Tata McGraw-Hill, New Delhi, 2005.

Recommended Books:

- 1. Stanley & Hall, "PC Data Handbook, BPB Publications, New Delhi, 2007.
- 2. Govindarajulu, "IBM PC and clones Hardware trouble shooting and maintenance, TataMcGraw-Hill, New Delhi, 2007.
- 3. Scott Muller, "Upgrading and Repairing PCs", Microtech Publications, Dubai, 2006.
- 4. Ronald L.Krutz, "Interfacing Techniques in Digital Design with Emphasis on Microprocessors", John Wiley & Sons New York, 2004.

Suggested Websites:

- 1. PC Hardware — Open & Free – OLI (cmu.edu)

<https://www.classcentral.com/course/build-a-computer-3234> : Free Online Course: Build a Modern Computer

24DGEN08: Electronics Workshop						
Diploma in Computer Science and Engineering						
Semester — I						
L	T	P	Credits	Core Course	Internal Examination	70
0	0	4	2		External Examination	30
Effective from Session:				w.e.f. 2024-25	Total	100
Date of BOS approval:				23.07.2024	Duration of Exam	3Hrs

COURSE OBJECTIVE

The course aims to inculcate skills among students with following objectives

- Verification of logic gates practically.
- Designing gates using universal gates.
- Verify Demorgan's theorem of logic gates.
- Designing different sequential and digital circuits.
- Verifying Digital circuits.

COURSE LEARNING OUTCOME

After completion of the course, the student will be able to

CO1: Verify logic gates.

CO2: Apply knowledge to realize the all logic gates using NAND and NOR gate.

CO3: Verify Demorgan's theorem.

CO4: Design Adders and Subtractors.

CO5: Verify designed logic circuits.

LIST OF EXPERIMENTS

1. Verify Truth Table of Logic Gates (AND, OR, NOT, NAND & NOR Gates)
2. Design Basic Gates Using NAND gates
3. Design Basic Gates Using NOR gates
4. Verify Demorgan's theorem.
5. Design Half Adder. (a) Using AND/OR/NOT Gates. (b) Using NAND/NOR Gates.
6. Design full Adder
7. Design full subtractor
8. Verify the Truth Table of RS Flip-flop, JK F/F, D F/F & T type F/F
9. Design shift Register & verify truth table. used as a serial/parallel shift Register
10. Design 3/4 bit Counter & verify truth table

Suggested Websites:

1. www.electronics.wisc-online.com
2. www.electronicsforu.com
3. <https://www.electronics-tutorials.ws/design>

24DGEN09: Basics of Prompt Engineering						
Diploma in Computer Science and Engineering						
Semester — I						
L	T	P	Credits	Core Course	Internal Examination	30
2	0	0	2		External Examination	70
Effective from Session:				w.e.f. 2024-25	Total	100
Date of BOS approval:				23.07.2024	Duration of Exam	3Hrs

COURSE OBJECTIVES:

- Basic understanding of artificial intelligence and machine learning concepts.
- Familiarity with the concept of large language models (LLMs) such as GPT-3 or GPT-3.5.
- Comfort with basic computer usage and navigating online platforms.
- Ability to read and comprehend technical English language.
- Interest in learning how to interact with AI systems effectively.
- Some exposure to any programming or scripting language is beneficial but not mandatory.
- Willingness to experiment and explore new technological tools and applications.

COURSE LEARNING OUTCOME

After completion of the course, the student will be able to

CO1: defining Prompt's role, give context/input data, then provide the instruction.

CO2: Use specific, varied examples to help the model narrow its focus and generate more accurate results.

CO3: Use constraints to limit the scope of the model's output. This can help avoid meandering away from the instructions into factual inaccuracies.

CO4: Break down complex tasks into a sequence of simpler prompts.

CO5: Instruct the model to evaluate or check its own responses before producing them.

COURSE CONTENT:

Unit I: LARGE LANGUAGE MODELS

- 1.1 Introduction to Large Language Models (LLMs)
- 1.2 Introduction to ChatGPT
- 1.3 Overview of GPT 4 Architecture
- 1.4 Common Use cases and applications of ChatGPT 1.5
- Limitations and ethical considerations
- 1.6 Comparative study of ChatGPT and recent LLMs

Unit II: INTRODUCTION TO PROMPTING

- 2.1 Basics of Prompting and Prompt Elements
- 2.2 Types of Prompts
- 2.3 Examples of Prompting
- 2.4 Benefits and Challenges of Prompt Engineering
- 2.5 Natural Language Processing and Prompting

- 2.6 Introduction: AI, Gen AI and Prompts for Gen AI
- 2.7 Case Studies and Roles of Prompting in different sectors

Unit III: THE ART OF WELL-CRAFTED PROMPTS

- 3.1 The principles of Prompting
- 3.2 The 5Ws: What, Where, When, Why and Who?
- 3.3 The art of open-ended Questions
- 3.4 The Role of Active Listening and Paraphrasing
- 3.5 Leveraging Context and Background Information
- 3.6 General Mistakes: Mistakes related to Book Writing, Mistakes related to SEO, Mistakes related to Copywriting Task.

Unit IV: PROMPTING TECHNIQUES

- 4.1 Systematic Review Process: The Pipeline
- 4.2 Text Based Prompting
- 4.3 Multilingual Prompting
- 4.4 Multimodal Prompting

Unit-V: RISK AND MISUSES

- 5.1 Prompting Issues: Security and Alignment
- 5.2 Addressing Prompt Misuses
- 5.3 Factuality and Verbosity
- 5.4 Biases
- 5.5 Mitigating Biases
- 5.6 Making adjustments and tailoring Prompts for different Use Cases
- 5.7 Future of Prompting

RECOMMENDED READINGS

1. Schulhoff, S., Ilie, M., Balepur, N., Kahadze, K., Liu, A., Si, C., ... & Resnik, P. (2024). The Prompt Report: A Systematic Survey of Prompting Techniques. *arXiv preprint arXiv:2406.06608*.
2. Getting Great Answers Chat GPT's The art of Prompting.
3. Prompting mistakes that are killing your productivity.
4. The Prompt Engineers handbook.

Semester – II

Course Title	Applied Mathematics-II	Course Code	14DMTH04		
Specialization	Basic Sciences	Structure (L/P/C)	3	0	3
Offered for	Diploma	Status	Core	Elective	
Faculty	Skill Faculty of Applied Sciences	Type	New	Modification	
Pre-requisite		To take effect from			
Submission date		Date of approval by BoS			
Course Objective:	The primary objective of this learning program is to acquire proficiency in beginner-level calculus. Learners will use a variety of tools to solve application problems in engineering and technology.				
Course Outcome:	By the end of this course, the student will be able to: CO1. Formulate the engineering problems into mathematical format with the use of differential equations and differential. CO2. Use the differentiation and integration in solving various Mathematical and Engineering problems. CO3. Calculate the approximate area under a curve by applying integration and numerical methods. CO4. Learn about basic fundamentals about MATLAB/ SciLab and mathematical calculation with MATLAB/ SciLab software..				
Contents of the course	Unit 1: Limits and Differentiation Concept of limits (Introduction only) and problems related to four standard limits only. Differentiation of sum, product and quotient of functions. Differentiation of trigonometric functions, inverse trigonometric functions, Logarithmic differentiation, successive differentiation (upto 2nd order) Unit 2: Application of differentiation To find the rate measures To find the Maxima and minima. Unit 3: Software MATLAB and SciLab software – Theoretical Introduction. Basic difference between MATLAB and SciLab software. Calculations with MATLAB or SciLab – (a) Representation of matrix (2×2 order) (b) Addition, Subtraction of matrices (2×2 order) in MATLAB or SciLab I Addition and subtraction of values –Trigonometric and Inverse Trigonometric functions Unit 4: Integration Integration as inverse operation of differentiation with simple examples. Simple standard integrals and related problems, Integration by Substitution method and				

	Integration by parts Evaluation of definite integrals with given limits Unit 5: Application of Integration, Numerical Integration and Differential Equations Applications of integration: for evaluation of area under a curve and axes (Simple problems). Numerical integration by Trapezoidal Rule and Simpson's $1/3^{rd}$ Rule using pre-existing mathematical models. Definition, order, degree, Type of differential Equations, linearity, Formulation of ordinary differential equation (up to 1^{st} order), solution of ODE (1^{st} order) by variable separation method.
Textbook	1. R. D. Sharma, "Applied Mathematics – I & II for Diploma Courses", Dhanpat Rai Publications. 2. "Mathematics for Class XI", NCERT Publication, New Delhi. 3. "Mathematics for Class XII", NCERT Publication, New Delhi. 4. R. Pratap, "Getting Started with MATLAB 7", Oxford University Press, Seventh Edition
References	1. H. K. Dass, "Applied Mathematics for Polytechnics", CBS Publishers & Distributors. 2. A. Ganesh and G. Balasubramanian, "Textbook of Engineering Mathematics – I", CBS Publisher, New Delhi. 3. A. Ganesh and G. Balasubramanian, "Textbook of Engineering Mathematics – II", CBS Publisher, New Delhi. 4. G. B. Thomas, R. L. Finney, "Calculus and Analytic Geometry", Addison Wesley, Ninth Edition. 5. B. S. Grewal, "Elementary Engineering Mathematics", Khanna Publishers, Delhi.

Applied Physics / Engineering Physics - II						
Diploma (Common for all Branches)						
L	T	P	Credits	Core Course	Internal Examination	: 30
3	0	0	3	24DPI1Y05	External Examination	: 70
Effective from Session:				2024-25	Total	: 100
Date of BoS approval:				23-07-2024	Duration of Exam	: 3 Hrs
Prerequisite						
Instruction for Paper Setter:						
- There should be 11 questions in the End Term examinations question paper. - The first (1st) question should be compulsory and cover the entire syllabus. This question should be objective, single line answers or short answer type question of total 20 marks. - Apart from question 1 which is compulsory, rest of the paper shall consist of 5 units as per the syllabus. Every unit shall have two questions each of 10 marks each. However, the student shall be asked to attempt only one of the two questions in the unit. Individual questions may contain sub-parts / sub-questions. - Each Unit shall have a marks weightage of 14. - The questions are to be framed keeping in view the learning outcomes of the course / paper. The standard / level of the questions to be asked should be at the level of the prescribed textbook. - The requirement of (scientific) calculators / log-tables / data – tables may be specified if required.						

Course Objectives:

The course aims to inculcate skills among students with following objectives

- Understanding different types of wave forms.
- Learn laws of reflection and refraction of light.
- Demonstrating electrostatics and electricity phenomena.
- Categorizing properties of materials and create new materials.
- Apply knowledge of Modern Physics for different technical applications.

Course Outcomes

At the end of this course, the students will be able to:

- CO1: Differentiate between types of waves and their motion.
- CO2: State laws of reflection and refraction of light.
- CO3: Demonstrate competency in phenomena of electrostatics and electricity.
- CO4: Classify properties of material to prepare new materials for various technical applications.
- CO5: Demonstrate a strong foundation on Modern Physics to use at various Technical applications.

Detailed Contents:

UNIT I: Wave Motion and its Applications

- 1.1 Waves: definition, types (mechanical and electromagnetic wave)
- 1.2 Wave motion- transverse and longitudinal with examples, terms used in wave motion like displacement, amplitude, time period, frequency, wavelength, wave velocity; relationship among wave velocity, frequency and wave length
- 1.3 Simple harmonic motion (SHM): definition, examples
- 1.4 Cantilever: definition, formula of time period
- 1.5 Free, forced and resonant vibrations with examples
- 1.6 Sound waves: types (infrasonic, audible, ultrasonic) on the basis of frequency, noise, coefficient of absorption of sound, echo

UNIT II: Optics

- 2.1 Reflection and refraction of light with laws, refractive index
- 2.2 Lens: introduction, lens formulae (no derivation), power of lens and simple numerical problems
- 2.3 Total internal reflection and its applications, critical angle and conditions for total internal reflection
- 2.4 Superposition of waves, definition of Interference, Diffraction and Polarization of waves
- 2.5 Introduction to Microscope, Telescope and their applications

UNIT III: Electrostatics and Electricity

- 3.1 Electric charge, unit of charge, conservation of charge
- 3.2 Coulomb's law of electrostatics
- 3.3 Electric field, electric lines of force (definition and properties), electric field intensity due to a point charge
- 3.4 Definition of electric flux, Gauss law
- 3.5 Capacitor and capacitance
- 3.6 Electric current and its SI Unit, direct and alternating current
- 3.7 Resistance, conductance
- 3.8 Series and parallel combination of resistances
- 3.9 Ohm's law

UNIT IV: Classification of Materials and their Properties

- 4.1 Definition of energy level, energy bands.
- 4.2 Types of materials (conductors, Semiconductors, insulators, and dielectric)
With example, intrinsic and extrinsic semiconductors with examples.
- 4.3 Introduction to magnetism, type of magnetic materials: diamagnetic,
- 4.4 paramagnetic and ferromagnetic materials with examples
- 4.5 Magnetic field, magnetic lines of force, magnetic flux
- 4.6 Electromagnetic induction

UNIT V

Modern Physics

- 5.1 Laser: introduction, principle, absorption, spontaneous emission, stimulated emission, population inversion
- 5.2 Engineering and medical applications of laser
- 5.3 Fibre optics: introduction to optical fibers, light propagation, fiber type, applications in medical, telecommunication and sensors
- 5.4 Nanotechnology: introduction, definition of Nano materials with examples, properties at nanoscale, applications of nanotechnology.

Text Books:

1. "Text Book of Physics for Class XII (Part-I, Part-II)", N.C.E.R.T., Delhi.
2. Dr. HH Lal, "Applied Physics, Vol. I & II", TTTI Publications, Tata McGraw Hill, Delhi.
3. AS Vasudeva, "Applied Physics – I", Modern Publishers, Jalandhar.
4. R A Banwait, "Applied Physics – II", Eagle Prakashan, Jalandhar.
5. N Subrahmanyam, Brij Lal and Avadhanula, "A text book of OPTICS", S Chand Publishing, New Delhi. E-books/e-tools/relevant software to be used as recommended by AICTE/ HSBTE/NITTTR.
6. M H Fulekar, "Nanotechnology: Importance and Applications", IK International Publishing House (P) Ltd., New Delhi.
7. C. L. Arora, "Practical Physics", S Chand Publication.

Recommended Books:

1. Dr. HH Lal, "Applied Physics, Vol. I and Vol. II", TTTI Publications, Tata McGraw Hill, Delhi.
2. AS Vasudeva, "Applied Physics – I", Modern Publishers, Jalandhar.
3. R A Banwait, "Applied Physics – I", Eagle Prakashan, Jalandhar.
4. E-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/ NITTTR.
5. C. L. Arora, "Practical Physics", S Chand Publication.

Applied Physics / Engineering Physics – II Lab						
Diploma (Common for all Branches)						
L	T	P	Credits	Core Course	Internal Examination	1 70
0	0	2	1	24PHY06	External Examination	1 30
Effective from Session:				2024-25	Total	1 100
Date of BoS approval:				23-07-2024	Duration of Exam	1 3 hrs

COURSE OBJECTIVES

The course aims to inculcate skills among students with following objectives

- Identifying different types of apparatus/ instruments for measuring properties.
- Analyzing time and time variations of varying different objects.
- Demonstrating electrostatics and electricity phenomena.
- Plot voltage, current and study colour coding scheme of resistance.
- Verify different laws and phenomena of physics.

COURSE LEARNING OUTCOMES

At the end of this course, the students will be able to:

- CO1: Identify the apparatus to be used and understand their components.
CO2: Analyse time variations of pendulum and cantilever.
CO3: Test laws of reflection, refraction, ohms law and laws of resistance.
CO4: Examine physical properties of objects.
CO5: Examine focal length of concave and convex lens.

PRACTICAL EXERCISES

1. Familiarization with apparatus (resistor, rheostat, key, ammeter, voltmeter, telescope, microscope etc.)
2. To find the time period of a simple pendulum.
3. To study variation of time period of a simple pendulum with change in length of pendulum.
4. To determine and verify the time period of Cantilever.
5. To verify Ohm's laws by plotting a graph between voltage and current.
6. To study colour coding scheme of resistance.
7. To verify laws of resistances in series combination.
8. To verify laws of resistance in parallel combination.
9. To find resistance of galvanometer by half deflection method.
10. To verify laws of reflection of light using mirror.
11. To verify laws of refraction using glass slab.
12. To find the focal length of a concave lens, using a convex lens.

Note- Experiment may be added as per the curriculum and ability.

