B. TECH. FOUR YEAR DEGREE

PROGRAM CURRICULUM

(Applicable for the batches admitted from A.Y 2025-26)

COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE)

(in association with Google Cloud)

ADITYA UNIVERSITY

Aditya Nagar, ADB Road, Surampalem - 533 437

ADITYA UNIVERSITY

Department of Data Science

DEPARTMENT VISION AND MISSION

VISION

To be a center of excellence in Data Science through innovative education and impactful research, fostering global recognition and sustainability.

MISSION

M1: Equip students with advanced Data Science knowledge and skills to solve industrial and societal challenges.

M2: Foster research and innovation through interdisciplinary collaboration in emerging technologies.

M3: Collaborate with industry and community to develop inclusive, sustainable data-driven solutions.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO 1: Apply Data Science knowledge to create solutions for global and industrial challenges.

PEO 2: Innovate through interdisciplinary research and sustain lifelong learning.

PEO 3: Demonstrate ethics and build strong collaborations with industry.

PROGRAM SPECIFIC OUTCOMES (PSOs)

After successful completion of the program, the graduates will be able to

PSO 1: Apply data engineering to create scalable data systems.

PSO 2: Employ data analytics and ML to analyze data and enable decisions.

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(DS)) in association with Google Cloud

(Applicable for the batches admitted from the A.Y. 2025-26)

UG Programs Offered

- B. Tech in (Computer Science and Engineering (Data Science))

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

- Cloud Administration in collaboration with Google Cloud

B. Tech in (Computer Science and Engineering (Data Science)) with Minor Degree in:

- Civil Engineering
- Electrical and Electronics Engineering
- Mechanical Engineering
- Electronics and Communication Engineering
- Petroleum Technology
- Mining Engineering
- Agricultural Engineering
- Entrepreneurship Development and Incubation

Credit Division Category Wise

S.No	Broad Category of Course	UGC	Credits
1	Major Core Courses (MCC)	80	85
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	5
6	Value Added Courses (VAC)	6-8	4
7	Summer Internships (SI)	2-4	4
8	Full Semester Internship (PROJ)	12	12
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
2501MA01	Linear Algebra & Calculus	FC	2	1		3	50	50	100	-
2501MA02	Differential Equations & Vector Calculus	FC	2	1		3	50	50	100	-
2501PH02	Modern Physics	FC	2		1	3	50	50	100	-
2501ME01	Engineering Graphics	FC	1		2	3	50	50	100	-
2501CS01	Programming for Problem Solving Using C	FC	2		2	4	50	50	100	-
2501IT01	Business Intelligence Lab	FC			2	2	50	50	100	-
2501CS03	Data Structures	FC	2		2	4	50	50	100	PPSC
2501CS71	Computer Organization & Architecture	FC	2	1		3	50	50	100	DLD
2501IT42	Programming with Python	FC	2		2	4	50	50	100	PPSC
2501CS08	Object Oriented Programming through C++	IC	2		2	4	50	50	100	PPSC
2501MA08	Discrete Mathematics	IC	2	1		3	50	50	100	LAC
2501CS34	Fundamentals of Data Science	IC	2		1	3	50	50	100	PPSC
2501IT05	Database Management Systems	IC	2		2	4	50	50	100	PPSC
2501MA09	Probability & Statistics	IC	2	1		3	50	50	100	LAC
2501AI02	Artificial Intelligence	IC	2		1	3	50	50	100	-
2501IT06	Java Programming	IC	2		2	4	50	50	100	PPSC
2501CS09	Language Processors	IC	2	1		3	50	50	100	PPSC
2501IT07	Agile Software Engineering	IC	2		1	3	50	50	100	PPSC
2501CS13	Operating Systems	IC	2		1	3	50	50	100	-
2501CS07	Computer Networks	IC	2		1	3	50	50	100	-
2501AI03	Data Mining	IC	1		2	3	50	50	100	-
2501CS10	Advanced Data Structures and Algorithm Analysis	AC	2		1	3	50	50	100	DS
2501AI05	Machine Learning	IC	2		2	4	50	50	100	DAE
2501AI11	Deep Learning	AC	2		2	4	50	50	100	DAE
2501AI04	Big Data Analytics	AC	2		1	3	50	50	100	DM
2501AI19	Data Visualization	AC	2		1	3	50	50	100	DAE
	Total		**48**	**6**	**31**	**85**				

