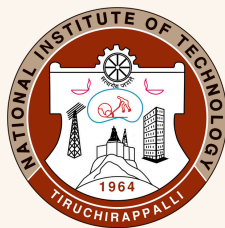# CURRICULA
POST GRADUATE PROGRAMMES
(M.Tech., M.Sc., MCA, MBA, M.A.)

(2024 – 25)

NATIONAL INSTITUTE OF TECHNOLOGY
TIRUCHIRAPPALLI - 620 015
TAMIL NADU, INDIA

CONTENTS

CREDIT DISTRIBUTION

Sl. No.	Programme	Semester / Trimester (for MBA)							
		1	2	3	4	5	6	1-4	Total
	M.Tech.								
1.	Chemical Engineering	24	24	14	12	-	-	6	80
2.	Process Control and Instrumentation	24	24	14	12	-	-	6	80
3.	Transportation Engineering and Management	25	23	14	12	-	-	6	80
4.	Structural Engineering	25	23	14	12	-	-	6	80
5.	Environmental Engineering	23	25	14	12	-	-	6	80
6.	Construction Technology and Management	23	25	14	12	-	-	6	80
7.	Geotechnical Engineering	23	25	14	12	-	-	6	80
8.	Data Analytics	24	24	14	12	-	-	6 (1-3)	80
9.	Computer Science and Engineering	24	24	20	12	-	-	-	80
10.	Power Systems	25	23	14	12	-	-	6	80
11.	Power Electronics	25	23	14	12	-	-	6	80
12.	Communication Systems	23	25	14	12	-	-	6	80
13.	VLSI System	23	25	14	12	-	-	6	80
14.	Energy Engineering	25	23	14	12	-	-	6	80
15.	Industrial Automation	25	23	14	12	-	-	6 (1-3)	80
16.	Industrial Safety Engineering	24	24	14	12	-	-	6	80
17.	Thermal Power Engineering	24	24	14	12	-	-	6	80
18.	Welding Engineering	24	24	14	12	-	-	6	80
19.	Materials Science and Engineering	24	24	14	12	-	-	6	80
20.	Industrial Metallurgy	24	24	14	12	-	-	6	80
21.	Non - Destructive Testing	23	25	14	12	-	-	6	80
22.	Manufacturing Technology	23	25	14	12	-	-	6	80
23.	Industrial Engineering and Management	25	23	14	12	-	-	6	80
	M.Sc.								
24.	Chemistry	20	19	23	18	-	6		80
25.	Computer Science	26	22	14	12	-	-	6	80
26.	Mathematics	22	19	20	15	-	-	6	80
27.	Physics	20	19	20	15	-	-	6	80
	MCA								
28.	Master of Computer Applications	20	21	23	20	21	12	3	120
	MBA								
29.	Master of Business Administration	15	14	14	15	12	10	-	80
	MA								
30.	English	20	19	20	18	-	-	3	80

M.Tech. (CHEMICAL ENGINEERING)

The total minimum credits required for completing the M.Tech. Programme in Chemical Engineering is 80.

CURRICULUM

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	CL601	Advanced Process Control	4
2.	CL603	Mathematical Methods for Chemical Engineers	4
3.	CL605	Advances in Fluidization Engineering	4
4.		Programme Elective I	4
5.		Programme Elective II	3
6.		Programme Elective III	3
7.	CL607	Chemical Process Modelling and Simulation Laboratory	2
		Total	**24**

SEMESTER II

Sl. No.	Code	Course of Study	Credit
1.	CL602	Chemical Reactor Analysis and Design	4
2.	CL604	Chemical Process Design	4
3.	CL606	Advanced Separation Techniques	4
4.		Programme Elective IV	4
5.		Programme Elective V	3
6.		Programme Elective VI	3
7.	CL608	Analytical Instrumentation Laboratory	2
		Total	**24**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
CL609	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Code	Course of Study	Credit
CL647	Project Work (Phase I)	12

SEMESTER IV

Code	Course of Study	Credit
CL648	Project Work (Phase II)	12

OPEN ELECTIVES (OE) / ONLINE COURSE (OC) (To be completed between I to IV semester)

Sl. No.	Code	Course of Study	Credit
1.		OPEN ELECTIVE I / Online Course	3
2.		OPEN ELECTIVE II / Online Course	3

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course of Study	Credit
1.	CL611	Nano Technology	3
2.	CL612	Scale - up Methods	3
3.	CL613	Industrial Safety and Risk Management	3
4.	CL614	Bioprocess Engineering	3
5.	CL615	Polymer Dynamics	3
6.	CL616	Multiphase Flow	3
7.	CL617	Design and Analysis of Experiments	3
8.	CL618	Fuel Cell Technology	3
9.	CL619	Pinch Analysis and Heat Exchange Network Design	4
10.	CL620	Industrial Energy Systems	3
11.	CL621	Wastewater and Solid Waste Treatment	3
12.	CL622	Computational Fluid Dynamics	3
13.	CL623	Process Optimization	4
14.	CL624	Ecology for Engineers	3
15.	CL625	Advanced Food Process Engineering	3
16.	CL626	Bio-refinery Engineering	3
17.	CL627	Air Pollution Control Equipment Design	3
18.	CL628	Advanced Transport Phenomena	4
19.	CL629	Electrochemical Reaction Engineering	3
20.	CL630	Bio-energy	3
21.	CL631	Process Intensification	3
22.	CL632	Bio electrochemical Systems	3
23.	HS611	Technical Communication	3
24.	MT667	Surface Engineering	3

OPEN ELECTIVES (OE)

Sl. No.	Code	Course of Study	Credit
1.	CL617	Design and Analysis of Experiments	3
2.	CL630	Bio-energy	3

OPEN ELECTIVES (OE)

M. Tech. (PROCESS CONTROL AND INSTRUMENTATION)

The total minimum credits required for completing the M.Tech. Programme in Process Control and Instrumentation is 80.

CURRICULUM

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	CL651 A/B	Measurement Systems / Chemical Process Systems	4
2.	CL653	Modern Control Engineering	4
3.	CL601	Advanced Process Control	4
4.		Programme Elective I	4
5.		Programme Elective II	3
6.		Programme Elective III	3
7.	CL655	Process Control and Instrumentation Laboratory	2
		Total	**24**

SEMESTER II

Sl. No.	Code	Course of Study	Credit
1.	CL652	Computational Techniques in Control Engineering	4
2.	CL654	Process Flow-Sheeting	4
3.	CL656	Industrial Instrumentation	4
4.		Programme Elective IV	4
5.		Programme Elective V	3
6.		Programme Elective VI	3
7.	CL658	Process Simulation Laboratory	2
		Total	**24**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
CL659	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Code	Course of Study	Credit
CL697	Project Work (Phase I)	12

SEMESTER IV

Code	Course of Study	Credit
CL698	Project Work (Phase II)	12

OPEN ELECTIVES (OE) / ONLINE COURSE (OC) (To be completed between I to IV semester)

Sl. No.	Code	Course of Study	Credit
1.		OPEN ELECTIVE I / Online Course	3
2.		OPEN ELECTIVE II / Online Course	3

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course of Study	Credit
1.	CL661	Signal Conditioning and Processing	3
2.	CL662	Computer Control of Processes	3
3.	CL663	Analytical Instrumentation	3
4.	CL664	Applied Soft Computing	4
5.	CL665	Multi Sensor Data Fusion	3
6.	CL666	System Identification and Adaptive Control	4
7.	CL667	Logic and Distributed Control Systems	3
8.	CL668	Industrial Data Communication Systems	3
9.	CL669	Micro Electro Mechanical Systems	3
10.	CL670	Optimal Control	3
11.	CL671	Real-Time and Embedded Systems	3
12.	CL672	Cyber Physical System	3
13.	CL673	Biomedical Instrumentation	3
14.	CL674	Machine Learning	3
15.	CL675	Optimization Techniques	4
16.	CL676	Controller Tuning	3
17.	CL677	Wireless Sensor Networks	3
18.	CL678	Mathematical Methods for Engineers	3
19.	HS611	Technical Communication	3

OPEN ELECTIVES (OE)

Sl. No.	Code	Course of Study	Credit
1.	CL674	Machine Learning	3
2.	CL675	Optimization Techniques	3

M. Tech. (TRANSPORTATION ENGINEERING AND MANAGEMENT)

The total minimum credits required for completing the M.Tech. Programme in Transportation Engineering and Management is 80.

CURRICULUM

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	MA601	Numerical Methods and Applied Statistics	4
2.	CE601	Highway Traffic Analysis and Design	4
3.	CE603	Pavement Analysis and Design	4
4.		Programme Elective I	3
5.		Programme Elective II	3
6.		Programme Elective III / Online (NPTEL)	3
7.	CE607	Traffic Engineering and Transportation Planning Laboratory	2
8.	CE609	Pavement Engineering Laboratory	2
		Total	**25**

SEMESTER II

Sl. No.	Code	Course of Study	Credit
1.	CE602	Urban Transportation Systems	4
2.	CE604	Transportation Planning	4
3.	CE606	Pavement Construction and Maintenance	4
4.		Programme Elective IV	3
5.		Programme Elective V	3
6.		Programme Elective VI / Online (NPTEL)	3
7.	CE610	Computer Aided Design in Transportation Engineering	2
		Total	**23**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
CE645	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Code	Course of Study	Credit
CE647	Project Work (Phase I)	12

SEMESTER IV

Code	Course of Study	Credit
CE648	Project Work (Phase II)	12

OPEN ELECTIVES (OE) / ONLINE COURSE (OC)

Sl. No.	Code	Course of Study	Credit
1.		**# (To be completed between I to IV semester)**	6

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course of Study	Credit
1.	CE611	Traffic Flow Theory	3
2.	CE612	Introduction to Computational Techniques in Transportation Engineering	3
3.	CE613	Transportation Network Analysis and Optimization	3
4.	CE614	Transportation Systems	3
5.	CE615	Transportation Economics	3
6.	CE616	Waterway Transportation	3
7.	CE617	Airport Planning and Design	3
8.	CE618	Advanced Highway Materials	3
9.	CE619	Intelligent Transportation Systems	3
10.	CE620	Advanced Surveying and Cartography	3
11.	CE621	Geospatial Techniques	3
12.	CE622	Statistical Methods for Civil Engineers	3
13.	CE623	Basics of Machine Learning and its Application in Civil Engineering	3
14.	CE624	Urban Planning Techniques and Practices	3
15.	CE625	Design and Construction of Low Volume Rural Roads	3
16.	CE626	Pavement Evaluation and Management	3
17.	CE627	Behavioral Travel Modeling	3
18.	CE628	Sustainable Transportation	3
19.	CE629	Logistics in Transportation Engineering	3
20.	CE630	Road Safety System	3
21.	CE631	Railways Infrastructure Planning and Design	3