Note: Minimum 8 Experiments to be performed

Reference Book:

1. B.Sc. Practical Physics, Geeta Sanon
2. B.Sc. Practical Physics, C. L. Arora
3. NCERT Class XI Practical Physics.
4. NCERT Class XII Practical Physics.

dl MK2

24DGEN15: Engineering Graphics							
Diploma in Computer Science and Engineering Semester – II							
L	T	P	Credits	Core Course	Internal Examination	:	70
0	0	6	3		External Examination	:	30
Effective from Session:				w.e.f. 2024-25	Total	:	100
Date of BoS approval:				23.07.2024			

COURSE OBJECTIVES:

The course aims to inculcate skills among students with following objectives

- Creating orthographic views of objects from different angles.
- Creating sectional views of objects.
- Creating isomorphic of solids.
- Identification of conventions for different engineering materials, symbols, etc. in engineering applications.
- Apply knowledge of AutoCAD for orthographic views.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:

CO1: Sketch Orthographic views of different objects viewed from different angles.

CO2: Sketch and interpret sectional views of an object which are otherwise not visible in normal view.

CO3: Sketch Isometric views of different solids and develop their surfaces.

CO4: Identify conventions for different engineering Materials, symbols, sections of regular objects and general fittings used in Civil and Electrical household appliances /fittings.

CO5: Sketch orthographic views of different objects by using basic commands of AutoCAD.

DETAILED CONTENTS

UNIT I: Introduction to Engineering Drawing and Graphics, Technical writing

- 1.1 Introduction to use and care of drawing instruments, drawing materials, layout and sizes of drawing sheets and drawing boards.
- 1.2 Symbols and Conventions-Conventions of Engineering Materials, Sectional Breaks and Conventional lines. Civil Engineering Sanitary fitting symbols, Electrical fitting symbols for domestic interior installations.
- 1.3 Geometrical construction-geometrical figures such as triangles, rectangles, circles, ellipses and curves, hexagons, pentagons bisecting a line and arc , division of line and circle with the help of drawing instruments.
- 1.4 Definition and classification of lettering
- 1.5 Free hand (of height of 5,8,12 mm) and instrumental lettering (of height 20 to 35 mm): upper case and lower case, single and double stroke, vertical and inclined (Gothic lettering) at 75 degrees to horizontal and with suitable height to width ratio 7:4.

UNIT II Orthographic Projections and Sectioning

- 2.1 Theory of orthographic projections (Elaborate theoretical instructions).
- 2.2 Three views of orthographic projections of different objects of given pictorial view of a block in 1st and 3rd angle.
- 2.3 Projection of Points in different quadrant
- 2.4 Projection of Straight Line (1st angle)
- 2.5 Line parallel to both the planes.
- 2.6 Line perpendicular to any one of the reference planes and parallel to others
- 2.7 Line inclined to any one of the references and parallel to another plane.
- 2.8 Projection of Plane – Different lamina like square rectangular, triangular, circle and Hexagonal pentagon. Trace of planes (HT and VT).

- 2.9 Identification of surfaces.
- 2.10 Importance and salient features 2.11 Drawing of full section, half section, partial or broken out sections, Offset sections, revolved sections and removed sections (theoretical only).
- 2.12 Orthographic sectional views of different objects.

UNIT III

- 3.1 Introduction of projection of right solids such as prism & pyramid (square, Pentagon, Hexagonal) cube, cone & cylinder (Axes perpendicular to H.P and parallel to V.P.)
- 3.2 Introduction of sections of right solids - Section planes, Sections of Hexagonal prism,
- 3.3 pentagon pyramid, cylinder and cone (Section plane parallel to anyone reference planes and perpendicular to V.P. and inclined to H.P.)
- 3.4 Development of Surfaces – Development of lateral surfaces of right solids like cone, cylinder, pentagonal prism, pyramid and hexagonal pyramid (Simple problems)

UNIT IV Isometric Views

- 4.1 Fundamentals of isometric projections and isometric scale.
- 4.2 Isometric views of different laminas like circle, pentagon and hexagon.
- 4.3 Isometric views of different regular solids like cylinder, cone, cube, cuboid, pyramid and prism.
- 4.4 Isometric views from given different orthographic projections (front, side and top view)

UNIT V Introduction to AutoCAD

- 5.1 Basic introduction and operational instructions of various commands in AutoCAD.
- 5.2 At least two sheets of different objects on AutoCAD (given pictorial/isometric view of a block
- 5.3 AutoCAD skill of student is evaluated in internal assessment only not in external exam.

Text Books

A Text Book of Engineering Drawing by Surjit Singh; Dhanpat Rai & Co., Delhi

RECOMMENDED BOOKS

- 1.Engineering Drawing by PS Gill; SK Kataria & Sons, New Delhi
- 2.Elementary Engineering Drawing in First Angle Projection by ND Bhatt;Charotar Publishing House Pvt. Ltd.,Anands
- 3.Engineering Drawing and Graphics using AutoCAD by T. Jeyapoovan,VikasPublishing House Pvt, Ltd Noida.
- 4.A Text Book of Engineering Drawing by S.R.Singhal and O.P.Saxena, AsianPublisher, Delhi
- 5.Engineering Drawing by RB Gupta, Satya Prakashan, New Delhi

24DGEN10: Advances in IT						
Diploma in Computer Science and Engineering						
Semester — II						
L	T	P	Credits	Core Course	Internal Examination	30
3	0	0	3		External Examination	70
Effective from Session:				w.e.f. 2024-25	Total	100
Date of BOS approval:				23.07.2024	Duration of Exam	3Hrs

Course Objectives:

The course aims to inculcate skills among students with following objectives:

- The course aims to inculcate skills among students with following objectives acquire skills to develop webapplications using HTML.
- Developing interactive internet applications.
- Learning syntax and structure of XML languages.
- Designing XML codes.
- Developing and testing web codes.

Course Outcomes:

At the end of the course student will be able to

CO1: Describe the need of HTML

CO2: Understand its applications in Web Development

CO3: Design and Develop Websites using HTML

CO3: Apply acquired knowledge to develop interactive Internet applications

CO5: Design XML web Pages

Detailed Contents

UNIT I: HTML Introduction

1.1 Introduction to HTML

1.2 Characteristics of HTML language

1.3 Structure of a HTML page.

1.4 Describing Tags.

1.5 How to create a HTML document? Viewing HTML document

UNIT II: HTML Syntax

2.1 Using tags, Heading, Paragraph

2.2 Changing appearance of text (bold, italics, underline, and subscript, superscript); Changing font size, text color and background

2.3 Changing the background color and background of HTML page

2.4 Top margin, left margin, <hr> and its attributes.

2.5 Marquee

UNIT III: HTML Lists and Links

3.1 Using list and images: Unordered lists: type attribute. Ordered lists: start attribute, type attribute, value attribute.

3.2 Nested lists. Inserting images, aligning an image, centring image, adding border to image, alternate text, setting height and width, adding space around the image.

3.3 Working with links: Anchor elements, creating hyperlink to a document. Internal linking and external linking.

UNIT IV: HTML Tables and Frames

4.1 Creating tables: Creating a table, attributes of table tag (BORDER, BORDERCOL OR, BGCOLOR, ALIGN, CELLSPACING, CELLPADING, WIDTH) Attributes of table row <tr> and table data <td> tag (BORDERCOLOR, BGCOLOR, ALIGN, VALIGN, HEIGHT). Row span and Colspan.

4.2 Working with Frames. Use and creating frames. Introduction to Forms Steps for developing a Website.

UNIT V: XML

5.1 Introduction to XML

5.2 Creating XML pages

5.3 HTML vs XML

Text Books:

1. Thomas A.Powell, “HTML&XHTML –The Complete Reference”, Tata McGraw Hill,2006

Suggested Websites:

1. <https://nptel.ac.in/courses/117/106/117106113/>
2. <https://nptel.ac.in/courses/106/105/106105084/>

24DGEN11: Advances in IT Lab							
Diploma in Computer Science and Engineering Semester – II							
L	T	P	Credits	Core Course	Internal Examination	:	70
0	0	2	1		External Examination	:	30
Effective from Session:				w.e.f 2024-25	Total	:	100
Date of BoS approval:				23.07.2024			

Course Objectives:

The course aims to inculcate skills among students with following objectives:

- Understanding syntax and structure of mark-up languages for web development.
- Applying knowledge to tags to create different types of web pages.
- Creating interlinking of web documents to navigate across webpages.
- Incorporating multimedia content in web pages.
- Developing online forms.

Course Learning Outcomes:

At the end of the course student will be able to:

CO1: Develop basic HTML document.

CO2: Apply knowledge of different HTML tags to format web document.

CO3: Implement heading, paragraphs, tables, lists, frames, etc. in the web document.

CO4: Create web page that contains inter and intra hyperlinks.

CO5: Create forms and controls using web development applications or languages.

Practical Exercises

1. Creating an HTML document
2. Working with Mark up Tags
3. Working with Heading-Paragraphs
4. Working with Text
5. Working with Lists
6. Working with Tables
7. Working with Frames
8. Working with Hyperlinks
9. Working with Images and Multimedia
10. Designing Marquee and changing its colors

24DGEN16: Multimedia Applications							
Diploma in Computer Science and Engineering Semester – II							
L	T	P	Credits	Core Course	Internal Examination	:	30
3	0	0	3		External Examination	:	70
Effective from Session:				w.e.f. 2024-25	Total	:	100
Date of BoS approval:				23.07.2024	Duration of Exam	:	3 Hrs

COURSE OBJECTIVES

The course aims to inculcate skills among students with following objectives

- Developing interactive websites.
- Applying multimedia tools knowledge to create applications.
- Determine the appropriate use of interactive verses standalone Web applications
- identifying use of interactive and standalone applications.
- Identifying challenges during deploying web based applications.

COURSE OUTCOMES

At the end of the course student will be able to

CO1: Develop a well-designed, interactive Web site with respect to current standards and practices
CO2: Demonstrate in-depth knowledge in an industry-standard multimedia development tool and its associated scripting language

CO3: Recognize the appropriate use of interactive verses standalone Web applications

CO4: Design time-based and interactive multimedia components

CO5: Identify issues and obstacles encountered by Web authors in deploying Web-based application

DETAILED CONTENTS

UNIT I Definitions and Classification

- 1.1 Multimedia Hardware
- 1.2 Multimedia Software
- 1.3 Meetings the analog signals
- 1.4 Secret of Digital recording
- 1.5 CD ROMs.

UNIT II Digital Audio Technologies

- 2.1 Sound Cards
- 2.2 Playback and Recording
- 2.3 MIDI – working with MIDI.

UNIT III Multimedia texts

- 3.1 Coloring
- 3.2 Digital Imaging Fundamentals
- 3.3 Digital Image Development and Editing.

UNIT IV Animation fundamentals

- 4.1 Animation Software tools
- 4.2 Animation Techniques
- 4.3 Digital video fundamentals
- 4.4 Digital video production techniques.

UNIT V M/M Project Design Concepts

- 5.1 Authoring
- 5.2 Project Planning and Costing
- 5.3 Multimedia team.

TEXT BOOKS

1. Multimedia Magic – S.Gokul - BPB Publications, 2008.

RECOMMENDED BOOKS

2. Multimedia – Making it work – T. Vaughan – Osborne McGraw Hill - 2005.
3. Fundamentals of Multimedia – Drew – Pearson Education – 2006.
4. Multimedia Systems – Buford – Pearson Education – 2007.

SUGGESTED WEBSITES

1. <https://nptel.ac.in/courses/117/105/117105083/>
2. <https://nptel.ac.in/courses/106/106/106106200/>

24DGEN17: Multimedia Applications lab							
Diploma in Computer Science and Engineering							
Semester – II							
L	T	P	Credits	Core Course	Internal Examination	:	70
0	0	4	2		External Examination	:	30
Effective from Session:				w.e.f. 2024-25	Total	:	100
Date of BoS approval:				23.07.2024	Duration of Exam	:	3Hrs

COURSE OBJECTIVES

The course aims to inculcate skills among students with following objectives

- Understanding Multimedia tools.
- Applying knowledge of flash tools for the multimedia operations.
- Understanding action scripts for basic operations and event handling.
- Understanding animation techniques
- Apply tools and techniques for the image and video editing.

COURSE OUTCOMES

At the end of the course student will be able to

CO1: Identify capabilities of Multimedia

CO2: Apply to perform multimedia operations.

CO3: Develop animations

CO4: Understand audio, video, text editing

CO5: Apply latest tools to perform image editing operations.

PRACTICAL EXERCISES

1. Introduction to Multimedia tools
2. Performing Image Editing & Graphic Design Techniques
3. Performing Audio Editing Techniques
4. 2D Animation Principles & Techniques
5. Performing Video editing and special effects
6. 3D Animation Techniques
7. Practice Web Page Design & Development
8. Creating artwork to be used in video games
9. Visual Effects in Multimedia Design
10. Visual Design Elements and its methodologies

24DCSE66: Human Values and Ethics							
Diploma in Computer Science and Engineering Semester – II							
L	T	P	Credits	Core Course	Internal Examination	:	30
2	0	0	2		External Examination	:	70
Effective from Session:				w.e.f. 2024-25	Total	:	100
Date of BoS approval:				14.07.2025			

Course Objective:

To develop students' understanding of moral, ethical, and professional responsibilities as IT/computer professionals in the modern world. The course builds awareness about human values, social responsibilities, legal implications, and the ethical use of technology.

Course Outcome: By the end of this course, the student will be able to:

- CO1.** Identify and analyze key human values like integrity, honesty, and trust in personal, social, and tech contexts, emphasizing ethical digital contributions.
- CO2.** Apply values like empathy and emotional intelligence in IT, and make value-based decisions respecting human dignity and rights in online spaces.
- CO3.** Evaluate ethical software practices, including AI bias and data responsibility, while demonstrating leadership and accountability in tech.
- CO4.** Understand ethical challenges in global tech operations, respect cultural diversity, and assess the societal and environmental impact of technology.
- CO5.** Fulfill duties in IT roles with ethical collaboration, manage conflicts of interest, and uphold loyalty, confidentiality, and integrity.

Course Contents:

Unit 1: Introduction to Human Values in IT

Morals, Values in Technology Context: Understanding values, Types of values, values for individual and social wellbeing. Ethics: Importance of Integrity and Trustworthiness

Work Ethics: Concept of service-learning in community tech projects, civic virtue in digital contributions (e.g., open source). Honesty: -Understanding honesty and its role in personal and social life. Co-operation: - Understanding cooperation and significance of cooperation in social and professional life.

Unit 2: Human Values for Tech Professionals

Empathy: Basic Concepts on Empathy -Self-confidence –Spirituality –Character. Value Education - Human dignity, Human Rights, Fundamental duties in online spaces, Gender bias in tech roles, Emotional Intelligence. Value Judgments, Facts & Values, how values are justified, Selection and justification of values in IT. Universal Values.

Unit 3: Professional Ethics & Excellence in IT

Ethics in the Software Profession, Value-based programming: Avoiding bias in AI/algorithms

Competence & responsibility in software development. Current Ethical Issues: Data misuse, AI biases, fake news, trolling, misinformation. Leadership and Power Dynamics in IT: Positive use of authority in tech teams, ethical tech startups

Unit 4: Global Perspectives on Tech Ethics

Globalization and MNCs, Ethical outsourcing, cultural sensitivity in software design. Cross-Cultural Challenges: Respecting values in global teams, Business & Media Ethics in Tech: Truth in online marketing, influencer responsibility. Case study: Cambridge Analytica, etc. Environmental Ethics: E-waste, green computing. Computer Ethics Topics: Hacking, phishing, cyberbullying, Cybersecurity responsibilities, ethical hacking, Endangering lives via automation (e.g., autonomous vehicles)

Unit 5: Duties, Rights & Accountability in the Tech Profession

Professional Duties in IT Roles: Software engineers, system admins, data analysts. Collegiality in IT Teams: Techniques to improve collaboration, respectful communication. Loyalty and Conflict of Interest: Working across multiple projects, handling client confidentiality, Conflict of Interest, Ethical egoism, Plagiarism.

Recommended Reading/Resources:

1. *Ethics in Information Technology* – George Reynolds
2. *Cyberethics: Morality and Law in Cyberspace* – Richard Spinello

3. *Code of Ethics* – ACM, IEEE
4. Case Studies from tech news (TechCrunch, Wired, etc.)