Multidisciplinary Courses (MDC)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
2501EE01	Basic Electrical & Electronics Engineering	**FC**	2		2	4	50	50	100	-
2501EC95	Digital Logic Design	**FC**	2	1		3	50	50	100	-
2501MB01	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
2501EN01	Essential Cognitive Skills for Engineers	FC			1	1	100	-	100	-
2501EN02 2501UC05 2501UC04 2501UC06 2501UC03	Advanced Cognitive Skills for Engineers (or) Proficiency in Foreign Language (Japanese/German/ Spanish/ French)	FC			1	1	100	-	100	ECSE
2501UC07	Design Thinking using AI	FC			1	1	100	-	100	-
2501UC08	Universal Human Values	FC	2			2	100	-	100	-
2501UC09	Technical Paper Publication	AC			2	2	100	-	100	-
2501CS72	Student Activity Based Learning	AC				2	100	-	100	-
Total			**2**		**5**	**9**				

Skill Enhancement Courses (SEC)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
2501CS17	Object Oriented Analysis & Design using UML	IC			2	2	50	50	100	ASE
2501AI34	Web Application Development using MERN Stack	AC			2	2	50	50	100	-
2501CS19	CI/CD using DevOps	AC			1	1	100	-	100	-
Total					**5**	**5**				

Value Added Courses (VAC)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
2501CS04	Internet of Things	FC			1	1	100		100	-
2501AI06	Data Analysis Essentials	IC			2	2	50	50	100	PP
2501UC11	Employability Skills-I	FC			3	0	100	-	100	-
2501UC13	Employability Skills-II	FC			3	0	100	-	100	ES-I
2501UC14	Employability Skills-III	IC			3	0	100	-	100	ES-II
2501UC15	Employability Skills-IV	IC			3	0	100	-	100	ES-III
2501UC16	Employability Skills-V	AC			3	1	100	-	100	ES-IV
Total					**18**	**4**				

Summer Internships (SI)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
2501CS20	Summer Internship-I	IC			2	2	100	-	100	-
2501CS21	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
2501CS22	Full Semester Internship	AC			12	12	50	50	100	-
Total					**12**	**12**				

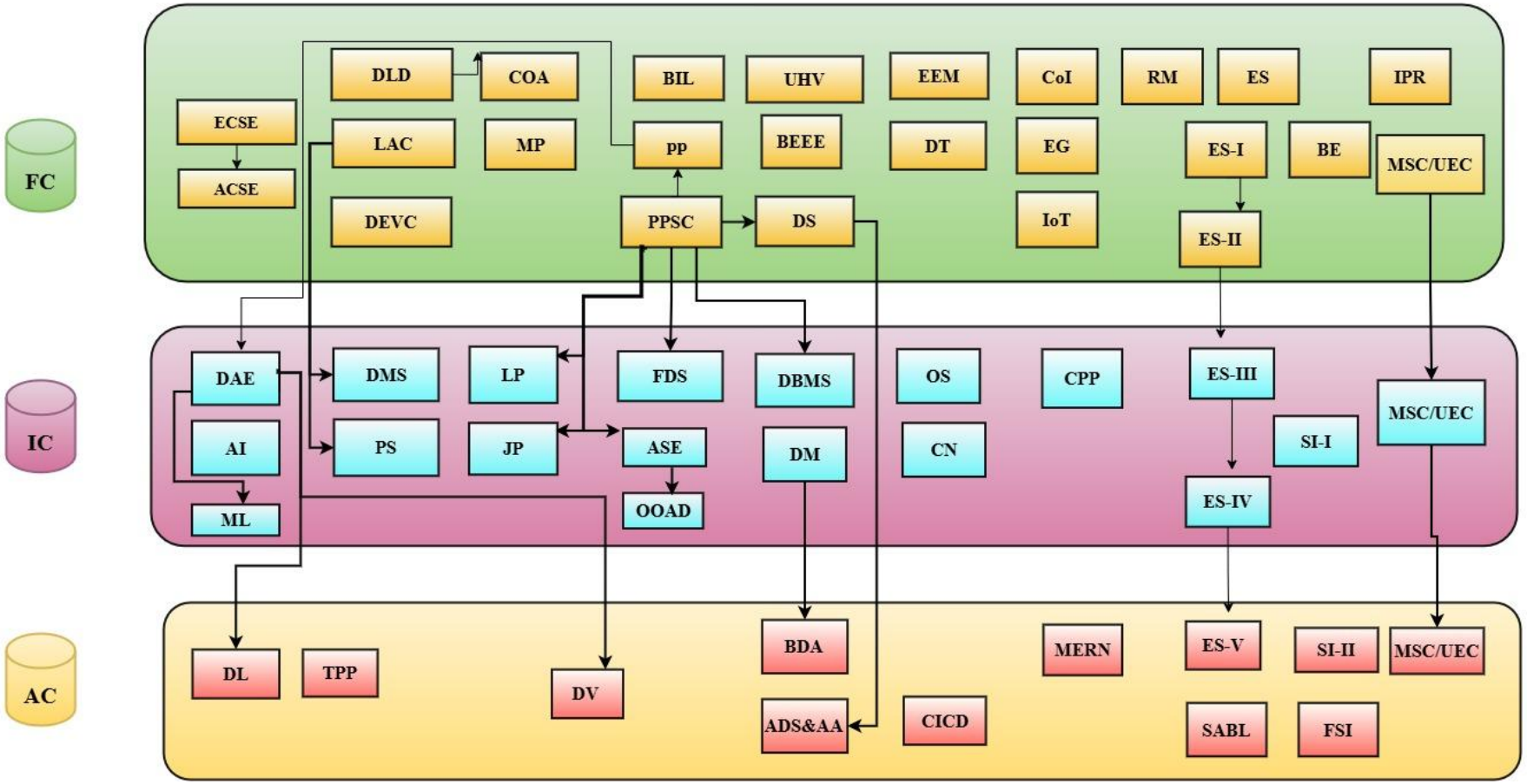
Mandatory Courses (MC)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
2501AC01	Environmental Science	FC	2			0	100	-	100	-
2501AC02	Constitution of India	FC	2			0	100	-	100	-
2501AC03	Research Methodology	FC	2			0	100	-	100	-
2501AC04	Intellectual Property Rights & Patents	FC	2			0	100	-	100	-
2501AC05	Indian Knowledge Systems (IKS)	FC	2			0	100	-	100	-
Total			**10**			**0**				