OPEN ELECTIVES (OE)

Sl. No.	Code	Course of Study	Credit
1.	CE619	Intelligent Transportation Systems	3
2.	CE621	Geospatial Techniques	3
3.	CE622	Statistical Methods for Civil Engineers	3
4.	CE623	Basics of Machine Learning and its Application in CivilEngineering	3
5.	CE624	Urban Planning Techniques and Practices	3

MICROCREDITS (MC) (Students can opt 3 courses of 1 credit (4-week duration) each as microcredits or 2 courses (2 credits (8-week duration) & 1 credit (4-week duration) instead of 1 OE/OC)

Code	Course of Study	Credit
	Equivalent to OC (May be completed between Semester I to Semester IV)	3

ELECTIVE COMBINATIONS

1. Program Elective Courses

Option 1:

Semester	No. of Programme Electives	No. of Online Programme Electives	Credits for Programme Elective Courses
I	3	0	9
II	3	0	9

Option 2:

Semester	No. of Programme Electives	No. of Online Programme Electives	Credits for Programme Elective Courses
I	2	1	9
II	3	0	9

Option 3:

Semester	No. of Programme Electives	No. of Online Programme Electives	Credits for Programme Elective Courses
I	3	0	9
II	2	1	9

Option 4:

Semester	No. of Programme Electives	No. of Online Programme Electives	Credits for Programme Elective Courses
I	2	1	9
II	2	1	9

2. Online Courses (OC) / Open Elective (OE) Courses

Option 1:

Semester	No. of Open Elective Courses	No. of Online Courses		
		3 credit courses	2 credit courses	1 credit course
I - IV	-	2	-	-
	-	1	1	1
	-	1	-	3

Option 2:

Semester	No. of Open Elective Courses	No. of online Courses		
		3 credit courses	2 credit courses	1 credit course
I - IV	1	1	-	-
	1	-	1	1
	1	-	-	3

Option 3:

Semester	Open elective Courses	No. of online Courses		
		3 credit courses	2 credit courses	1 credit course
I - IV	2	-	-	-

M. Tech. (STRUCTURAL ENGINEERING)

The total minimum credits required for completing the M.Tech. Programme in Structural Engineering is 80.

CURRICULUM

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	MA624	Applied Mathematics for Structural Engineering	4
2.	CE651	Theory of Elasticity and Plasticity	4
3.	CE653	Advanced Reinforced Concrete Design	4
4.		Programme Elective I	3
5.		Programme Elective II	3
6.		Programme Elective III / Online (NPTEL)	3
7.	CE655	Structural Engineering Laboratory	2
8.	CE657	Computational Laboratory for Structural Engineers	2
		Total	**25**

SEMESTER II

Sl. No.	Code	Course of Study	Credit
1.	CE652	Structural Dynamics	4
2.	CE654	Finite Element Analysis of Structural Members	4
3.	CE656	Advanced Design of Metal Structures	4
4.		Programme Elective IV	3
5.		Programme Elective V	3
6.		Programme Elective VI / Online (NPTEL)	3
7.	CE658	Structural Design Studio	2
		Total	**23**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
CE659	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Code	Course of Study	Credit
CE697	Project Work (Phase I)	12

SEMESTER IV

Code	Course of Study	Credit
CE698	Project Work (Phase II)	12

OPEN ELECTIVES (OE) / ONLINE COURSE (OC)

Sl. No.	Code	Course of Study	Credit
		# (To be completed between I to IV semester)	6

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course of Study	Credit
1.	CE661	Matrix Methods of Structural Analysis	3
2.	CE662	Non – Linear Analysis	3
3.	CE663	Reliability Analysis of Structures	3
4.	CE664	Stochastic Processes in Structural Mechanics	3
5.	CE665	Structural Optimization	3
6.	CE666	Failure Analysis of Structures	3
7.	CE667	Forensic Engineering and Rehabilitation of Structures	3
8.	CE668	Fracture Mechanics	3
9.	CE669	Advanced Steel and Concrete Composite Structures	3
10.	CE670	Design of Metal Structures II	3
11.	CE671	Design of Thin-walled Steel Structures	3
12.	CE672	Stability of Structures	3
13.	CE673	Theory of Plates and Shells	3
14.	CE674	Analysis and Design of Tall Buildings	3
15.	CE675	Design of Offshore Structures	3
16.	CE676	Seismic Design of Structures	3
17.	CE677	Wind Effects on Structures	3
18.	CE678	Advanced Concrete Technology	3
19.	CE679	Prefabricated Structures	3
20.	CE680	Prestressed Concrete Structures	3
21.	CE681	Smart Structures and Applications	3
22.	CE682	Special Concrete	3

23.	CE683	Structures in Disaster Prone Areas	3
24.	CE684	Design of Boiler Structures	3
25.	CE685	Design of Bridges	3
26.	CE686	Façade Design and Engineering	3
27.	CE687	Design of Structures for Accidental Loads	3
28.	CE688	Green Building Design	3
29.	CE689	Hydraulic Structures	3
30.	CE690	Structures for Power Plants	3
31.	CE691	Soil Structure Interaction	3
32.	CE692	Seismic Design of Steel Structures	3
33.	CE693	Introduction to 3D Printing Technology	3
34.	CE694	Modelling, Simulation and Computer Applications	3
35.	CE695	Random Vibrations	3
36.	CE696	Uncertainty Modeling, and Analysis	3

OPEN ELECTIVES (OE)

Sl. No.	Code	Course of Study	Credit
1.	CE665	Structural Optimization	3
2.	CE678	Advanced Concrete Technology	3
3.	CE685	Design of Bridges	3
4.	CE688	Green Building Design	3
5.	CE691	Soil Structure Interaction	3
6.	CE693	Introduction to 3D Printing Technology	3
7.	CE694	Modelling, Simulation and Computer Applications	3
8.	CE696	Uncertainty Modeling, and Analysis	3

(For OE courses refer the curriculum of other PG specializations)

MICROCREDITS (MC) [Students can opt 3 courses of 1 credit (4-week duration) each as microcredits or 2 courses (2 credits (8-week duration) & 1 credit (4-week duration) instead of 1 OE/OC]

Sl. No.	Code	Course of Study	Credit
1.		Equivalent to Online Course (May be completed between Semester I to Semester IV)	3

Electives [Choices]

1. Program Elective (PE) Courses

Option 1:

Semester	No. of Programme Electives	No. of Online Programme Electives	Credits for Programme Elective Courses
I	3	0	9
II	3	0	9

Option 2:

Semester	No. of Programme Electives	No. of Online Programme Electives	Credits for Programme Elective Courses
I	2	1	9
II	3	0	9

Option 3:

Semester	No. of Programme Electives	No. of Online Programme Electives	Credits for Programme Elective Courses
I	3	0	9
II	2	1	9

Option 4:

Semester	No. of Programme Electives	No. of Online Programme Electives	Credits for Programme Elective Courses
I	2	1	9
II	2	1	9

2. Online Courses (OC) / Open Elective (OE) Courses

Option 1:

Semester	No. of Open Elective Courses	No. of online Courses		
		3 credit courses	2 credit courses	1 credit course
I – IV	-	2	-	-
	-	1	1	1
	-	1	-	1+1+1

Option 2:

Semester	No. of Open elective Courses	No. of online Courses		
		3 credit courses	2 credit courses	1 credit course
I – IV	1	1	-	-
	1	-	1	1
	1	-	-	1+1+1

Option 3:

Semester	Open elective Courses	No. of online Courses		
		3 credit courses	2 credit courses	1 credit course
I - IV	2	-	-	-

M. Tech. (ENVIRONMENTAL ENGINEERING)

The total credits required for completing the M.Tech. Programme in Environmental Engineering is 80.

CURRICULUM

SEMESTER I

SI. No.	Code	Course of Study	Credit
1.	MA601	Numerical Methods and Applied Statistics	4
2.	CE701	Environmental Process Chemistry and Microbiology	4
3.	CE703	Physico-Chemical Processes for Water and Wastewater Treatment	4
4.		Programme Elective I	3
5.		Programme Elective II	3
6.		Programme Elective III	3
7.	CE707	Environmental Quality Measurements Laboratory	2
		Total	**23**

SEMESTER II

SI. No.	Code	Course of Study	Credit
1.	CE702	Biological Process Design for Wastewater Treatment	4
2.	CE704	Solid and Hazardous Waste Management	4
3.	CE706	Air Pollution and Control Engineering	4
4.		Programme Elective IV	3
5.		Programme Elective V	3
6.		Programme Elective VI	3
7.	CE708	Environmental Engineering Processes Laboratory	2
8.	CE710	Environmental Computation Laboratory	2
		Total	**25**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
CE746	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Code	Course of Study	Credit
CE747	Project Work (Phase I)	12

SEMESTER IV

Code	Course of Study	Credit
CE748	Project Work (Phase II)	12

OPEN ELECTIVES (OE) / ONLINE COURSE (OC)

Sl. No.	Code	Course of Study	Credit
		# (To be completed between I to IV semester)	6

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course of Study	Credit
1.	CE711	Transport of Water and Wastewater	3
2.	CE712	Membrane Technologies for Water and Wastewater Treatment	3
3.	CE713	Industrial Wastewater Management	3
4.	CE714	Modeling of Natural Systems	3
5.	CE715	Groundwater Flow and Contaminant Transport Through Porous Media	3
6.	CE716	Indoor Environmental Quality	3
7.	CE717	Aerosol Science and Engineering	3
8.	CE718	Analytical Methods for Environmental Monitoring	3
9.	CE719	Landfill Design and Operation	3
10.	CE720	Environmental Impact Assessment	3
11.	CE721	Environmental Laws	3
12.	CE722	Environmental Nanotechnology	3
13.	CE723	Cleaner Production and Environmental Sustainable Management	3
14.	CE724	Environmental Biotechnology	3
15.	CE725	Remote Sensing and GIS for Environmental Applications	3
16.	CE726	Climate Variability, Mitigation and Adaptation	3
17.	CE727	Environmental Systems Analysis	3
18.	CE728	Environmental Social Governance	3
19.	CE729	Ecological and Ecosystem Engineering	3