Course Title	Environmental Science	Course No. :	24DEVS01		
Specialization	Value Added Course	Structure (LTP)	2	0	0
Offered for	D.Voc./Diploma	Status	Core ✓	Elective	
Faculty	SFASH	Type	New ✓	Modification	
Credits	2	Marks	Internal	30	
Hours	30		External	70	
Pre-requisite	Nil	To take effect from	2024-2025		
Submissiondate	13-07-2024	Date of approval by BoS	23-07-2024		
Course Objective	To create awareness among the students about our ecosystem, related problems and our role in that.				
Course Outcome	On completion of this course, students will be able to: CO1: Understand our environment. CO2: Comprehend ecosystems and biodiversity. CO3: Analyze atmospheric and climate dynamics. CO4: Evaluate urbanization and agricultural practices. CO5: Develop strategies for environmental pollution control.				
Contents of the course	Unit:1 Indian Knowledge System- Indigenous Practices, Understanding our Environment Environment: Definition, Scope and Importance, Natural Resources management: Forest Resources, Water Resources, Mineral Resources, Energy Resources, Food Resources, Land Resources., Traditional agricultural practices - Organic farming, Crop rotation, Intercropping), Water management techniques - Stepwells, Tankas, Baolis, Forest management and conservation methods - Sacred groves, Agroforestry Unit:2 Ecosystem Ecosystem: Introduction, structure, functions & Kinds of ecosystem. Energy flow in ecosystem, Biogeochemical cycles, Habitat and Ecological Niche, Species Interactions, Bio-geographic zones of India. Unit-3: Atmosphere and Environmental Pollution Atmosphere: Introduction, layers of the atmosphere, Climate Change: Greenhouse effect, Global warming, Ozone layer depletion, Deforestation, Air pollution: major air pollutants, classification of air pollutants, impact of air Pollution, controlling measures. Acid Rain. Water Pollution: Introduction, causes, impacts & waste water treatment. Unit-4: Urbanization Urbanization: Introduction, Manifestations of Urbanization, social economic and environmental problems in urbanization, Agriculture: Introduction, unsustainable patterns of modern industrialized agriculture, Green revolution, Soil erosion				

Field Work	☐ Visit to a local area to document environmental assets river/forest/grassland/hill/mountain ☐ Visit to a local polluted Site-Urban/Rural/Industrial/Agricultural ☐ Participation in plantation drive and nature camps. ☐ Campus environmental management activities such as solid waste disposal, water Management and sanitation, and sewage treatment.
Text Books	1. Singh, J.S., Singh, S.P. & Gupta, S.R. (2006). Ecology, Environment and Resource Conservation. Anamaya Publications. 2. Odum, E.P., Odum, H.T. & Andrews, J. (1971). Fundamentals of Ecology. Philadelphia: Saunders. 3. Gilbert M. Masters and W. P. (2008). An Introduction to Environmental Engineering and Science, Ela Publisher (Pearson).
References	1. Deveddi M. (2021). Environment and ecology in the Indian knowledge system. Vidyanidhi prakashan. 2. Melissa K. Nelson and Daniel Shilling. (2018). Traditional Ecological Knowledge: Learning from Indigenous Practices for Environmental Sustainability. Cambridge University Press. 3. Krishnamurthy, K.V. (2003) Textbook of Biodiversity, Science Publishers, Plymouth, UK. 4. Manahan, S.E. (2022). Environmental Chemistry (11th ed.). CRC Press. 5. Central Pollution Control Board Web page for various pollution standards. https://cpcb.nic.in/standards/ 6. Ahluwalia, V. K. (2015). <i>Environmental Pollution, and Health</i>. The Energy and Resources Institute (TERI).

Semester – III

24DCSE18 Programming in C							
Diploma in Computer Science and Engineering							
Semester – III							
Hours per week							
L	T	P	Credits	Core Course	Internal Examination	:	30
3	0	0	3	Program Core	External Examination	:	70
Effective from Session:				w.e.f 2024-25	Total	:	100
Date of BoS approval:				23.07.2024	Duration of Exam	:	3 Hrs

COURSE OBJECTIVES:

- To have understanding of Programming Language Standards, Problem Solving Techniques, IDE and Compilers for C Programming.
- To have in depth knowledge of Writing, Compiling and Running Programs.
- To understand and Practice Programming Construct: Variable, Operators, Control Structures, Loop, Functions with C Programming.
- To understand and Practice basics of arrays, pointers, preprocessor, Structure and Union
- To learn difference in procedural and object oriented programming language with understanding of OOPs features and Practice beginner level of Pointers, Preprocessor, Programming

COURSE LEARNING OUTCOMES

At the end of the course student will be able to

CO1: Identify various control structures, variables and implement them.

CO2: Practice pointer in an array and structure.

CO3: Use structures and union for handling data.

CO4: Explain and execute member functions in C language.

CO5: Describe and implement array in C language.

CO6: Perform the execution of pointers in C language.

DETAILED CONTENTS

UNIT I

Basics of C Programming

- 1.1 Steps in development of a program, Flow charts, Algorithm development
- 1.2 Programme Debugging, I/O statements, Constants, variables and data types
- 1.3 Operators & Expressions, Unformatted and Formatted IOS, Data Type Casting
- 1.4 Decision making with IF – statement, IF – Else and Nested IF
- 1.5 While and do-while, for loop, Break. Continue, goto and switch statements

UNIT II

Pointers and Functions

- 2.1 Introduction to pointers, Address operator and pointers
- 2.2 Declaring and initializing pointers, Single pointer,
- 2.3 Introduction to functions, Function Declaration, calling, definition
- 2.4 Parameter Passing, Call - by value/reference, Global and Local Variables

UNIT III

Arrays and Strings

- 3.1 Introduction to Arrays
- 3.2 Array Declaration, Length of array
- 3.3 Single and multi dimensional array
- 3.4 Arrays of characters
- 3.5 Introduction of Strings
- 3.6 String declaration and definition
- 3.7 String related function i.e. strlen, strcpy, strcmp
- 3.8 Passing an array to function
- 3.9 Pointers to an array and strings.

UNIT IV

Structures and Unions

- 4.1 Declaration of structures
- 4.2 Accessing structure members
- 4.3 Structure Initialization
- 4.4 Pointer to a structures,
- 4.5 Unions

UNIT V

File Handling

- 5.1 Opening and Closing of File
- 5.2 Modes of Accessing Files
- 5.3 Reading and Writing in the File

Text Book:

- 1. E. Balaguru Swamy - ANSI C Programming Language, 2nd Edition, PHI, 1988.
- 2. H. Schildt, C: The Complete Reference, 4th Edition, TMH Edition, 2000.
- 3. Kanetkar Y., Let us C, BPB Pub., New Delhi, 1999.
- 4. Reema Thareja - Programming in C
- 5. Byron Gotfried – C Programming; Oxford University Press

24DCSE19 Programming in C Lab							
Diploma in Computer Science and Engineering							
Semester – III							
L	T	P	Credits	Core Course	Internal Examination	:	70
0	0	4	2	Program Core	External Examination	:	30
Effective from Session:				w.e.f. 2024-25	Total	:	100
Date of BoS approval:				23.07.2024			

COURSE LEARNING OUTCOMES

At the end of the course student will be able to

CO1: List and Demonstrate Basic Terminology Used in Computer Programming Write, Compile and Debug Programs in C Language.

CO2: Understand and Apply Variable, Conditional Statements, Loops, Functions in C.

CO3: Practice Pointers, Structure, Union and Class in Programming.

CO4: Explain and Differentiate the Process of Problem Solving

CO5: Understand and Practice in C Programming

LIST OF EXPERIMENTS

- Find the area of a Triangle.
- Find greatest among 3 numbers.
- Perform the arithmetic expression using switch statement.
- Find the factorial of a given number.
- Generate all prime numbers up to nth number.
- Print Fibonacci series.
- Find total of even integers.
- Find factorial of a given number using function.
- Find total mark of n students
- Print product of two matrices.
- Concatenate two strings without using library functions.
- Print the elements of array using pointers.
- File handling programs

24DCSE26 Basics of Computer Network							
Diploma in Computer Science and Engineering Semester – III							
L	T	P	Credits	Core Course	Internal Examination	:	30
3	0	0	3		External Examination	:	70
Effective from Session:				w.e.f 2024-25	Total	:	100
Date of BoS approval:				23.07.2024	Duration of Exam	:	3 Hrs

COURSE OBJECTIVES:

The course aims inculcate the skills with the objectives:

- Understand network and technologies.
- Understand various networking devices.
- Use various networking and crimping tool.

COURSE LEARNING OUTCOMES

After undergoing this subject, the students will be able to:

CO1: Understand basic of network with its types.

CO2: Understand data communication with its types.

CO3: Analyze the necessity of tools & connectors required during networking.

CO4: Analyze the necessity of Networking cables required during networking.

CO5: Analyze the necessity of Networking devices required during networking.

DETAILED CONTENTS

UNIT I Introduction to Network

- 1.1 Evolution of network: ARPANET, NSFNET
- 1.2 OSI Model
- 1.3 TCP/IP Model
- 1.4 Introduction to Network
- 1.5 Network topology architecture: 2 Tier, 3 Tier, Spine Leaf
- 1.6 Network Toplogy
- 1.7 Type of network LAN (SOHO Network), PAN, CAN, MAN, WAN, SD LAN
- 1.8 Advantages of Network

UNIT II The Physical Layer and Data Link Layer

- 2.1 Theoretical basis for communication
- 2.2 Wireless transmission
- 2.3 Public switched telephone networks
- 2.4 Mobile telephone system.
- 2.5 Data Link Layer introduction and its protocols
- 2.6 Medium Access Sub layer

UNIT III Network Layer and Transport Layer

- 3.1 Network layer design issues
- 3.2 Routing
- 3.3 Congestion control

- 3.4 Network layer in the internet (IPv4 and IPv6)
- 3.5 Transport service, elements of transport protocol, Simple Transport Protocol, Internet transport layer protocols: UDP and TCP

UNIT IV Application Layer

- 4.1 Domain name system
- 4.2 Electronic mail
- 4.3 APPLICATION LAYER PROTOCOLS: Simple Network Management Protocol, File Transfer Protocol, Simple Mail Transfer Protocol, Telnet

UNIT V Internet and Communication

- 5.1 Introduction to WWW and Internet
- 5.2 Applications of Internet
- 5.3 Introduction to communication
- 5.4 Communication channels used in Networking-Guided, Unguided.
- 5.5 Data Communication types: Simplex, Half Duplex and Full Duplex
- 5.6 Colour code of CAT6 cable.

REFERENCE BOOKS

- 1. Forouzan, B. A. (2007). Data Communications and Networking. New York: Alan R.Apt.
- 2. Kurose, Ross (2010), Computer Networking: A top down approach, Pearson Education, India.

24DCSE27 Basics of Computer Networks Lab							
Diploma in Computer Science and Engineering Semester – III							
L	T	P	Credits	Core Course	Internal Examination	:	70
0	0	2	1		External Examination	:	30
Effective from Session:				w.e.f. 2024-25	Total	:	100
Date of BoS approval:				23.07.2024			

COURSE OBJECTIVES:

The course aims to inculcate skills among students with following objectives

- Identify different network devices.
- Execute Network commands.

COURSE LEARNING OUTCOMES:

At the end of the course, student will be able to:

CO1: Identify different types of network cables and other Network devices.

CO2: Install and configure Network devices.

CO3: Understand different types of Networks.

CO4: Identify different Network tools.

CO5: Practice using Network tools.

LIST OF EXPERIMENTS

1. Study of different types of Network cables and practically implement the cross-wired cable and straight through cable using clamping tool.
2. Install and Configure Wired and Wireless NIC and transfer files between systems in LAN and Wireless LAN.
3. Install and configure Network Devices: HUB, Switch and Routers.
4. Connect the computers in Local Area Network.
5. Configure Host IP, Subnet Mask and Default Gateway in a System in LAN (TCP/IP Configuration).
6. Establish Peer to Peer network connection using two systems using Switch and Router in a LAN.
7. Configure Internet connection and use IPCONFIG, PING / Tracer and Net stat utilities to debug the network issues.
8. Transfer files between systems in LAN using FTP Configuration, install Print server in a LAN and share the printer in a network.
9. Study of basic network command and Network configuration commands.
10. Configure a Network topology using packet tracer software
11. Configure a Network topology using packet tracer software.
12. Identify various Network tools like:
 - a) Crimping tool (RJ45)
 - b) Punch Down Impact tool(RJ45)
 - c) Fiber Stripper
 - d) Fiber Cleaver
 - e) LAN Tester
13. Identify various Network connectors like:
 - a) RJ45
 - b) SC/ST
 - c) MT-RJ

- d) Patch Panel
 - e) Keystone
 - f) Information Outlets Box, Gang Box
14. Identify various Networking cables like:
- a) Co-axial cable(Cat5e/6), UTP
 - b) Fiber-optic
15. Identify various Network devices like:
- a) Hub
 - b) Switch
 - c) Repeater
 - d) Router
 - e) Network Rack
 - f) Patch Panel
 - g) Wireless Access Point
 - h) Visual Fault Locator
 - i) Wireless Network Adapter, Wi-Fi Card
 - j) Firewall k) Network Splitter/Economizer
 - l) Network Load Balancer m) Media Converter (LAN to Optic, vice-versa).
16. Practice Ethernet cabling with straight-through, crossover and rolled cable and further testing them using LAN tester.
17. Practice crimping with Fibre Optic cable using SC connector and further testing them using Visual Fault Locator.
18. Practice punching the IO Box using punch tool.
19. Practice punching the Patch panel using punch tool.
20. Set up and configure wired LAN in between at least three computers.
21. Setting up the network Rack.

24DCSE28 Introduction to Operating System							
Diploma in Computer Science and Engineering Semester – III							
L	T	P	Credits	Core Course	Internal Examination	:	30
3	0	0	3		External Examination	:	70
Effective from Session:				w.e.f. 2024-25	Total	:	100
Date of BoS approval:				23.07.2024	Duration of Exam	:	3 Hrs

COURSE OBJECTIVES:

The course aims to inculcate skills among students with following objectives:

- To understand the fundamental concepts and techniques of Operating Systems.
- To study the concepts in process management and concurrency control mechanisms.
- To understand the concepts in memory managements and deadlocks. • To study on file management and storage structures.

LEARNING OUTCOMES:

At the end of the course, the student will be able to:

CO1: Understand basic concepts of operating system.

CO2: Describe process management, scheduling and concurrency control mechanisms.

CO3: Analyze memory management and deadlocks.

CO4: Compare various file systems and its operating systems examples.

CO5: Understand file management and storage structures.

DETAILED CONTENTS

UNIT I INTRODUCTION

- 1.1 Introduction: Definition - System Components - Operating System Services
- 1.2 System Calls and its types
- 1.3 Types of Operating System in various computing environments
- 1.4 Operating System Structure
- 1.5 Open Source Operating Systems.

UNIT II PROCESSES AND THREADS

- 2.1 Process Management: Process Concepts - Process definition - Process State - Process Control Block
- 2.2 Process Scheduling – Basic Concepts - Scheduling Criteria
- 2.3 Scheduling Algorithms FCFS, SJF, Priority, Round- Robin
- 2.4 Thread – Overview – Benefits - User & Kernel Threads And Multithreading Models
- 2.5 Deadlocks –Characterization - Necessary Conditions
- 2.6 Resource Allocation graph
- 2.7 Detection (Single Instance and Multiple Instance)
- 2.8 Recovery (Process Termination and Resource Preemption).

UNIT III MEMORY MANAGEMENT

- 3.1 Memory Management: Swapping - Contiguous Memory Allocation
- 3.2 Memory Protection
- 3.3 Memory Allocation - Fragmentation - Paging - Basic method - Hardware Support - Protection,
- 3.4 Structure of the Page table- Hierarchical Paging - Hashed Page Tables - Inverted Page Table
- 3.5 Segmentation- Basic Method – Hardware - Protection and Sharing
- 3.6 Fragmentation

- 3.7 Demand Paging- Basic Concepts
- 3.8 Page Replacement- Basics Concepts

UNIT IV FILE MANAGEMENT

- 4.1 File Management: File Concepts - Attributes – Operations – Types – Structure - Internal File Structure
- 4.2 Access Methods: Sequential – Direct – Indexed
- 4.3 Directory Structures – Single – level - Two-level
- 4.4 Tree Structured - Allocation Methods – Contiguous – Linked – Indexed
- 4.5 Free Space Management: Bit Vector - Linked List – Counting - Grouping.

UNIT V DEVICE MANAGEMENT

- 5.1 Device Management: Overview - I/O Hardware- Polling
- 5.2 Interrupts – DMA
- 5.3 Application I/O interface- Block and Character devices
- 5.4 Network Devices - Clocks and Timers
- 5.5 Blocking and Non-blocking I/O
- 5.6 Device drivers - introduction.