Minor Stream in Cloud Administration in collaboration with Google Cloud

Course Code	Course Name	Level	L	T	P	C	Total
2501CS81	Cloud Computing Foundations	FC	2		2	4	6
2501CS82	Cloud Data Analytics	FC	2		2	4	6
2501CS83	Cloud Cybersecurity	FC	2		2	4	6
2501CS84	Cloud GenAI	IC	2		1	3	4
2501CS25	Cloud IOT &Edge ML	AC	2		1	3	4
2501CS85	Cloud Digital Leader	AC	1		0	1	1
2501CS86	Cloud Engineering	AC	2		2	4	6
2501CS26	Block Chain Technologies	AC	2		1	3	4
2501AI24	API and Micro Services	IC	2		1	3	4
2501CS87	Devops Essentials	AC	2		1	3	4
Total			**19**		**13**	**32**	**45**

B.Tech (CSE(DS)) Program Curriculum
Pre-requisite Flowchart



FOUNDATION COURSES		INTERMEDIATE-LEVEL COURSES		ADVANCED COURSES	
EG	Engineering Graphics	**DMS**	Discrete Mathematics	**ADSAA**	Advanced Data Structures & Algorithm Analysis
LAC	Linear Algebra & Calculus	**FDS**	Fundamentals of Data Science	**DL**	Deep Learning
DEVC	Differential Equations & Vector Calculus	**DBMS**	Database Management Systems	**BDA**	Big Data Analytics
MP	Modern Physics	**PS**	Probability & Statistics	**DV**	Data Visualization
PP	Programming with Python	**AI**	Artificial Intelligence	**TPP**	Technical Paper Publication
PPSC	Programming for Problem Solving Using C	**JP**	Java Programming	**MERN**	Web Application Development using MERN Stack
BIL	Business Intelligence Lab	**CPP**	Object Oriented Programming Through C++	**CICD**	CI/CD using DevOps
DS	Data Structures	**LP**	Language Processors	**SI-II**	Summer Internship-II
BEEE	Basic Electrical & Electronics Engineering	**ASE**	Agile Software Engineering	**FSI**	Full Semester Internship
DLD	Digital Logic Design	**OS**	Operating Systems	**ES-V**	Employability Skills-V
COA	Computer Organization & Architecture	**CN**	Computer Networks	**SABL**	Student Activity Based Learning
EEM	Engineering Economics & Management	**DM**	Data Mining		
ECSE	Essential Cognitive Skills for Engineers	**OOAD**	Object Oriented Analysis & Design using UML		
ECSE-II	Essential Cognitive Skills for Engineers-II (or) Proficiency in Foreign Language (Japanese/German/Spanish/French)	**DAE**	Data Analysis Essentials		
ACSE-I	Advanced Cognitive Skill for Engineers-I	**ML**	Machine Learning		
ACSE-II	Advanced Cognitive Skill for Engineers-II	**SI-I**	Summer Internship-I		
DT	Design Thinking using AI	**MSC**	Minor Stream Courses		

UHV	Universal Human Values	**ES-III**	Employability Skills-III		
ES-I	Employability Skills-I	**ES-IV**	Employability Skills-IV		
ES-II	Employability Skills-II				
IoT	Internet of Things				
ES	Environmental Science				
CoI	Constitution of India				
RM	Research Methodology				
IPR	Intellectual Property Rights & Patents				
BE	Biology for Engineers				
MSC	Minor Stream Courses				

