

PROGRAM CURRICULUM

COMPUTER SCIENCE AND ENGINEERING

for

B. TECH. FOUR YEAR DEGREE PROGRAM

(Applicable for the batches admitted from A.Y. 2024-25)



ADITYA UNIVERSITY

Aditya Nagar, ADB Road, Surampalem - 533 437



DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**Vision**

To be a globally recognized centre of excellence in Computer Science through quality education, innovative practices, Sustainable technologies.

Mission

M1: Provide transformative and inclusive education through robust curriculum, modern pedagogy, and state-of-art infrastructure.

M2: Foster innovation and research by developing sustainable technological solutions that address real-world challenges.

M3: Strengthen collaborations with industry, academia, and global partners to promote knowledge sharing and entrepreneurial growth.

Program Educational Objectives (PEOs)**Graduates of the Program will:****PROGRAM EDUCATIONAL OBJECTIVES (PEOs)**

PEO1: Apply emerging tools and technologies to solve interdisciplinary problems.

PEO2: Advance in education and research by applying innovative ideas and project-based learning.

PEO3: Work collaboratively and establish leadership with ethical, social, and financial accountability.

Program Specific Outcomes (PSOs)**After successful completion of the program, the graduates will be able to:**

PSO1: Apply advanced computing tools and technologies for effective software design, development, and deployment.

PSO2: Design, configure, and secure computing infrastructure services by applying emerging technologies

PROGRAM OUTCOMES (PO's)

The 11 Program Outcomes are described as below.

- After successful completion of the program, the 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 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 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 the world :** 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 teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
 - PO9 **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.
 - PO10 **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
 - PO11 **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.



Department of Computer Science and Engineering

B.Tech (CSE) Program Curriculum-2024 (Applicable for the batches admitted from the A.Y. 2024-25)

UG Programs Offered

- B. Tech in (Computer Science and Engineering)
- B. Tech in (Computer Science and Engineering) with
 - Minor degree in Civil Engineering
 - Minor degree in Electrical and Electronics Engineering
 - Minor degree in Mechanical Engineering
 - Minor degree in Electronics and Communication Engineering
 - Minor degree in Petroleum Technology
 - Minor degree in Mining Engineering
 - Minor degree in Agricultural Engineering
 - Minor degree in Entrepreneurship Development and Incubation
 - Minor degree in Quantum Technologies

Minor Streams offered in B.Tech (Computer Science and Engineering)

- Minor Stream in Network Security
- Minor Stream in Machine Intelligence
- Minor Stream in Data Engineering
- Minor Stream in Mobile Application Development
- Minor Stream in Cyber Security industry integrated Program- L&T
- Minor Stream in Agile Methodology with DevOps Programming integrated Program- L&T
- Minor Stream in Cloud Infrastructure (Certification Programs - CISCO, Red hat, Oracle, AWS, Google & Microsoft)

Credit Division Category-wise

S.No	Broad Category of Course	UGC	Credits
1	Major Core Courses (MCC)	80	81
2	Minor Stream Courses (MSC) (or) University Open Elective Courses (UEC)	32	32
3	Multidisciplinary Courses (MDC)	9	9
4	Ability Enhancement Courses (AEC)	8	9
5	Skill Enhancement Courses (SEC)	9	9
6	Value Added Courses (VAC)	6-8	6
7	Summer Internships (SI)	2-4	4
8	Full Semester Internship (or) Project (PROJ)	12	10
9	Mandatory Courses (MC)		0
Total Credits to be earned for B. Tech Degree		160	160

Foundation Courses – FC

Intermediate-level Courses – IC

Advanced Courses – AC

Major Core Courses (MCC)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241MA001	Linear algebra & Calculus	FC	2	1		3	50	50	100	-
241MA002	Differential equations & vector calculus	FC	2	1		3	50	50	100	-
241CH002	Applied Chemistry	FC	2		1	3	50	50	100	-
241PH002	Modern Physics	FC	2		1	3	50	50	100	-
241ME001	Engineering Graphics	FC	1		2	3	50	50	100	-
241ME003	Engineering Workshop	FC			1	1	100		100	-
241CS001	Programming for Problem Solving Using C	FC	2		2	4	50	50	100	-
241CS003	Data Structures	FC	2		2	4	50	50	100	PPSC
241IT001	IT & AI Skills	FC			2	2	50	50	100	-
241MA008	Discrete Mathematics	IC	2	1		3	50	50	100	LAC
241IT005	Database Management Systems	IC	2		2	4	50	50	100	PPSC
241CS008	Object Oriented Programming through C++	IC	2		2	4	50	50	100	PPSC
241MA009	Probability & Statistics	IC	2	1		3	50	50	100	LAC
241IT006	Java Programming	IC	2		2	4	50	50	100	PPSC
241CS011	Theory of Computation	IC	2	1		3	50	50	100	DMS
241IT007	Agile Software Engineering	IC	2		1	3	50	50	100	PPSC
241CS013	Operating Systems	IC	2		1	3	50	50	100	-
241AI002	Artificial Intelligence	IC	2		1	3	50	50	100	-
241CS015	Software Architecture	IC	2		1	3	50	50	100	ASE
241CS007	Computer Networks	IC	2		1	3	50	50	100	-
241AI003	Data Mining	IC	2		1	3	50	50	100	-
241IT003	Cryptography & Network Security	AC	2		1	3	50	50	100	CN
241IT004	Compiler Design	AC	2		1	3	50	50	100	TOC
241CS010	Advanced Data Structures & Algorithm Analysis	AC	2		1	3	50	50	100	DS
241AI004	Big Data Analytics	AC	2		1	3	50	50	100	DM
241AI005	Machine Learning	AC	2		2	4	50	50	100	DAP
	Total		47	5	29	81				

Multidisciplinary Courses (MDC)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241EE001	Basic Electrical&Electronics Engineering	FC	2		2	4	50	50	100	-
241AI006	Digital Logic &Computer Organization	FC	2	1		3	50	50	100	-
241MB001	Engineering Economics & Management	FC	2			2	50	50	100	-
Total			6	1	2	9				

Ability Enhancement Courses (AEC)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241EN001	Essential Cognitive Skills for Engineers	FC			1	1	100	-	100	-
241EN002	Advanced Cognitive Skills for Engineers (or)	FC			1	1	100	-	100	-
241UC005	Proficiency in Foreign Language									
241UC004	(Japanese/German/ Spanish/ French)									
241UC006										
241UC007	Design Thinking	FC			1	1	100	-	100	-
241UC008	Universal Human Values	FC	2			2	50	50	100	-
241UC009	Technical Paper Publication	AC			2	2	100	-	100	-
241CS071	Student Activity-Based Learning	AC				2				
Total			2		5	9				

Skill Enhancement Courses (SEC)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241CS016	Introduction to MERN Stack Development	IC			2	2	50	50	100	-
241CS017	Object Oriented Analysis & Design using UML	IC			2	2	50	50	100	ASE
241CS018	Advanced MERN Stack Development	AC			2	2	50	50	100	IMSD
241IT008	Bigdata Spark	AC			2	2	50	50	100	-
241CS019	CI/CD using DevOps	AC			1	1	100	-	100	-
Total					9	9				

Value Added Courses (VAC)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241UC010	Indian Cultural Heritage & Fine Arts	FC			1	1	100	-	100	-
241PE001	Sports & Yoga	FC			1	1	100	-	100	-
241CS004	Internet of Things	FC			1	1	100	-	100	-
241CS002	Data Analysis using Python	IC			2	2	50	50	100	-
241UC011	Employability Skills-I	FC			3	0	100	-	100	-
241UC013	Employability Skills-II	FC			3	0	100		100	ES-I
241U4014	Employability Skills-III	IC			3	0	100		100	ES-II
241UC015	Employability Skills-IV	IC			3	0	100		100	ES-III
241UC016	Employability Skills-V	AC			3	1	100		100	ES-IV
Total					20	6				