RECOMMENDED BOOKS:

- 1. Abraham Silberschatz, Greg Gagne, Peter Galvin. Operating Systems Principles. John Wiley Publications. 2006.7th Edition.
- 2. Andrew S Tanenbaum, Modern Operating Systems, Prentice Hall of India Learning. 2009.3 rdEdition.
- 3. Gary Nutt, Operating Systems. Pearson Education. 3rd edition.
- 4. D.M. Dhamdhere, Operating Systems: A Concept-based Approach, Tata McGraw-Hill Education-2012, 3rd edition

24DCSE65 Indian Constitution							
Diploma in Computer Science and Engineering Semester – III							
L	T	P	Credits	Core Course	Internal Examination	:	30
2	0	0	2		External Examination	:	70
Effective from Session:				w.e.f. 2024-25	Total	:	100
Date of BoS approval:				23.07.2024	Duration of Exam	:	3 Hrs

COURSE CONTENT

Unit 1 – The Constitution – Introduction

- 1.1 The History of the Making of the Indian Constitution
- 1.2 Preamble and the Basic Structure, and its interpretation
- 1.3 Fundamental Rights and Duties and their interpretation
- 1.4 State Policy Principles

Unit 2 – Union Government

- 2.1 Structure of the Indian Union
- 2.2 President – Role and Power
- 2.3 Prime Minister and Council of Ministers
- 2.4 Lok Sabha and Rajya Sabha

Unit 3 – State Government

- 3.1 Governor – Role and Power
- 3.2 Chief Minister and Council of Ministers
- 3.3 State Secretariat

Unit 4 – Local Administration

- 4.1 District Administration
- 4.2 Municipal Corporation
- 4.3 Zila Panchayat

Unit 5 – Election Commission

- 5.1 Role and Functioning
- 5.2 Chief Election Commissioner
- 5.3 State Election Commission

SUGGESTED LEARNING RESOURCES:

S. No.	Title of Book	Author	Publication
1.	Ethics and Politics of the Indian Constitution	Rajeev Bhargava	Oxford University Press, New Delhi, 2008
2.	The Constitution of India	B.L. Fadia	Sahitya Bhawan; New edition (2017)
3.	Introduction to the Constitution of India	DD Basu	Lexis Nexis; Twenty-Third 2018 edition

Suggested Software/Learning Websites:

- a. <https://www.constitution.org/cons/india/const.html>
- b. <http://www.legislative.gov.in/constitution-of-india>
- c. <https://www.sci.gov.in/constitution>
- d. <https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-of-india/>

Semester – IV

24DCSE38 Entrepreneurship Skill Development and Management							
Diploma in Computer Science and Engineering							
Semester – IV							
L	T	P	Credits	Core Course	Internal Examination	:	30
2	0	0	2		External Examination	:	70
Effective from Session:				w.e.f. 2024-25	Total	:	100
Date of BoS approval:				23.07.2024	Duration of Exam	:	3 Hrs

COURSE OBJECTIVES

The course aims to inculcate skills among students with following objectives

- o Develop conceptual understanding of Entrepreneurship.
- o Comprehend the environment of making of an entrepreneur.

COURSE OUTCOMES

At the end of the course student will be able to

- CO1: Recall the basic theories of Entrepreneurship.
- CO2: Basic understanding of types of Enterprises and Ownership structure.
- CO3: Understand the process to select the business ideas.
- CO4: Understand the process to screen business ideas.
- CO5: Design strategies for successful implementation of ideas.

DETAILED CONTENTS

UNIT I: ENTREPRENEURSHIP

- 1.1 Introduction
- 1.2 Requirements to be entrepreneur
- 1.3 Entrepreneur and Manager
- 1.4 Rural and Urban entrepreneurship

UNIT II: ENTREPRENEURIAL MOTIVATION

- 2.1 Motivating Factors
- 2.2 Motivating Theories
- 2.3 Government's policy actions towards entrepreneurial motivation
- 2.4 Entrepreneurship Development Plans

UNIT III: ENTERPRISES AND OWNERSHIP

- 3.1 Types of Enterprises
- 3.2 Introduction to ownership and its structure
- 3.3 Co-operatives

UNIT IV: PROJECTS

- 4.1 Identification and selection of projects
- 4.2 Formulation of project reports
- 4.3 Project Evaluation

UNIT V: MANAGEMENT AND ENTERPRISES

- 5.1 Introduction to management and its types
- 5.2 Human Resource Management
- 5.3 Enterprise Financing

TEXT BOOK

- 1. Entrepreneurship Development by K Ramachandran

RECOMMENDED BOOKS

- 1. Entrepreneurship Development: Programmes and Practices Hardcover – by J.S. Saini (Author)
- 2. Entrepreneurial Development by S S Khanka

24DCSE44: Network Administration and Management							
Diploma in Computer Science and Engineering Semester – IV							
L	T	P	Credits	Core Course	Internal Examination	:	30
3	0	0	3		External Examination	:	70
Effective from Session:				w.e.f. 2024-25	Total	:	100
Date of BoS approval:				23.07.2024	Duration of Exam	:	3 Hrs

COURSE OBJECTIVES:

The course aims to inculcate skills among students with following objectives:

- Understanding TCP/IP architecture of networking
- Distinguish and identify different network devices
- Identify need of security in networking
- Identification and mitigation of security threats

COURSE LEARNING OUTCOMES:

At the end of the course, the student will be able to:

CO1: Understand TCP/IP layers.

CO2: Identify different network devices.

CO3: Understand encryption modules

CO4: Configure different network devices

CO5: Mitigate threats.

DETAILED CONTENTS

UNIT I: INTRODUCTION TO TCP/IP

- 1.1 Introduction
- 1.2 IP Addressing
- 1.3 IP Routing
- 1.4 Routing Protocols

UNIT II: WIRELESS NETWORKING

- 2.1 Overview of 802.11 standard
- 2.2 Comparison components: access points, Wireless NIC, antenna, controllers, mobile hotspots
- 2.3 Wireless security
- 2.4 Configuration of Access points

UNIT III: AUTHENTICATION AND ACCESS CONTROL

- 3.1 Overview of filtering, tunneling
- 3.2 ACLs
- 3.3 Encryption overview
- 3.4 Remote access
- 3.5 User accounts and password security
- 3.6 PKI and AAA services

UNIT IV: NETWORK THREAT MITIGATION

- 4.1 Overview of Security Threats
- 4.2 Denial of Service; Distributed DoS
- 4.3 Authentication Issues
- 4.4 Viruses and Vulnerabilities, Malicious User, etc.

UNIT V: NETWORK DOCUMENTATION AND MANAGEMENT

- 5.1 Tools for network monitoring and diagramming
- 5.2 Concepts of SNMP, RMON and sFlow
- 5.3 Overview of Security Standards and Policies

TEXT BOOK

1. Forouzan, B. A. (2007). Data Communications and Networking. New York: Alan R.Apt.

RECOMMENDED BOOKS:

1. Lammle, T. (2007). Cisco Certified Network Associate. Indiana: Richard Swadley.

24DCSE45 Network Administration and Management Lab							
Diploma in Computer Science and Engineering Semester – IV							
L	T	P	Credits	Core Course	Internal Examination	:	70
0	0	2	1		External Examination	:	30
Effective from Session:				w.e.f. 2024-25	Total	:	100
Date of BoS approval:				23.07.2024	Duration of Exam	:	3 Hrs
Prerequisite							

COURSE OBJECTIVES:

The course aims to inculcate skills among students with following objectives:

- Understand different protocols.
- Practicing different networking troubleshooting.

LEARNING OUTCOMES:

At the end of the course, the student will be able to:

- CO1: Analyze protocols using Wireshark
- CO2: Testing internet connectivity
- CO3: Configuration of protocols
- CO4: Perform network troubleshooting
- CO5: Configuration of network devices.

LIST OF EXPERIMENTS

1. Protocol analysis with Wireshark. ARP, ICMP, DNS & HTTP.
2. Setup, install and configure IIS server/Linux server.
3. Checking internet connectivity and Troubleshooting IP Addressing using command prompt.
4. Using loopback in PING (Packet InterNet Groper) for troubleshooting
5. Using local host IP in ping for troubleshooting.
6. Using default gateway(router) in ping for troubleshooting.
7. Assigning IP in a LAN and configuring it
8. Connecting computer to a network for sharing resource like Printer, File, Folder.
9. Configuring NTP, DHCP, DNS and TFTP on Linux.
10. Practice common networking troubleshooting commands.

24DCSE36 Python Programming Fundamentals							
Diploma in Computer Science and Engineering Semester – IV							
L	T	P	Credits	Core Course	Internal Examination	:	30
3	0	0	3		External Examination	:	70
Effective from Session:				w.e.f. 2024-25	Total	:	100
Date of BoS approval:				23.07.2024	Duration of Exam	:	3 Hrs

COURSE OBJECTIVES:

The course aims to inculcate skills among students with following objectives

- To provide basic knowledge of python.
- To analyse the concept of module programming.
- To apply the basic concepts of OOPs and its use in Python.

COURSE LEARNING OUTCOMES:

At the course, the student will be able to:

CO1: Learn how to design and program python applications

CO2: Demonstrate the Python shell in interactive and script modes.

CO3: Define and design objects and classes in Python and access attributes and methods.

CO4: Understand and apply the methods to create and execute threads and perform multithreading in Python.

CO5: Understand various methods and operations available in Python libraries and packages.

DETAILED CONTENTS

UNIT I: PYTHON PROGRAMMING FUNDAMENTALS

- 1.1 Introduction to Python language: History, Versions, Features and Applications
- 1.2 Python development environment (IDE).
- 1.3 Variables, data types, keywords, operators, expressions, statements, input, output, comments etc.
- 1.4 Mutable and immutable sequence types in Python.
- 1.5 Functions: modules, built-in and user-defined.
- 1.6 Argument Passing
- 1.7 Module Programming
- 1.8 Selection, Loop and iteration statements.
- 1.9 Lambda and other functions in Python.

UNIT II: PYTHON PROGRAMMING CONSTRUCTS

- 2.1 Input, store and use strings in Python.
- 2.2 Immutable strings.
- 2.3 Slicing, traversing, concatenation, comparison, repetition, in, not in, range etc.
- 2.4 Strings
- 2.5 Re-module for Regular expressions.

UNIT III: HIGHER ORDER DATA STRUCTURES

- 3.1 Introduction to higher order data structures such as lists, dictionaries, tuples and sets.
- 3.2 Create, access, traverse, append, manipulate, search and sort list objects.
- 3.3 List, Passing list as arguments
- 3.4 Dictionaries
- 3.5 Tuples

UNIT IV: OBJECT ORIENTED PROGRAMMING CONCEPTS USING PYTHON

- 4.1 Introduction to OOPS and its use in Python.
- 4.2 Name spaces and scope rules.
- 4.3 Objects and classes in Python.
- 4.4 Access methods, attributes
- 4.5 Built-in class attributes (dict., doc, name, module, bases)
- 4.6 Multithreading in Python
- 4.7 Static methods.
- 4.8 Class Inheritance
- 4.9 Abstract Data Types
- 4.10 Constructor and Destructor

UNIT V: FILE AND EXCEPTION HANDLING

- 5.1 File Handling in Python.
- 5.2 Error Handling
- 5.3 Exception Handling
- 5.4 Iterators and Generators

RECOMMENDED BOOKS

1. “Head First Python” – 2nd Edition – written by Paul Barrey and published by O’Reilly.
2. “Core Python Programming”- 3rd Edition – written by R. Nageswara Rao and published by DreamTechPress
3. Taneja, S. & Kumar, N., (2017), *Python Programming- A Modular Approach*. Pearson Education
4. “Dive into Python” – written by Mark Pilgrim
5. Brown, M. C. (2001). *The Complete Reference: Python*, McGraw Hill Education.

24DCSE37 Python Programming Fundamentals Lab							
Diploma in Computer Science and Engineering Semester – IV							
L	T	P	Credits	Core Course	Internal Examination	:	70
0	0	4	2		External Examination	:	30
Effective from Session:				w.e.f. 2024-25	Total	:	100
Date of BoS approval:				23.07.2024	Duration of Exam	:	3 Hrs

COURSE OBJECTIVES:

The course aims to inculcate skills among students with following objectives

- To provide basic knowledge of python.
- To analyse the concept of module programming.
- To apply the basic concepts of OOPs and its use in Python.

COURSE LEARNING OUTCOMES:

At the course, the student will be able to:

CO1: Learn how to design and program python applications

CO2: Demonstrate the Python shell in interactive and script modes.

CO3: Define and design objects and classes in Python and access attributes and methods.

CO4: Understand and apply the methods to create and execute threads and perform multithreading in Python.

CO5: Understand various methods and operations available in Python libraries and packages.

LIST OF EXPERIMENTS

1. Let list1 and list2 be two lists of integers. Implement function sublist() that takes as input lists list1 and list2 and returns True if list1 is a sublist of list2, and False otherwise. >>> sublist([15, 1, 100], [20, 15, 30, 50, 1, 100])
True
>>> sublist([15, 50, 20], [20, 15, 30, 50, 1, 100]) False
2. Write function vowelCount() that takes a string as input and counts and prints the number of occurrences of vowels in the string. >>> vowelCount('Le Tour de France') a, e, i, o, and u appear, respectively, 1, 3, 0, 1, 1 times.
3. The cryptography function crypto() takes as input a string (i.e., the name of a file in the current directory). The function should print the file on the screen with this modification: Every occurrence of string 'secret' in the file should be replaced with string 'xxxxxxx'. >>> crypto('crypto.txt')
I will tell you my xxxxxx. But first, I have to explain why
it is a xxxxxx.
And that is all I will tell you about my xxxxxx.
4. Write a function stats() that takes one input argument: the name of a text file. The function should print, on the screen, the number of lines, words, and characters in the file; your

function should open the file only once. >>>stats('example.txt') line count: 3 word count: 20 character count: 98

5. Implement function `distribution ()` that takes as input the name of a file (as a string). This oneline file will contain letter grades separated by blanks. Your function should print the distribution of grades, as shown. >>> `distribution('grades.txt')` 6

students got A 2

students got A- 3

students got B+ 2

students got B 2

students got B- 4

students got C 1

student got C- 2

students got F

6. The function `censor ()` takes the name of a file (a string) as input. The function should open the file, read it, and then write it into file `censored.txt` with this modification: Every occurrence of a four-letter word in the file should be replaced with string `'xxxx'`. >>> `censor('example.txt')`

Note that this function produces no output, but it does create file `censored.txt` in the current folder.

7. Create a dictionary for phones and their prices. Write functions to add a new entry (phone:price) ,search for a particular phone and retrieve it's price, given price find phones with same price , remove an entry, display all phones sorted according to price. [Program must be menu driven]

8. Write a Python program that prompts the user to enter a list of first names and stores them in a list. The program should display how many times the letter 'a' appears within the list.

9. Write a Python program that prompts the user to enter integer values for each of two lists. It then should displays whether the lists are of the same length, whether the elements in each list sum to the same value, and whether there are any values that occur in both lists.

10. Implement and test a Python program that determines if all parentheses in an entered line of code form matching pairs. Note: Pairs of parentheses may be nested.

11. Suppose variable `s` has been assigned in this way: `s = "It was the best of times, it was the worst of times; it was the age of wisdom, it was the age of foolishness; it was the epoch of belief, it was the epoch of incredulity; it was ..."` Then do the following, in order, each time:

- (a) Write a sequence of statements that produce a copy of `s`, named `newS`, in which characters `., ,, ;,` and `\n` have been replaced by blank spaces.
- (b) Remove leading and trailing blank spaces in `newS` (and name the new string `newS`).
- (c) Make the all characters in `newS` lowercase (and name the new string `newS`).
- (d) Compute the number of occurrences in `newS` of string `'it was'`.
- (e) Change every occurrence of `was` to `is` (and name the new string `newS`).

(f) Split newS into a list of words and name the list listS.