OPEN ELECTIVES (OE)

Sl. No.	Code	Course of Study	Credit
1.	CE711	Transport of Water and Wastewater	3
2.	CE712	Membrane Technologies for Water and Wastewater Treatment	3
3.	CE718	Analytical Methods for Environmental Monitoring	3
4.	CE720	Environmental Impact Assessment	3
5.	CE723	Cleaner Production and Environmental Sustainable Management	3

(For OE courses refer the curriculum of other PG specializations)

MICROCREDITS (MC) [Students can opt 3 courses of 1 credit (4-week duration) each as microcredits or 2 courses (2 credits (8-week duration) & 1 credit (4-week duration) instead of 1 OE/OC]

Sl. No.	Code	Course of Study	Credit
1.		Equivalent to OC (May be completed between Semester I to Semester IV)	3

Electives [Choices]

1. Program Elective (PE) Courses

Option 1:

Semester	No. of Programme Electives	No. of Online Programme Electives	Credits for Programme Elective Courses
I	3	0	9
II	3	0	9

Option 2:

Semester	No. of Programme Electives	No. of Online Programme Electives	Credits for Programme Elective Courses
I	2	1	9
II	3	0	9

Option 3:

Semester	No. of Programme Electives	No. of Online Programme Electives	Credits for Programme Elective Courses
I	3	0	9
II	2	1	9

Option 4:

Semester	No. of Programme Electives	No. of Online Programme Electives	Credits for Programme Elective Courses
I	2	1	9
II	2	1	9

2. <u>Online Courses (OC) / Open Elective (OE) Courses</u>

Option 1:

Semester	No. of Open Elective Courses	No. of online Courses		
		3 Credit courses	2 credit courses	1 credit course
I - IV	-	2	-	-
	-	1	1	1
	-	1	-	1+1+1

Option 2:

Semester	No. of Open elective Courses	No. of online Courses		
		3 credit courses	2 credit courses	1 credit course
I - IV	1	1	-	-
	1	-	1	1
	1	-	-	1+1+1

Option 3:

Semester	Open elective Courses	No. of online Courses		
		3 credit courses	2 credit courses	1 credit course
I - IV	2	-	-	-

M. Tech. (CONSTRUCTION TECHNOLOGY AND MANAGEMENT)

The total credits required for completing the M.Tech. Programme in Construction Technology and Management is 80.

CURRICULUM

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	CE751	Construction Planning and Control	4
2.	CE753	Contracts and Specifications	4
3.	CE755	Lean Construction Concepts, Tools and Practices	4
4.	CE757	Construction Economics and Finance	3
5.		Programme Elective I	3 to 4
6.		Programme Elective II	3 to 4
7.	CE759	Construction Management Software Laboratory	2
		Total	**23 to 25**

SEMESTER II

Sl. No.	Code	Course of Study	Credit
1.	CE752	Construction Quality and Safety Management	4
2.	CE754	Organizational Behaviour	4
3.	CE756	Construction Methods and Equipment	4
4.		Programme Elective III	3 to 4
5.		Programme Elective IV	3 to 4
6.		Programme Elective V	3 to 4
7.	CE758	Construction Engineering and Information Laboratory	2
8.	CE760	Construction Materials Laboratory	2
		Total	**25 to 28**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
CE796	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Code	Course of Study	Credit
CE797	Project Work (Phase I)	12

SEMESTER IV

Code	Course of Study	Credit
CE798	Project Work (Phase II)	12

OPEN ELECTIVES (OE) / ONLINE COURSE (OC)/ MICROCREDITS (MC) (Students can opt 3 courses of 1 credit (4 weeks) each as microcredits instead of 1 OE/OC)

Code	Course of Study	Credit
	# (To be completed between I to IV semester)	1 to 6

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course of Study	Credit
1.	CE761	Modern Construction Materials	3
2.	CE762	Functional Efficiency of Buildings	3
3.	CE763	Disaster Mitigation and Management	3
4.	CE764	Construction Supply Chain Management	3
5.	CE765	Planning of Prefabricated Structures	3
6.	CE766	Safety in Material Handling at Construction	3
7.	CE767	Non Destructive Evaluation	3
8.	CE768	Value Engineering	3
9.	CE769	Quantitative Methods in Construction Management	3
10.	CE770	Formwork Design	3
11.	CE771	Construction Personal Management	3
12.	CE772	Project Risk Analysis and Management Techniques	3
13.	CE773	Strategic Management in Construction	3
14.	CE774	Infrastructure Planning and Management	3
15.	CE775	Sustainable Construction	3
16.	CE776	Construction Project Modelling	3
17.	CE777	Smart Buildings	3
18.	CE778	Soft Computing Techniques in Civil Engineering	3
19.	CE779	Estimation and Quantity Surveying	3
20.	CE780	Urban Water Infrastructure	3

OPEN ELECTIVES (OE)

Sl. No.	Code	Course of Study	Credit
1.	CE769	Quantitative Methods in Construction Management	3
2.	CE772	Project Risk Analysis and Management Techniques	3
3.	CE773	Strategic Management in Construction	3
4.	CE774	Infrastructure Planning and Management	3
5.	CE777	Smart Buildings	3
6.	CE778	Soft Computing Techniques in Civil Engineering	3
7.	CE779	Estimation and Quantity Surveying	3

COURSES FROM OTHER SPECIALIZATION / DEPARTMENTS (To be offered as Program Elective)

Sl. No.	Code	Course of Study	Credit
TRANSPORTATION ENGINEERING AND MANAGEMENT			
1.	CE601	Highway Traffic Analysis and Design	4
2.	CE603	Pavement Analysis and Design	4
3.	CE604	Transportation Planning	4
4.	CE606	Pavement Construction and Maintenance	4
5.	CE619	Intelligent Transportation Systems	3
6.	CE621	Geospatial Techniques	3
7.	CE624	Urban Planning Techniques and Practices	3
STRUCTURAL ENGINEERING			
1.	CE667	Forensic Engineering and Rehabilitation of Structures	3
2.	CE678	Advanced Concrete Technology	3
3.	CE689	Hydraulic Structures	3
ENVIRONMENTAL ENGINEERING			
1.	CE701	Environmental Process Chemistry and Microbiology	4
2.	CE702	Biological Process Design for Wastewater Treatment	4
3.	CE703	Physico-Chemical Process for Water and Wastewater Treatment	4
4.	CE711	Transport of Water and Wastewater	3
5.	CE712	Membrane Technologies for Water and Wastewater Treatment	3
6.	CE713	Industrial Wastewater Management	3

		GEOTECHNICAL ENGINEERING	
1.	CE815	Ground Improvement Techniques	3
2.	CE816	Analysis of Deep Foundation	3
3.	CE818	Marine Foundations Engineering	3
4.	CE820	Geotechnical Constitutive Modelling	3
5.	CE826	Geosynthetics Engineering	3
6.	CE829	Ports and Harbour Structures	3
		ENERGY AND ENVIRONMENT	
1.	EN620	Energy Efficient Buildings	3
2.	EN636	Smart Grid Systems	
		ELECTRICAL AND ELECTRONICS ENGINEERING	
1.	EE662	High Voltage DC Transmission	3
2.	EE671	Fuzzy Logic Control System	3
3.	EE673	Renewable Power Generation Technologies	3
4.	EE680	Smart Grid Technologies	3
5.	EE684	Distributed Generation and Micro-Grids	3
6.	EE703	E-Vehicle Technology and Mobility	3

M.Tech. (GEOTECHNICAL ENGINEERING)

The total minimum credits required for completing the M.Tech. Programme in Geotechnical Engineering is 80.

CURRICULUM

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	MA602	Applied Mathematics	4
2.	CE801	Advanced Soil Mechanics	4
3.	CE803	Soil Exploration and Field Testing	4
4.		Programme Elective I	3
5.		Programme Elective II	3
6.		Programme Elective III / Online (NPTEL)	3
7.	CE807	Advanced Geotechnical Engineering Laboratory	2
		Total	**23**

SEMESTER II

Sl. No.	Code	Course of Study	Credit
1.	CE802	Foundation Analysis and Design	4
2.	CE804	Earth Retaining Structures	4
3.	CE806	Dynamics of Soils and Foundations	4
4.		Programme Elective IV	3
5.		Programme Elective V	3
6.		Programme Elective VI / Online (NPTEL)	3
7.	CE808	Geosynthetics and Field Testing Laboratory	2
8.	CE810	Geotechnical Design Studio	2
		Total	**25**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
CE845	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Code	Course of Study	Credit
CE847	Project Work (Phase I)	12

SEMESTER IV

Code	Course of Study	Credit
CE848	Project Work (Phase II)	12

OPEN ELECTIVES (OE) / ONLINE COURSE (OC)

Code	Course of Study	Credit
	# (To be completed between I to IV semester)	6

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course of Study	Credit
1.	CE811	Geotextile from Design to Applications	3
2.	CE812	Geomechanics -Theory and Applications	3
3.	CE813	Finite Element Methods in Geotechnical Engineering	3
4.	CE814	Slope Stability and Earth Dams	3
5.	CE815	Ground Improvement Techniques	3
6.	CE816	Analysis of Deep Foundation	3
7.	CE817	Machine Foundations	3
8.	CE818	Marine Foundation Engineering	3
9.	CE819	Soil-Structure Interaction	3
10.	CE820	Geotechnical Constitutive Modelling	3
11.	CE821	Rock Mechanics	3
12.	CE822	Unsaturated Soil Mechanics	3
13.	CE823	Design of Underground Excavation	3
14.	CE824	Geotechnical Earthquake Engineering	3
15.	CE825	Geo-environmental Engineering	3
16.	CE826	Geosynthetics Engineering	3
17.	CE827	Forensic Geotechnical Engineering	3
18.	CE828	Geotechnics in Practice	3
19.	CE829	Ports and Harbour Structures	3
20.	CE830	Risk and Reliability in Geotechnical Engineering	3
21.	CE831	Geotechnology of Waste Disposal Facilities	3