Summer Internships (SI)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241CS020	Summer Internship-I	IC			2	2	100	-	100	-
241CS021	Summer Internship-II	AC			2	2	100	-	100	-
Total					4	4				

Full Semester Internship (PROJ)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241CS022	Full Semester Internship (or) Project	AC			10	10	50	50	100	-
Total					10	10				

Mandatory Courses (MC)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241AC001	Environmental Science	FC	2			0	100	-	100	
241AC002	Constitution of India	FC	2			0	100	-	100	
241AC003	Research Methodology	FC	2			0	100	-	100	
241AC004	Intellectual Property Rights & Patents	FC	2			0	100	-	100	
241AC005	Indian Knowledge Systems (IKS)	FC	2			0	100	-	100	
Total			10			0				

Minor Stream: Network Security

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241CS032	Cyber Security Essentials	FC	2		1	3	50	50	100	-
241CS030	Information Security Analysis & Audit	FC	2			2	50	50	100	-
241CS023	Cloud Computing	FC	2		2	4	50	50	100	-
241CS024	Wireless Networks	IC	2		1	3	50	50	100	-
241CS025	Cloud IoT & Edge ML	AC	2		1	3	50	50	100	-
241CS028	Ethical Hacking	AC	2		2	4	50	50	100	-
241CS027	Digital Forensics	AC	2		1	3	50	50	100	-
241CS026	Block Chain Technologies	AC	2		2	4	50	50	100	CSE
241CS031	Cyber Laws	AC	2		1	3	50	50	100	-
241CS033	Secure Coding Techniques	AC	2		1	3	50	50	100	-
Total			20		12	32				

Minor Stream: Machine Intelligence

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241AI007	Computer Vision	IC	2		1	3	50	50	100	DAP
241AI014	Soft Computing	IC	2		1	3	50	50	100	AI
241AI010	Natural Language Processing	AC	2		2	4	50	50	100	DAP
241AI011	Deep Learning	AC	2		2	4	50	50	100	DAP
241AI013	Recommender Systems	AC	2		2	4	50	50	100	-
241AI009	Reinforcement Learning	AC	2		2	4	50	50	100	DAP
241AI016	Prompt Engineering & GenAI	AC	2		1	3	50	50	100	ML
241AI015	AI Chatbot	IC	2			2	50	50	100	DAP
241AI017	Federated Machine Learning	AC	2			2	50	50	100	ML
241AI008	Expert Systems	AC	2		1	3	50	50	100	-
Total			20		12	32				

Minor Stream: Data Engineering

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241CS012	NoSQL Databases	FC	2			2	50	50	100	-
241CS039	or Advanced Database Management	AC	2		1	3	50	50	100	DBMS
241CS034	Fundamentals of Data Science	IC	2		1	3	50	50	100	-
241AI026	Information Retrieval Systems	IC	2		1	3	50	50	100	-
241CS036	Business Intelligence & Analytics	IC	2		2	4	50	50	100	PPSC
241AI018	Mining Massive Data Sets	IC	2		1	3	50	50	100	DM
241CS037	Health Care Data Analytics	IC	2		2	4	50	50	100	-
241AI019	Data Visualization	AC	2		2	4	50	50	100	DAP
241CS038	Security & Privacy for Big Data Analytics	AC	2		1	3	50	50	100	-
241CS040	Social Networks & Semantic Web	AC	2		1	3	50	50	100	-
241CS014	Finance & Retail Analytics	AC	2		1	3	50	50	100	-
Total			20		12/13	32/33				

Minor Stream: Mobile Application Development

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241IT012	Flutter Fundamentals	FC			2	2	50	50	100	-
241IT014	Web Technologies	FC	2		2	4	50	50	100	JP
241IT015	Software Testing	IC	2		1	3	50	50	100	ASE
241IT016	Software Project Management	IC	2		1	3	50	50	100	ASE
241IT017	Mobile Operating System	IC	2		1	3	50	50	100	-
241CS024	Wireless Networks	IC	2		1	3	50	50	100	-
241AI024	API & Micro Services	IC	2		2	4	50	50	100	JP
241CS025	Cloud IoT & Edge ML	AC	2		1	3	50	50	100	-
241CS028	Ethical Hacking	AC	2		2	4	50	50	100	-
241IT022	Software Quality Assurance	AC	2		1	3	50	50	100	ASE
Total			18		14	32				

Minor Stream in Cyber Security industry integrated Program- L&T#

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241CS032	Cyber Security Essentials	FC	2		1	3	50	50	100	-
241CS030	Information Security Analysis & Audit	FC	2			2	50	50	100	-
241CS042	Linux Administration	IC			3	3	50	50	100	-
241IT003	Cryptography & Network Security	AC	2		1	3	50	50	100	-
241CS043	Secure Networking	AC			3	3	50	50	100	-
241CS044	Application Security	AC			3	3	50	50	100	-
241CS045	Ethical Hacking & Penetration Testing	AC			3	3	50	50	100	-
241CS046	Cyber Forensic	AC			3	3	50	50	100	-
241CS047	Malware Analysis & Governance, Risk & Compliance	AC			3	3	50	50	100	-
241CS031	Cyber Laws	AC	2		1	3	50	50	100	-
241CS033	Secure Coding Techniques	AC	2		1	3	50	50	100	-
Total			10		22	32				

**Minor Stream in Agile Methodology with DevOps Programming integrated
Program- L&T#**

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241CS048	IT Infrastructure Management	FC			3	3	50	50	100	-
241CS049	Web Engineering	FC			2	2	50	50	100	-
241CS050	Intro to Azure& AWS DevOps	FC			3	3	50	50	100	-
241CS051	Intro to Google Cloud DevOps	FC			3	3	50	50	100	-
241CS052	Cloud fundamentals&DevOps	IC			3	3	50	50	100	-
241CS053	Agile with DevOps fundamentals & Usage	IC			3	3	50	50	100	-
241IT016	Software Project Management	IC	2		1	3	50	50	100	ASE
241CS054	Agile based project automation with DevOps	AC			3	3	50	50	100	-
241CS055	DevOps Container Services	AC			3	3	50	50	100	-
241CS056	CI &CD (Continuous Integration & Continuous Development)	AC			3	3	50	50	100	-
241CS057	Object Oriented Software Engineering	AC			3	3	50	50	100	-
Total			2		30	32				

Note: #

-The Syllabus for the industry partnered course will be released in the department as and when required

Minor Stream in Cloud Infrastructure (Certification Programs - CISCO, Red hat, Oracle, AWS, Google & Microsoft)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241CS068	Enterprise Linux Fundamentals	FC			2	2	50	50	100	-
241CS058	Linux System Administration	FC			3	3	50	50	100	-
241CS059	Introduction to Cloud Networking	FC	1		3	4	50	50	100	-
241CS060	Routing & Switching Essentials	FC			3	3	50	50	100	-
241CS061	Advanced Cloud Networking	FC	1		3	4	50	50	100	-
241CS074	Introduction to Cloud Computing Core Concepts	IC			3	3	50	50	100	-
241CS062	Cloud Architecture & Platform Services	IC			3	3	50	50	100	-
241CS063	Enterprise Cloud Infrastructure	IC			3	3	50	50	100	-
241CS069	Cloud Security	IC	1		3	4	50	50	100	-
241CS064	Machine Learning Services on Cloud	IC			3	3	50	50	100	-
Total			3		29	32				