12. The function avgavg() takes as input a list whose items are lists of three numbers. Each three-number list represents the three grades a particular student received for a course. For example, here is an input list for a class of four students: [[95,92,86], [66,75,54],[89,72,100],[34,0,0]]

The function avgavg() should print, on the screen, two lines. The first line will contain a list containing every student's average grade. The second line will contain just one number: the average class grade, defined as the average of all student average grades.

```
>>> avgavg([[95, 92, 86], [66, 75, 54],[89, 72, 100], [34, 0, 0]])
```

```
[91.0, 65.0, 87.0, 11.333333333333334]
```

```
63.5833333333
```

13. Implement function names () that takes no input and repeatedly asks the user to enter the first name of a student in a class. When the user enters the empty string, the function should print for every name the number of students with that name. >>> names ()

```
Enter next name: Valerie
```

```
Enter next name: Bob
```

```
Enter next name: Valerie
```

```
Enter next name: Amelia
```

```
Enter next name: Bob
```

```
Enter next name:
```

```
There is 1 student named Amelia
```

```
There are 2 students named Bob
```

```
There are 2 students named Valerie
```

14. Consider the class tree hierarchy:



Implement six classes to model this taxonomy with Python inheritance. In class Animal, implement method speak() that will be inherited by the descendant classes of Animal as is. Complete the implementation of the six classes so they exhibit this behavior:

```
>>> garfield = Cat()
```

```
>>> garfield.speak()
```

```
Meeow
```

```
>>> dude = Hacker()
```

```
>>> dude.speak( )
```

```
Hello world!
```

RECOMMENDED BOOKS

1. “Head First Python” – 2nd Edition – written by Paul Barrey and published by O’Reilly.
2. “Core Python Programming”- 3rd Edition – written by R. Nageswara Rao and published by DreamTechPress
3. Taneja, S. & Kumar, N., (2017), *Python Programming- A Modular Approach*. Pearson Education
4. “Dive into Python” – written by Mark Pilgrim
5. Brown, M. C. (2001). *The Complete Reference: Python*, McGraw Hill Education.
6. Dromey, R. G. (2006), *How to Solve it by Computer*, Pearson Education.
7. Guttag, J.V.(2016), *Introduction to computation and programming using Python*. MIT Press.

24DCSE40 Data Structure							
Diploma in Computer Science and Engineering Semester – IV							
L	T	P	Credits	Core Course	Internal Examination	:	30
3	0	0	3		External Examination	:	70
Date of BoS approval:				23.07.2024	Duration of Exam	:	3 Hrs
Prerequisite							

Course Learning Outcomes:

At the course, the student will be able to:

CO1: understand different data structures

CO2: remember functions associated with data structures

CO3: implementing programming language to formulate Data Structure Problems

CO4: analyze data structures problems.

CO5: develop solutions

Course Content:

UNIT I: INTRODUCTION

- 1.1 Introduction to Data Structures: Basic Terminology
- 1.2 Classification of Data Structures
- 1.3 Operations on Data Structures.

UNIT II: LINEAR DATA STRUCTURE-ARRAYS AND STACK

- 2.1 Linear Data Structures- Arrays
- 2.2 Stacks: Introduction to Stacks, Array Representation of Stacks
- 2.3 Operations on a Stack
- 2.4 Applications of Stacks-Infix-to-Postfix Transformation
- 2.5 evaluating Postfix Expressions.

UNIT III: LINKDED LIST AND QUEUES

- 3.1 Linked Lists: Singly Linked List, Representation in Memory, Operations on a Single Linked List
- 3.2 Circular Linked Lists, Doubly Linked Lists
- 3.3 Linked List Representation and Operations of Stack,
- 3.4 Queues: Introduction to Queues, Array Representation of Queues, Operations on a Queue
- 3.5 Types of Queues-De-Queue, Circular Queue, Applications of Queues-Round Robin-Algorithm.
- 3.6 Linked List Representation and Operations of Queue.

UNIT IV: NON-LINEAR DATA STRUCTURE

- 4.1 Non-Linear Data Structures - Trees: Basic Terminologies, Definition
- 4.2 Concepts of Binary Trees
- 4.3 Representations of a Binary Tree using Arrays and Linked Lists
- 4.4 Operations on a Binary Tree-Insertion, Deletion, Traversals
- 4.5 Types of Binary Trees.

UNIT V GRAPHS

- 5.1 Graph Terminologies
- 5.2 Representation of Graphs- Set, Linked, Matrix, Graph Traversals

TEXT BOOKS

1. Data Structures, R.S. Salaria, Khanna Book Publishing, New Delhi
2. Data Structures Using C, Reema Thareja, Oxford University Press India.

Reference Books:

1. Classic Data Structures, Samanta Debasis, Prentice Hall of India.
2. Fundamentals of Data Structure in C, Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan, University Press, India.
3. Data Structures: A Pseudo code approach with C, Richard F. Gilberg, Behrouz A. Forouzan, CENGAGE Learning, India.
4. Data Structures and Algorithms: Concepts, Techniques and Applications, G. A. V. Pai, McGraw- Hill Education, India.

24DCSE41 Data Structure Lab							
Diploma in Computer Science and Engineering							
Semester – IV							
L	T	P	Credits	Core Course	Internal Examination	:	70
0	0	4	2		External Examination	:	30
Effective from Session:				w.e.f. 2024-25	Total	:	100
Date of BoS approval:				23.07.2024	Duration of Exam	:	3 Hrs

Course Learning Outcomes:

At the course, the student will be able to:

CO1: understand different data structures

CO2: remember functions associated with data structures

CO3: implementing programming language to formulate Data Structure Problems

CO4: analyze data structures problems.

CO5: develop solutions

LIST OF EXPERIMENTS

S.No.	Topics for Practice
1	Write a program using recursive and non-recursive functions to perform search operation in a given list of integers using linear search technique
2	Search operation in a given list of integers using binary search technique
3	Write a program to implement insertion sorting for a given random data
4	Write a program to implement bubble sorting for a given random data
5	Write a program to implement quick sorting for a given random data
6	Write a program to implement selection sorting for a given random data
7	Write a program to implement heap sorting for a given random data
8	Write a program to Push and pop operation in stack.
9	Write a program to Inserting and deleting elements in queue.
10	Write a program to Inserting and deleting elements in circular queue.
11	Insertion and deletion of elements in linked list.
12	Insertion and deletion of elements in doubly linked list.
13	Write a program for binary search tree operation
14	Write a program to implement Breadth First Search (BFS)
15	Write a program to implement Depth First Search (DFS)

24DCSE67 Essence of Indian Knowledge & Tradition (IKS)								
Diploma in Computer Science and Engineering Semester – IV								
L	T	P	Credits	Core Course	Internal Examination	:	30	
2	0	0	2		External Examination	:	70	
Effective from Session:				w.e.f. 2024-25	Total	:	100	
Date of BoS approval:				23.07.2024	Duration of Exam	:	3 Hrs	

UNIT–I: Introduction to Indian Knowledge System

1. Concept, scope and significance of Indian Knowledge System (IKS).
2. Salient features of IKS.
3. Oral tradition and methods of knowledge transmission in ancient India

UNIT–II: Vedas and Upavedas

A. The Vedas

1. Introduction to the Vedas
2. Rigveda, Yajurveda, Samaveda and Atharvaveda
3. Philosophical and scientific ideas in the Vedas

B. Upavedas

1. Concept and importance of Upavedas
2. Ayurveda – science of life and medicine
3. Dhanurveda – science of warfare
4. Gandharvaveda – music and performing arts
5. Sthapatyaveda / Shilpaveda – architecture and engineering

UNIT–III: Vedangas and Upangas

A. Vedangas

1. Meaning and role of Vedangas
2. Shiksha, Kalpa, Nirukta, Vyakarana, Jyotisha, Chandas

B. Upangas

1. Dharma Shastra – law and ethics
2. Nyaya – logic
3. Tarka Shastra – reasoning and debate

UNIT–IV: Yoga and Holistic Health Care

1. Concept and philosophy of Yoga
2. Ashtanga Yoga
4. Yoga for physical, mental and spiritual well-being
5. Yoga and Ayurveda in holistic health care
6. Relevance of Yoga in modern lifestyle diseases

UNIT–V: Modern Science and Indian Knowledge System (Case Studies)

1. Interface between Modern Science and Indian Knowledge System
2. Scientific relevance of Indian mathematics, astronomy and medicine

3. Comparative study of ancient Indian knowledge and modern science
4. **Case studies** on Yoga, Ayurveda, architecture, astronomy, and environmental practices

SUGGESTED TEXT/REFERENCE BOOKS:

S. No. Title of Book Author Publication

1. Cultural Heritage of India-Course Material V. Sivaramakrishna Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014
2. Modern Physics and Vedant Swami Jitatmanand Bharatiya Vidya Bhavan
3. The wave of Life Fritzof Capra
4. Tao of Physics Fritzof Capra
5. Tarkasangraha of Annam VN Jha Chinmay Foundation, Velliarnad, Bhatta, International
6. Science of Consciousness Psychotherapy and Yoga RN Jha Amaku,am Vidyanidhi Prakasham, Delhi, 2016 Practices.

Semester - V

24DCSE48 Introduction to Database Management Systems							
Diploma in Computer Science and Engineering							
Semester – V							
L	T	P	Credits	Core Course	Internal Examination	:	30
3	0	0	3		External Examination	:	70
Effective from Session:				w.e.f. 2024-25	Total	:	100
Date of BoS approval:				23.07.2024	Duration of Exam	:	3 Hrs

COURSE LEARNING OBJECTIVES:

It covers the development of database-driven applications using the capabilities provided by modern database management system software. The concepts include conceptual modeling, relational database design and database query languages.

COURSE OUTCOMES:

After completing the course, the students will be able to

CO1: Define and describe the database

CO2: Compile the design of database architecture

CO3: Convert database in the form of tables

CO3: Provide the security to the database

CO5: Respond various queries in the SQL

COURSE CONTENT:

UNIT I:

Introduction to Database system Concepts and Architecture

Database Systems; Database and its purpose, Characteristics of the database approach, Advantages and disadvantages of database systems. Classification of DBMS Users; Actors on the scene, Database Administrators, Database Designers, End Users, System Analysts and Application Programmers, Workers behind the scene (DBMS system designers and implementers, tool developers, operator and maintenance personnel).

Data models, schemas, instances, data base state. DBMS Architecture; The External level, The conceptual level, The internal level, Mappings. Data Independence; Logical data Independence, Physical data Independence. Database Languages and Interfaces; DBMS Language, DBMS Interfaces. Classification of Database Management Systems- Centralized, Distributed, parallel and object based.

UNIT II

Data Modeling using E.R. Model (Entity Relationship Model) and Relational

Data Models Classification; File based or primitive models, traditional data models, semantic data models. Entities and Attributes, Entity types and Entity sets, Key attribute and domain of attributes, Relationship among entities, Database design with E/R model.

Relational Model Concepts: Domain, Attributes, Tuples cardinality, keys (Primary, Secondary, foreign, alternative keys) and Relations. Relational constraints and relational database schemes; Domain constraints, Key constraints and constraints on Null. Relational databases and relational database schemes, Entity integrity, referential integrity and foreign key. Comparison b/w E/R model and Relational model.

UNIT III

Normalization Trivial and Non-trivial Dependencies.

Non-loss decomposition and functional dependencies, First, Second and Third normal forms, Boyce/Codd normal form, denormalization.

UNIT IV

Database Access and Security

Creating and using indexes, creating and using views.

Database security, process controls, database protection, grant and revoke

UNIT V

MYSQL/SQL (Structured Query Language)

SQL* DDL (Data Definition Languages): Creating Tables, Creating a table with data from another table, Inserting values into a table, updating columns of a Table, Deleting Rows, Dropping a Table.

DML (Data Manipulation Language): Database Security and Privileges, Grant and Revoke Command, Maintaining Database Objects, Commit and Rollback, various types of select commands, various types of joins, sub query, aggregate functions. Challenges of My SQL. Introduction to Big Data. Understanding Big Data with samples.

RECOMMENDED BOOKS

Dr. Renu Vig and Ekta Walia, “Fundamentals of Database Management Systems”, an ISTE, Publication, New Delhi.

1. Arun K Majumdar and P Bhattacharya, “Database Management Systems”, Tata Mc Graw Hill Education Pvt. Ltd., New Delhi.
2. ISRD Group, “Introduction to DBMS”, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. Alexis Leon and Mathews Leon, “Database Management Systems”, Vikas Publishing House Pvt. Ltd., New Delhi.
4. Date C.J. Addison Wesley, “An Introduction to Database Systems”.
5. Elmasri/Navathe/Addison Wesley, “Fundamentals of Database Systems”.
6. “SQL Unleashed”, Hans Ladanyi Techmedia Publications, New Delhi.
7. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

SUGGESTED WEBSITES

1. <http://swayam.gov.in>

24DCSE49 Introduction to Database Management Systems Lab								
Diploma in Computer Science and Engineering Semester – V								
L	T	P	Credits	Core Course	Internal Examination		:	70
0	0	4	2		External Examination		:	30
Effective from Session:				w.e.f. 2024-25	Total		:	100
Date of BoS approval:				23.07.2024	Duration of Exam		:	3 Hrs

COURSE LEARNING OBJECTIVES:

This Lab course is intended to practice whatever is taught in theory class of ‘Introduction to DBMS’. A few sample case studies are listed with some suggested activities. More case studies may be added to this list. You need to develop these case studies, apply all relevant concepts learnt in theory class as the course progress, identify activities/operations that may be performed on the database. It will be a good idea to also use concepts learnt in the course on Software Engineering/SSAD.

COURSE OUTCOMES:

After completing the course, the students will be able to

CO1: Define and describe the database

CO2: Compile the design of database architecture

CO3: Convert database in the form of tables

CO3: Provide the security to the database

CO5: Respond various queries in the SQL

PRACTICAL EXERCISES

1. Exercises on creation and modification of structure of tables.
2. Exercises on inserting and deleting values from tables.
3. Exercises on querying the table (using select command).
4. Exercises on using various types of joins.
5. Exercises on using functions provided by database package.
6. Exercises on commands like Grant, Revoke, Commit and Rollback etc.
7. Design of database for any application

S.No.	Topics for Practice
1	Case Study-1: Employee database – ‘Create’ employee table, ‘Select’ and display an employee matching a given condition, ‘Delete’ duplicate records, delete rows using triggers, insert and update records, find net salary, etc.
2	Case Study-2: Visitor Management database
3	Case Study-3: Students Academic database
4	Case Study-4: Inventory Management System database
5	Case study-5: Bank Operations database
6	Case Study-6: Bus Operator (Roadways) – Do related activities such as prepare E-R Model, Relational Model, do Normalisation, Create Tables, Insert data, Delete Data, Query database, create stored procedures, etc.

This is a skill course. More student practice and try to find solution on their own, better it will be.

24DCSE50 Basics of Data Analytics								
Diploma in Computer Science and Engineering								
Semester – V								
L	T	P	Credits	Core Course	Internal Examination	:	30	
3	0	0	3		External Examination	:	70	
Effective from Session:				w.e.f. 2024-25	Total	:	100	
Date of BoS approval:				23.07.2024	Duration of Exam	:	3 Hrs	

COURSE OBJECTIVES

The course aims to inculcate skills among students with following objectives:

- Understanding of Data analysis and its applications.
- Implement a wide range of data analytics techniques.
- Understand machine learning concepts.
- Design experiments and creating datasets.

COURSE LEARNING OUTCOMES

At the end of the course student will be able to

CO1: Identify need of data analysis in real world .

CO2: carry out descriptive analytics on the datasets.

CO3: Have a good understanding of the fundamental issues and challenges of machine learning and data analysis.

CO4: Design experiments and creating data using machine learning techniques.

CO5: Predictions using Regression Least square method.

DETAILED CONTENTS

UNIT-I: INTRODUCTION

- 1.1 Introduction to Data: Definition, types and sources or data
- 1.2 Data Management
- 1.3 Data Quality (Noises, Outliers, Missing Values, etc.)
- 1.4 Data Pre-processing

UNIT-II: DATA ANALYTICS BASICS

- 2.1 Introduction to Data Analytics and its Types
- 2.2 Introduction Tools and Techniques for Data Analytics
- 2.3 Applications of Data Analytics
- 2.4 Challenges of Data Analytics
- 2.5 Case Studies and Real world Examples

UNIT-III: DESCRIPTIVE STATISTICS

- 3.1 Introduction to Descriptive Statistics
- 3.2 Central Tendency and Dispersion
- 3.3 Frequency Distribution
- 3.4 Probability Distributions: Binomial, Poisson, Normal

UNIT-IV: MACHINE LEARNING BASICS

- 4.1 Basics of Machine Learning
- 4.2 Supervised and Unsupervised Machine Learning
- 4.3 Role of Machine Learning in Data Analytics
- 4.4 Decision Tree and Rule Based Classification
- 4.5 Introduction to Regression: Linear and Non-linear, Least Square Method

UNIT-V: PRESCRIPTIVE ANALYTICS

- 5.1 Designing Experiments
- 5.2 Active Learning
- 5.3 Creating Data Using Active Learning
- 5.4 Reinforcement Learning
- 5.5 Creating Data Using Reinforcement Learning

RECOMMENDED BOOKS

1. Hastie, Trevor, et al. The elements of statistical learning. Vol. 2. No. 1. New York: springer, 2009.
2. Montgomery, Douglas C., and George C. Runger. Applied statistics and probability for engineers. John Wiley & Sons, 2010
3. Moreira, J., Carvalho, A., & Horvath, T. (2018). *A general introduction to data analytics*. John Wiley & Sons.