OPEN ELECTIVES (OE)

Sl. No.	Code	Course of Study	Credit
1.	CE815	Ground Improvement Techniques	3
2.	CE816	Analysis of Deep Foundation	3
3.	CE819	Soil-Structure Interaction	3
4.	CE825	Geo-environmental Engineering	3
5.	CE829	Ports and Harbour Structures	3

(For OE courses refer the curriculum of other PG specializations)

MICROCREDITS (MC) [Students can opt 3 courses of 1 credit (4-week duration) each as microcredits or 2 courses (2 credits (8-week duration) & 1 credit (4-week duration) instead of 1 OE/OC]

Sl. No.	Code	Course of Study	Credit
			3

Electives [Choices]

1. Program Elective (PE) Courses

Option 1:

Semester	No. of Programme Electives	No. of Online Programme Electives	Credits for Programme Elective Courses
I	3	0	9
II	3	0	9

Option 2:

Semester	No. of Programme Electives	No. of Online Programme Electives	Credits for Programme Elective Courses
I	2	1	9
II	3	0	9

Option 3:

Semester	No. of Programme Electives	No. of Online Programme Electives	Credits for Programme Elective Courses
I	3	0	9
II	2	1	9

Option 4:

Semester	No. of Programme Electives	No. of Online Programme Electives	Credits for Programme Elective Courses
I	2	1	9
II	2	1	9

2. **Online Courses (OC) / Open Elective (OE) Courses**

Option 1:

Semester	No. of Open Elective Courses	No. of online Courses		
		3 Credit courses	2 credit courses	1 credit course
I - IV	-	2	-	-
	-	1	1	1
	-	1	-	1+1+1

Option 2:

Semester	No. of Open elective Courses	No. of online Courses		
		3 credit courses	2 credit courses	1 credit course
I - IV	1	1	-	-
	1	-	1	1
	1	-	-	1+1+1

Option 3:

Semester	Open elective Courses	No. of online Courses		
		3 credit courses	2 credit courses	1 credit course
I - IV	2	-	-	-

M.Tech. (DATA ANALYTICS)

The total minimum credits required for completing the M.Tech. Programme in Data Analytics is 80.

CURRICULUM

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	CA611	Mathematical Foundations for Data Analytics	4
2.	CA613	Advanced Data Structures and Algorithms	4
3.	CA615	Machine Learning Techniques	3
4.	CA617	Big Data Analytics	4
5.	CA6AX	Programme Elective I	4
6.	CA6BX	Programme Elective II	3
7.	CA601	Machine Learning Laboratory	2
		Total	**24**

SEMESTER II

Sl. No.	Code	Course of Study	Credit
1.	CA610	Deep Learning and its Applications	3
2.	CA612	Image and Video Analytics	3
3.	CA6CX	Programme Elective III	4
4.	CA6DX	Programme Elective IV	4
5.	CA6EX	Programme Elective V	3
6.	CA6FX	Programme Elective VI	3
7.	CA602	Deep Learning Laboratory	2
8.	CA604	Image and Video Analytics Laboratory	2
		Total	**24**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
CA648	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Code	Course of Study	Credit
CA649	Project Work (Phase I)	12

SEMESTER IV

Code	Course of Study	Credit
CA650	Project Work (Phase II)	12

OPEN ELECTIVES (OE) / ONLINE COURSE (OC) (To be completed between I to IV semester)

Sl. No.	Code	Course of Study	Credit
1.		OPEN ELECTIVE I / Online Course	3
2.		OPEN ELECTIVE II / Online Course	3

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course of Study	Credit
		ELECTIVE - I	
1.	CA6A1	Data Mining and Warehousing	4
2.	CA6A2	Soft Computing Techniques	4
3.	CA6A3	Next Generation Data Base Systems	4
		ELECTIVE - II	
4.	CA6B1	Distributed and Cloud Computing	3
5.	CA6B2	Block Chain Technology	3
6.	CA6B3	Cognitive Sciences	3
		ELECTIVE - III	
7.	CA6C1	DevOps	4
8.	CA6C2	Analytics for Strategic Market Planning	4
9.	CA6C3	Financial Risk Analytics and Management	4
		ELECTIVE - IV	
10.	CA6D1	Data Visualization	4
11.	CA6D2	Pattern Recognition	4
12.	CA6D3	Natural Language Processing	4
		ELECTIVE - V	
13.	CA6E1	Web Analytics	3
14.	CA6E2	Federated Learning	3
15.	CA6E3	Human Resource Analytics	3
		ELECTIVE - VI	
16.	CA6F1	Intelligent Systems and Process Automation	3
17.	CA6F2	Social Network Analytics	3
18.	CA6F3	Supply Chain Analytics	3

OPEN ELECTIVES (OE)

Sl. No.	Code	Course of Study	Credit
1.	CA615	Machine Learning Techniques	3

M. Tech. (COMPUTER SCIENCE AND ENGINEERING)

The total minimum credits required for completing the M. Tech. Programme in Computer Science and Engineering Course is 80.

CURRICULUM

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	CS601	Mathematical Concepts of Computer Science	4
2.	CS603	Advanced Data Structures and Algorithms	4
3.	CS605	High Performance Computer Architecture	3
4.	CS607	Principles of Machine Learning and Deep Learning	4
5.	E1	Programme Elective I	4
6.	E2	Programme Elective II	3
7.	CS609	Computer System Design Laboratory	2
		Total	**24**

SEMESTER II

Sl. No.	Code	Course of Study	Credit
1.	CS602	Service Oriented Architecture and Web Security	3
2.	CS604	Advances in Operating Systems	4
3.	E3	Programme Elective III	4
4.	E4	Programme Elective IV	3
5.	E5	Programme Elective V	3
6.	E6	Programme Elective VI	3
7.	CS606	Data Science and AI Laboratory	2
8.	CS608	Web Development Laboratory	2
		Total	**24**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
CS675	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Sl. No.	Code	Course of Study	Credit
1.	CS677	Project Work (Phase I)	12
2.	CS704	Online Courses (NPTEL)	6

SEMESTER IV

Code	Course of Study	Credit
CS678	Project Work (Phase II)	12

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course of Study	Credit
1.	CS615	Advanced Network Principles and Protocols	4
2.	CS616	Cloud Computing Principles	4
3.	CS617	Statistical Natural Language Processing	4
4.	CS618	Internet of Things	4
5.	CS619	Image and Video Analytics	4
6.	CS620	Fog and Edge Computing	4
7.	CS621	Immersive Technologies	4
8.	CS622	Quantum Computing	4
9.	CS630	Advanced Databases	3
10.	CS631	Advanced Cryptography	3
11.	CS632	Network Security	3
12.	CS633	Wireless Sensor Networks	3
13.	CS634	Software Design Architectures	3
14.	CS635	Mobile Network systems	3
15.	CS636	Cloud Security	3
16.	CS637	Design and Analysis of Parallel Algorithms	3
17.	CS638	Social Network Mining and Analysis	3
18.	CS639	Computational Geometry	3
19.	CS640	Database Tuning and Administration	
20.	CS641	Big Data Analytics and Mining	3
21.	CS642	Models of Computation	3
22.	CS643	Cognitive Science	3

23.	CS644	Information Visualization	3
24.	CS645	Knowledge Management	3
25.	CS646	Text Mining	3
26.	CS647	Digital and Cyber Forensics	3
27.	CS648	Multimedia Presentation and Coding Techniques	3
28.	CS649	Principles of Data Warehousing and Datamining	3
29.	CS650	Hardware Security	3
30.	CS651	Advanced Digital Design	3
31.	CS652	Real Time systems	3
32.	CS653	Smart Phone Computing	3
33.	CS654	Quantum-safe Cryptography	3
34.	CS655	Drone Technologies	3
35.	CS656	Reinforcement Learning	3
36.	CS657	Data Science	3
37.	CS658	AI Principles and Practices	3
38.	CS659	Advanced Compiler Design	3
39.	CS660	Algorithmic Graph Theory	3
40.	CS661	Soft Computing Techniques	3
41.	CS662	Algorithmic Game Theory	3

OPEN ELECTIVES (OE) (offered to other Departments)

Sl. No.	Code	Course of Study	Credit
1.	CS700	Machine Learning and Deep Learning Techniques	3
2.	CS701	Natural Language Processing Techniques	3
3.	CS702	Image and Video Analytic Fundamentals	3
4.	CS703	Reinforcement Learning Principles	3

M. Tech. (POWER SYSTEMS)

The total credits required for completing the M.Tech. Programme in Power Systems is 80.

CURRICULUM

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	MA603	Advanced Engineering Mathematics	4
2.	EE601	Advanced Power System Analysis	4
3.	EE603	Power Conversion Techniques	4
4.		Programme Elective I	3
5.		Programme Elective II	3
6.		Programme Elective III / Online (NPTEL)	3
7.	EE607	Power Conversion Laboratory	2
8.	EE611	Power System Computation Laboratory	2
		Total	**25**

SEMESTER II

Sl. No.	Code	Course of Study	Credit
1.	EE602	Power System Operation and Control	4
2.	EE604	Advanced Power System Protection	4
3.	EE606	Power System Stability	4
4.		Programme Elective IV	3
5.		Programme Elective V	3
6.		Programme Elective VI / Online (NPTEL)	3
7.	EE608	Power Systems Laboratory	2
		Total	**23**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
EE613	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Code	Course of Study	Credit
EE609	Project Work (Phase I)	12

SEMESTER IV

Code	Course of Study	Credit
EE610	Project Work (Phase II)	12

OPEN ELECTIVES (OE) / ONLINE COURSE (OC) (To be completed between I to IV semester)

SI. No.	Code	Course of Study	Credit
1.		Open Elective I / Online Course	3
2.		Open Elective II / Online Course	3

LIST OF OPEN ELECTIVES (OE)

SI. No.	Code	Course Title	Credit
1.	EE679	Swarm Intelligent Techniques	3
2.	EE686	Energy Auditing and Management	3

Note:

- Department will give the list of recommended online courses for PE and OE in every session.

- Students shall opt the online courses from the list of recommended courses by any department of the institute as open elective.