UNIVERSITY OPEN ELECTIVE COURSES

AI & ML											
Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Offered to Programs	Pre-requisite
241AI002	Artificial Intelligence	FC	2		1	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241AI005	Machine Learning	FC	2		2	4	50	50	100	CE,EEE,ME, ECE, PT,Min.E	DAP
241AI027	AI & Data Science	IC	2		1	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	DAP
241AI028	AI in Healthcare	IC	2		1	3	50	50	100	CE,EEE, ME, ECE,CSE, IT, AIML,CSE (DS) PT,Min.E	DAP
241AI011	Deep Learning	IC	2		2	4	50	50	100	CE,EEE,ME, ECE, PT,Min.E	DAP
241AI010	Natural Language Processing	IC	2		1	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	DAP
241AI009	Reinforcement Learning	AC	2		1	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	DAP
241AI029	AI in Agriculture	AC	2		1	3	50	50	100	CE,EEE,ME, ECE,CSE,IT, AIML,CSE(DS) PT,Min.E	DAP
241AI030	Robotics & AI	AC	2		1	3	50	50	100	CE,EEE,ME, ECE,CSE,IT, AIML,CSE(DS) PT,Min.E	DAP
241AI031	AI in Finance & Economics	AC	2		1	3	50	50	100	CE,EEE,ME, ECE,CSE,IT, AIML,CSE(DS) PT,Min.E	DAP
Total			20		12	32					

Production Excellence											
Course Code	Course Name	Level	L	T	P	C	CI E	SE E	Total	Offered to Programs	Pre-requisite
241ME081	Fundamentals of Production Excellence	FC	2			2	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML,CSE(DS) PT,Min.E	-
241ME082	Six Sigma for Production Excellence	FC	2		1	3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	FPE
241ME083	Quality Excellence in Production	IC	2		1	3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	FPE
241ME084	Digital Transformation for Production Excellence	IC	2		1	3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	FPE
241ME085	Agile Production Systems	IC	2		1	3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	FPE
241ME086	Process Excellence & Optimization	IC	2		1	3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	FPE
241ME087	Risk Management in Production Excellence	AC	2		1	3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	FPE
241ME088	Ethical & Social Responsibility in Production Excellence	AC	2		1	3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	FPE
241ME089	Data-Driven Decision Making for Production Excellence	AC	2		1	3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,MinE	FPE
241ME058	Industry 5.0 for Engineers	AC	3			3	50	50	100	CE,EEE, ECE, CSE,IT, AIML, CSE(DS) PT,MinE	FPE
241ME090	Cost Excellence in Production	AC	2		1	3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	FPE
Total			23		09	32					

Supply Chain Management											
Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Offered to Programs	Pre-requisite
241MB017	Introduction to Supply Chain Management	FC	2			2	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML,CSE(DS) PT,Min.E	-
241MB018	Logistics & Distribution Management	FC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	ISCM
241MB019	Supply Chain Project Management	IC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	ISCM
241MB020	Supply Chain Innovation & Trends	IC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	ISCM
241MB021	Supply Chain Analytics	IC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	ISCM
241MB022	Demand Planning & Forecasting	IC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	ISCM
241MB023	Supply Chain Risk Management	AC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	ISCM
241MB024	Inventory Management & Control	AC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	ISCM
241MB025	E-Commerce & Supply Chain Management	AC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	ISCM
241MB026	Operations Management	AC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	ISCM
241MB027	Supply Chain Ethics & Corporate Social Responsibility (CSR)	AC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	ISCM
Total			32			32					

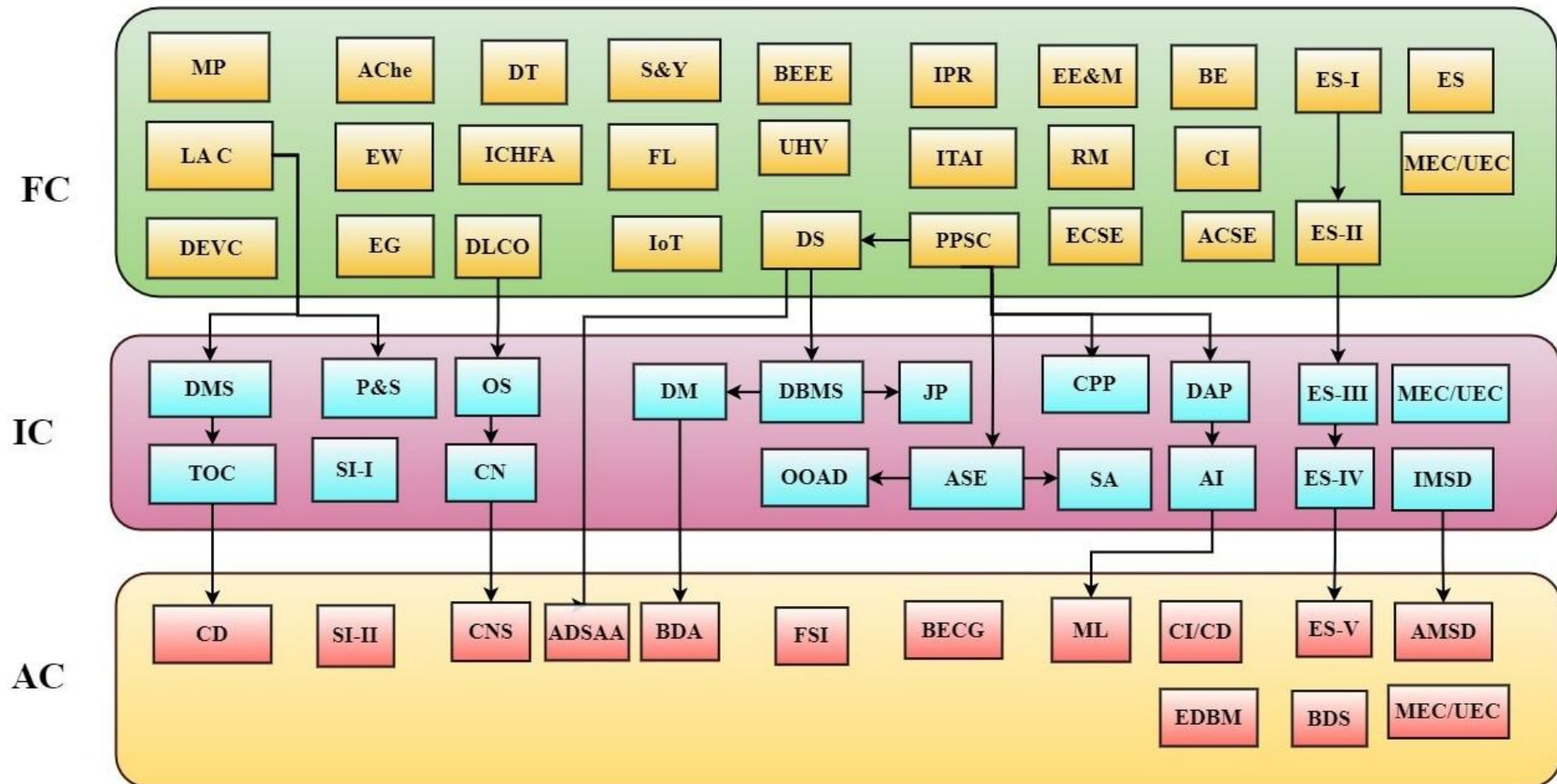
Sustainability											
Course Code	Course Name	Level	L	T	P	C	CI E	SEE	Total	Offered to Programs	Pre-requisite
241CE074	Introduction to Sustainable Development	FC	2			2	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML,CSE(DS) PT,Min.E	-
241CE079	Natural Disaster Management & Mitigation	FC	3			3	50	50	100	EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241CE081	Waste Water Management	IC	3			3	50	50	100	EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241CE082	Integrated Solid Waste Management for a Smart City	IC	3			3	50	50	100	EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241CE083	Watershed Management	IC	3			3	50	50	100	EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241EE033	Energy Audit, Conservation & Management	IC	3			3	50	50	100	CE, ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	BEE E
241EE006	Electric Power Generation, Transmission & Distribution Systems	AC	3			3	50	50	100	CE, ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	BEE E
241CE075	Sustainable Agriculture & Food Systems	AC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241CE076	Sustainable Supply Chain Management	AC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241CE077	Sustainable Production Excellence	AC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241CE078	AI in Environmental Science and Sustainability	AC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
Total			32			32					