24DCSE51 Basics of Data Analytics Lab								
Diploma in Computer Science and Engineering Semester – V								
L	T	P	Credits	Core Course	Internal Examination	:	70	
0	0	4	2		External Examination	:	30	
Effective from Session:				w.e.f. 2024-25	Total	:	100	
Date of BoS approval:				23.07.2024	Duration of Exam	:	3 Hrs	

COURSE OBJECTIVES:

The course aims to inculcate skills among students with following objectives:

- Understand the fundamental concepts and techniques data analysis using excel
- Implement the basic data analytics tools on the datasets.

LEARNING OUTCOMES:

At the end of the course, the student will be able to:

CO1: Perform Descriptive analytics of the Dataset.

CO2: Understand Pivot Tables

CO3: Analysis using Pivot Tables

CO4: Understand and performing What-if Analysis

CO5: Visualizing data using Charts and Tables.

LIST OF EXPERIMENTS

1. Create or download a dataset
2. Compute following using Excel Formula and functions
 - a. Central tendency of the dataset
 - b. Dispersion of the dataset
 - c. Frequency distribution of the dataset
3. Perform sorting and filtering of dataset
4. Create a customized list and perform custom sort on it.
5. Perform Conditional Formatting on the customized list
6. Creating and understanding Pivot Tables
7. Performing what-if analysis in Excel.
8. Data visualization using Charts in Excel
9. Linear Regression in Excel
10. Correlation in Excel

RECOMMENDED READINGS

1. Aqlan, F., Nwokeji, J. C., & Shamsan, A. (2020, October). Teaching an introductory data analytics course using microsoft access® and excel®. In *2020 IEEE Frontiers in Education Conference (FIE)* (pp. 1-10). IEEE.
2. Blayney, P. J., & Sun, Z. (2019). Using excel and excel VBA for preliminary analysis in big data research. In *Managerial Perspectives on Intelligent Big Data Analytics* (pp. 110-136). IGI Global

PROGRAM ELECTIVES – I

24DCSE20 : AI Fundamentals							
Diploma in Computer Science & Engineering							
L	T	P	Credits	Core Course	Internal Examination	:	30
3	0	0	3	Program Core	External Examination	:	70
Effective from Session:				w.e.f. 2025-26	Total	:	100
Date of BoS approval:				14-07-2025	Duration of Exam	:	3 Hrs

Course objectives:

The course inculcate following skills among students:

- 1.To introduce the basic concepts, history, and goals of Artificial Intelligence.
- 2.To familiarize students with various AI problem-solving approaches and techniques.
- 3.To understand foundational algorithms like search, knowledge representation, and reasoning.
- 4.To provide insight into machine learning, natural language processing, and AI applications.
- 5.To develop the ability to design simple AI-based solutions using Python and AI libraries.

Course outcome:

By the end of this course, you should be able to:

CO1: Create AI solutions for various business problems.

CO2: Build and deploy production grade AI applications.

CO3: Apply methods, techniques and tools immediately.

CO4: Gain experience of doing independent study and research.

CO5: Design AI based solution.

Content Detail:

Unit 1: INTRODUCTION

AI - Problems and Search: Introduction: The Artificial Intelligence (AI) Problem – What is an AI technique - Criteria for success. Problems, Problem Spaces, Search: Defining Problems, Problem Spaces, Search State space search.

Unit 2: SEARCH TECHNIQUES

Heuristic Search techniques: Generate and Test - Hill Climbing- Best-First search – Problem reduction – constraint satisfaction - Means-end analysis.

Unit 3: KNOWLEDGE REPRESENTATION

AI - Knowledge Representation: Knowledge representation issues: Representations and mappings -Approaches to Knowledge representations -Issues in Knowledge representations - Frame Problem.

Unit 4: PREDICATE LOGIC

Using Predicate logic: Representing simple facts in logic – Representing Instance and ISA relationships - Computable functions and predicates -Resolution. Representing knowledge using rules: Procedural Vs Declarative knowledge –Logic programming - Forward Vs Backward reasoning - Matching – Control knowledge.

Unit 5: AI LEARNING TECHNIQUES

AI –Learning: What is learning – Rote learning - Learning by taking advice – learning in problem solving. Learning from examples: Induction - Explanation-based learning – discovery – analogy – formal learning theory – Neural Net Learning and Genetic Learning.

TEXT BOOKS:

1. Dan W. Patterson, “Introduction to AI and ES”, Pearson Education.
2. Dheeraj Mehrotra (2019), Basics of Artificial Intelligence & Machine Learning, Notion Press.
3. Elaine Rich and Kevin Knight (1991), "Artificial Intelligence", Second Edition, Tata McGraw Hill, Publishers company Pvt Ltd.

24DCSE21 AI Fundamentals Lab							
Diploma in Computer Science & Engineering							
L	T	P	Credits	Core Course	Internal Examination	:	70
0	0	2	1	Program Core	External Examination	:	30
Effective from Session:				w.e.f. 2025-26	Total	:	100
Date of BoS approval:				14.07.2025	Duration of Exam	:	3 Hrs

Course objectives:

The course aims to inculcate following skills among students:

- 1.To introduce the basic concepts, history, and goals of Artificial Intelligence.
- 2.To familiarize students with various AI problem-solving approaches and techniques.
- 3.To understand foundational algorithms like search, knowledge representation, and reasoning.
- 4.To provide insight into machine learning, natural language processing, and AI applications.
- 5.To develop the ability to design simple AI-based solutions using Python and AI libraries.

Course outcome:

By the end of this course, student will be able to:

- CO1:** Create AI solutions for various business problems.
- CO2:** Build and deploy production grade AI applications.
- CO3:** Apply methods, techniques and tools immediately.
- CO4:** To gain experience of doing independent study and research.

List of Practical –

1. Explore and demonstrate the use of basic Python libraries used in AI and ML (NumPy, Pandas, Matplotlib, Scikit-learn).
2. Develop a program to perform Breadth First Search (BFS) algorithm.
3. Develop a program to perform Depth First Search (DFS) algorithm.
4. Design a solution using A* Search algorithm.
5. Design a solution using AO* (And-Or) Search algorithm.
6. Construct a program to apply the Hill Climbing algorithm.
7. Develop a solution using Minimax and Alpha-Beta Pruning algorithms.
8. Create a basic chatbot application using Python.
9. Solve the N-Queens problem using backtracking technique in Python.
10. Solve the Missionaries and Cannibals problem using logic-based programming in Python.

REFERENCE STUDY MATERIAL:

1. Kevin Night, Elaine Rich, Nair B.(2008), “*Artificial Intelligence (SIE)*”, McGraw Hill.
2. Stuart Russel, Peter Norvig (2007), “*AI – A Modern Approach*”, 2nd Edition, Pearson Education.
3. Venugopal C.K(2019), *Artificial Intelligence and Machine Learning*, Pacific Books International.

DATA MINING AND DATAWAREHOUSING: 24DCSE22(new scheme)/ DCE-203 (old scheme)							
Diploma in Computer Science & Engineering							
L	T	P	Credits	Core Course	Internal Examination	:	30
3	0	0	3	Program Core	External Examination	:	70
Effective from Session:				w.e.f. 2024-2025	Total	:	100
Date of BoS approval:				23.07.24	Duration of Exam	:	3 Hrs

COURSE OBJECTIVES:

The course aims to inculcate skills among students with following objectives

- Be familiar with mathematical foundations of data mining tools.
- Understand and implement classical models and algorithms in data warehouses and data mining.
- Master data mining techniques in various applications like social, scientific and environmental context.
- Develop skill in selecting the appropriate data mining algorithm for solving practical problems.

COURSE LEARNING OUTCOMES

At the end of the course student will be able to

CO1: Understand the functionality of the various data mining and data warehousing component

CO2: Appreciate the strengths and limitations of various data mining and data warehousing models

CO3: Explain the analyzing techniques of various data

CO4: Describe different methodologies used in data mining and data ware housing.

CO5: Compare different approaches of data ware housing and data mining with various technologies.

DETAILED CONTENTS

UNIT I: DATA WAREHOUSE

- 1.1 Introduction to Dataware House
- 1.2 Operational Database System Vs Data Ware House
- 1.3 Dataware House Characteristics
- 1.4 Dataware House Architecture and its Components
- 1.5 Extraction Transformation Loading

UNIT II : INTRODUCTION TO DATA MINING

- 2.1 Introduction
- 2.2 KDD
- 2.3 Challenges
- 2.4 Data Mining Task
- 2.5 Data Pre-processing
- 2.6 Dimensionality Reduction

UNIT III: ASSOCIATION RULE

- 3.1 Problem Definition
- 3.2 Frequent Item Set Generation- APRIORI
- 3.3 The Partition Algorithm
- 3.4 FP-Growth Algorithm

UNIT IV: CLASSIFICATION

- 4.1 General Approaches to solve classification problems
- 4.2 Classification techniques
- 4.3 Decision Tree
- 4.4 Decision Tree Induction
- 4.5 K-nearest Neighbor
- 4.6 Model Evaluation

UNIT V: CLUSTERING

- 5.1 Clustering Overview
- 5.2 K-means
- 5.3 Hierarchical Clustering
- 5.4 Outlier Detection

TEXT BOOK

1. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbach, Pearson Education.

RECOMMENDED BOOKS

1. Data Mining-Concepts and Techniques- Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishers, Elsevier, 2 Edition, 2006.

DATA MINING AND DATAWAREHOUSING Lab: 24DCSE23(new scheme) / DCE-203L (old scheme)							
Diploma in Computer Science & Engineering							
L	T	P	Credits	Core Course	Internal Examination	:	70
0	0	2	1	Program Core	External Examination	:	30
Effective from Session:				w.e.f. 2024-2025	Total	:	100
Date of BoS approval:				23.07.24			

COURSE OBJECTIVES:

The course aims to inculcate skills among students with following objectives:

- Understand the fundamental concepts and techniques of Operating Systems.
- Implement the basic techniques for scheduling and memory allocation.

LEARNING OUTCOMES:

At the end of the course, the student will be able to:

CO1: Distinguish between Windows and other Operating Systems

CO2: Install Operating Systems

CO3: Execute Linux Commands

CO4: Test Linux Commands

CO5: Implement file editing operations in Linux`

LIST OF EXPERIMENTS

1. Identify source tables and populate sample data.
2. Create the source tables and populate them
3. Create the Data Warehouse
4. Design multi-dimensional data models namely Star, Snowflake and Fact Constellation schemas for any one enterprise (ex. Banking, Insurance, Finance, Healthcare, manufacturing, Automobiles, sales etc).
5. Install WEKA tool for Data Mining applications
6. Explore visualization features of the tool for analysis like identifying trends etc.
7. Load dataset and perform classification models.
8. Load dataset and perform clustering models.
9. Explore visualization features of WEKA to visualize the clusters.
10. Demonstrate performing Regression on data sets.

24DCSE24-: CLOUD COMPUTING							
Diploma in Computer Science & Engineering							
L	T	P	Credits	Core Course	Internal Examination	:	30
3	0	0	3	Program Core	External Examination	:	70
Effective from Session:				w.e.f. 2024-2025	Total	:	100
Date of BoS approval:				23.07.24	Duration of Exam	:	3 Hrs

COURSE OBJECTIVES:

The course aims to inculcate skills among students with following objectives

- To be familiar with cloud computing.
- Understand concepts of distributed system models, different cloud service models, service-oriented architectures
- Introduction to cloud programming and software environments, resource management.

COURSE LEARNING OUTCOMES

At the end of the course student will be able to

CO1: Understand various service delivery models of a cloud computing architecture.

CO2: Understand the ways in which the cloud can be programmed and deployed.

CO3: Understanding cloud service providers.

DETAILED CONTENTS

UNIT I: COMPUTING PARADIGM

- 1.1 High-Performance Computing
- 1.2 Parallel Computing
- 1.3 Distributed Computing
- 1.4 Cluster Computing
- 1.5 Grid Computing
- 1.6 Cloud Computing

UNIT II: CLOUD COMPUTING BASICS

- 2.1 The Need for Cloud Computing
- 2.2 Defining Cloud Computing, Cloud Computing Is a Service, Cloud Computing Is a Platform
- 2.3 Principles of Cloud computing
- 2.4 Five Essential Characteristics 2.5 Four Cloud Deployment Models.

UNIT III: CLOUD ARCHITECTURE

- 3.1 Cloud architecture, Layer, Anatomy of the Cloud
- 3.2 Network Connectivity in Cloud Computing
- 3.3 Applications on the Cloud

UNIT IV: CLOUD MANAGEMENT

- 4.1 Managing the Cloud Infrastructure
- 4.2 Managing the Cloud application
- 4.3 Migrating Application to Cloud
- 4.4 Phases of Cloud Migration Approaches for Cloud Migration

UNIT V: CLOUD SERVICE MODELS

- 5.1 Infrastructure as a Service, Characteristics of IaaS, Pros and Cons of IaaS
- 5.2 Platform as a Service, Characteristics of PaaS, Pros and Cons of PaaS
- 5.3 Software as a Service, Characteristics of SaaS, Pros and Cons of SaaS

TEXT BOOK

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.

RECOMMENDED BOOKS

1. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier, 2012.
2. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp 2011.

24DCSE25: COULD COMPUTING LAB							
Diploma in Computer Science & Engineering							
L	T	P	Credits	Core Course	Internal Examination	:	70
0	0	2	1	Program Core	External Examination	:	30
Effective from Session:				w.e.f. 2024-2025	Total	:	100
Date of BoS approval:				23.07.24			

COURSE OBJECTIVES:

The course aims to inculcate skills among students with following objectives:

- Understand the fundamental concepts and techniques of VMware workstation
- Implement the basic techniques for in VMware workstation

LEARNING OUTCOMES:

At the end of the course, the student will be able to:

- CO1: Install VMware workstation
CO2: set up environment for VMware workstation
CO3: Execute commands
CO4: Understand virtual networks
CO5: Implement virtual networks

LIST OF EXPERIMENTS

1. Introduction to VMware workstation
2. Explore the capabilities of VMware in cloud computing
3. Understanding the hardware and software requirements for VMware
4. Downloading and Installing VMware workstation
5. Editing VM settings and configuring the network
6. Introduction to virtual disk and network adapter
7. Adding a Virtual Disk and Network adapter
8. Introduction to virtual networks
9. Editing Virtual Network settings
10. Deploying a VM Running ESXi on VMware workstation

PROGRAM ELECTIVES II

SERVER CONFIGURATION AND SECURITY: 24DCSE30 (new scheme) / DCE-215 (old scheme)							
Diploma in Computer Science & Engineering							
L	T	P	Credits	Core Course	Internal Examination	:	30
3	0	0	3	Program Core	External Examination	:	70
Effective from Session:				w.e.f. 2024-2025	Total	:	100
Date of BoS approval:				23.07.24	Duration of Exam	:	3 Hrs

COURSE OBJECTIVES:

The course aims to inculcate skills among students with following objectives

- Be familiar with Security attacks in different paradigms
- Identify security threats in servers and network
- Working with linux

COURSE LEARNING OUTCOMES

At the end of the course student will be able to

- CO1: Identify security challenges in cloud computing
- CO2: understand principles of security implementation in server configurations
- CO3: Execute Linux commands for network security
- CO4: Identify security threats
- CO5: Comprehend different security preventive measures.

DETAILED CONTENTS

UNIT I: CLOUD COMPUTING AND SECURITY

- 1.1 Cloud Computing and its various services.
- 1.2 Cloud Computing Security
- 1.3 Security Issues in Cloud Computing
- 1.4 Privacy Challenges in Cloud Computing

UNIT II: SERVERS AND SECURITY

- 2.1 Server and its types
- 2.2 Server OS and its types
- 2.3 Server Consolidation in Cloud Computing
- 2.4 Role of multi-server and virtual environments in security
- 2.5 Server security best practices

UNIT III: LINUX BASICS

- 3.1 LINUX package introduction
- 3.2 Linux server basic Editing /etc/hosts file.
- 3.3 Linux Basic commands for access rights, authentication, security etc.