- **MICROCREDITS (MC)** (Students can opt 3 courses of 1 credit (4 weeks) each as microcredits instead of 1 OE/OC)

PROGRAMME ELECTIVES (PE)

SI. No.	Code	Course of Study	Credit
1.	EE661	Flexible AC Transmission System	3
2.	EE662	High Voltage DC Transmission	3
3.	EE663	Microcontroller Applications in Power Converters	3
4.	EE664	Advanced Digital Signal Processing	3
5.	EE665	Advanced Digital System Design	3
6.	EE667	Neural Networks and Deep Learning	3

7.	EE668	Digital Controllers in Power Electronics Applications	3
8.	EE669	Computer Networking	3
9.	EE670	Electrical Distribution Systems	3
10.	EE671	Fuzzy Logic Control Systems	3
11.	EE672	Transient over Voltages in Power Systems	3
12.	EE673	Renewable Power Generation Technologies	3
13.	EE674	Power System Planning and Reliability	3
14.	EE675	Modeling And Analysis of Electrical Machines	3
15.	EE676	Power Quality	3
16.	EE677	Power System Restructuring and Pricing	3
17.	EE678	Computer Relaying and Wide Area Measurement Systems	3
18.	EE680	Smart Grid Technologies	3
19.	EE681	Electrical Systems in Wind Energy	3
20.	EE683	Embedded Processors and Controllers	3
21.	EE684	Distributed Generation and Micro-Grids	3
22.	EE685	Control Design Techniques for Power Electronic Systems	3
23.	EE688	Principles of VLSI Design	3
24.	EE695	Digital Control Systems	3
25.	EE696	Power System Automation	3
26.	EE703	E-Vehicle Technology and Mobility	3
27.	EE705	Design of Magnetics for Power Electronic Applications	3
28.	EE706	Power Management Integrated Circuits	3
29.	EE707	Electric Power Market	3
30.	EE711	Cybersecurity of Smart Grids	3

M. Tech. (POWER ELECTRONICS)

The total credits required for completing the M.Tech. Programme in Power Electronics is 80.

CURRICULUM

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	MA603	Advanced Engineering Mathematics	4
2.	EE651	Power Converters	4
3.	EE653	Linear and Non-Linear System Theory	4
4.		Programme Elective I	3
5.		Programme Elective II	3
6.		Programme Elective III / Online (NPTEL)	3
7.	EE657	Design and Simulation of Power Electronic Circuit Laboratory	2
8.	EE659	Power Electronics Systems Laboratory	2
		Total	**25**

SEMESTER II

Sl. No.	Code	Course of Study	Credit
1.	EE652	Switched Mode Power Conversion	4
2.	EE654	Power Electronic Drives	4
3.	EE656	Industrial Control Electronics	4
4.		Programme Elective IV	3
5.		Programme Elective V	3
6.		Programme Elective VI / Online (NPTEL)	3
7.	EE658	Power Converters and Drives Laboratory	2
		Total	**23**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
EE713	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Code	Course of Study	Credit
EE709	Project Work (Phase I)	12

SEMESTER IV

Code	Course of Study	Credit
EE710	Project Work (Phase II)	12

OPEN ELECTIVES (OE) / ONLINE COURSE (OC) (To be completed between I to IV semester)

Sl. No.	Code	Course of Study	Credit
1.		Open Elective I	3
2.		Open Elective II	3

LIST OF OPEN ELECTIVES (OE)

Sl. No.	Code	Course of Study	Credit
1.	EE687	Electric and Hybrid Vehicles	3
2.	EE712	Home Energy Management System	3

Note:

- Department will give the list of recommended online courses for PE and OE in every session.

- Students shall opt the online courses from the list of recommended courses by any department of the institute as open elective.

- **MICROCREDITS (MC)** (Students can opt 3 courses of 1 credit (4 weeks) each as microcredits instead of 1 OE/OC)

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course of Study	Credit
1.	EE661	Flexible AC Transmission System	3
2.	EE662	High Voltage DC Transmission	3
3.	EE664	Advanced Digital Signal Processing	3
4.	EE665	Advanced Digital System Design	3
5.	EE667	Neural Networks and Deep Learning	3
6.	EE668	Digital Controllers in Power Electronics Applications	3
7.	EE669	Computer Networking	3

8.	EE670	Electrical Distribution Systems	3
9.	EE671	Fuzzy Logic Control Systems	3
10.	EE672	Transient over Voltages in Power Systems	3
11.	EE673	Renewable Power Generation Technologies	3
12.	EE674	Power System Planning and Reliability	3
13.	EE675	Modeling and Analysis of Electrical Machines	3
14.	EE676	Power Quality	3
15.	EE677	Power System Restructuring and Pricing	3
16.	EE678	Computer Relaying and Wide Area Measurement Systems	3
17.	EE680	Smart Grid Technologies	3
18.	EE681	Electrical Systems in Wind Energy	3
19.	EE684	Distributed Generation and Micro-Grids	3
20.	EE685	Control Design Techniques for Power Electronic Systems	3
21.	EE688	Principles of VLSI Design	3
22.	EE689	Advanced Topics in Power Electronics Applications	3
23.	EE690	Design Techniques for SMPS	3
24.	EE691	Energy Storage Systems	3
25.	EE692	Digital Simulation of Power Electronic Systems	3
26.	EE693	PWM Converters and Applications	3
27.	EE695	Digital Control Systems	3
28.	EE696	Power System Automation	3
29.	EE698	Grid Converters for Renewable Energy Applications	3
30.	EE699	Topics in Power Electronics and Distributed Generation	3
31.	EE700	Wireless Sensor Networks and Applications	3
32.	EE701	Soft Switching Power Converters	3
33.	EE702	Solar PV System	3
34.	EE703	E-Vehicle Technology and Mobility	3
35.	EE704	Design of Embedded Controllers for Smart Micro-Grid	3
36.	EE705	Design of Magnetics for Power Electronic Applications	3
37.	EE706	Power Management Integrated Circuits	3
38.	EE708	Electric Vehicle Charging Systems	3

M. Tech. (COMMUNICATION SYSTEMS)

The total minimum credits required for completing the M.Tech. Programme in Communication Systems is 80.

CURRICULUM

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	EC601	Linear Algebra and Stochastic Processes	4
2.	EC603	Advanced Digital Signal Processing	4
3.	EC605	Microwave Circuits	4
4.		Programme Elective I	3
5.		Programme Elective II	3
6.		Programme Elective III	3
7.	EC607	Microwave and MIC Laboratory	2
		Total	23

SEMESTER II

Sl. No.	Code	Course of Study	Credit
1.	EC602	Advanced Digital Communication	4
2.	EC604	Broadband Wireless Technologies	4
3.	EC606	Optical Communication Systems	4
4.		Programme Elective IV	3
5.		Programme Elective V	3
6.		Programme Elective VI	3
7.	EC608	Fiber Optics and Communication Laboratory	2
8.	EC610	Digital Signal and Image Processing Laboratory	2
		Total	25

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
EC649	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Code	Course of Study	Credit
EC647	Project Work (Phase I)	12

SEMESTER IV

Code	Course of Study	Credit
EC648	Project Work (Phase II)	12

In addition to the Programme electives, students have to do 2 Open Electives offered by the institute or PG-level Online Courses from NPTEL (Can be completed from Semester I-IV) as given in the list in the next page. If students opt to do open electives from institute, they can choose open electives offered by VLSI or other departments.

OPEN ELECTIVES (OE) / ONLINE COURSE (OC) (To be completed between I to IV semester)

Sl. No.	Code	Course of Study	Credit
1.		Open Elective I / Online Course	3
2.		Open Elective II / Online Course	3

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course of Study	Credit
1.	EC611	Detection and Estimation	3
2.	EC612	DSP Architecture	3
3.	EC613	High Speed Communication Networks	3
4.	EC614	Spectral Analysis of Signal	3
5.	EC615	Digital Image Processing	3
6.	EC616	RF MEMS	3
7.	EC617	Smart Antennas	3
8.	EC618	Ad Hoc Networks	3
9.	EC619	Wavelet Signal Processing	3
10.	EC620	WDM Optical Networks	3
11.	EC621	Advanced Techniques for Wireless Reception	3
12.	EC622	Error Control Coding	3
13.	EC623	Digital Communication Receivers	3
14.	EC624	Analysis Methods for Passive MIC	3
15.	EC625	Electromagnetic Metamaterials	3
16.	EC626	Bio MEMS	3
17.	EC627	Substrate Integrated Waveguide Technology: Design and Analysis	3
18.	EC628	Pattern Recognition and Computational Intelligence	3
19.	EC629	Photonic Integrated Circuits and Systems	3
20.	EC630	Fiber-Optic Sensors	3
21.	EC631	Optical Wireless Communications	3
22.	EC632	Foundations of Artificial Intelligence	3
23.	EC633	Introduction to Soft Computing and Machine Learning	3
24.	EC634	Next Generation WLAN	3
25.	EC635	Electromagnetic Interference and Compatibility	3
26.	EC636	Computer Vision	3
27.	EC637	Natural Language Processing	3
28.	EC638	Optimization Methods in Machine Learning	3

29.	EC639	Hardware for Deep Learning	3
30.	EC640	Image and Video Processing	3
31.	EC641	Automated Test Engineering for Electronics	3
32.	EC642	Radiating Systems	3
33.	EC643	Advanced Topics in 5G/B5G Wireless Communication	3
34.	EC646	Verilog HDL: Digital Design and Modeling	3
35.	EC654	Electronic Design Automation Tools	3
36.	EC656	Design of ASICs	3
37.	EC663	Optimization of Digital Signal Processing Structures for VLSI	3
38.	EC664	Cognitive Radio	3

LIST OF OPEN ELECTIVES (Offered to VLSI and other Departments)

Sl. No.	Code	Course of Study	Credit
1.	EC703	Pattern Recognition and Computational Intelligence Techniques	3
2.	EC704	High Speed Networks and Internet	3
3.	EC705	Design for Electromagnetic Compatibility	3

LIST OF NPTEL ONLINE COURSES

Sl. No.	Code	Course of Study	Credit
1.	EC801	Fundamentals of MIMO Wireless Communications	3
2.	EC802	Evolution of Air Interface Towards 5G	3
3.	EC803	Introduction to Industry 4.0 and Industrial Internet of Things	3
4.	EC804	VLSI Data Conversion Circuits	3
5.	EC805	Introduction to Time-Varying Electrical Networks	3
6.	EC806	Power Management Integrated Circuits	3
7.	EC807	Optical Wireless Communications beyond 5G Networks and IOT	3
8.	EC808	5G Wireless Standard Design	3

M. Tech. (VLSI SYSTEM)

The total minimum credits required for completing the M.Tech. Programme in VLSI System is 80.

