VINAYAKA MISSION'S RESEARCH FOUNDATION

(Deemed to be University under section 3 of the UGC Act 1956)

B.E – COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE)

DEGREE PROGRAMME- FULL TIME

CURRICULUM AND SYLLABUS

CHOICE BASED CREDIT SYSTEM (CBCS)

UNDER THE FACULTY OF ENGINEERING AND TECHNOLOGY

(SEMESTER I TO VIII)

REGULATION 2025

(FOR THE STUDENTS ADMITTED FROM 2025 ONWARDS)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

VISION

Providing world class education in the field of Computer Engineering and Information Technology. Equip our graduates with the knowledge and expertise to contribute significantly to the computer industry and to apply techniques learned toward continued growth.

MISSION

- Endeavoring to produce confident professionals tuned to real time working environment.
- Offer excellent academic environment with a team of highly qualified faculty members to inspire the students & develop their technical skills and inculcate the spirit of team work in them.
- Promote world class research with absolute commitment to excellence in teaching.

PROGRAMME OUTCOMES

Engineering Graduates will be able to:

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 engineeringproblems 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 the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Engineering tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO8	Individual and Collaborative team work: Function effectively as an individual, and as a member or leader in diverse / multidisciplinary teams,
PO9	Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences
PO10	Project management and finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO11	Life-long learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOS)

Graduating Students of Data Science programme will be able to:

PSO 1	Demonstrate understanding of the principles and working of the hardware and software aspects of computer systems.
PSO 2	Understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics and networking for efficient design of computer-based systems of varying complexity.
PSO 3	Apply standard Software Engineering practices and strategies in software project development using open-source programming environment to deliver a quality product for business success and to be acquainted with the contemporary issues, latest trends in technological development and thereby innovate new ideas and solutions to existing problems.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOS)

PEO1	Technical Expertise: Implement fundamental domain knowledge of core courses for developing effective computing solutions by incorporating creativity and logical reasoning.
PEO2	Graduate will establish effective professionals by solving real world problems using investigative and analytical skills along with the knowledge acquired in the field of Computer Science and Engineering.
PEO3	Graduate will prove a ability to work and communicate effectively as a team member and /or leader to complete the task with minimal resources, meeting deadlines.
PEO4	Graduate will demonstrate his/her ability to adapt to rapidly changing environment in advanced areas of Computer Science and scale new height in their profession through lifelong learning.

STRUCTURE OF UNDERGRADUATE ENGINEERING PROGRAM – FULL TIME

Sl. No.	Category of Courses	Types of Courses		Suggested Breakupof Credits (Min – Max)
1	**A. Foundation Courses(48)**	Humanities and Social Sciences		9
2		Basic Science courses		18
3		Engineering Science courses including workshop, drawing, basicsofelectrical / mechanical / Computer etc.		21
4	**B. Professional Core Courses (62)**	Core courses		62
5	**C.Elective Courses (33)**	Professional Electives/Specialization Electives		12-15
		Industry Electives: Industry Designed/Industry Supported/ / Industry Sponsored courses/ Industry Integrated		3-9
		Vocational Skill Development Courses		2
		Open Electives	Innovation and Entrepreneurship	3-9
			Interdepartmental Open Electives including Management courses	3-9
			University multidisciplinary Open Elective	1
6	**D. IKS (2)**	Indian knowledge Systems		2
7	**E. DT (1)**	Design Thinking		1
8	**F. Courses for Presentationof technicalSkills related to the specialization(14)**	Project work		8
		Mini Project		3
		Internship		3
9	****G. Mandatory Courses (5)** (to be completed from 1st semester to 7th semester)	Research Methodology		1
		UHV-I		1
		Indian Constitution		1
		Environmental Sciences		1
		Idea Lab		1
		Yogaand Meditation /NCC / NSS / RRC / YRC / Student Clubs / Unnat Bharat Abhiyan /Swachh Bharat / Sports and Games		1
Minimum Credits to be earned				**165**
**** The credits earned in category 'G' Courses will not be counted in CGPA calculation.**				

STRUCTURE OF UNDERGRADUATE ENGINEERING

PROGRAM – LATERAL ENTRY AND WORKING PROFESSIONAL STUDENTS

Sl. No.	Category of Courses	Types of Courses		SuggestedBreakupof Credits (Min – Max)
1	**A.Foundation Courses (9)**	Humanities and Social Sciences		3
		Basic Science courses / Engineering Science courses		6
2	**B.Professional Core Courses (62)**	Core courses		62
3	**C.Elective Courses(33)**	Professional Electives/Specialization Electives		12-15
		IndustryDesigned/IndustrySupported/ / Industry Sponsored courses/ Industry Integrated		3-9
		Vocational Skill Development Courses		2
		Open Electives	Innovation and Entrepreneurship	3-9
			Interdepartmental Open Electives including Management courses	3-9
			University multidisciplinary Open Electives	1
4	**D. IKS(2)**	Indian knowledge Systems		2
5	**E. DT(1)**	Design Thinking		1
6	**F. Courses for Presentationof technicalSkills related to the specialization (14)**	Project work		8
		Mini Project		3
		Internship		3
7	****G.Mandatory Courses (5)** (to be completed from 3rd semester to 7th semester)	Research Methodology		1
		UHV-I		1
		Indian Constitution		1
		Environmental Sciences		1
		Idea Lab		1
		Yoga and Meditation /NCC / NSS / RRC / YRC / Student Clubs / Unnat Bharat Abhiyan /Swachh Bharat / Sports and Games		1
Minimum Credits to be earned				126