UNIT IV: SECURITY THREATS

- 4.1 Application Layer Attacks
- 4.2 Backdoors
- 4.3 Autorooters
- 4.4 DoS & DDoS
- 4.5 IP Spoofing

- 4.6 Man-in-middle
- 4.7 Brute Force Attack
- 4.8 Trojan Horse

UNIT V: SECURITY SOLUTIONS

- 5.1 Preventative Measures
- 5.2 ACL and mitigating attacks
- 5.3 Firewall and its types
- 5.4 Intrusion Detection Systems

TEXT BOOK

1. Forouzan, B. A. (2007). Data Communications and Networking. New York: Alan R. Apt.

RECOMMENDED BOOKS

1. Lammle, T. (2007). Cisco Certified Network Associate. Indiana: Richard Swadley.

SERVER CONFIGURATION AND SECURITY LAB: 24DCSE31 (new scheme) / DCE-215L (old scheme)							
Diploma in Computer Science & Engineering							
L	T	P	Credits	Core Course	Internal Examination	:	70
0	0	2	1	Program Core	External Examination	:	30
Effective from Session:				w.e.f. 2024-2025	Total	:	100
Date of BoS approval:				23.07.24			

COURSE OBJECTIVES:

The course aims to inculcate skills among students with following objectives:

- Understand the cloud and network security
- Implement the security solutions to mitigate or prevent threats.

LEARNING OUTCOMES:

At the end of the course, the student will be able to:

- CO1. Understand Basic of Network security.
- CO2. Practice on Packet Analyser such as Wireshark
- CO3. Practice on firewall technologies to secure the network perimeter.
- CO4. Configuring to implement security in Wi-Fi.
- CO5: Practice for Firewall Security

LIST OF EXPERIMENTS

1. Setup, install and configure IIS server/Linux server.
2. Install and configure Proxy server.
3. Install and configure following on Linux Server DHCP, DNS, NFS, /etc/hosts file and SAMBA.
4. Find package installed on your system (DPKG, YUM, DNF) using system control command for configuration and monitoring daemon and services.
5. Use of grep command for search
6. Configure Access Control List.
7. Practice on Packet analyzer like Wireshark.
8. Practice on firewall technologies to secure the network perimeter.
9. Configuration and Management of Firewall.
10. Configuring to implement security in Wi-Fi.

24DCSE32 : WEB PROGRAMMING USING PYTHON							
Diploma in Computer Science & Engineering							
L	T	P	Credits	Core Course	Internal Examination	:	30
3	0	0	3	Program Core	External Examination	:	70
Effective from Session:				w.e.f. 2024-2025	Total	:	100
Date of BoS approval:				23.07.24	Duration of Exam	:	3 Hrs

COURSE OBJECTIVES:

The course aims to inculcate skills among students with following objectives

- Be familiar with web development basics
- Distinguish between front end and back end applications
- Identify tools and techniques for front end and back end development
- Working with Django

COURSE LEARNING OUTCOMES

At the end of the course student will be able to

- CO1: Identify tools and techniques for web development
- CO2: understand principles of website designing
- CO3: Work with Django frameworks in python
- CO4: Outline web architectures
- CO5: Apply python for the back-end applications

DETAILED CONTENTS

UNIT I: WEB DEVELOPMENT BASICS

- 1.1 Introduction To WWW, Browser And Website
- 1.2 Website Design Principles
- 1.3 Planning Website And Navigation
- 1.4 Web Application Architecture

UNIT II: WEB SYSTEM ARCHITECTURE

- 2.1 Architecture of Web based systems- client/server (2-tier) architecture, 3-Tier architecture
- 2.2 Building blocks of fast and scalable data access
- 2.3 Concepts - Caches-Proxies- Indexes-Load Balancers- Queues

UNIT III: WEB DEVELOPMENT FOUNDATIONS

- 3.1 Definition to web development
- 3.2 Frontend and backend development
- 3.3 Techniques for frontend web development
- 3.4 Techniques for backend web development

UNIT IV: BACK END DEVELOPMENT

- 4.1 Backend Development Introduction
- 4.2 Role of Backend Development Applications
- 4.3 Backend Application Development Stages
- 4.4 Deployment
- 4.5 Model Validation
- 4.6 User Authentication

UNIT V: DJANGO FRAMEWORK

- 5.1 Introduction
- 5.2 Django architecture
- 5.3 Virtual Environment in Django
- 5.4 Project Structure in Django

TEXT BOOKS

1. “Web Technologies--A Computer Science Perspective”, Jeffrey C.Jackson,
2. “Internet & World Wide Web How To Program”, Deitel, Deitel, Goldberg, Pearson Education

RECOMMENDED BOOKS

1. “Web programming- Building Internet Application”, Chris Bales
2. Web Applications: Concepts and Real World Design, Knuckles.

24DCSE33: WEB PROGRAMMING USING PYTHON LAB							
Diploma in Computer Science & Engineering							
L	T	P	Credits	Core Course	Internal Examination	:	70
0	0	2	1	Program Core	External Examination	:	30
Effective from Session:				w.e.f. 2024-2025	Total	:	100
Date of BoS approval:				23.07.24			

COURSE OBJECTIVES:

The course aims to inculcate skills among students with following objectives:

- Understand the Django framework
- Implement Django basic scripts

LEARNING OUTCOMES:

At the end of the course, the student will be able to:

- CO1. Understand Basic of web development using Django
- CO2. Practice on Django
- CO3. Practice on forms and templates
- CO4. Configuring polls app
- CO5: Practice server verification

LIST OF EXPERIMENTS

1. Introduction to Django framework
2. Comparative analysis of Django and other stack development techniques
3. Setup, install and configure Django for web development
4. Setting up virtual environment in Django framework
5. Autogenerate some code to establish Django Project
6. The development server verification
7. Develop the polls app
8. Introduction to MVT architecture of Django
9. Create a basic Django script in the MVT
10. Work with Django Forms and Templates

JAVA PROGRAMMING: 24DCSE34 (new scheme) / DCE-313 (old scheme)							
Diploma in Computer Science & Engineering							
L	T	P	Credits	Core Course	Internal Examination	:	30
3	0	0	3	Program Core	External Examination	:	70
Effective from Session:				w.e.f. 2024-2025	Total	:	100
Date of BoS approval:				23.07.24	Duration of Exam	:	3 Hrs

COURSE OBJECTIVES:

The course aims to inculcate skills among students with following objectives

- Introduction to Java programming basics
- Install and set up Java programming environment
- Practice Java Programming constructs
- Identify errors and exceptions

COURSE LEARNING OUTCOMES

At the end of the course student will be able to

CO1: Understand Java programming constructs

CO2: Install and set up Java Programming Error

CO3: Perform implementation of Java programming constructs

CO4: Understand OOPS concepts

CO5: Comprehend and resolve error and exception handling

DETAILED CONTENTS

UNIT I: INTRODUCTION TO JAVA

- 1.1 Basics of Java: history, background, applications
- 1.2 Java and Internet
- 1.3 Java Environment setup
- 1.4 Java Program Structure
- 1.5 JVM and Byte Code

UNIT II: JAVA PROGRAMMING CONSTRUCTS

- 2.1 Primitive Data Types and User Defined Data Types
- 2.2 Identifier and literals; Constant and variables declaration; comments
- 2.3 Working with Arrays
- 2.4 Java Operators
- 2.5 Decision and Control Statements

UNIT III: OBJECTS AND CLASSES

- 3.1 Objects, Classes and Methods
- 3.2 String Vs String Buffer Class
- 3.3 Constructor and its Types

UNIT IV: INHERITANCE AND INTERFACES

- 4.1 Inheritance and its types
- 4.2 Interface basics
- 4.3 ADT and interfaces

UNIT V: ERRORS AND EXCEPTIONS

- 5.1 Common Errors in Java Program
- 5.2 Types of Errors
- 5.3 Exceptions
- 5.4 Try Catch Block
- 5.5 User defined Exceptions

TEXT BOOK

1. Balaguruswamy, E. (2014). *Programming with Java-A Primer*. McGraw-Hill Professionals.

RECOMMENDED BOOKS

1. Arnold, K., Gosling, J., & Holmes, D. (2005). *The Java programming language*. Addison Wesley Professional.
2. Liang, Y. D., & Bhattacharjee, A. K. (1999). *Introduction to Java programming*. Que E & T.

JAVA PROGRAMMING Lab: 24DCSE35 (new scheme) / DCE-313L (old scheme)							
Diploma in Computer Science & Engineering							
L	T	P	Credits	Core Course	Internal Examination	:	70
0	0	2	1	Program Core	External Examination	:	30
Effective from Session:				w.e.f. 2024-2025	Total	:	100
Date of BoS approval:				23.07.24			

COURSE OBJECTIVES:

The course aims to inculcate skills among students with following objectives:

- Understand the cloud and network security
- Implement the security solutions to mitigate or prevent threats.

LEARNING OUTCOMES:

At the end of the course, the student will be able to:

- CO1. Understand Basic of Network security.
- CO2. Practice on Packet Analyser such as Wireshark
- CO3. Practice on firewall technologies to secure the network perimeter.
- CO4. Configuring to implement security in Wi-Fi.
- CO5: Practice for Firewall Security

LIST OF EXPERIMENTS

1. Setup, install jdk environment
2. Write a program in JAVA to print “Hello” using classes.
3. Write a program to input using Scanner Class.
4. Write a program to print factorial of a Number.
5. Write a Java program to reverse the digits in a number using loop
6. Write a Java program to check if entered string is palindrome or not.
7. Write a program to create a Class and make objects of that class.
8. Create a class with data members Feet, Inches and add them.
9. Create a class using constructors.
10. Create a class and show the use of Single inheritance.
11. Create a class and show the use of multiple inheritance.
12. Create a class and show the use of Multi-level inheritance.
13. Create a class showing the use of Constructor Overloading.
14. Create a program showing the use of Interfaces.
15. Create a program using Try and Catch Block.

PROGRAM ELECTIVES- III

24DCSE42: CRYPTOGRAPHY AND NETWORK SECURITY							
Diploma in Computer Science & Engineering							
L	T	P	Credits	Core Course	Internal Examination	:	30
3	0	0	3	Program Core	External Examination	:	70
Effective from Session:				w.e.f. 2024-2025	Total	:	100
Date of BoS approval:				23.07.24	Duration of Exam	:	3 Hrs

COURSE OBJECTIVES:

The course aims to inculcate skills among students with following objectives

- Explain the importance and application of each of confidentiality, integrity, authentication and availability
- Understand various cryptographic algorithms.
- Understand the basic categories of threats to computers and networks.
- Describe public-key cryptosystem.

COURSE LEARNING OUTCOMES

At the end of the course student will be able to

- CO1: Understand basic cryptographic algorithms
- CO2: Understand message and web authentication and security issues.
- CO3: Identify information system requirements for both of them such as client and server.
- CO4: Understand the current legal issues towards information security.
- CO5: Analyze different cryptographic mechanism's applications with respect to different scenarios.

DETAILED CONTENTS

UNIT I: SECURITY CONCEPTS

- 1.1 Introduction
- 1.2 The Need for Security
- 1.3 Security Approaches
- 1.4 Principles of Security
- 1.5 Types of Security Attacks
- 1.6 Security Services
- 1.7 Security Mechanisms
- 1.8 A Model for Network Security
- 1.9 Possible Types of Attacks

UNIT II: CRYPTOGRAPHY CONCEPTS AND TECHNIQUES

- 2.1 Introduction
- 2.2 Plain Text and Cipher Text
- 2.3 Substitution Techniques
- 2.4 Transposition Techniques
- 2.5 Encryption and Decryption
- 2.6 Symmetric and Asymmetric Key Cryptography
- 2.7 Key Range and Key Size

UNIT III: HAST FUNCTIONS AND MESSAGE AUTHENTICATION

- 3.1 Message Authentication
- 3.2 Secure Hash Algorithm (SHA-512)
- 3.3 Authentication requirements
- 3.4 HMAC AND CMAC
- 3.5 Digital signatures

UNIT IV: KEY MANAGEMENT AND DISTRIBUTION

- 4.1 Symmetric Key Distribution Using Symmetric & Asymmetric Encryption
- 4.2 Distribution of Public Keys
- 4.3 Kerberos
- 4.4 X.509 Authentication Service
- 4.5 Public – Key Infrastructure.

UNIT V: NETWORK SECURITY

- 5.1 Web security considerations
- 5.2 HTTPS, Secure Shell (SSH)
- 5.3 Wireless Security
- 5.4 Mobile Device Security
- 5.5 IEEE 802.11i Wireless LAN Security.

TEXT BOOK

- 1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition.

RECOMMENDED BOOKS

- 1. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 3rd Edition.

24DCSE43: CRYPTOGRAPHY AND NETWORK SECURITY LAB							
Diploma in Computer Science & Engineering							
L	T	P	Credits	Core Course	Internal Examination	:	70
0	0	2	1	Program Core	External Examination	:	30
Effective from Session:				w.e.f. 2024-2025	Total	:	100
Date of BoS approval:				23.07.24			

COURSE OBJECTIVES:

The course aims to inculcate skills among students with following objectives:

- Explain the importance and application of each of confidentiality, integrity, authentication and availability.
- Understand various cryptographic algorithms.
- Implement and execute different cryptographic modules

LEARNING OUTCOMES:

At the end of the course, the student will be able to:

- CO1: Understand basic cryptographic algorithms, message and web authentication and security issues.
- CO2: Identify information system requirements for both of them such as client and server.
- CO3: understand tools and techniques for network security
- CO4: Capturing Packets
- CO5: Analyzing Packets

LIST OF EXPERIMENTS

1. Study Practical significance of Ethereal, Snort and Wireshark
2. Download and install Ethereal, Snort and Wireshark
3. Working with sniffers for monitoring network communication using Ethereal and Wireshark
 - Capturing and analyzing packets using Ethereal
 - Capturing and analyzing packets using Wireshark
 - Capturing and analyzing packets using Snort
4. Practice Linear Algebra and Number theory that lays the foundation to cryptographic modules.
5. Case study 1: Study of GNU PGP
6. Case study 2: Study Intrusion Detection Systems and Honey Pots

SOFTWARE ENGINEERING: 24DCSE46 (new scheme) / DCE-211 (old scheme)							
Diploma in Computer Science & Engineering							
L	T	P	Credits	Core Course	Internal Examination	:	30
3	0	0	3	Program Core	External Examination	:	70
Effective from Session:				w.e.f. 2024-2025	Total	:	100
Date of BoS approval:				23.07.24	Duration of Exam	:	3 Hrs

COURSE OBJECTIVES:

The course aims to inculcate skills among students with following objectives

- Study a body of knowledge relating to Software Engineering, Software reengineering, and maintenance
- Understand the principles of large-scale software systems, and the processes that are used to build them

COURSE LEARNING OUTCOMES:

At the end of the course, student will be able to:

CO1: Develop an awareness of the role and responsibilities of the professional software engineer

CO2: Use appropriate methods of analysis and design

CO3: Design and communicate ideas about software system solutions at different level

CO4: Understand different software engineering development life cycle models.

CO5: Apply SDLC models during project development.

UNIT – I: INTRODUCTION

- 1.1. Introduction to Software Engineering
- 1.2. Managerial Issues
- 1.3. Software Development Lifecycle
- 1.4. Classification of Software
- 1.5. Software Quality

UNIT – II: SOFTWARE DEVELOPMENT MODELS

- 2.1 Water fall model
- 2.2 Iterative Water Fall Model
- 2.3 Spiral model
- 2.4 Prototyping model
- 2.5 Incremental model

UNIT – III

SOFTWARE DESIGN AND TESTING

- 3.1 Software design: Fundamental Design Concepts
- 3.2 Software testing and its types
- 3.3 Test Plans - Milestones, walkthroughs, and Inspections.
- 3.4 Debugging in software

UNIT – IV: IMPLEMENTATION

- 4.1 Implementation issues: Structured Coding Techniques
- 4.2 Coding Style - Standards and Guidelines - documentation guidelines
- 4.3 Type Checking
- 4.4 Scoping Rules

UNIT – V: SOFTWARE QUALITY

- 5.1 Quality Assurance - Walkthroughs and Inspections

- 5.2 Static Analysis - Symbolic Execution
- 5.3 Verification and Validation
- 5.4 Managerial Aspects of Software Maintenance
- 5.5 Other Maintenance Tools and Techniques.

TEXT BOOK

1. R.S. Pressman, Software Engineering, Fourth Ed., McGraw Hill, 1997.

REFERENCE BOOK

1. R.Fairley, Software Engineering Concepts, Tata McGraw-Hill, 1997.
2. Software Engineering, H. Sommervill Ian , Addition Wesley Pub. Co.
3. Software Engineering: An Object Oriented Perspective by Braude, E.J., Willey, 2001.