CURRICULUM

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	EC651	Analog VLSI	4
2.	EC653	Basics of VLSI	4
3.	EC661	Digital System Design	4
4.		Programme Elective I	3
5.		Programme Elective II	3
6.		Programme Elective III	3
7.	EC655	HDL Programming Laboratory	2
		Total	**23**

SEMESTER II

Sl. No.	Code	Course of Study	Credit
1.	EC652	VLSI System Testing	4
2.	EC654	Electronic Design Automation Tools	4
3.	EC656	Design of ASICs	4
4.		Programme Elective IV	3
5.		Programme Elective V	3
6.		Programme Elective VI	3
7.	EC658	Analog IC Design Laboratory	2
8.	EC660	ASIC – CAD Laboratory	2
		Total	**25**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
EC699	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Code	Course of Study	Credit
EC697	Project Work (Phase I)	12

SEMESTER IV

Code	Course of Study	Credit
EC698	Project Work (Phase II)	12

In addition to the Programme electives, students have to do 2 Open Electives offered by the institute or PG-level Online Courses from NPTEL (Can be completed from Semester I-IV) as given in the list. If students opt to do open electives from institute, they can choose open electives offered by M.Tech.- Communication Systems or other departments.

OPEN ELECTIVES (OE) / ONLINE COURSE (OC) (To be completed between I to IV semester)

Sl. No.	Code	Course of Study	Credit
1.		Open Elective I / Online Course	3
2.		Open Elective II / Online Course	3

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course of Study	Credit
1.	MA617	Graph Theory and Discrete Optimization	3
2.	EC612	DSP Architecture	3
3.	EC613	High Speed Communication Networks	3
4.	EC615	Digital Image Processing	3
5.	EC616	RF MEMS	3
6.	EC626	Bio MEMS	3
7.	EC628	Pattern Recognition and Computational Intelligence	3
8.	EC632	Foundations of Artificial Intelligence	3
9.	EC635	Electromagnetic Interference and Compatibility	3
10.	EC636	Computer Vision	3
11.	EC637	Natural Language Processing	3
12.	EC638	Optimization Methods in Machine Learning	3
13.	EC639	Hardware for Deep Learning	3
14.	EC640	Image and Video Processing	3
15.	EC641	Automated Test Engineering for Electronics	3
16.	EC662	Modelling and Synthesis with Verilog HDL	3
17.	EC663	Optimizations of Digital Signal Processing Structures for VLSI	3
18.	EC664	Cognitive Radio	3
19.	EC665	VLSI Process Technology	3
20.	EC666	Analysis and Design of Digital Systems using VHDL	3
21.	EC667	Advanced Computer Architecture	3
22.	EC668	Low Power VLSI Systems	3
23.	EC669	VLSI Digital Signal Processing Systems	3
24.	EC670	Asynchronous System Design	3
25.	EC671	Advanced Digital Design	3
26.	EC672	Physical Design Automation	3
27.	EC673	Mixed - Signal Circuit Design	3

28.	EC674	Integrated Circuits for Wireless Communication	3
29.	EC675	Functional Verification using Hardware Verification Languages	3
30.	EC676	Testability of Analog / Mixed-Signal Circuits and High Speed Circuit Design	3
31.	EC677	High Speed System Design	3
32.	EC678	Modelling of Solid-State Devices	3
33.	EC679	Nano-Scale Devices: Modelling and circuits	3
34.	EC680	Embedded System Design	3
35.	EC681	Internet of Things	3
36.	EC682	Design and Testing of Advanced Semiconductor Memories	3
37.	EC683	FPGA Based System Design	3
38.	EC684	Bio-Medical CMOS ICs	3
39.	EC685	On-chip Antenna Design	3
40.	EC687	VLSI SoC Design and Verification	3
41.	EC688	VLSI Broadband Communication Circuits	3
42.	EC689	High Performance Frequency Synthesizers	3
43.	EC690	Analog Power Integrated Circuit Design	3

LIST OF NPTEL ONLINE COURSES

Sl. No.	Code	Course of Study	Credit
1.	EC801	Fundamentals of MIMO Wireless Communications	3
2.	EC802	Evolution of Air Interface Towards 5G	3
3.	EC803	Introduction to Industry 4.0 and Industrial Internet of Things	3
4.	EC804	VLSI Data Conversion Circuits	3
5.	EC805	Introduction to Time-Varying Electrical Networks	3
6.	EC806	Power Management Integrated Circuits	3
7.	EC807	Optical Wireless Communications beyond 5G Networks and IOT	3
8.	EC808	5G Wireless Standard Design	3

LIST OF OPEN ELECTIVES (Offered to M.Tech. Communication Systems and Other Branches)

Sl. No.	Code	Course of Study	Credit
1.	EC701	Frequency Synthesizer Circuits	3
2.	EC702	Power Management Circuits	3

M.Tech. (ENERGY ENGINEERING)

The total credits required for completing the M.Tech. Programme in Energy Engineering is 80.

CURRICULUM

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	EN601	Renewable Energy Technologies-I	4
2.	EN603	Energy Data Analytics	4
3.	EN605	Smart Energy Systems	4
4.		Programme Elective I	3
5.		Programme Elective II	3
6.		Programme Elective III / Online (NPTEL)	3
7.	EN607	Energy and Material-Characterization Laboratory	2
8.	EN609	Smart Energy Systems Laboratory	2
		Total	**25**

SEMESTER II

Sl. No.	Code	Course of Study	Credit
1.	EN602	Renewable Energy Technologies-II	4
2.	EN604	Artificial Intelligence (AI) in Energy Systems	4
3.	EN606	Energy Audit and Management	4
4.		Programme Elective IV	3
5.		Programme Elective V	3
6.		Programme Elective VI / Online (NPTEL)	3
7.	EN608	Energy Modelling, Simulation and Data Analytics Laboratory	2
		Total	**23**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
EN671	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Code	Course of Study	Credit
EN673	Project Work (Phase I)	12

SEMESTER IV

Code	Course of Study	Credit
EN674	Project Work (Phase II)	12

OPEN ELECTIVES (OE) / ONLINE COURSE (OC) (To be completed between I to IV semester)

Sl. No.	Code	Course of Study	Credit
1.		Open Elective I / Online Course	3
2.		Open Elective II / Online Course	3

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course of Study	Credit
1.	EN610	Direct Energy Conversion	3
2.	EN611	Environmental Engineering and PollutionControl	3
3.	EN612	Energy Storage Systems	3
4.	EN613	Advanced Fuel Technologies	3
5.	EN614	Hydrogen Energy	3
6.	EN615	Professional Skill Development	3
7.	EN616	Computational Fluid Dynamics	3
8.	EN617	Foundation for Energy Engineering	3
9.	EN618	Energy Systems Modeling and Analysis	3
10.	EN619	Air Conditioning and Refrigeration	3
11.	EN620	Energy Efficient Buildings	3
12.	EN621	Thermal Engineering	3
13.	EN622	Optimum Utilization of Heat and Power	3
14.	EN623	Power Plant Technology	3
15.	EN624	Power Generation and Systems Planning	3
16.	EN625	Electrical Energy Technology	3
17.	EN626	Applied Thermodynamics	3
18.	EN627	Power Generation, Transmission and Distribution	3

19.	EN628	Advanced Heat Transfer	3
20.	EN629	Power Systems Planning and Operation	3
21.	EN630	Advanced Thermodynamics	3
22.	EN631	Instrumentation and Control in Energy Systems	3
23.	EN632	Advanced Reaction Engineering	3
24.	EN633	Computational Heat Transfer	3
25.	EN634	Batteries and Fuel Cells	3
26.	EN635	Environmental Impact Assessment	3
27.	EN636	Smart Grid Systems	3
28.	EN637	Nuclear Reactor Theory	3
29.	EN638	Optimization Techniques	3
30.	EN639	Power Sources for Electric Vehicles	3
31.	EN640	IPR, Startup and Entrepreneurship	3
32.	EN641	Carbon Sequestration Techniques	3
33.	EN642	Design of Heat Transfers Equipments	3
34.	EN643	Waste Management and Energy Generation Technology	3
35.	EN644	Blockchain Technologies	3
36.	EN645	Heat and Mass Transfer	3

OPEN ELECTIVE (OE)

Sl. No.	Code	Course of Study	Credit
1.	EN610	Direct Energy Conversion	3
2.	EN611	Environmental Engineering and PollutionControl	3
3.	EN612	Energy Storage Systems	3
4.	EN613	Advanced Fuel Technologies	3
5.	EN614	Hydrogen Energy	3
6.	EN615	Professional Skill Development	3
7.	EN616	Computational Fluid Dynamics	3
8.	EN617	Foundation for Energy Engineering	3
9.	EN618	Energy Systems Modeling and Analysis	3
10.	EN619	Air Conditioning and Refrigeration	3

11.	EN620	Energy Efficient Buildings	3
12.	EN621	Thermal Engineering	3
13.	EN622	Optimum Utilization of Heat and Power	3
14.	EN623	Power Plant Technology	3
15.	EN624	Power Generation and Systems Planning	3
16.	EN625	Electrical Energy Technology	3
17.	EN626	Applied Thermodynamics	3
18.	EN627	Power Generation, Transmission and Distribution	3
19.	EN628	Advanced Heat Transfer	3
20.	EN629	Power Systems Planning and Operation	3
21.	EN630	Advanced Thermodynamics	3
22.	EN631	Instrumentation and Control in Energy Systems	3
23.	EN632	Advanced Reaction Engineering	3
24.	EN633	Computational Heat Transfer	3
25.	EN634	Batteries and Fuel Cells	3
26.	EN635	Environmental Impact Assessment	3
27.	EN636	Smart Grid Systems	3
28.	EN637	Nuclear Reactor Theory	3
29.	EN638	Optimization Techniques	3
30.	EN639	Power Sources for Electric Vehicles	3
31.	EN640	IPR, Startup and Entrepreneurship	3
32.	EN641	Carbon Sequestration Techniques	3
33.	EN642	Design of Heat Transfers Equipments	3
34.	EN643	Waste Management and Energy Generation Technology	3
35.	EN644	Blockchain Technologies	3
36.	EN645	Heat and Mass Transfer	3

MICROCREDITS (MC) (Students can opt 3 courses of 1 credit (4 weeks) each as Microcredits instead of one OE /OC)

Sl. No.	Code	Course of Study	Credit
1.	EN680	Building Energy Management Using IoT	1
2.	EN681	Carbon Markets	1
3.	EN682	Carbon Capture and Utilization, Sequestration	1
4.	EN683	Life Cycle Assessment	1
5.	EN684	Decarbonasation of Industry	1
6.	EN685	Safety Management in Electrical Vehicles	1
7.	EN686	Introduction to Block Chain Technologies	1
8.	EN687	Digital Twinning	1

M. Tech. (INDUSTRIAL AUTOMATION)

The total minimum credits required for completing the M. Tech. Programme in Industrial Automation is 80.