**** The credits earned in category 'F' Courses will not be counted in CGPA calculation.**

Regulation - 2025 CURRICULUM
BE–COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE)

A. FOUNDATION COURSES - CREDITS (48)									
HUMANITIES AND SOCIAL SCIENCES (9)									
Sl No	**Course Code**	**Course**	**Offering Dept**	**Category**	**L**	**T**	**P**	**C**	**Prerequisite**
1	34125H01	TECHNICAL ENGLISH COMMUNICATION	ENG	FC-HS	2	0	0	2	NIL
2	34125H04	ENGLISH LANGUAGE LEARNING USING GENERATIVE AI (THEORY AND PRACTICE)	ENG	FC-HS	1	0	2	2	NIL
3	34125H81	ENGLISH LANGUAGE LAB	ENG	FC-HS	0	0	2	1	NIL
4	34125H82	PROFESSIONAL COMMUNICATION AND PERSONALITY DEVELOPMENT LAB	ENG	FC-HS	0	0	2	1	NIL
5	34125H02	UNIVERSAL HUMAN VALUES - UNDERSTANDING HARMONY II	ENG	FC-HS	2	1	0	3	NIL
6	34125H03	BUSINESS ENGLISH	ENG	FC-HS	2	0	0	2	NIL
7	34125H05	PROFESSIONAL ENGLISH COMMUNICATION	ENG	FC-HS	2	0	0	2	NIL
BASIC SCIENCE COURSES (18)									
Sl No	**Course Code**	**Course**	**OfferingDept**	**Category**	**L**	**T**	**P**	**C**	**Prerequisite**
1	34125B14	DISCRETE MATHEMATICS	MATH	FC-BS	2	1	0	3	NIL
2	34125B02	MATRICES AND CALCULUS	MATH	FC-BS	2	1	0	3	NIL
3	34125B18	NUMERICAL METHODS AND NUMBER THEORY	MATH	FC-BS	2	1	0	3	MATRICES AND CALCULUS
4	34125B20	PARTIAL DIFFERENTIAL EQUATIONS AND TRANSFORMS	MATH	FC-BS	2	1	0	3	MATRICES AND CALCULUS
5	34125B21	PROBABILITY AND QUEUEING THEORY	MATH	FC-BS	2	1	0	3	MATRICES AND CALCULUS
6	34125B23	RESOURCE MANAGEMENT TECHNIQUES	MATH	FC-BS	2	1	0	3	NIL
7	34125B24	STATISTICAL FOUNDATION	MATH	FC-BS	2	1	0	3	NIL
8	34125B03	PHYSICAL SCIENCES	PHY & CHEM	FC-BS	4	0	0	4	NIL
9	34125B81	PHYSICAL SCIENCES LAB	PHY & CHEM	FC-BS	0	0	4	2	NIL
10	34125B04	SMART MATERIALS AND NANOTECHNOLOGY	PHY	FC-BS	3	0	0	3	NIL

ENGINEERING SCIENCE COURSES INCLUDING WORKSHOP, DRAWING, BASICS OF ELECTRICAL / MECHANICAL/COMPUTER ETC - CREDITS(21)									
Sl No	**Course Code**	**Course**	**Offering Dept**	**Category**	**L**	**T**	**P**	**C**	**Prerequisite**
1	35025E02	PROBLEM SOLVING AND PROGRAMMING USING C (THEORY AND PRACTICALS)	CSE	FC-ES	3	0	2	4	NIL
2	35025E03	PYTHON PROGRAMMING (THEORY AND PRACTICALS)	CSE	FC-ES	3	0	2	4	NIL
3	35025E01	ARTIFICIAL INTELLIGENCE IN SCIENTIFIC RESEARCH AND EDUCATION	CSE	FC-ES	3	0	0	3	NIL
4	I35025E01	EMERGING TRENDS IN IT INFRASTRUCTURE	CSE/ HCL	FC-ES	2	0	0	2	NIL
5	34625E01	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	EEE & ECE	FC-ES	4	0	0	4	NIL
6	34625E81	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING LAB	EEE & ECE	FC-ES	0	0	4	2	NIL
7	34425E01	BASICS OF CIVIL AND MECHANICAL ENGINEERING	CIVIL & MECH	FC-ES	4	0	0	4	NIL
8	34425E02	ENGINEERING MECHANICS	MECH	FC-ES	2	1	0	3	NIL
9	34425E81	ENGINEERING GRAPHICS AND DESIGN	MECH	FC-ES	0	0	6	3	NIL
10	34425E83	WORKSHOP PRACTICES	MECH	FC-ES	0	0	4	2	NIL
11	34425E82	ENGINEERING SKILLS PRACTICE	CIVIL & MECH	FC-ES	0	0	4	2	NIL