Security											
Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Offered to Programs	Pre-requisite
241CS032	Cybersecurity Essentials	FC	2		1	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241IT035	Security in Software Development	FC	3			3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241CS028	Ethical Hacking	IC	2		1	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241CS069	Cloud Security	IC			3	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241IT036	Security & Compliance in Business	IC	3			3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241IT037	Cryptography & Data Security	IC	2		1	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241IT038	Security Awareness & Social Engineering	AC	2		1	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241IT039	Cybersecurity Policy & Strategy	AC	3			3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241IT040	Security in Emerging Technologies	AC	3			3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241CS030	Information Security Analysis & Audit	AC	2			2	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241IT041	Financial Information Security & Privacy	AC	3			3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
	Total		25		07	32					

Others											
Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Offered to Programs	Pre-requisite
241CE080	Remote Sensing & GIS Applications	FC	3			3	50	50	100	EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241EE036	Electric Energy Storage Systems	FC	3			3	50	50	100	CE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	BEEE
241EE043	Electrical safety	IC	3			3	50	50	100	CE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	BEEE
241EE054	Hybrid & Electric Vehicles	IC	3			3	50	50	100	CE, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	BEEE
241ME073	Organizational Behaviour	FC	3			3	50	50	100	CE,EEE, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241ME036	Sustainable Energy Systems	FC	3			3	50	50	100	CE, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241ME037	Solar Energy Systems	FC	3			3	50	50	100	CE,EEE,ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241ME060	Composite Materials	IC	3			3	50	50	100	CE,EEE,ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	SSP/MP
241EC082	Communication Systems	FC	3			3	50	50	100	CE,EEE,ME,CSE,IT, AIML, CSE(DS) PT,Min.E	-
241EC083	Electronic Measurements & Instrumentation	FC	3			3	50	50	100	CE,EEE,ME, CSE,IT, AIML, CSE(DS) PT,Min.E	BEEE
241EC084	Introduction to Embedded Systems	FC	3			3	50	50	100	CE,EEE,ME, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241EC085	Fundamentals of Image Processing	FC	3			3	50	50	100	CE,EEE,ME, CSE,IT, AIML, CSE(DS) PT,Min.E	
241EC077	Sensors and Transducers	IC	3			3	50	50	100	CE,EEE,ME, CSE,IT, AIML, CSE(DS) PT,Min.E	
241CS003	Data Structures	FC	2		2	4	50	50	100	CE,EEE,ME, ECE, PT,Min.E	PPSC
241CS065	Computer Organization	FC	2		1	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241CS013	Operating Systems	IC	2		1	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-

241IT005	Database Management Systems	IC	2		2	4	50	50	100	CE,EEE,ME, ECE, PT,Min.E	PPSC
241IT007	Agile Software Engineering	IC	2		1	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	PPSC
241CS007	Computer Networks	IC	2		1	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241IT006	Java Programming	IC	2		2	4	50	50	100	CE,EEE,ME, ECE, PT,Min.E	PPSC
241CS068	Enterprise Linux Fundamentals	FC			2	2	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241CS074	AWS Cloud Foundations	IC			3	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241CS066	AWS Cloud Development	AC			3	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241CS070	Continuous integration & delivery using DevOps	AC			3	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241IT024	Fundamentals of Salesforce Administration	FC			2	2	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241IT034	Advanced Salesforce Administration	AC			3	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241IT023	Principles of Pega Systems	IC			3	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241IT026	Pega System Architecture & Design	AC			3	3	50	50	100	CE,EEE,ME, ECE, PT,Min.E	-
241MB004	Entrepreneurship Development & Incubation	IC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241MB005	Business Ethics & Corporate Governance	AC	3			3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241MB006	Entrepreneurship Development & Business Management	AC	1		2	3	50	50	100	CE,EEE,ME, ECE, CSE,IT, AIML, CSE(DS) PT,Min.E	-
241EC029	SoC Design	AC	3			3	50	50	100	CE, EEE, ME, CSE, IT, AIML, CSE (DS), PT, Min.E.	MPMC
241CS023	Cloud Computing	FC	2		2	4	50	50	100	CE, EEE, ME, ECE, PT, Min.E.	-

B.Tech(CSE) Program Curriculum Pre-requisite Flow Chart



Foundation Level Courses:

LAC - Linear algebra & Calculus
DEVC - Differential equations & vector calculus
ITAI – IT & AI Skills
AChe – Applied chemistry
MP– Modern Physics
EDI - Entrepreneurship Development & Incubation
PPSC - Programming for Problem Solving Using C
DS - Data Structures
BEEE - Basic Electrical & Electronics Engineering
IoT - Internet of Things
DLCO - Digital Logic & Computer Organization
EEM - Engineering Economics & Management
ECSE – Essential Cognitive Skills for Engineers
ACSE - Advanced Cognitive Skills for Engineers
DT - Design Thinking
EW – Engineering Workshop
EG – Engineering Graphics
ES – Environmental Science
CI - Constitution of India
RM- Research Methodology
IPR- Intellectual Property Rights & Patents
ES-I- Employability Skills-I
ES-II- Employability Skills-II
ICHFA – Indian Culture Heritage & Fine Arts
S&Y – Sports & Yoga
FL – Proficiency in Foreign Language
UHV- Universal Human Values

Intermediate Level Courses:

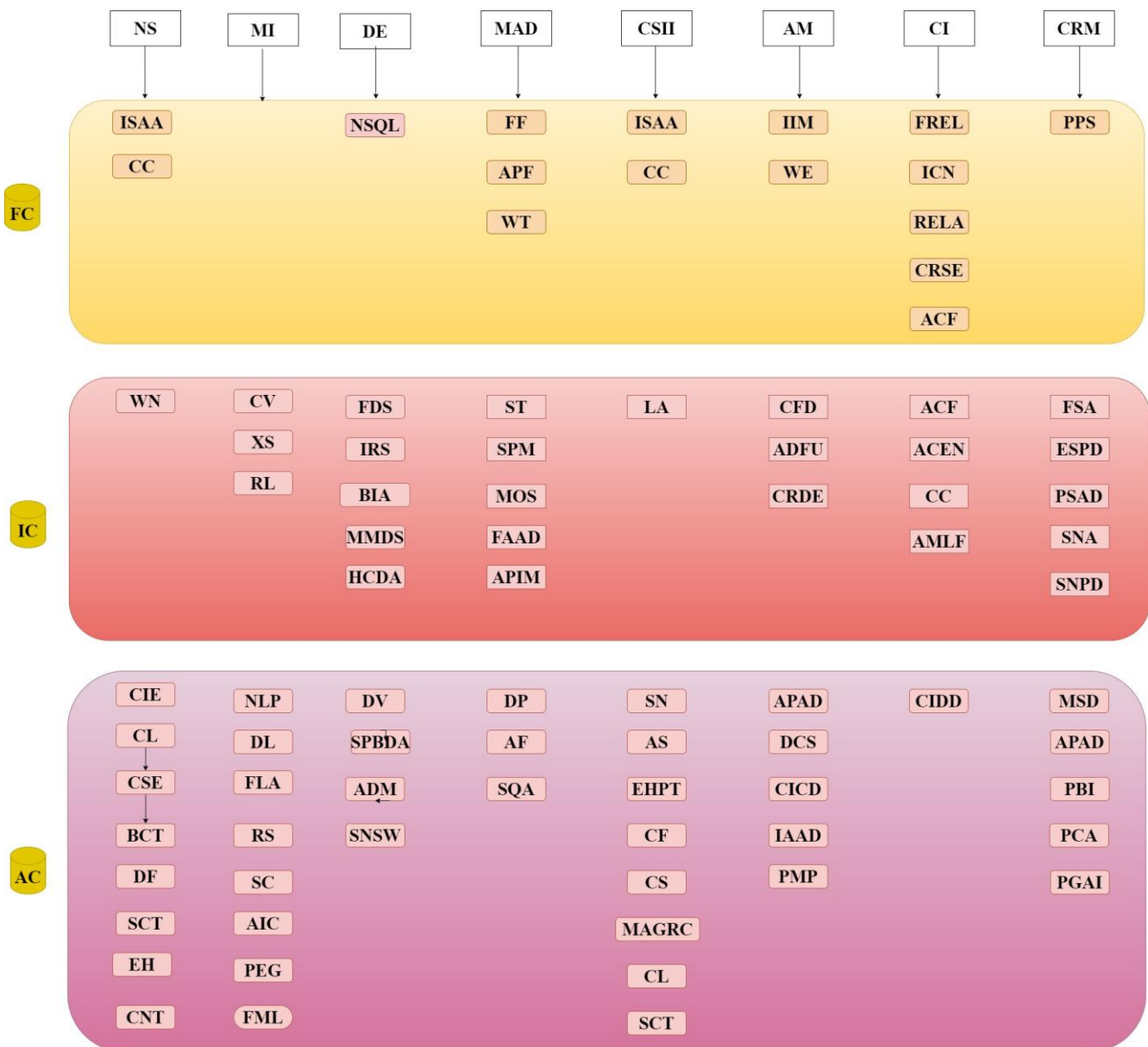
DMS - Discrete Mathematics
DBMS - Database Management Systems
CPP - Object Oriented Programming through C++
P&S - Probability & Statistics
JP - Java Programming
AI - Artificial Intelligence
SA - Software Architecture
DM – Data Mining
OOAD – Object Oriented Analysis & Design using UML
TOC - Theory of Computation
ASE – Agile Software Engineering
OS - Operating Systems
CN - Computer Networks
DAP - Data Analysis using Python
ES-III- Employability Skills-III
ES-IV- Employability Skills-IV
IMSD - Introduction to MERN Stack Development
SI - I - Summer Internship - I

Advanced Level Courses:

CNS - Cryptography & Network Security
CD - Compiler Design
ADSAA – Advanced Data Structures and Algorithm Analysis
BDA - Big Data Analytics
ML - Machine Learning
AMSD - Advanced MERN Stack Development
BECG - Business Ethics & Corporate Governance
BDS - Big data Spark
CI/CD – CI/CD using DevOps
ES-V- Employability Skills-V
EDBM - Entrepreneurship Development & Business Management
SI - II - Summer Internship - II
MEC/UEC - Minor Elective Courses/ University Open Elective Courses
FSI– Full Semester Internship

B.Tech (CSE) Minor Stream

Pre-requisite flowchart



	<u>FC-Foundation Course</u>	<u>IC-Intermediate-Level Course</u>	<u>AC-Advanced Course</u>
NS: Network Security	ISAA: Information Security Analysis and Audit CC: Cloud Computing	WN: Wireless Networks	SCT: Secure Coding Techniques BCT: Block Chain Technologies CIE: Cloud IoT & Edge ML EH: Ethical Hacking CL: Cyber Laws DF: Digital Forensics CSE: Cyber Security Essentials CNT: Computational Number Theory
MI: Machine Intelligence		CV: Computer Vision XS: Expert Systems RL: Reinforcement Learning	DL: Deep Learning FLA: Fuzzy Logic and its Applications RS: Recommender Systems NLP: Natural Language Processing SC: Soft Computing AIC: AI Chatbot PEG: Prompt Engineering and GenAI FML: Federated Machine Learning
DE: Data Engineering	NSQL: NoSQL Databases	FDS: Fundamentals of Data Science IRS: Information Retrieval Systems BIA: Business Intelligence and Analytics MMDS: Mining Massive Data Sets SNA: Social Network Analysis HCDA: Health Care Data Analytics	DV: Data Visualization SPBDA: Security and Privacy for Big Data Analytics ADM: Advanced Database Management SNSW: Social Networks and Semantic Web
MAD: Mobile Application Development	FF: Flutter Fundamentals APF: Adobe Photoshop & Figma WT: Web Technologies	FAAD: Fundamentals Android Application Development ST: Software Testing SPM: Software Project management MOS: Mobile Operating System APIM: API&Micro Services	DP: Dart Programming AF: Advanced Flutter SQA: Software Quality Assurance
CS: Cyber Security Industry Integrated Program-L & T	ISAA: Information Security Analysis and Audit CC: Cloud Computing	LA: Linux Administration	SN: Secure Networking AS: Application Security EHPT: Ethical Hacking & Penetration Testing CF: Cyber Forensic CS: Cyber Security CL: Cyber Laws SCT: Secure Coding Techniques MAGRC: Malware Analysis and Governance, Risk and Compliance

AM: Agile Methodology with DevOps Programming Industry Integrated -L & T	WE: Web Engineering IIM: IT Infrastructure Management	CFD: Cloud Fundamentals and DevOps ADFU: Agile with DevOps Fundamentals and Usage CRDE: Career Readiness in Digital Era	APAD: Agile based Project Automation with DevOps DCS: DevOps Container Services CICD: CI and CD (Continuous Integration and Continuous Development) IAAD: Intro to Azure and AWS DevOps PMP: Project Management for Professionals
CI: Cloud Infrastructure	FREL: Enterprise Linux Fundamentals ICN: Introduction to Cisco Networks RELA: Redhat Enterprise Linux Administration CRSE: Cisco Routing and Switching Essentials ACF: Azure Cloud Fundamentals	ACF: AWS Cloud Foundations ACEN: Advanced Cisco Enterprise Networking CC: Cloud security AMLF: AWS Machine learning Foundations	CIDD: Continuous Integration and Deployment DevOps
CRM: Customer Relationship Management	PPS: Principles of Pega Systems	ESPD: Essentials of Salesforce Platform Development PSAD: Pega System Architecture and Design SNA: Service Now Administration SNPD: Service Now Platform Development FSA: Fundamentals of Salesforce Administration	MSD: Mastering Salesforce Development APAD: Advanced Power APPS Development PBI: Power BI PCA: Pega CSA Advanced PGAI: PEGA GenAI

Suggestive Semester-wise Curriculum

I SEMESTER

Course code	Course Title	Course		Credits				Total Hours
		Category	Level	L	T	P	Total	
241MA001	Linear algebra & Calculus	MCC	FC	2	1		3	3
241CH002	Applied Chemistry	MCC	FC	2		1	3	4
241CS001	Programming for Problem Solving Using C	MCC	FC	2		2	4	6
241IT001	IT & AI Skills	MCC	FC			2	2	4
241EE001	Basic Electrical & Electronics Engineering	MDC	FC	2		2	4	6
241EN001	Essential Cognitive Skills for Engineers	AEC	FC			1	1	2
241UC008	Universal Human Values	AEC	FC	2			2	2
241UC010	Indian Cultural Heritage & fine arts	VAC	FC			1	1	2
Total				10	1	9	20	29