SOFTWARE ENGINEERING Lab: 24DCSE47 (new scheme) / DCE-211L (old scheme)							
Diploma in Computer Science & Engineering							
L	T	P	Credits	Core Course	Internal Examination	:	70
0	0	2	1	Program Core	External Examination	:	30
Effective from Session:				w.e.f. 2024-2025	Total	:	100
Date of BoS approval:				23.07.24			

COURSE OBJECTIVES:

The course aims to inculcate skills among students with following objectives:

- Understand the design principles of software engineering process.
- Engineering tools to design and develop different diagram to be utilized for the software engineering processes.

COURSE LEARNING OUTCOMES:

At the end of the course, student will be able to:

- CO1: Understand the different structure of different diagram used in software engineering process.
- CO2: Understand the basics of UML diagram modelling.
- CO3: Develop different diagram for software engineering process using engineering tools.
- CO4: Understand concept of Entity and Relationships.
- CO5: Develop ER designs.

LIST OF EXPERIMENTS

Note: The diagrams may be designed using UML diagram tools and software.

1. Prepare an SRS Document in line with IEEE recommended standards.
2. Draw the use case diagram and specify the role of each of the actors. Also state the precondition, post condition and function of each use case.
3. Draw Level-0 and Level-1 Data Flow Diagram
4. Draw Sequence Diagram
5. Draw Activity diagram
6. Draw the Class Diagram
7. Draw the Collaboration Diagram
8. Draw State Chart Diagram
9. Draw Component Diagram
10. Draw Deployment diagram
11. Draw ER diagram

OPEN ELECTIVES

Course on Computer Application

Soft Skills

Course Code: 24DOFM08

Course Credit: 03 (2-1-0)
Max. Marks: 100 (30[-70E])

Course Objective: Courses on soft skills are intended to improve the communication skills, enrich personality development and knowledge of the students.

Learning Outcomes

LO	Statement
1	Make use of the important elements of Soft Skills in the workplace
2	Make use of verbal and non-verbal communication wherever required at the workplace.
3	Demonstrate behaviours that promote professionalism in the learning environment
4	Handle customers over telephone and direct them on the phone
5	Outline the various procedures for developing body language and teamwork.

Unit	Content
I LO1	Importance of Soft Skills: Soft Skills, Active Listening, Empathy, Building Assertiveness, Service No, Types of Customers/Dealing with Irate Customers, Apology, Building Rapport.
II LO2	Transactional Analysis: Attention Grabber, Verbal and Non-Verbal Communication, workplace Communication, Ego States, Role Play.
III LO3	Demonstrate behaviours: Assertive Behaviour, Handling Different Types of Customers, Giving and Receiving feedback, Importance of Communication skills, Effective listening skills, Emotional Intelligence.
IV LO4	Handling customers: Dos and Don'ts, Communicating effectively, Opening and Closing a Customer Service call, Paraphrasing, Directing a Customer, Handling Customer Queries, The Call Flow, Business Meetings.
V LO5	Personal Outlook: Dress and appearance, problem-solving in intercultural communication, Character building, Teamwork.

25DCSE01 : ECONOMIC POLICIES IN INDIA							
Diploma in Computer Engineering							
L	T	P	Credits	Core Course	Internal Examination		30
3	0	0	3	Elective	External Examination		70
Effective from Session:				w.e.f 2025-2026	Total		100
Date of BoS approval:				14.07.25			

Course Objectives:

The objective of this course is to familiarize the students of different streams with the basic concepts, structure, problems and issues concerning Indian economy.

Course outcomes:

At the end of the course, the student will be able to:

CO1	Understand Indian economics policy, planning strategies
CO2	It will enable to students to comprehend theoretical and empirical development across countries and region for policy purposes
CO3	Development Economics as a discipline encompasses different approaches to the problems of unemployment, poverty, income generation, industrialization from different perspectives
CO4	Able to identify the problems and capable to decide the application for future development
CO5	Analyze economic issues and find solutions to complex economic problems and take correct economic judgment

Course Content:

UNIT-I: Basic features and problems of Indian Economy; Economic History of India; Nature of Indian Economy, demographic features and Human Development Index, Problems of Poverty, Unemployment, Inflation, income inequality, Black money in India.

UNIT-II: Sectoral composition of Indian Economy: Issues in Agriculture sector in India, land reforms Green Revolution and agriculture policies of India,

UNIT-III: Industrial development, small scale and cottage industries, industrial Policy, Public sector in India, service sector in India.

UNIT-IV: Economic Policies: Economic Planning in India, Planning commission v/s NITI Aayog, Five Year Plans, monetary policy in India, Fiscal Policy in India, Centre state Finance Relations, Finance commission in India. LPG policy in India

UNIT-V: External sector in India: - India's foreign trade value composition and direction, India Balance of payment since 1991, FDI in India, Impact of Globalization on Indian Economy, WTO and India. **Reference**

Books:

1. Dutt Rudder and K.P.M Sunderam (2017). Indian Economy. S Chand & Co. Ltd. New Delhi.
2. Mishra S.K & V.K Puri (2017). Indian Economy and –Its Development Experience. Himalaya Publishing House.
3. Singh, Ramesh, (2016): Indian Economy, Tata-McGraw Hill Publications, New Delhi.
4. Dhingra, I.C., (2017): March of the Indian Economy, Heed Publications Pvt. Ltd.
5. Karam Singh Gill, (1978): Evolution of the Indian Economy, NCERT, New Delhi
6. Kaushik Basu (2007): The Oxford Companion to Economics of India, Oxford University Press.

25DCSE02 : RENEWABLE ENERGY TECHNOLOGIES
Diploma in Computer Engineering

L	T	P	Credits	Core Course	Internal Examination		30
3	0	0	3	Elective	External Examination		70
Effective from Session:				w.e.f 2025-2026	Total		100
Date of BoS approval:				14.07.25			

Course Objectives:

The objective of this course is to provide a comprehensive look at global energy, both present and future. It will cover the fundamentals of solar and wind energy, along with an exploration of bioenergy's diverse applications. A key aim is for students to identify and differentiate various non-conventional energy sources.

Course outcomes:

At the end of the course, the student will be able to:

CO1	Understand present and future energy scenario of the world.
CO2	Understand various methods of solar energy harvesting.
CO3	Identify various wind energy systems.
CO4	Evaluate appropriate methods for Bio energy generations from various Bio wastes.
CO5	Identify suitable energy sources for a location.

Course Content:

UNIT-I: Introduction: World Energy Use; Reserves of Energy Resources; Environmental Aspects of Energy Utilisation; Renewable Energy Scenario in India and around the World; Potentials; Achievements / Applications; Economics of renewable energy systems.

Unit-II: Solar energy: Solar Radiation; Measurements of Solar Radiation; Flat Plate and Concentrating Collectors; Solar direct Thermal Applications; Solar thermal Power Generation Fundamentals of Solar Photo Voltaic Conversion; Solar Cells; Solar PV Power Generation; Solar PV Applications.

Unit-III: Wind Energy: Wind Data and Energy Estimation; Types of Wind Energy Systems; Performance; Site Selection; Details of Wind Turbine Generator; Safety and Environmental Aspects.

Unit-IV: Bio-Energy: Biomass direct combustion; Biomass gasifiers; Biogas plants; Digesters; Ethanol production; Bio diesel; Cogeneration; Biomass Applications.

Unit-V: Other Renewable Energy Sources: Tidal energy; Wave Energy; Open and Closed OTEC Cycles; Small Hydro-Geothermal Energy; Hydrogen and Storage; Fuel Cell Systems; Hybrid Systems.

Reference Books:

1. O.P. Gupta, Energy Technology, Khanna Publishing House, Delhi (ed. 2018)
2. Renewable Energy Sources, Twidell, J.W. & Weir, A., EFN Spon Ltd., UK, 2006.
3. Solar Energy, Sukhatme. S.P., Tata McGraw Hill Publishing Company Ltd., New Delhi, 1997.
4. Renewable Energy, Power for a Sustainable Future, Godfrey Boyle, Oxford University Press, U.K., 1996.
5. Fundamental of Renewable Energy Sources, GN Tiwari and MK Ghoshal, Narosa, New Delhi, 2007.
6. Renewable Energy and Environment-A Policy Analysis for India, NH Ravindranath, UK Rao, B Natarajan, P Monga, Tata McGraw Hill.
7. Energy and The Environment, RA Ristinen and J J Kraushaar, Second Edition, John Willey & Sons, New York, 2006.
8. Renewable Energy Resources, JW Twidell and AD Weir, ELBS, 2006.

25DCSE03 : Mechatronics							
Diploma in Computer Engineering							
L	T	P	Credits	Core Course	Internal Examination		30
3	0	0	3	Elective	External Examination		70

Effective from Session:	w.e.f 2025-2026	Total		100
Date of BoS approval:	14.07.25			

Course Objectives:

The objective of this course is to provide a foundational understanding of Mechatronics, integrating mechanical, electrical, computer, and control engineering principles. Students will learn about system design, essential electronic and control components like sensors and microcontrollers, and various drive systems

Course Content:

Unit 1 – Introduction to Mechatronics

- Introduction to System Concepts, Analysis and Design
- Mechatronics basic definitions; systems and components;
- Systems with mixed disciplines
- Electronics Fundamentals Review

Unit 2 – Elements in Mechatronics

- Data conversion devices, sensors, micro-sensors, transducers, signal processing devices, timers
- Microprocessors, Microcontrollers
- PID Controllers and PLCs

Unit 3 – Drives

- Stepper Motors, Servo Drives
- Linear Motion bearings, cams
- Systems controlled by camshafts, electronic cams
- Tool magazines and indexing mechanisms.

Unit 4 – Hydraulic Systems

- Flow, Pressure and Direction Control Valves
- Actuators, Supporting Elements, Hydraulic Power Packs, Pumps
- Design of Hydraulic circuits

Unit 5 – Pneumatic System

- Production, Distribution and conditioning of compressed air
- System Components and Graphic representations
- Design of Systems

SUGGESTED LEARNING RESOURCES:

S.N.	Title of Book	Author	Publication
1.	Analysis and design of Dynamic Systems	Cochin, Era and Cadwallender	AddisonWesley, 1997
2.	Mechatronics Engineering	Tomkinson, D. And Horne, J. Longman	McGraw Hill, 1996
3.	Mechatronics	Bolton, W	Pearson
4.	Fundamental of mecha- tronic	M. Jouaneh	Cengage Learning ISBN – 978-1111569020
5.	Mechatronics – An Inte- grated Approach	Clarence W. de Silva	CRC Press ISBN – 978-0849312748

SUGGESTED SOFTWARE/LEARNING WEBSITES:

6. https://youtu.be/Ro_tFv1iH6g
7. <https://www.motioncontroltips.com/faq-what-are-stepper-drives-and-how-do-they-work/>
8. <https://science.howstuffworks.com/robot.htm>
<https://howtomechatronics.com/>

25DCSE04 : ARTIFICIAL INTELLIGENCE & MACHINE LEARNING							
Diploma in Computer Engineering							
L	T	P	Credits	Core Course	Internal Examination		30
3	0	0	3	Elective	External Examination		70
Effective from Session:				w.e.f 2025-2026	Total		100
Date of BoS approval:				14.07.25			

Course Objectives:

The objective of this course is to provide the understanding of classical and modern AI applications. Be able to implement a wide range of AI concepts using Prolog. Understand non-classical AI approaches such as genetic algorithms and neural networks. Be able to assess the potential of AI in research and real world environments.

Course outcomes: At the end of the course, the student will be able to:

CO1	Identify problems that are amenable to solution by AI methods.
CO2	Design and carry out an empirical evaluation of different algorithms on a problem formalization, and state the conclusions that the evaluation supports.
CO3	Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
CO4	able to design and implement various machine learning algorithms in a range of real-world applications.
CO5	Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.

Course Content:

UNIT-I: Introduction: History and foundations of AI, Problem solving: Uninformed and informed Search; Constraint Satisfaction Problems and Constrained Optimization problems (complete and in- complete techniques).

UNIT-II: Adversarial Search: Two players games, games with uncertainty; Decision support systems and technologies; Knowledge representation, Reasoning, Expert systems Contents (2/2), Planning (basics).

UNIT-III: Machine learning Basics: Decision trees, Ensemble learning, Reinforcement learning, Evolutionary computation, Neural networks, Problems, data, and tools; Visualization;

UNIT-IV: Linear regression; SSE; gradient descent; closed form; normal equations; features, Over fitting and complexity; training, validation, test data, and introduction to Matlab.

UNIT-V: Classification problems; Decision boundaries; Probability and classification, Bayes optimal decisions, Naive Bayes and Gaussian class-conditional distribution.

References:

1. Russell, Norvig, Artificial intelligence: A modern approach, 2nd edition. Pearson/Prentice Hall.
2. M.C. Trivedi, A classical approach to Artificial Intelligence, Khanna Publishing House, New Delhi (2018)
3. V.K. Jain, Machine Learning, Khanna Publishing House, New Delhi (2018)
4. Ethem Alpaydin, Introduction to Machine Learning, Second Edition, <http://mitpress.mit.edu/catalog/item/default.asp?ttype=2&tid=12012>.

Internet of Things: 25DCSE05(new scheme) /DCE303 (old scheme)						
Diploma in Computer Engineering Semester V						
L	T	P	Credits	Core Course	Internal Examination	30
3	0	0	3	Elective	External Examination	70
Effective from Session:				w.e.f 2025-2026	Total	100
Date of BoS approval:				14.07.25		

Course Learning Objectives:

Internet of Things (IoT) is presently an important technology with wide ranging interest from Government, academia and industry. IoT cuts across different application domain verticals ranging from civilian to defence sectors which includes agriculture, space, health care, manufacturing, construction, water, mining, etc. Today it is possible to build different IoT solutions such as shopping system, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems. Therefore, it is very important to learn the fundamentals of this emerging technology.

Course outcomes:

After course completion Students will be able to

CO1: Define the Internet of Things (IoT) and identify the technological trends that led to its development, while also understanding the societal impact and the fundamental components of an embedded system. Students will have good understanding of various aspect of IoT, know some tools and have basic implementation skills.

CO2: Identify the core hardware components of IoT devices and explain their interaction with the physical world, detailing the interplay between software and hardware and how these systems connect to the internet.

CO3: Differentiate between various short-range and long-range wireless communication technologies, explaining the characteristics of key protocols like Wi-Fi, BLE, and MQTT, as well as the function of an IoT gateway.

CO4: Describe the role of IoT cloud platforms and the data flow from a device to the cloud, recognizing the importance of data analytics and visualization for making sense of sensor data.

CO5: Major security threats to IoT systems and describe best practices for securing them, including methods for authentication, authorization, and data encryption.

Course Content:

Unit I - Introduction to Internet of Things

- Define the term “Internet of Things”
- State the technological trends which have led to IoT.
- Describe the impact of IoT on society.

Unit II - Design consideration of IoT

- Enumerate and describe the components of an embedded system.
- Describe the interactions of embedded systems with the physical world.
- Name the core hardware components most commonly used in IoT devices.

Unit III - Interfacing by IoT devices

- Describe the interaction between software and hardware in an IoT device.
- Explain the use of networking and basic networking hardware.
- Describe the structure of the Internet.

Unit IV - IoT Communication Protocols and Connectivity

- Describe the different types of short-range and long-range wireless communication technologies used in IoT.
- Explain the key characteristics of popular IoT protocols, including Wi-Fi, Bluetooth Low Energy (BLE), Zigbee, and LoRaWAN.
- Detail the role of application-layer protocols like MQTT (Message Queuing Telemetry Transport) and HTTP in sending data to the cloud.

- Illustrate the concept of a "gateway" and its function in an IoT network.

Unit V - IoT Cloud, Data, and Security

- Describe the purpose of an IoT cloud platform and list major providers (e.g., AWS IoT, Google Cloud IoT).
- Explain the typical flow of data from an IoT device to the cloud.
- State the importance of data analytics and visualization for making sense of sensor data.
- Identify the major security threats to IoT devices and networks.
- Enumerate and describe best practices for securing an IoT system, including authentication, authorization, and data encryption.

SUGGESTED LEARNING RESOURCES:

Text/Reference Books:

1. Internet of Things Raj Kamal McGraw Hill Education; First edition (10 March 2017) ISBN 978-9352605224
2. Internet of Things: A Hands-On Approach Arsheep Bahge and Vijay Madisetti Orient Blackswan Private Limited - New Delhi; First edition (2015) ISBN : 978-8173719547

SUGGESTED SOFTWARE/LEARNING WEBSITES:

1. <https://www.raspberrypi.org/blog/getting-started-with-iot/>
2. <https://www.arduino.cc/en/IoT/HomePage>
3. <https://www.microchip.com/design-centers/internet-of-things>
4. [https://learn.adafruit.com/category/internet](https://learn.adafruit.com/category/internet-of-things)