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
BE – CSE (DS) – R2025 CURRICULUM

B. PROFESSIONAL CORE COURSES–CREDITS (62)									
SL. NO	COURSE CODE	COURSE	OFFERING DEPT	CATEGORY	L	T	P	C	PRE – REQUISITE
1.	35025C01	ADVANCED JAVA PROGRAMMING	CSE	CC-C	3	0	0	3	JAVA PROGRAMMING
2.	35025C81	ADVANCED JAVA PROGRAMMING LAB	CSE	CC-C	0	0	4	2	JAVA PROGRAMMING LAB
3.	35025C02	ARTIFICIAL INTELLIGENCE	CSE	CC-C	3	0	0	3	NIL
4.	37425C01	BIG DATA ANALYTICS USING HADOOP	DS	CC-C	3	0	0	3	DATABASE MANAGEMENT SYSTEM
5.	37425C81	BIG DATA ANALYTICS LAB	DS	CC-C	0	0	4	2	NIL
6.	35025C03	CLOUD SERVICE AND DATA MANAGEMENT	CSE	CC-C	3	0	0	3	NIL
7.	35025C05	COMPUTER ARCHITECTURE AND ORGANIZATION	CSE	CC-C	3	0	0	3	NIL
8.	35025C06	COMPUTER NETWORKS (THEORY AND PRACTICALS)	CSE	CC-C	3	0	2	4	NIL
9.	37425C11	TIME SERIES ANALYSIS AND FORECASTING	DS	CC-C	3	0	0	3	NIL
10.	37425C03	DATA SCIENCE USING PYTHON (THEORY AND PRACTICALS)	DS	CC-C	3	0	2	4	NIL
11.	35025C08	DATA STRUCTURES (THEORY AND PRACTICALS)	CSE	CC-C	3	0	2	4	NIL
12.	35025C09	DATABASE MANAGEMENT SYSTEMS (THEORY AND PRACTICALS)	CSE	CC-C	3	0	2	4	NIL
13.	37425C06	DEEP LEARNING (THEORY AND PRACTICALS)	DS	CC-C	3	0	2	4	NIL
14.	35025C11	DESIGN AND ANALYSIS OF ALGORITHMS	CSE	CC-C	3	0	0	3	NIL
15.	37425C10	R FOR DATA SCIENCE (THEORY AND PRACTICALS)	DS	CC-C	3	0	2	4	NIL
16.	37425C07	FOUNDATIONS OF DATA SCIENCE	DS	CC-C	3	0	0	3	NIL
17.	35025C15	JAVA PROGRAMMING	CSE	CC-C	3	0	0	3	NIL
18.	35025C83	JAVA PROGRAMMING LAB	CSE	CC-C	0	0	4	2	NIL
19.	37425C08	MACHINE LEARNING	DS	CC-C	3	0	0	3	NIL
20.	37425C82	MACHINE LEARNING LAB	DS	CC-C	0	0	4	2	NIL

21.	35025C16	OBJECT ORIENTED PROGRAMMING (THEORY AND PRACTICALS)	CSE	CC-C	3	0	2	4	NIL
22.	35025C17	OPERATING SYSTEMS (THEORY AND PRACTICALS)	CSE	CC-C	3	0	2	4	NIL
23.	35025C18	SOFTWARE ENGINEERING AND PROJECT MANAGEMENT (THEORY AND PRACTICALS)	CSE	CC-C	3	0	2	4	NIL
24.	37425C09	PREDICTIVE MODELING AND ANALITICS	DS	CC-C	3	0	0	3	NIL
25.	35025C20	THEORY OF COMPUTATION	CSE	CC-C	3	0	0	3	NIL
26.	37425C05	DATA WRANGLING (THEORY AND PRACTICALS)	DS	CC-C	3	0	2	4	NIL
27.	37425C04	DATA VISUALIZATION	DS	CC-C	3	0	0	3	NIL
28.	37425C02	BUSINESS INTELLIGENCE AND ANALYTICS (THEORY AND PRACTICALS)	DS	CC-C	3	0	2	4	NIL
29.	37025C82	DESIGN PROJECT	AIML	CC-C	0	0	4	2	NIL
30.	34125C01	APPLIED STATISTICS	MATH	CC-C	3	0	0	3	NIL

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C. PROFESSIONAL ELECTIVE COURSES – CREDITS (12-15)									
SL. NO	**COURSE CODE**	**COURSE**	**OFFERING DEPT**	**CATEGORY**	**L**	**T**	**P**	**C**	**PRE – REQUISITE**
1.	37425P01	ACCELERATED DATA SCIENCE	DS	EC – PS	3	0	0	3	NIL
2.	35025P04	AUTONOMOUS NAVIGATION AND VEHICLES	CSE	EC – PS	3	0	0	3	NIL
3.	37025P03	BIO SYSTEMS WITH AI	AIML	EC – PS	3	0	0	3	NIL
4.	37025P05	COMPUTER VISION	AIML	EC – PS	3	0	0	3	NIL
5.	37425P02	DATA CENTRE VIRTUALIZATION	DS	EC – PS	3	0	0	3	NIL
6.	37025C02	GENETIC ALGORITHMS AND FUZZY LOGIC SYSTEMS	AIML	EC – PS	3	0	0	3	NIL
7.	37025P10	HUMAN COMPUTER INTERACTION	AIML	EC – PS	3	0	0	3	NIL
8.	37425P05	INTELLIGENCE OF BIOLOGICAL SYSTEMS	DS	EC – PS	3	0	0	3	NIL