II SEMESTER

Course code	Course Title	Course		Credits				Total Hours
		Category	Level	L	T	P	Total	
241MA002	Differential equations & vector calculus	MCC	FC	2	1		3	3
241PH002	Modern Physics	MCC	FC	2		1	3	4
241CS003	Data Structures	MCC	FC	2		2	4	6
241ME001	Engineering Graphics	MCC	FC	1		2	3	5
241ME003	Engineering Workshop	MCC	FC			1	1	2
241AI006	Digital Logic & Computer Organization	MDC	FC	2	1		3	3
241EN002	Advanced Cognitive Skills for Engineers (or) Proficiency in Foreign Language (Japanese/ German/Spanish/French)	AEC	FC			1	1	2
241UC005								
241UC004								
241UC006								
241UC003								
241UC007	Design Thinking	AEC	FC			1	1	2
241PE001	Sports & Yoga	VAC	FC			1	1	2
241UC011	Employability Skills-I	VAC	FC			3	0	3
241AC001	Environmental Science	MC	FC	2			0	2
Total				11	2	12	20	34

III SEMESTER

Course code	Course Title	Course		Credits				Total Hours
		Category	Level	L	T	P	Total	
241MA008	Discrete Mathematics	MCC	IC	2	1		3	3
241CS008	Object Oriented Programming through C++	MCC	IC	2		2	4	6
241CS011	Theory of Computation	MCC	IC	2	1		3	3
241IT005	Database Management Systems	MCC	IC	2		2	4	6
241IT007	Agile Software Engineering	MCC	IC	2		1	3	4
241CS016	Introduction to MERN Stack Development	SEC	IC			2	2	4
241CS002	Data Analysis using Python	VAC	IC			2	2	4
241UC013	Employability Skills-II	VAC	FC			3	0	3
241AC002	Constitution of India	MC	FC	2			0	2
Total				12	2	12	21	35

IV SEMESTER

Course code	Course Title	Course		Credits				Total Hours
		Category	Level	L	T	P	Total	
241MA009	Probability & Statistics	MCC	IC	2	1		3	3
241IT006	Java Programming	MCC	IC	2		2	4	6
241CS013	Operating Systems	MCC	IC	2		1	3	4
241AI002	Artificial Intelligence	MCC	IC	2		1	3	4
	Minor Stream Course-1/ University Open Elective Course-1	MSC/UE C	FC/IC	2			2	2
241CS010	Advanced Data Structures & Algorithm Analysis	MDC	FC	2	0	1	3	4
241CS018	Advanced MERN Stack Development	SEC	IC			2	2	4
241UC014	Employability Skills-III	VAC	IC			3	0	3
241AC003	Research Methodology	MC	FC	2			0	2
Total				14	1	10	20	32

V SEMESTER

Course code	Course Title	Course		Credits				Total Hours
		Category	Level	L	T	P	Total	
241CS007	Computer Networks	MCC	IC	2		1	3	4
241IT004	Compiler Design	MCC	AC	2		1	3	4
241AI005	Machine Learning	MCC	AC	2		2	4	6
241CS010	Engineering Economics & Management	MDC	AC	2	0	0	2	2
	Minor Stream Course – 2/ University Open Elective Course-20	MSC/UEC	IC/AC	2		1	3	4
	Minor Stream Course-3/ University Open Elective Course-3	MSC/UEC	IC/AC	2		2	4	4
241UC015	Employability Skills-IV	VAC	IC			3	0	3
241CS017	Object Oriented Analysis & Design using UML	SEC	IC			2	2	4
241CS020	Summer Internship-I	SI	IC			2	2	4
241AC004	Intellectual Property Rights & Patents	MC	FC	2			0	2
Total				14		14	23	30

VI SEMESTER

Course code	Course Title	Course		Credits				Total Hours
		Category	Level	L	T	P	Total	
241AI004	Bigdata Analytics	MCC	IC	2		1	3	4
241AI003	Data Mining	MCC	IC	2		1	3	5
	Minor Stream Course-4/ University Open Elective Course-4	MSC/UEC	IC/AC	2		2	4	4
	Minor Stream Course – 5/ University Open Elective Course-5	MSC/UEC	IC/AC	2		1	3	4
	Minor Stream Course-6/ University Open Elective Course-6	MSC/UEC	IC/AC	2		1	3	4
	Minor Stream Course-7/ University Open Elective Course-7	MSC/UEC	IC/AC	2		1	3	4
241CS004	Internet of Things	VAC	AC			1	1	2
241AC005	Indian Knowledge Systems (IKS)	MC	FC	2				2
241CS019	CI/CD using DevOps	SEC	AC			1	1	2
Total				14		9	21	31

VII SEMESTER

Course code	Course Title	Course		Credits				Total Hours
		Category	Level	L	T	P	Total	
241IT003	Cryptography & Network Security	MCC	AC	2		1	3	4
241CS015	Software Architecture	MCC	AC	2		1	3	4
	Minor Stream Course – 8/ University Open Elective Course-8	MSC/UEC	AC	2		2	4	4
	Minor Stream Course – 9/ University Open Elective Course-9	MSC/UEC	AC	2		1	3	4
	Minor Stream Course-10/ University Open Elective Course-10	MSC/UEC	AC	2		1	3	4
241IT008	Bigdata Spark	SEC	AC			2	2	4
241CS021	Summer Internship-II	SI	AC			2	2	4
Total				10		10	20	28

VIII SEMESTER

Course code	Course Title	Course		Credits				Total Hours
		Category	Level	L	T	P	Total	
241UC009	Technical Paper Publication	AEC	AC			2	2	4
241UC016	Employability Skills-V	VAC	AC			3	1	3
241CS071	Student Activity-Based Learning	VAC	AC				2	
241CS022	Full Semester Internship (or) Project	PROJ	AC			10	10	20
Total						15	15	27

Total Credits:160

* To acquire a minor degree, a student has to earn 20 credits in addition to the 160 credits.

Minor Degree in Computer Science and Engineering (offered to other branches students):

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite	
241CS013	Operating Systems	IC	2		1	3	50	50	100	-	
241CS007	Computer Networks	IC	2		1	3	50	50	100	-	
241IT007	Agile Software Engineering	IC	2		1	3	50	50	100	PPSC	
241AI003	Data Mining	IC	2		1	3	50	50	100	-	
241CS008	Object Oriented Programming through C++ (or) Java Programming	IC	2		2	4	50	50	100	PPSC	
241IT006											
241CS016	Introduction to MERN Stack Development(or) Information Security Analysis & Audit	IC	2			2	50	50	100	JP	
241CS030											
241CS018	Advanced MERN Stack Development (or) Flutter Fundamentals	AC				2	2	50	50	100	IMSD
241IT012											
Total			12		8	20					

Minor Degree in Civil Engineering

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241CE025	Repair & Rehabilitation of Structures	FC	3			3	50	50	100	-
241CE043	Building Planning & Computer-Aided Drawing	FC			2	2	50	50	100	-
241CE027	Green Buildings	FC	3			3	50	50	100	-
241CE040	Fundamentals of Soil Behaviour	FC	3			3	50	50	100	-
241CE054	Railway Engineering (or)Docks & Harbour Engineering	FC	3			3	50	50	100	-
241CE047										
241CE036	Environmental Impact & Risk Management(or) Environmental Management	IC	3			3	50	50	100	-
241CE037										
241CE056	Urban Transportation Planning (or) Intelligent Transportation Systems	IC	3			3	50	50	100	-
241CE049										
Total			18		2	20				