Suggestive Semester-wise Curriculum

I SEMESTER

Course code	Course Title	Course		Credits				Total Hours
		Category	Level	L	T	P	Total	
2501MA01	Linear Algebra & Calculus	MCC	FC	2	1		3	3
2501PH02	Modern Physics	MCC	FC	2		1	3	4
2501CS01	Programming for Problem Solving Using C	MCC	FC	2		2	4	6
2501IT01	Business Intelligence lab	MCC	FC			2	2	4
2501ME01	Engineering Graphics	MCC	FC	1		2	3	5
2501EC95	Digital Logic Design	MDC	FC	2	1		3	3
2501EN01	Essential Cognitive Skills for Engineers	AEC	FC			1	1	2
2501UC07	Design Thinking using AI	AEC	FC			1	1	2
Total				**9**	**2**	**8**	**20**	**29**

II SEMESTER

Course code	Course Title	Course		Credits				Total Hours
		Category	Level	L	T	P	Total	
2501MA02	Differential Equations & Vector Calculus	MCC	FC	2	1		3	3
2501CS03	Data Structures	MCC	FC	2		2	4	6
2501IT42	Programming with Python	MCC	FC	2		2	4	6
2501CS71	Computer Organization & Architecture	MCC	FC	2	1		3	3
2501EE01	Basic Electrical & Electronics Engineering	MDC	FC	2		2	4	6
2501EN02 2501UC05 2501UC04 2501UC06 2501UC03	Advanced Cognitive Skills for Engineers (or) Proficiency in Foreign Language (Japanese/German/Spanish/French)	AEC	FC			1	1	2
2501UC08	Universal Human Values	AEC	FC	2			2	2
2501CS81	**Cloud Computing Foundations** (Google Certification)	**MSC**	**FC**	**2**		**2**	**4**	**6**
2501UC11	Employability Skills-I *	VAC	FC			3	0	3
2501AC01	Environmental Science	MC	FC	2			0	2
Total				**15**	**2**	**12**	**25**	**38**

III SEMESTER

Course code	Course Title	Course		Credits				Total Hours
		Category	Level	L	T	P	Total	
2501MA09	Probability & Statistics	MCC	IC	2	1		3	3
2501CS13	Operating Systems	MCC	IC	2		1	3	4
2501CS34	Fundamentals of Data Science	MCC	IC	2		1	3	4
2501IT05	Database Management Systems	MCC	IC	2		2	4	6
2501IT07	Agile Software Engineering	MCC	IC	2		1	3	4
2501CS08	Object Oriented Programming through C++	MCC	IC	2		2	4	6
2501AI06	Data Analysis Essentials	VAC	IC			2	2	4
2501CS82	**Cloud Data Analytics** (Google Certification)	**MSC**	**IC**	**2**		**2**	**4**	**6**
2501UC13	Employability Skills-II *	VAC	FC				0	0
2501AC02	Constitution of India	MC	FC	2			0	2
Total				**16**	**1**	**11**	**26**	**39**

IV SEMESTER

Course code	Course Title	Course		Credits				Total Hours
		Category	Level	L	T	P	Total	
2501MA08	Discrete Mathematics	MCC	IC	2	1		3	3
2501AI03	Data Mining	MCC	IC	1		2	3	5
2501IT06	Java Programming	MCC	IC	2		2	4	6
2501CS10	Advanced Data Structures and Algorithm Analysis	MCC	AC	2		1	3	4
2501AI34	Web Application Development using MERN Stack	SEC	AC			2	2	4
2501CS83	**Cloud Cybersecurity** (Google Certification)	**MSC**	**IC**	**2**		**2**	**4**	**6**
2501UC14	Employability Skills-III *	VAC	FC			3	0	3
2501AC03	Research Methodology	MC	FC	2			0	2
	Total			**11**	**1**	**12**	**19**	**33**

V SEMESTER

Course code	Course Title	Course		Credits				Total Hours
		Category	Level	L	T	P	Total	
2501CS07	Computer Networks	MCC	IC	2		1	3	4
2501CS09	Language Processors	MCC	IC	2	1		3	3
2501AI02	Artificial Intelligence	MCC	AC	2		1	3	4
2501CS17	Object Oriented Analysis & Design using UML	SEC	IC			2	2	4
2501UC15	Employability Skills-IV *	VAC	FC			3	0	3
2501CS20	Summer Internship-I	SI	IC			2	2	4
2501CS84	**Cloud GenAI** (Google Certification)	**MSC**	**IC**	**2**		**1**	**3**	**4**
2501CS25	**Cloud IOT &Edge ML**	**MSC**	**AC**	**2**		**1**	**3**	**4**
2501AC04	Intellectual Property Rights & Patents	MC	FC	2			0	2
Total				**12**	**1**	**12**	**19**	**32**