9.	37425P07	INTRODUCTION TO ROBOTICS	DS	EC – PS	3	0	0	3	NIL
10.	37025P12	KNOWLEDGE BASED DECISION SUPPORT SYSTEM	AIML	EC – PS	3	0	0	3	NIL
11.	35025P22	MOBILE COMPUTING	CSE	EC – PS	3	0	0	3	NIL
12.	35025P23	NATURAL LANGUAGE PROCESSING	CSE	EC – PS	3	0	0	3	NIL
13.	37025P13	NEURAL NETWORKS	AIML	EC – PS	3	0	0	3	NIL
14.	37025P20	REINFORCEMENT LEARNING	AIML	EC – PS	3	0	0	3	NIL
15.	35025P24	SOFTWARE QUALITY MANAGEMENT	CSE	EC – PS	3	0	0	3	NIL
16.	36025P05	SOCIAL NETWORK ANALYTICS	CYBER	EC – PS	3	0	0	3	NIL
17.	35025P27	VIRTUAL REALITY AND AUGMENTED REALITY	CSE	EC – PS	3	0	0	3	NIL
18.	37425P06	INTELLIGENT DATABASE MANAGEMENT SYSTEM	DS	EC – PS	3	0	0	3	NIL
19.	37425P04	IMAGE ANALYTICS	DS	EC – PS	3	0	0	3	NIL
20.	37425P09	STATISTICAL INFERENCE FOR DATA SCIENCE	DS	EC – PS	3	0	0	3	NIL
21.	37425P08	IOT CLOUD AND DATA ANALYTICS	DS	EC – PS	3	0	0	3	NIL
22.	35025P08	CYBER SECURITY	CSE	EC – PS	3	0	0	3	NIL
23.	37025P14	OPTIMIZATION TECHNIQUES	AIML	EC – PS	3	0	0	3	NIL

INDUSTRY DESIGNED/ INDUSTRY SUPPORTED/ INDUSTRY SPONSORED COURSES/ INDUSTRY INTEGRATED-CREDITS(3-9)									
SL. NO	**COURSE CODE**	**COURSE**	**OFFERING DEPT**	**CATEGORY**	**L**	**T**	**P**	**C**	**PRE - REQUISITE**
1	34125I04	BUSINESS INTELLIGENCE AND ITS APPLICATIONS	INFOSYS	EC-IE	3	0	0	3	NIL
2	34125I03	BUILDING ENTERPRISE APPLICATIONS	INFOSYS	EC-IE	3	0	0	3	NIL
3	34125I18	INTERNET AND WEB TECHNOLOGY	INFOSYS	EC-IE	3	0	0	3	NIL
4	34125I20	LEARNING IT ESSENTIALS BY DOING	INFOSYS	EC-IE	3	0	0	3	NIL
5	34125I13	ESSENTIALS OF INFORMATION TECHNOLOGY	INFOSYS	EC-IE	3	0	0	3	NIL
6	34125I19	INTRODUCTION TO MAINFRAMES	INFOSYS	EC-IE	3	0	0	3	NIL
7	34125I22	MOBILE APPLICATION DEVELOPMENT	INFOSYS	EC-IE	3	0	0	3	NIL

8.	34125I09	CYBER FORENSICS	AVANZO TECH	EC-IE	3	0	0	3	NIL
9.	34125I08	CRYPTOGRAPHY AND NETWORK SECURITY	AVANZO TECH	EC-IE	3	0	0	3	NIL
10.	34125I07	CLOUD DATABASE MANAGEMENT AND SECURITY	SALEM INFO TECH	EC-IE	3	0	0	3	NIL
11	34125I15	GOOGLE CLOUD	GOOGLE	EC-IE	3	0	0	3	NIL

VOCATIONAL SKILL DEVELOPMENT COURSES-CREDITS(2)									
1	35025V83	ANGULAR JS AND NODE.JS	CSE	EC-VSD	0	0	4	2	NIL
2	35025V84	DATA SCIENCE AND BIG DATA ANALYTICS	CSE	EC-VSD	0	0	4	2	NIL
3	35025V82	ANDROID APPLICATION DEVELOPMENT WITH KOTLIN	CSE	EC-VSD	0	0	4	2	NIL
4	35025V81	ADVANCED UI / UX DESIGN	CSE	EC-VSD	0	0	4	2	NIL