Minor Degree in Electrical and Electronics Engineering

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241EE055	Operation & Control of Electric machines	FC	2			2	50	50	100	BEEE
241EE056	Fundamentals of Power Electronics	FC	2			2	50	50	100	BEEE
241EE013	Electrical Measurements & Instrumentation	FC	2		2	4	50	50	100	ENA-1/BEEE
241EE006	Electric Power Generation and Distribution Systems	IC	3			3	50	50	100	ENA-1/BEEE
241EE034	Alternative Energy Sources (or) Utilization of Electrical Energy	IC	3			3	50	50	100	EPGDS / BEEE/ ISM
241EE027										
241EE037	Hybrid Electric Vehicles (or) Special Electric machines	AC	3			3	50	50	100	FPE/ OCEM
241EE035										
241EE043	Electrical Safety (or) Methods & Algorithms for Intelligent Control	AC	3			3	50	50	100	EPGDS/PSA
241EE030										
Total			18	2		20				

Minor Degree in Mechanical Engineering

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241ME074	Basic Mechanical Engineering	FC	2			2	50	50	100	-
241ME004	Engineering Thermodynamics	IC	2	1		3	50	50	100	SSP/MP
241ME077	Introduction to Automobile Engineering (or) Mechanics of Solids	IC	3			3	50	50	100	SSP/MP
241ME078										
241ME012	Heat Power Engineering (or) Refrigeration & Air Conditioning	IC	2	1		3	50	50	100	ETD
241ME040										
241ME075	Production Technology	IC	3			3	50	50	100	EW
241ME076	Metallurgy & Material Science	IC	3			3	50	50	100	SSP/MP
241ME079	Theory of Machines (or) Advanced Engineering Metrology	AC	3			3	50	50	100	SSP/MP
241ME080										
Total			18	2		20				

Minor Degree in Electronics & Communication Engineering

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241EC087	Fundamentals of Communications	FC	2		1	3	50	50	100	-
241EC088	Fundamentals of Signal Processing	FC	2		1	3	50	50	100	-
241EC089	Analog & Digital Circuits	IC	2			2	50	50	100	BEEE
241EC042	Wireless LAN's & PAN's	IC	3			3	50	50	100	-
241EC090	Linear & Digital IC Applications (or)	IC	3			3	50	50	100	ADC
241EC091	Sensors & Actuators									
241EC092	Embedded Microcontrollers	IC	2		1	3	50	50	100	ADC, PPSC
241EC093	(or) Digital System Design									
241EC067	Introduction to Internet of things (or)	AC	2		1	3	50	50	100	EM, WLAN's & PAN's
241EC074	Modern Wireless Communications									
Total			16		4	20				

Minor Degree in Petroleum Technology

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241PT027	Introduction to Petroleum Engineering	FC	2			2	50	50	100	-
241PT035	Unit Operations in Petroleum Industry	FC	3			3	50	50	100	-
241PT047	Fundamentals of Geology & Reservoir Engineering	IC	3			3	50	50	100	-
241PT048	Fundamentals of Drilling & Production Engineering (or)	IC	3			3	50	50	100	-
241PT016	Unconventional Hydrocarbon Resources									
241PT049	Natural Gas Hydrates (or) Fundamentals of Liquefied Natural Gas	AC	3			3	50	50	100	-
241PT005										
241PT050	Artificial Lift Techniques (or)	AC	3			3	50	50	100	-
241PT003	Enhanced Oil Recovery									
241PT012	Petroleum Refinery Engineering	AC	3			3	50	50	100	-
Total			20			20				

Minor Degree in Mining Engineering

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241MN003	Development of Mineral Deposits	FC	3			3	50	50	100	-
241MN041	Green Mining	FC	3			3	50	50	100	-
241MN006	Surface Mining	IC	3			3	50	50	100	DMD
241MN024	Drilling & Blasting	IC	3			3			100	DMD
241MN007	Underground Coal Mining Technology (or)	IC	3			3	50	50	100	DMD
241MN008	Underground Metal Mining Technology									
241MN014	Mine Legislation & General Safety (or)	AC	3			3	50	50	100	UCMT/UMMT
241MN028	Environmental Pollution & Control									
241MN045	Industrial Safety Practices(or)	AC	2			2	50	50	100	-
241MN046	Ground Control									
Total			20			20				

Minor Degree in Agricultural Engineering

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241AE082	Fundamentals of Renewable Energy Sources	FC	3			3	50	50	100	-
241AE083	Post-harvest Engineering of Cereal Crops	FC	3			3	50	50	100	-
241AE084	Ground Water Hydrology	FC	3			3	50	50	100	-
241AE085	Micro Irrigation Systems	IC	2			2	50	50	100	-
241AE086	Surface Water Hydrology (or)	IC	3			3	50	50	100	GWH
241AE087	Land & Water Management Engineering									
241AE088	Agricultural Process Engineering & Food Quality (or)	AC	3			3	50	50	100	PHECC
241AE089	Post-harvest Engineering for Horticultural Produce									
241AE090	Agricultural Machinery & Equipment (or)	AC	3			3	50	50	100	FRES
241AE091	Design of Bio-energy systems									
TOTAL			20			20				

Minor Degree in Entrepreneurship Development & Incubation

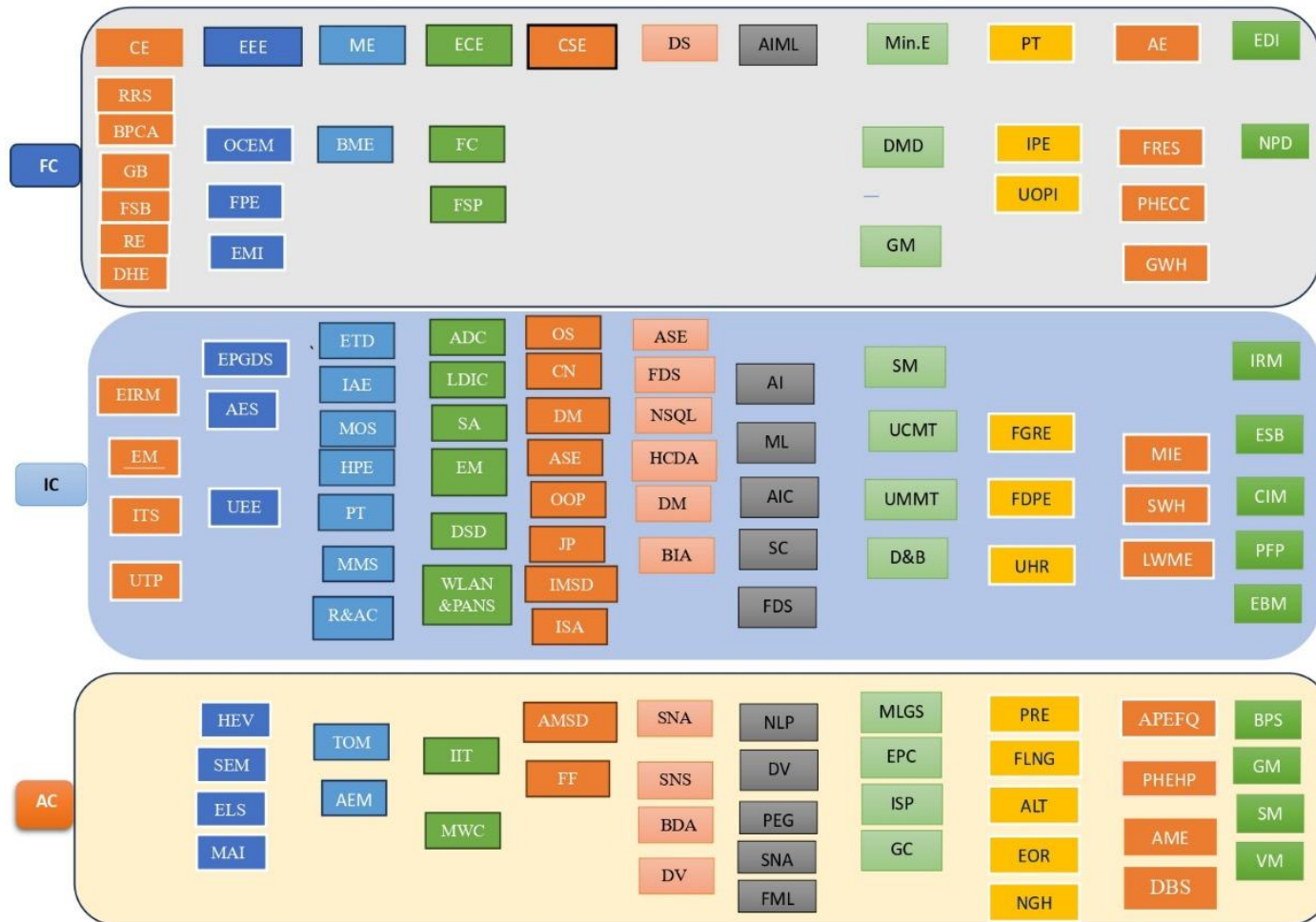
Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
241MB007	New Product Development	FC	3			3	50	50	100	-
241MB008	Entrepreneurship & Small Business Management	IC	2			2	50	50	100	-
241MB009	Insurance & Risk Management	IC	3			3	50	50	100	-
241MB010	Change & Innovations Management	IC	3			3	50	50	100	-
241MB011	Personal Financial Planning (or)	IC	3			3	50	50	100	-
241MB012	E-Business management									
241MB013	Business Policy & Strategic Management	AC	3			3	50	50	100	-
241MB014	(or)Green Marketing									
241MB015	Startup Management (or)	AC	3			3	50	50	100	-
241MB016	Venture Management									
Total			20			20				