VI SEMESTER

Course code	Course Title	Course		Credits				Total Hours
		Category	Level	L	T	P	Total	
2501AI05	Machine Learning	MCC	IC	2		2	4	6
2501AI19	Data Visualization	MCC	AC	2		1	3	4
2501AI04	Big Data Analytics	MCC	AC	2		1	3	4
2501CS04	Internet of Things	VAC	FC			1	1	2
2501CS85	**Cloud Digital Leader** (Google Certification)	**MSC**	**AC**	**1**		**0**	**1**	**1**
2501CS86	**Cloud Engineering** (Google Certification)	**MSC**	**AC**	**2**		**2**	**4**	**6**
2501CS26	**Block Chain Technologies**	**MSC**	**AC**	**2**		**1**	**3**	**4**
2501AC05	Indian Knowledge Systems (IKS)	MC	FC	2			0	2
Total				**13**		**8**	**19**	**29**

VII SEMESTER

Course code	Course Title	Course		Credits				Total Hours
		Category	Level	L	T	P	Total	
2501AI11	Deep Learning	MCC	AC	2		2	4	6
2501MB01	Engineering Economics & Management	MDC	FC	2			2	2
2501CS19	CI/CD using DevOps	SEC	AC			1	1	2
2501CS21	Summer Internship-II	SI	AC			2	2	4
2501AI24	**API and Micro Services**	**MSC**	**IC**	**2**		**1**	**3**	**4**
2501CS87	**Devops Essentials**	**MSC**	**AC**	**2**		**1**	**3**	**4**
Total				**8**		**7**	**15**	**22**

VIII SEMESTER

Course code	Course Title	Course		Credits				Total Hours
		Category	Level	L	T	P	Total	
2501UC09	Technical Paper Publication	AEC	AC			2	2	4
2501CS72	Student Activity Based Learning	AEC	AC				2	0
2501UC16	Employability Skills-V *	VAC	AC			3	1	6
2501CS22	Full Semester Internship	PROJ	AC			12	12	24
Total						**17**	**17**	**34**

Total Credits:160.

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

Minor Degree in Data Science (offered to other branches students)

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
2501IT07	Agile Software Engineering	IC	2		1	3	50	50	100	PPSC
2501CS34	Fundamentals of Data Science	IC	2		1	3	50	50	100	PPSC
2501CS12	NoSQL Databases	IC	2			2	50	50	100	-
2501AI03	Data Mining	IC	1		2	3	50	50	100	-
2501CS37 2501CS36	Health Care Data Analytics(or) Business Intelligence & Analytics	IC	2		1	3	50	50	100	PPSC
2501AI04 2501AI19	Big Data Analytics (or) Data Visualization	AC	2		1	3	50	50	100	DM DAP
2501CS41 2501CS40	Social Network Analysis (or) Social Networks & Semantic Web	AC	2		1	3	50	50	100	-
	Total		**13**		**7**	**20**				

Minor Degree in Civil Engineering

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
2501CE25	Repair & Rehabilitation of Structures	FC	3			3	50	50	100	-
2501CE43	Building Planning & Computer-Aided Drawing	FC			2	2	50	50	100	-
2501CE27	Green Buildings	FC	3			3	50	50	100	-
2501CE40	Fundamentals of Soil Behaviour	FC	2	1		3	50	50	100	-
2501CE54 2501CE47	Railway Engineering (or) Docks & Harbour Engineering	FC	3			3	50	50	100	-
2501CE36 2501CE37	Environmental Impact & Risk Management (or) Environmental Management	IC	3			3	50	50	100	-
2501CE56 2501CE49	Urban Transportation Planning (or) Intelligent Transportation Systems	IC	3			3	50	50	100	-
Total			**17**	**1**	**2**	**20**				

Minor Degree in Electrical and Electronics Engineering

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
2501EE55	Operation & Control of Electric machines	FC	2			2	50	50	100	BEEE
2501EE56	Fundamentals of Power Electronics	FC	2			2	50	50	100	BEEE
2501EE13	Electrical Measurements & Instrumentation	FC	2	1	1	4	50	50	100	ENA-BEEE
2501EE53	Electric Power Generation, Transmission and Distribution Systems	IC	3			3	50	50	100	ENA-BEEE
2501EE34 / 2501EE27	Alternative Energy Sources (or) Utilization of Electrical Energy	IC	3			3	50	50	100	EPGDS / BEEE/ ISM
2501EE37 / 2501EE35	Hybrid Electric Vehicles (or) Special Electric machines	AC	3			3	50	50	100	FPE/ OCEM
2501EE43 / 2501EE30	Electrical Safety (or) Methods & Algorithms for Intelligent Control	AC	3			3	50	50	100	EPGDS/PSA
	Total		**18**	**1**	**1**	**20**				