OPEN ELECTIVES –INNOVATION AND ENTREPRENEURSHIP - CREDITS(3-9)									
1.	34125O05	CREATIVITY AND INNOVATION MANAGEMENT	MANAG	OE-IE	3	0	0	3	NIL
2.	34125O08	INTELLECTUAL PROPERTY RIGHTS	MANAG	OE-IE	3	0	0	3	NIL
3.	34125O09	PRODUCT DESIGN & DEVELOPMENT	MANAG	OE-IE	3	0	0	3	NIL
4.	34125O07	ENTREPRENEURSHIP AND NEW VENTURE CREATION	MANAG Ignite 5.0 course by Wadhwani foundation	OE-IE	3	0	0	3	NIL

OPEN ELECTIVES – INTER DEPARMENTAL OPEN ELECTIVES INCLUDING MANAGEMENT COURSES-CREDITS(3-9)									
1.	35325O01	BODY AREA NETWORKS	BME	OE-EA	3	0	0	3	NIL
2.	35325O02	FUNDAMENTALS OF BIOMEDICAL ENGINEERING	BME	OE-EA	3	0	0	3	NIL
3.	35325O03	TELEHEALTH TECHNOLOGY	BME	OE-EA	3	0	0	3	NIL
4.	38125O01	BIOFERTILIZER TECHNOLOGY	BTE	OE-EA	3	0	0	3	NIL
5.	38125O02	FOOD SCIENCE AND INDUSTRY 4.0	BTE	OE-EA	3	0	0	3	NIL

6.	38125O03	INTRODUCTION TO BIOFUELS	BTE	OE-EA	3	0	0	3	NIL
7.	34225O02	INDUSTRIAL PLANT DESIGN & ENGINEERING	CIVIL	OE-EA	3	0	0	3	NIL
8	34225O03	SUSTAINABLE WASTE MANAGEMENT PRACTICES	CIVIL	OE-EA	3	0	0	3	NIL
9	34225O01	DISASTER MANAGEMENT AND MITIGATION STRATEGIES	CIVIL	OE-EA	3	0	0	3	NIL
10	36925O02	BIOPHARMACEUTICS	PE	OE-EA	3	0	0	3	NIL
11	36925O03	FUNCTIONAL FOODS & NUTRACEUTICALS	PE	OE-EA	3	0	0	3	NIL
12	36925O01	BIOMOLECULES	PE	OE-EA	3	0	0	3	NIL
13	34725O02	DIGITAL IMAGE PROCESSING & PATTERN GENERATION	ECE	OE-EA	3	0	0	3	NIL
14	34725O03	EVOLUTION OF MOBILE COMMUNICATION 1G TO 5G	ECE	OE-EA	3	0	0	3	NIL
15	34725O04	PRINCIPLES OF RADAR AND SATELLITE COMMUNICATION	ECE	OE-EA	3	0	0	3	NIL
16	34625O01	ENERGY CONSERVATION AND MANGEMENT	EEE	OE-EA	3	0	0	3	NIL
17	34625O02	IOT SYSTEMS: AN INTRODUCTION TO SENSORS AND TRANSDUCERS	EEE	OE-EA	3	0	0	3	NIL
18	34625O03	SMART CITIES: ELECTRICAL SYSTEMS AND TECHNOLOGIES	EEE	OE-EA	3	0	0	3	NIL
19	34125O02	TOTAL QUALITY MANAGEMENT	MANAG	OE-EA	3	0	0	3	NIL
20	34125O03	MANAGEMENT PRINCIPLES FOR ENGINEERS	MANAG	OE- EA	3	0	0	3	NIL
21	34125O01	ENGINEERING MANAGEMENT AND ETHICS	MANAG	OE- EA	3	0	0	3	NIL
22	34425O01	3D PRINTING AND ITS APPLICATIONS	MECH	OE- EA	3	0	0	3	NIL
23	34425O02	ENERGY HARVESTING AND RENEWABLE ENERGY SYSTEMS	MECH	OE- EA	3	0	0	3	NIL
24	34425O03	INDUSTRIAL ROBOTICS	MECH	OE- EA	3	0	0	3	NIL

UNIVERSITY MULTIDISCIPLINARY OPEN ELECTIVES-CREDIT(1)									
1	40625U01	DENTAL HYGIENE & QUALITY OF LIFE	DENTISTRY	OE-UOE	1	0	0	1	NIL
2	40625U02	NUTRITION FOR WELLNESS & SPECIFIC DISEASES	NURSING	OE-UOE	1	0	0	1	NIL
3	40625U03	FUNDAMENTALS OF HOMOEOPATHY	HOMOEOPATHY	OE-UOE	1	0	0	1	NIL
4	40625U04	ADVERTISING	ARTS & SCIENCE	OE-UOE	1	0	0	1	NIL
5	40625U05	TEAMWORK & COLLABORATION	ARTS & SCIENCE	OE-UOE	1	0	0	1	NIL