Minor Degree in Quantum Technologies

S.No.	Course Code	Course Name	L	T	P	C	Semester
Mandatory Courses							
1	241EC097	Survey of Quantum technologies and Application	3	0	0	3	IV
2	241EC098	Foundations of Quantum Technologies	3	0	0	3	V
3	241EC099	Basic Programming Lab (or)	1	0	2	3	V
	241EC100	Basic Laboratory Course for Quantum Technologies					
4	241EC101	Quantum Algorithms and Cryptography	12 week 3 Credit - NPTEL MOOC			3	VII/VIII
Any One course from the below							
5	241EC102	Introduction to Quantum Computation	3	0	0	3	VI
6	241EC103	Introduction to Quantum Communication	3	0	0	3	VI
7	241EC104	Introduction to Quantum Sensing	3	0	0	3	VI
8	241EC105	Introduction to Quantum Materials	3	0	0	3	VI

Any One course from the below							
9	241EC106	Engineering Foundations of Quantum Technologies	3	0	0	3	VII
10	241EC107	Solid State Physics for Quantum Technologies	3	0	0	3	VII
11	241EC108	Quantum Optics	3	0	0	3	VII
12	241EC109	Quantum Cybersecurity	3	0	0	3	VII
13	241EC110	Quantum Machine Learning	3	0	0	3	VII
Total			18	0	0	18	

Minor Degree
Pre-requisite Flow Chart



Dept.	FOUNDATION COURSE		INTERMEDIATE- LEVEL COURSE		ADVANCED COURSE	
CE	RRS	Repair & Rehabilitation of Structures	EIRM	Environmental Impact & Risk Management		
	BPCA	Building Planning & Computer-Aided Drawing	EM	Environmental Management		
	GB	Green Building	UTP	Urban Transportation Planning		
	FSB	Fundamental of Soil Behaviour	ITS	Intelligent Transportation Systems		
	RE	Railway Engineering				
	DHE	Docks & Harbour Engineering				
EEE	OCEM	Operation control of Electric Machines	AES	Alternative Energy Sources	MA I	Methods & Algorithms for Intelligent Control
	FPE	Fundamentals of Power Electronics	EPGDS	Electric Power Generation & Distribution Systems	HE V	Hybrid Electric Vehicles
	EMI	Electrical Measurements & Instrumentation	UEE	Utilization of Electrical Energy	SE M ES	Special Electric Machines Electrical Safety
ME	BME	Basic Mechanical Engineering	ETD	Engineering Thermodynamics	TO M	Theory of Machines
			IAE	Introduction to Automobile Engineering	AE M	Advanced Engineering Metrology
			MOS	Mechanics of Solids		
			HPE	Heat Power Engineering		
			PT	Production Technology		
			MMS	Metallurgy & Material Science		
ECE	FC	Fundamentals of Communications	ADC	Analog & Digital Circuits	IIT	Introduction to Internet of things
			LDIC	Linear & Digital IC Applications		
			SA	Sensors & Actuators		
	FSP	Fundamentals of Signal Processing	EM	Embedded Microcontrollers	M WC	Modern Wireless Communications
			DSD	Digital System Design		
CSE			WLAN & PAN	Wireless LANS & PANS		
			ASE	Agile Software Engineering	AM SD	Advanced MERN Stack Development
			OOP	Object Oriented Programming through C++		
			OS	Operating Systems	FF	Flutter Fundamentals
			CN	Computer Networks		
			JP	Java Programming		
			IMSD	Introduction to MERN Stack Development		
			ISA	Information Security Analysis and Audit		
DS			DM	Data Mining	SN A	Social Network Analysis
			DM	Data Mining		

			FDS	Fundamentals of Data Science	DV	Data Visualization
			ASE	Agile Software Engineering	BD A	Big Data Analytics
			NSQL	NoSQL Databases	SN SW	Social Networks and Semantic Web
			BIA	Business Intelligence & Analytics		
			HCDA	Health Care Data Analysis		
AIM L			ML	Machine Learning	DV	Data Visualization
			AI	Artificial Intelligence	PE G	Prompt Engineering and GenAI
			AI C	AI Chatbot	SN A	Social Network Analysis
			FDS	Fundamentals of Data Science	FM L	Federated Machine Learning
			SC	Soft Computing	NL P	Natural Language Processing
Min. E	DMD	Development of Mineral Deposits	SM	Surface Mining	ML GS	Mine Legislation and General Safety
	GM	Green Mining	UCMT	Underground Coal Mining Technology	EP C	Environmental Pollution & Control
			UMM T	Underground Metal Mining Technology	ISP	Industrial Safety Practices
			DB	Drilling & Blasting	GC	Ground Control
PT	IPE	Introduction to Petroleum Engineering	FGRE	Fundamentals of Geology and Reservoir Engineering	PR E	Petroleum Refinery Engineering
	UOPI	Unit operations in Petroleum Industry	FDPE	Fundamentals of Drilling and Production Engineering	FL NG	Fundamentals of Liquefied Natural Gas
					NG H	Natural Gas Hydrates
			UHR	Unconventional Hydrocarbon Resources	AL T	Artificial Lift Techniques
				EO R	Enhanced Oil Recovery	
Ag.E	GWH	Ground Water Hydrology	LWM E	Land and Water Management	DB S	Design of Bio-Energy Systems
	PHEC C	Post-harvest Engineering of Cereal Crops	SWH	Surface Water Hydrology	PH	Post-Harvest Engineering for Horticultural Produce
			MIE	Micro Irrigation Systems	EH P	
	FRES	Fundamentals of Renewable Energy Sources			AM E	Agricultural Machinery and Equipment
				AP EF Q	Agriculture Process Engineering and Food Quality	
EDC	NPD	New Product Development	ESB	Entrepreneurship and Small Business Management	BP S	Business Policy & Strategic Management
			CIM	Change & Innovations Management	GM	Green Marketing
			PFP	Personal Financial Planning	SM	Startup Management
			EBM	E-Business Management	VM	Venture Management
			IRM	Insurance and Risk Management		