Minor Degree in Mechanical Engineering

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
2501ME74	Basic Mechanical Engineering	FC	2			2	50	50	100	-
2501ME04	Engineering Thermodynamics	IC	2	1		3	50	50	100	SSP/MP
2501ME77 / 2501ME78	Introduction to Automobile Engineering (or) Mechanics of Solids	IC	3			3	50	50	100	SSP/MP
2501ME12 / 2501ME40	Heat Power Engineering (or) Refrigeration & Air Conditioning	IC	2	1		3	50	50	100	ETD
2501ME75	Production Technology	IC	3			3	50	50	100	EW
2501ME76	Metallurgy & Material Science	IC	3			3	50	50	100	SSP/MP
2501ME79 / 2501ME80	Theory of Machines (or) Advanced Engineering Metrology	AC	3			3	50	50	100	SSP/MP
	Total		**18**	**2**		**20**				

Minor Degree in Electronics & Communication Engineering

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite

2501EC87	Fundamentals of Communications	FC	2		1	3	50	50	100	-
2501EC88	Fundamentals of Signal Processing	FC	2		1	3	50	50	100	-
2501EC89	Analog & Digital Circuits	IC	2			2	50	50	100	BEEE
2501EC42	Wireless LAN's & PAN's	IC	2	1		3	50	50	100	-
2501EC90 2501EC91	Linear & Digital IC Applications (or) Sensors & Actuators	IC	3			3	50	50	100	ADC
2501EC92 2501EC93	Embedded Microcontrollers (or) Digital System Design	IC	2		1	3	50	50	100	ADC, PPSC
2501EC67	Introduction to Internet of things (or) Modern Wireless Communications	AC	2		1	3	50	50	100	EM, WLAN's & PAN's
2501EC74			3			3	50	50	100	FC
Total			**15**	**1**	**4**	**20**				

Minor Degree in Petroleum Technology

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
2501PT27	Introduction to Petroleum Engineering	FC	2			2	50	50	100	-
2501PT35	Unit Operations in Petroleum Industry	FC	3			3	50	50	100	-
2501PT47	Fundamentals of Geology & Reservoir Engineering	IC	3			3	50	50	100	-
2501PT48 2501PT16	Fundamentals of Drilling & Production Engineering (or) Unconventional Hydrocarbon Resources	IC	3			3	50	50	100	-
2501PT49 2501PT05	Natural Gas Hydrates (or) Fundamentals of Liquefied Natural Gas	AC	3			3	50	50	100	-
2501PT50 2501PT03	Artificial Lift Techniques (or) Enhanced Oil Recovery	AC	3			3	50	50	100	-
2501PT12	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
2501MN03	Development of Mineral Deposits	FC	3			3	50	50	100	-
2501MN41	Green Mining	FC	3			3	50	50	100	-
2501MN06	Surface Mining	IC	3			3	50	50	100	DMD
2501MN24	Drilling & Blasting	IC	3			3			100	DMD
2501MN07 2501MN08	Underground Coal Mining Technology (or) Underground Metal Mining Technology	IC	3			3	50	50	100	DMD
2501MN14 2501MN28	Mine Legislation & General Safety (or) Environmental Pollution & Control	AC	3			3	50	50	100	UCMT/ UMMT
2501MN45 2501MN46	Industrial Safety Practices (or) Ground Control	AC	2			2	50	50	100	-
Total			**20**			**20**				