6	40625U06	EMOTIONAL INTELLIGENCE	ARTS & SCIENCE	OE-UOE	1	0	0	1	NIL
7	40625U07	MEDIA MANAGEMENT	ARTS & SCIENCE	OE-UOE	1	0	0	1	NIL
8	40625U08	EXERCISE ESSENTIALS FOR PHYSICAL FITNESS	PHYSIOTHERAPY	OE-UOE	1	0	0	1	NIL
9	40625U09	ESSENTIAL SKILLS FOR MEDICAL EMERGENCIES	MEDICINE	OE-UOE	1	0	0	1	NIL
10	40625U10	MEDICINE PLANTS IN DISEASE MANAGEMENT	PHARMACY	OE-UOE	1	0	0	1	NIL
11	40625U11	BASIC LIFE SUPPORT	ALLIED HEALTH SCIENCES	OE-UOE	1	0	0	1	NIL
12	40625U12	MALLARKHAMBAM	PHYSICAL EDUCATION	OE-UOE	1	0	0	1	NIL
13	40625U13	SILAMBAM	PHYSICAL EDUCATION	OE-UOE	1	0	0	1	NIL
14	40625U14	BASIC FITNESS TRAINING	PHYSICAL EDUCATION	OE-UOE	1	0	0	1	NIL
15	40625U15	RECREATIONAL GAMES	PHYSICAL EDUCATION	OE-UOE	1	0	0	1	NIL
16	40625U16	INTRODUCTION TO LAW	LAW	OE-UOE	1	0	0	1	NIL
17	40625U17	FUNDAMENTALS OF LAW IN TECHNOLOGY AND CYBER SPACE	LAW	OE-UOE	1	0	0	1	NIL
18	40625U18	FOUNDATION COURSE IN YOGA	REHABILITATION AND BEHAVIORAL SCIENCES	OE-UOE	1	0	0	1	NIL
19	40625U19	INTRODUCTION TO PSYCHOLOGY	REHABILITATION AND BEHAVIORAL SCIENCES	OE-UOE	1	0	0	1	NIL
20	40625U20	INTRODUCTION TO PUBLIC POLICY AND GOVERNANCE	LIBERAL ARTS	OE-UOE	1	0	0	1	NIL
21	40625U21	INDIAN ECONOMY AND DEVELOPMENT CHALLENGES	LIBERAL ARTS	OE-UOE	1	0	0	1	NIL
22		ANY SWAYAM / MOOC / NPTEL COURSES WHICH ARE NOT RELATED TO THE DISCIPLINE OF STUDY OF THE STUDENT CAN BE CHOSEN AS AN OPEN ELECTIVE IN CONSULTATION WITH THE RESPECTIVE FACULTY ADVISOR OF THE INSTITUTION.	CSE	OE-UOE	1	0	0	1	NIL

D. INDIAN KNOWLEDGE SYSTEMS-CREDITS (2)									
1	35025K01	INDIAN KNOWLEDGE SYSTEMS	ENG	IKS	2	0	0	2	NIL

E. DESIGN THINKING-CREDIT(1)									
1	35025D01	DESIGN THINKING AND ADVANCED PROBLEM SLOVING	CSE	DT	1	0	0	1	NIL

F. COURSES FOR PRESENTATION OF TECHNICAL SKILLS RELATED TO THE SPECIALIZATION-CREDITS(14)									
1	35025R01	PROJECT WORK	CSE	PI-P	0	0	16	8	NIL
2	35025M01	MINI PROJECT	CSE	PI-M	0	0	6	3	NIL
3	35025T01	INTERNSHIP	CSE	PI-IT	3 WEEKS			3	NIL

G. MANDATORY COURSES (5 CREDIT- NOT INCLUDED FOR CGPA CALCULATIONS)									
1	34225Z82	RESEARCH METHODOLOGY	CSE	MC	1	0	0	1	NIL
2	34125Z82	YOGA AND MEDITATION	PHED	MC	0	0	2	1	NIL
3	34125Z01	ENVIRONMENTAL SCIENCES	CHEM	MC	1	0	0	1	NIL
4	34125Z81	INDIAN CONSTITUTION	LAW	MC	0	0	2	1	NIL
5	35025Z01	IDEA LAB	CSE	MC	0	0	2	1	NIL

SPECIALIZATION IN CLOUD COMPUTING									
1	35025CCT02	CLOUD COMPUTING ARCHITECTURE	CSE	EC-SE	3	0	0	3	NIL
2	35025CCT07	SECURITY IN CLOUD	CSE	EC-SE	3	0	0	3	NIL
3	35025CCT01	CLOUD APPLICATION DEVELOPMENT	CSE	EC-SE	3	0	0	3	NIL
4	35025CCT03	CLOUD STORAGE INFRASTRUCTURES	CSE	EC-SE	3	0	0	3	NIL
5	35025CCT04	CRYPTOGRAPHIC ALGORITHMS AND APPLICATIONS	CSE	EC-SE	3	0	0	3	NIL
6	35025CCT05	DISTRIBUTED COMPUTING	CSE	EC-SE	3	0	0	3	NIL
7	35025CCT06	INTERNET SECURITY AND COMPUTER FORENSICS	CSE	EC-SE	3	0	0	3	NIL
8	35025CCT81	CLOUD DEPLOYMENT MODEL LAB	CSE	EC-SE	0	0	4	2	NIL