CURRICULUM

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	MA623	Applied Mathematics	4
2.	IC601	Measurements in Manufacturing and Process Industries	4
3.	IC603	Industrial Automation Systems	4
4.	IC6XX	Programme Elective I	3
5.	IC6XX	Programme Elective II	3
6.	IC6XX / OC6XX	Programme Elective III / Online (NPTEL)	3
7.	IC605	Instrumentation and Measurement Laboratory	2
8.	IC607	Process Control and Automation Laboratory	2
		Total	**25**

SEMESTER II

Sl. No.	Code	Course of Study	Credit
1.	IC602	Industrial and Data Communications	4
2.	IC604	Electric Drives and Control	4
3.	IC606	Robotics in Industrial Automation	4
4.	IC6XX	Programme Elective IV	3
5.	IC6XX	Programme Elective V	3
6.	IC6XX / OC6XX	Programme Elective VI / Online (NPTEL)	3
7.	IC608	AI and Robotics Laboratory	2
		Total	**23**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
IC611	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Code	Course of Study	Credit
IC609	Project Work (Phase I)	12

SEMESTER IV

Code	Course of Study	Credit
IC610	Project Work (Phase II)	12

ONLINE COURSE (OC) / MICRO CREDIT COURSE (MC) (To be completed between I to III semester)

Sl. No.	Code	Course of Study	Credit
1.	OC6XX / MC6XX	ONLINE COURSE (OC) (1/2/3 credit) MICRO CREDIT COURSE (MC) (1 credit)	6

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course of Study	Credit
1.	IC612	Artificial Intelligence in Industrial Automation	3
2.	IC613	Modeling, Simulation and Analysis of Manufacturing Systems	3
3.	IC614	Industrial Internet of Things	3
4.	IC615	Embedded Systems	3
5.	IC616	Computer Vision and Image Processing	3
6.	IC617	Intelligent Transportation Systems	3
7.	IC618	Wireless Sensor Networks	3
8.	IC619	Fluid Power Systems	3
9.	IC620	Augmented Reality	3
10.	IC621	Advanced Control Systems	3
11.	IC622	Network Control Systems	3
12.	IC623	System Identification	3
13.	IC624	Cyber Security in Industrial Automation	3
14.	IC625	Building and Infrastructure Systems and Automation	3
15.	IC626	Rapid Prototyping	3
16.	IC627	Predictive Analytics	3
17.	IC628	Optimization Techniques	3
18.	IC629	Advanced Sensor Interfacing Circuits	3
19.	IC630	Automation in Financial Technology	3
20.	IC631	Nonlinear Control	3
21.	IC632	Robot Dynamics and Control	3

| 22. | IC633 | Condition Monitoring: Industrial Practices | 3 |
| 23. | IC634 | Modern Optimization Techniques and Algorithms | 3 |

OPEN ELECTIVES (OE)

Sl. No.	Code	Course of Study	Credit
1.	OE612	Artificial Intelligence in Industrial Automation	3
2.	OE613	Modeling, Simulation and Analysis of Manufacturing Systems	3
3.	OE614	Industrial Internet of Things	3
4.	OE615	Embedded Systems	3
5.	OE616	Computer Vision and Image Processing	3
6.	OE617	Intelligent Transportation Systems	3
7.	OE618	Wireless Sensor Networks	3
8.	OE619	Fluid Power Systems	3
9.	OE620	Augmented Reality	3
10.	OE621	Advanced Control Systems	3
11.	OE622	Network Control Systems	3
12.	OE623	System Identification	3
13.	OE624	Cyber Security in Industrial Automation	3
14.	OE625	Building and Infrastructure Systems and Automation	3
15.	OE626	Rapid Prototyping	3
16.	OE627	Predictive Analytics	3
17.	OE628	Optimization Techniques	3
18.	OE629	Advanced Sensor Interfacing Circuits	3
19.	OE630	Automation in Financial Technology	3
20.	OE631	Nonlinear Control	3
21.	OE632	Robot Dynamics and Control	3
22.	OE633	Condition Monitoring: Industrial Practices	3
23.	OE634	Modern Optimization Techniques and Algorithms	3

ONLINE COURSE (OC)
(to be completed within 1st to 3rd semesters)

All the courses (eligible for M.Tech Programme) offered online in SWAYAM portal during the respective session can be considered for the list of online courses (OC) Students can also opt for online courses of 2 credit (8 weeks / 24 hours)

Sl. No.	Code	Course of Study	Credit
1.	OC6XX	Fundamentals of Micro and Nanofabrication	3
2.	OC6XX	Distributed Optimization and Machine Learning	3
3.	OC6XX	Practical Cyber Security for Cyber Security Practitioners	3
4.	OC6XX	Social Innovation in Industry 4.0	3
5.	OC6XX	Industrial Robotics: Theories for Implementation	3
6.	OC6XX	Automation in Manufacturing	3
7.	OC6XX	Fundamentals of Artificial Intelligence	3

MICROCREDITS (MC)
Students can opt 3 courses of {1 credit (4 weeks / 12 hours); 2 credit (8 weeks / 24 hours)} each as microcredits instead of one OE/OC (3 - credit)

Sl. No.	Code	Course of Study	Credit
1.	MC6XX	Equipment Design: Mechanical Aspects	1
2.	MC6XX	Product Design and Development	1
3.	MC6XX	Drone Technology	1
4.	MC6XX	Automobile Technology	1
5.	MC6XX	Python Programming	1

M. Tech. (INDUSTRIAL SAFETY ENGINEERING)

The total minimum credits required for completing the M. Tech. Programme in Industrial Safety Engineering is 80.

CURRICULUM

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	MA611	Probability and Statistics	4
2.	ME651	Safety Management	4
3.	ME652	Occupational Health and Hygiene	4
4.	MEXXX	Program Elective I	4
5.	MEXXX	Program Elective II	3
6.	MEXXX	Program Elective III	3
7.	ME661	Industrial Hygiene and Ergonomics Laboratory	2
		Total	**24**

SEMESTER II

Sl. No.	Code	Course of Study	Credit
1.	ME653	Computer Aided Risk Analysis	4
2.	ME654	Safety in Process Industries	4
3.	ME655	Fire and Explosion: Prevention and Control	4
4.	MEXXX	Program Elective IV	4
5.	MEXXX	Program Elective V	3
6.	MEXXX	Program Elective VI	3
7.	ME662	Industrial Safety Laboratory	2
		Total	**24**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
ME663	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Code	Course of Study	Credit
ME797	Project Work (Phase I)	12

SEMESTER IV

Code	Course of Study	Credit
ME798	Project Work (Phase II)	12

OPEN ELECTIVES (OE) (To be completed between I to IV semester)

Sl. No.	Code	Course of Study	Credit
1.		Open Elective I	3
2.		Open Elective II	3

PROGRAMME ELECTIVES (PE)

PEs with 4 credits

Sl. No.	Code	Course of Study	Credit
1.	ME671	Regulation for Health, Safety and Environment	4
2.	ME672	Safety in Construction and Material Handling	4
3.	ME673	Design of Air Pollution Control Systems	4
4.	ME674	Transport Safety	4
5.	ME675	Safety in Mines	4
6.	ME676	Dock Safety	4

PEs with 3 credits

Sl. No.	Code	Course of Study	Credit
1.	ME677	Safety in Engineering Industry	3
2.	ME678	Environmental Pollution Control	3
3.	ME679	Electrical Safety	3
4.	ME680	Human Factors and Ergonomics	3
5.	ME681	Industrial Noise and Vibration Control	3
6.	ME682	Work Study and Ergonomics	3
7.	ME683	Safety in Textile Industry	3
8.	ME684	Sensitivity Measurements and Evaluation of Energetic Material	3
9.	ME685	Safety in Powder Handling	3
10.	ME686	Nuclear Engineering and Safety	3
11.	ME687	Disaster Management	3
12.	ME688	ISO 45001 and ISO 14001	3
13.	ME689	Safety in Refrigeration and Cryogenics	3
14.	ME690	Biomechanics and Human body vibration	3
15.	ME691	Safety in On and Off Shore Drilling	3

OPEN ELECTIVES (OE)

Sl. No.	Code	Course of Study	Credit
1.	ME689	Safety in Refrigeration and Cryogenics	3
2.	ME690	Biomechanics and Human body vibration	3
3.	ME691	Safety in On and Off Shore Drilling	3

M. Tech. (THERMAL POWER ENGINEERING)

The total minimum credits required for completing the M.Tech. Programme inThermal Power Engineering is 80.