Minor Degree in Agricultural Engineering

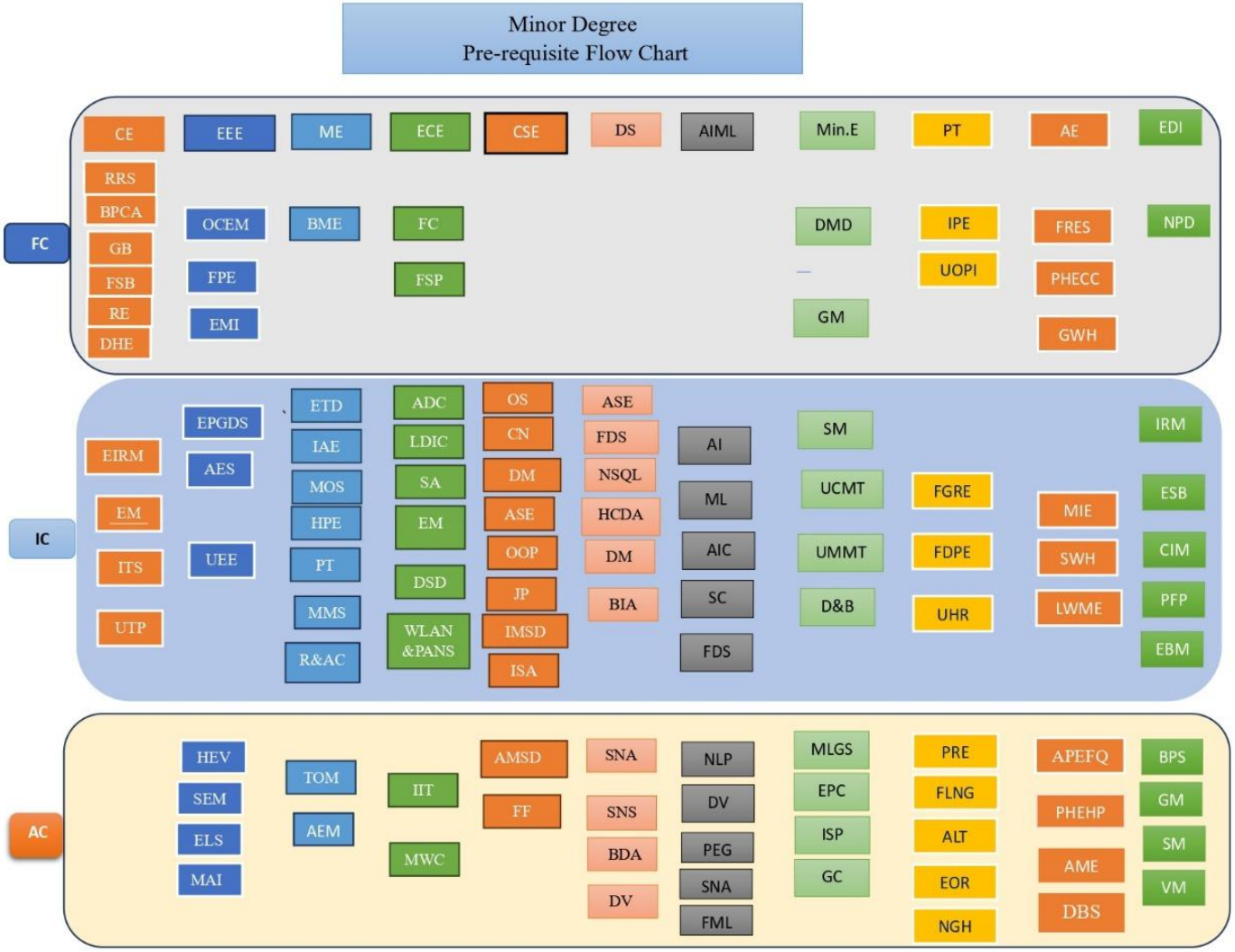
Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
2501AE82	Fundamentals of Renewable Energy Sources	FC	3			3	50	50	100	-
2501AE83	Post-harvest Engineering of Cereal Crops	FC	3			3	50	50	100	-
2501AE84	Ground Water Hydrology	FC	3			3	50	50	100	-
2501AE85	Micro Irrigation Systems	IC	2			2	50	50	100	-
2501AE86 2501AE87	Surface Water Hydrology (or) Land & Water Management Engineering	IC	3			3	50	50	100	GWH
2501AE88 2501AE89	Agricultural Process Engineering & Food Quality (or) Post-harvest Engineering for Horticultural Produce	AC	3			3	50	50	100	PHECC
2501AE90 2501AE91	Agricultural Machinery & Equipment (or) Design of Bio-energy systems	AC	3			3	50	50	100	FRES
TOTAL			**20**			**20**				

Minor Degree in Entrepreneurship Development & Incubation

Course Code	Course Name	Level	L	T	P	C	CIE	SEE	Total	Pre-requisite
2501MB07	New Product Development	FC	3			3	50	50	100	-
2501MB08	Entrepreneurship & Small Business Management	IC	2			2	50	50	100	-
2501MB09	Insurance & Risk Management	IC	3			3	50	50	100	-
2501MB10	Change & Innovations Management	IC	3			3	50	50	100	-
2501MB11 2501MB12	Personal Financial Planning (or) E-Business management	IC	3			3	50	50	100	-
2501MB13 2501MB14	Business Policy & Strategic Management (or) Green Marketing	AC	3			3	50	50	100	-
2501MB15 2501MB16	Startup Management (or) Venture Management	AC	3			3	50	50	100	-
Total			**20**			**20**				

Minor Degree in Quantum Technologies

S.No.	Course Code	Course Name	L	T	P	C	Semester
Mandatory Courses							
1	251EC097	Survey of Quantum technologies and Application	3	0	0	3	IV
2	251EC098	Foundations of Quantum Technologies	3	0	0	3	V
3	251EC099	Basic Programming Lab (or)	1	0	2	3	V
	251EC100	Basic Laboratory Course for Quantum Technologies					
4	251EC101	Quantum Algorithms and Cryptography	12 week 3 Credit - NPTEL MOOC			3	VII/VIII
Any One course from the below							
5	251EC102	Introduction to Quantum Computation	3	0	0	3	VI
6	251EC103	Introduction to Quantum Communication	3	0	0	3	VI
7	251EC104	Introduction to Quantum Sensing	3	0	0	3	VI
8	251EC105	Introduction to Quantum Materials	3	0	0	3	VI
Any One course from the below							
9	251EC106	Engineering Foundations of Quantum Technologies	3	0	0	3	VII
10	251EC107	Solid State Physics for Quantum Technologies	3	0	0	3	VII
11	251EC108	Quantum Optics	3	0	0	3	VII
12	251EC109	Quantum Cybersecurity	3	0	0	3	VII
13	251EC110	Quantum Machine Learning	3	0	0	3	VII
Total			**18**	**0**	**0**	**18**	