SPECIALIZATION IN QUANTUM COMPUTING									
1	35025QC01	INTRODUCTION TO QUANTUM COMPUTING	CSE	EC-SE	3	0	0	3	NIL
2	35025QC03	QUANTUM ALGORITHMS AND APPLICATIONS	CSE	EC-SE	3	0	0	3	NIL
3	35025QC04	QUANTUM CRYPTOGRAPHY AND COMMUNICATION	CSE	EC-SE	3	0	0	3	NIL
4	35025QC05	QUANTUM DEVICES AND HARDWARE	CSE	EC-SE	3	0	0	3	NIL
5	35025QC06	QUANTUM MACHINE LEARNING	CSE	EC-SE	3	0	0	3	NIL
6	35025QC02	QUANTUM ALGORITHMS	CSE	EC-SE	3	0	0	3	NIL
7	35025QC08	QUANTUM PROGRAMMING & SIMULATORS	CSE	EC-SE	3	0	0	3	NIL
8	35025QC07	QUANTUM NETWORKING & COMMUNICATION	CSE	EC-SE	3	0	0	3	NIL

MINOR DEGREE FOR OTHER DEPARTMENTS DATA MODELING TECHNIQUES-CREDITS(18-20)									
1	37425G05	DIMENSIONAL MODELING FOR DATA WAREHOUSING (THEORY AND PRACTICALS)	DS	MIN	3	0	2	4	NIL
2	37425G01	AI-ASSISTED AND AUTOMATED DATA MODELING (THEORY AND PRACTICALS)	DS	MIN	3	0	2	4	NIL
3	37425G02	BIG DATA ANALYTICS AND ITS APPLICATIONS (THEORY AND PRACTICALS)	DS	MIN	3	0	2	4	NIL
4	37425G04	DATA VISUALIZATION AND STORYTELLING (THEORY AND PRACTICALS)	DS	MIN	3	0	2	4	NIL
5	37425G03	CLOUD-BASED DATA ENGINEERING (THEORY AND PRACTICALS)	DS	MIN	3	0	2	4	NIL
6	37425G06	GRAPH DATABASES AND NETWORK ANALYTICS (THEORY AND PRACTICALS)	DS	MIN	3	0	2	4	NIL

HONORS DEGREE FOR B.E COMPUTER SCIENCE AND ENGINEERING(DATA SCIENCE) BIG DATA ENGINEERING-CREDITS(20)									
1	37425A01	BIG DATA ECOSYSTEMS AND ARCHITECTURE (THEORY AND PRACTICALS)	DS	HON	3	0	2	4	NIL
2	37425A04	DISTRIBUTED DATA PROCESSING WITH APACHE SPARK (THEORY AND PRACTICALS)	DS	HON	3	0	2	4	NIL
3	37425A03	CLOUD-BASED BIG DATA PLATFORMS (THEORY AND PRACTICALS)	DS	HON	3	0	2	4	NIL
4	37425A06	PERFORMANCE OPTIMIZATION IN BIG DATA SYSTEMS (THEORY AND PRACTICALS)	DS	HON	3	0	2	4	NIL
5	37425A07	STREAMING DATA ANALYTICS (THEORY AND PRACTICALS)	DS	HON	3	0	2	4	NIL
6	37425A02	BIG DATA SECURITY AND GOVERNANCE (THEORY AND PRACTICALS)	DS	HON	3	0	2	4	NIL
7	37425A05	MACHINE LEARNING WITH BIG DATA (THEORY AND PRACTICALS)	DS	HON	3	0	2	4	NIL

SPECIALIZATION -HCL POWERED COURSES-HCL(FULL STACK JAVA DEVELOPMENT WITH AI)									
Sl.No	**Course Code**	**Course**	**Offering Dept**	**Category**	**L**	**T**	**P**	**C**	**Prerequisite**
1	I35025C03	BASICS OF JAVA, AGILE AND GEN AI	CSE/ HCL	EC-SE	3	0	2	4	NIL
2	I35025P31	FRONT-END USER INTERFACE DESIGN AND DEVELOPMENT	CSE/ HCL	EC-SE	3	0	2	4	NIL
3	I35025P43	SPRING FRAMEWORK	CSE/ HCL	EC-SE	3	0	2	4	NIL
4	I35025I15	DEVOPS AND ITS TOOLS	CSE/ HCL	EC-SE	3	0	2	4	NIL

SPECIALIZATION -HCL POWERED COURSES- HCL(DATA ENGINEERING AND VISUALIZATION)									
Sl.No	**Course Code**	**Course**	**Offering Dept**	**Category**	**L**	**T**	**P**	**C**	**Prerequisite**
1	I35025C12	DATA ENGINEERING AND PYTHON PROGRAMMING FUNDAMENTALS	CSE/ HCL	EC-SE	3	0	2	4	NIL
2	I35025I01	ADVANCED PYTHON LIBRARIES, WORKING WITH SQL AND NOSQL	CSE/ HCL	EC-SE	3	0	2	4	NIL

3	I35025P46	DATA WAREHOUSE AND MODELING(THEORY AND PRACTICALS)	CSE/ HCL	EC-SE	3	0	2	4	NIL
4	I35025I12	DATA VISUALIZATION CONCEPTS AND WORKING WITH VISUALIZATION TOOLS (THEORY AND PRACTICALS)	CSE/ HCL	EC-SE	3	0	2	4	NIL

INTEL-NEC OFFERED COURSES- INTEL-NEC (AIML)									
Sl.No	**Course Code**	**Course**	**Offering Dept**	**Category**	**L**	**T**	**P**	**C**	**Prerequisite**
1	I37025E01	FUNDAMENTALS OF C PROGRAMMING USING INTEL LIBRARIES (THEORY AND PRACTICAL'S)	CSE/ INTEL - NEC	FC-ES	3	0	2	4	NIL
2	I35025E06	PYTHON PROGRAMMING AND RASPBRRY PI FUNDAMENTALS (THEORY AND PRACTICAL'S)	CSE/ INTEL - NEC	FC-ES	3	0	2	4	NIL
3	I35025C17	FOUNDATION OF ARTIFICIAL INTELLIGENCE (THEORY AND PRACTICAL'S)	CSE/ INTEL - NEC	CC-C	3	0	2	4	PYTHON PROGRAMMING
4	I35025C20	MACHINE INTELLIGENCE: UNLEASHING THE POWER OF LEARNING SYSTEMS (THEORY AND PRACTICAL'S)	CSE/ INTEL - NEC	CC-C	3	0	2	4	ARTIFICIIAL INTELLIGENCE
5	I35025C13	DEEP LEARNING TECHNIQUES	CSE/ INTEL - NEC	CC-C	3	0	2	4	PYTHON PROGRAMMING
6	I35025P32	HIGH PERFORMANCE COMPUTING	CSE/ INTEL - NEC	EC-PS	3	0	2	4	NIL
7	I35025P05	APPLIED AI AND IOT (THEORY AND PRACTICAL'S)	CSE/ INTEL - NEC	EC-PS	3	0	2	4	NIL

XTIC OFFERED COURSES									
Sl.No	**Course Code**	**Course**	**Offering Dept**	**Category**	**L**	**T**	**P**	**C**	**Prerequisite**
1	I37025E02	PROGRAMMING FUNDAMENTALS FOR XR	CSE/ XTIC	FC-ES	3	0	0	3	NIL

SKILL DEVELOPMENT COURSES-CREDITS(4)									
1	35025S04	INTERNET APPLICATION	CSE	SDC	3	0	2	4	NIL

2	I35025E05	MATHEMATICS AND PHYSICS FOR XR	CSE/ XTIC	FC-ES	3	0	0	3	NIL
3	I35025E03	DATA STRUCTURES AND ALGORITHMS FOR XR	CSE/ XTIC	FC-ES	3	0	0	3	NIL
4	I35025C07	COMPUTER VISION, IOT, ROBOTICS	CSE/ XTIC	CC-C	3	0	0	3	NIL
5	I35025C06	COMPUTER GRAPHICS AND 3D MODELING FOR XR	CSE/ XTIC	CC-C	3	0	0	3	NIL
6	I35025C02	AI AND MACHINE LEARNING FOR XR	CSE/ XTIC	CC-C	3	0	0	3	NIL
7	I35025C18	FOUNDATION OF VIRTUAL REALITY	CSE/ XTIC	CC-C	3	0	0	3	NIL
8	I35025P33	HUMAN COMPUTER INTERACTION FOR XR	CSE/ XTIC	EC-PS	3	0	0	3	NIL
9	I35025P34	INTRODUCTION TO GAME DESIGN THINKING IN XR	CSE/ XTIC	EC-PS	3	0	0	3	NIL
10	I35025R01	CAPSTONE PROJECT WORK	CSE/ XTIC	PI-P	0	0	16	8	NIL
		DEVELOPMENT							
2	35025S03	DIGITAL BUSINESS MARKETING	CSE	SDC	2	0	0	2	NIL
3	35025S01	BASICS OF ARTIFICIAL INTELLIGENCE	CSE	SDC	2	0	0	2	NIL
4	35025S02	COMPUTER HARDWARE AND OPERATING SYSTEMS	CSE	SDC	2	0	0	2	NIL
5	35025S05	MOBILE APP DEVELOPMENT WITH FLUTTER	CSE	SDC	2	0	0	2	NIL
MICRO CREDENTIAL COURSES-CREDITS(2)									
1	35025J03	INTRODUCTION TO CLOUD COMPUTING AND VIRTUALIZATION	CSE	MCC	2	0	0	2	NIL
2	35025J04	INTRODUCTION TO MULTIMEDIA AND DIGITAL DESIGN	CSE	MCC	2	0	0	2	NIL
3	35025J02	GRAPHIC DESIGN USING ADOBE PHOTOSHOP AND ILLUSTRATOR	CSE	MCC	2	0	0	2	NIL
4	35025J05	PROGRAMMING IN ROBOTICS	CSE	MCC	2	0	0	2	NIL
5	35025J01	AUGMENTED REALITY AND VIRTUAL REALITY	CSE	MCC	2	0	0	2	NIL