Minor Degree
Pre-requisite Flow Chart
FC
CE
EEE
ME
ECE
CSE
DS
AIML
Min.E
PT
AE
EDI
RRS
BPCA
GB
FSB
RE
DHE
OCEM
FPE
EMI
BME
FC
FSP
DMD
GM
IPE
UOPI
FRES
PHECC
GWH
NPD
IC
EIRM
EM
ITS
UTP
EPGDS
AES
UEE
ETD
IAE
MOS
HPE
PT
MMS
R&AC
ADC
LDIC
SA
EM
DSD
WLAN &PANS
OS
CN
DM
ASE
OOP
JP
IMSD
ISA
ASE
FDS
NSQL
HCDA
DM
BIA
AI
ML
AIC
SC
FDS
SM
UCMT
UMMT
D&B
FGRE
FDPE
UHR
MIE
SWH
LWME
IRM
ESB
CIM
PFP
EBM
AC
HEV
SEM
ELS
MAI
TOM
AEM
IIT
MWC
AMSD
FF
SNA
SNS
BDA
DV
NLP
DV
PEG
SNA
FML
MLGS
EPC
ISP
GC
PRE
FLNG
ALT
EOR
NGH
APEFQ
PHEHP
AME
DBS
BPS
GM
SM
VM

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	MAI	Methods &Algorithms for Intelligent Control
	FPE	Fundamentals of Power Electronics	EPGDS	Electric Power Generation Transmission & Distribution Systems	HEV	Hybrid Electric Vehicles
	EMI	Electrical Measurements & Instrumentation	UEE	Utilization of Electrical Energy	SEM	Special Electric Machines
					ES	Electrical Safety
ME	BME	Basic Mechanical Engineering	ETD	Engineering Thermodynamics	TOM	Theory of Machines
			IAE	Introduction to Automobile Engineering	AEM	Advanced Engineering Metrology
			MOS	Mechanics of Solids		
			HPE	Heat Power Engineering		
			PT	Production Technology		
			MMS	Metallurgy & Material Science		
			R&AC	Refrigeration & Air Conditioning		
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	MWC	Modern Wireless Communications
			DSD	Digital System Design		
			WLAN&PAN	Wireless LANS & PANS		
CSE			ASE	Agile Software Engineering	AMSD	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		
			DM	Data Mining		
DS			DM	Data Mining	SNA	Social Network Analysis
			FDS	Fundamentals of Data Science	DV	Data Visualization
			ASE	Agile Software Engineering	BDA	Big Data Analytics
			NSQL	NoSQL Databases	SNSW	Social Networks and Semantic Web
			BIA	Business Intelligence & Analytics		
			HCDA	Health Care Data Analysis		
AIML			ML	Machine Learning	DV	Data Visualization
			AI	Artificial Intelligence	PEG	Prompt Engineering and GenAI
			AI C	AI Chatbot	SNA	Social Network Analysis
			FDS	Fundamentals of Data Science	FML	Federated Machine Learning
			SC	Soft Computing	NLP	Natural Language Processing
Min. E	DMD	Development of Mineral Deposits	SM	Surface Mining	MLGS	Mine Legislation and General Safety
	GM	Green Mining	UCMT	Underground Coal Mining Technology	EPC	Environmental Pollution & Control
			UMMT	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	PRE	Petroleum Refinery Engineering
	UOPI	Unit operations in Petroleum Industry	FDPE	Fundamentals of Drilling and Production Engineering	FLNG	Fundamentals of Liquefied Natural Gas
					NGH	Natural Gas Hydrates
			UHR	Unconventional Hydrocarbon Resources	ALT	Artificial Lift Techniques
					EOR	Enhanced Oil Recovery
Ag.E	GWH	Ground Water Hydrology	LWME	Land and Water Management	DBS	Design of Bio-Energy Systems
	PHECC	Post-harvest Engineering of Cereal Crops	SWH	Surface Water Hydrology	PHEHP	Post-Harvest Engineering for Horticultural Produce
			MIE	Micro Irrigation Systems		
	FRES	Fundamentals of Renewable Energy Sources			AME	Agricultural Machinery and Equipment
					APEFQ	Agriculture Process Engineering and Food Quality

EDC	NPD	New Product Development	ESB	Entrepreneurship and Small Business Management	BPS	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		