CURRICULUM

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	ME601	Mathematical Methods	4
2.	ME602	Advanced Fluid Mechanics	4
3.	ME603	Advanced Heat Transfer	4
4.		Programme Elective I	4
5.		Programme Elective II	3
6.		Programme Elective III / Online (NPTEL)	3
7.	ME607	Advanced Thermal Engineering Laboratory	2
		Total	**24**

SEMESTER II

Sl. No	Code	Course of Study	Credit
1.	ME604	Fuels Combustion and Emission Control	4
2.	ME605	Heat Transfer Equipment Design	4
3.	ME606	Analysis and Design of Pressure Vessels	4
4.		Programme Elective IV	4
5.		Programme Elective V	3
6.		Programme Elective VI / Online (NPTEL)	3
7.	ME608	Advanced Engineering Simulation Laboratory	2
		Total	**24**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
ME609	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Code	Course of Study	Credit
ME747	Project Work (Phase I)	12

SEMESTER IV

Code	Course of Study	Credit
ME748	Project Work (Phase II)	12

OPEN ELECTIVES (OE) (To be completed between I to IV semester)

Sl. No.	Code	Course of Study	Credit
1.		Open Elective I	3
2.		Open Elective II	3

PROGRAMME ELECTIVES (PE)

Program Elective Course with 4 credits

Sl. No.	Code	Course of Study	Credit
1.	ME611	Fluid Mechanics of Turbomachines	4
2.	ME612	Computational Fluid Dynamics	4
3.	ME613	Finite Element Method in Heat Transfer Analysis	4
4.	ME614	Mechanical Shock and Vibration	4
5.	ME615	Thermal Piping Analysis and Design	4

Program Elective Course with 3 credits

Sl. No.	Code	Course of Study	Credit
1.	ME621	Energy Conservation, Management, and Audit	3
2.	ME622	Boiler Auxiliaries and Performance Evaluation	3
3.	ME623	Safety in Thermal and Nuclear Power Plants	3
4.	ME624	Boiler Production Technology	3
5.	ME625	Installation, Testing and Operation of Boilers	3
6.	ME626	Cogeneration and Waste Heat Recovery Systems	3
7.	ME627	Advanced IC Engines	3
8.	ME628	Power Plant Instrumentation	3
9.	ME629	Refrigeration and Cryogenics	3
10.	ME630	Analysis of Thermal Power Cycles	3
11.	ME631	Design and Optimization of Thermal Energy Systems	3
12.	ME632	Hydrogen Production, Handling and Storage	3
13.	ME633	Industrial Ventilation and Air-conditioning Systems	3

OPEN ELECTIVES (OE)

Sl. No.	Code	Course of Study	Credit
1.	ME631	Design and Optimization of Thermal Energy Systems	3
2.	ME632	Hydrogen Production, Handling and Storage	3
3.	ME633	Industrial Ventilation and Air-conditioning Systems	3

M.Tech. (WELDING ENGINEERING)

The total minimum credits required for completing the M.Tech. Programme in Welding Engineering is 80.

CURRICULUM

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	MA613	Engineering Mathematics	4
2.	MT601	Design of Weldments	4
3.	MT603	Joining of Materials – I	4
4.		Programme Elective I	4
5.		Programme Elective II	3
6.		Programme Elective III	3
7.	MT609	Metallography, Materials Testing and Characterization Laboratory	2
		Total	**24**

SEMESTER II

Sl. No.	Code	Course of Study	Credit
1.	MT602	Welding Metallurgy	4
2.	MT604	Welding Codes and Standards	4
3.	MT606	Joining of Materials – II	4
4.		Programme Elective IV	4
5.		Programme Elective V	3
6.		Programme Elective VI	3
7.	MT610	Welding Laboratory	2
		Total	**24**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
MT612	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Code	Course of Study	Credit
MT613	Project Work (Phase I)	12

SEMESTER IV

Code	Course of Study	Credit
MT614	Project Work (Phase II)	12

OPEN ELECTIVES (OE) / ONLINE COURSE (OC) (To be completed between I to IV semester)

Sl. No.	Code	Course of Study	Credit
1.	MTXXX	Open Elective I / Online Course	3
2.	MTXXX	Open Elective II / Online Course	3

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course of Study	Credit
1.	MT661	Physical Metallurgy	4
2.	MT662	Testing, Inspection and Characterization	4
3.	MT663	Mechanical Behaviour of Materials	3
4.	MT664	Corrosion Engineering	3
5.	MT665	Computational Techniques	3
6.	MT666	Metallurgical Failure Analyses	3
7.	MT667	Surface Engineering	3
8.	MT668	Modelling in Materials Processing	3
9.	MT669	Automaotive Materials	3
10.	MT670	Nanomaterials and Technology	3
11.	MT671	Advanced Electrochemical Techniques	3
12.	MT672	Developments in Iron Making and Steel Making	3
13.	MT673	Additive Manufacturing	3
14.	MT674	Phase Transformations	3
15.	MT675	Crystallography	3
16.	MT676	Particulate Technology	3
17.	MT677	Process Modeling	3
18.	MT678	Advanced Material Characterization Techniques	3
19.	MT679	Non-Destructive Testing	3
PROGRAMME SPECIFIC ELECTIVES			
20.	MT701	Electrical Aspects of Welding	3
21.	MT702	Welding Application Technology	3
22.	MT703	Repair Welding and Reclamation	3
23.	MT704	Life Assessment of Welded Structure	3
24.	MT705	Welding Economics and Management	3
OPEN ELECTIVES			
25.	MT761	Design and Selection of Materials	3
26.	MT762	Statistical Quality Control and Management	3
27.	MT763	Intellectual Property Rights	3
28.	MT764	Innovation and Product Development	3
29.	MT765	Energy Storage Systems	3
30.	MT766	Artificial Intelligence in Materials Engineering	3
31.	MT767	Molecular Modelling of Materials	3

M.Tech. (MATERIALS SCIENCE AND ENGINEERING)

The total minimum credits required for completing the M.Tech. Programme in Materials Science and Engineering is 80.

CURRICULUM

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	MA613	Engineering Mathematics	4
2.	MT621	Thermodynamics and Kinetics	4
3.	MT623	Electrical, Magnetic and Optical Materials	4
4.		Programme Elective I	4
5.		Programme Elective II	3
6.		Programme Elective III /Online (NPTEL)	3
7.	MT629	Materials Characterisation Laboratory	2
		Total	**24**

SEMESTER II

Sl. No.	Code	Course of Study	Credit
1.	MT622	Ceramic Science and Technology	4
2.	MT624	Polymers and Composites	4
3.	MT626	Metallic Materials	4
4.		Programme Elective IV	4
5.		Programme Elective V	3
6.		Programme Elective VI /Online (NPTEL)	3
7.	MT630	Functional Materials Laboratory	2
		Total	**24**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
MT631	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Code	Course of Study	Credit
MT639	Project Work (Phase I)	12

SEMESTER IV

Code	Course of Study	Credit
MT640	Project Work (Phase II)	12

OPEN ELECTIVES (OE) / ONLINE COURSE (OC) (To be completed between I to IV semester)

Sl. No.	Code	Course of Study	Credit
1.	MTXXX	Open Elective I / Online Course	3
2.	MTXXX	Open Elective II / Online Course	3

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course of Study	Credit
PE courses for all MME M.Tech. specializations			
1.	MT661	Physical Metallurgy	4
2.	MT662	Testing, Inspection and Characterisation	4
3.	MT663	Mechanical Behaviour of Materials	3
4.	MT664	Corrosion Engineering	3
5.	MT665	Computational Techniques	3
6.	MT666	Metallurgical Failure Analyses	3
7.	MT667	Surface Engineering	3
8.	MT668	Modelling in Materials Processing	3
9.	MT669	Automotive Materials	3
10.	MT670	Nanomaterials and Technology	3
11.	MT671	Advanced Electrochemical Techniques	3
12.	MT672	Developments in Iron-Making and Steel-Making	3
13.	MT673	Additive Manufacturing	3
14.	MT674	Phase Transformations	3
15.	MT675	Crystallography	3
16.	MT676	Particulate Technology	3
17.	MT677	Process Modelling	3
18.	MT678	Advanced Material Characterisation Techniques	3
19.	MT679	Non-Destructive Testing	3
PE courses for MSE specialization			
20.	MT721	High-Temperature Materials	3
21.	MT722	Biomaterials	3
22.	MT723	Severe Plastic Deformation	3
23.	MT724	Nuclear Materials	3
24.	MT725	Manufacturing Processes	3
25.	MT726	Structure-Property Relations in Nonferrous Metals	3
26.	MT727	Polymer Processing	3

OPEN ELECTIVES (OE) / ONLINE COURSE (OC) (To be completed between I to IV semester)

Sl. No.	Code	Course of Study	Credit
1.	MT761	Design and Selection of Materials	3
2.	MT762	Statistical Quality Control and Management	3
3.	MT763	Intellectual Property Rights	3
4.	MT764	Innovation and Product Development	3
5.	MT765	Energy Storage Systems	3
6.	MT766	Artificial Intelligence in Materials Engineering	3
7.	MT767	Molecular Modelling of Materials	3

OPEN ELECTIVES (OE)

Sl. No.	Code	Course of Study	Credit
		OE for Specializations other than MSE	
1.	MT721	High-Temperature Materials	3
2.	MT722	Biomaterials	3
3.	MT723	Severe Plastic Deformation	3
4.	MT724	Nuclear Materials	3
5.	MT726	Structure-Property Relations in Nonferrous Metals	3
6.	MT727	Polymer Processing	3

MICROCREDITS (MC) (Students can opt 3 courses of 1 credit (4 weeks) each as microcredits instead of 1 OE/OC)

Sl. No.	Code	Course of Study	Credit
1.			

M.Tech. (INDUSTRIAL METALLURGY)

The total minimum credits required for completing the M.Tech. Programme in Industrial Metallurgy is 80.

CURRICULUM

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	MA613	Engineering Mathematics	4
2.	MT641	Foundry Technology	4
3.	MT643	Welding Technology	4
4.		Programme Elective I	4
5.		Programme Elective II	3
6.		Programme Elective III /Online (NPTEL)	3
7.	MT649	Microstructure Characterization and Material Testing Laboratory	2
		Total	**24**

SEMESTER II

Sl. No.	Code	Course of Study	Credit
1.	MT642	Industrial Heat Treatment	4
2.	MT644	Foundry Metallurgy	4
3.	MT646	Metal Forming	4
4.		Programme Elective IV	4
5.		Programme Elective V	3
6.		Programme Elective VI /Online (NPTEL)	3
7.	MT650	Advanced Materials Processing Laboratory	2
		Total	**24**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
MT656	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Code	Course of Study	Credit
MT657	Project Work (Phase I)	12

SEMESTER IV

Code	Course of Study	Credit
MT658	Project Work (Phase II)	12

OPEN ELECTIVES (OE) (To be completed between I to IV semester)

Sl. No.	Code	Course of Study	Credit
1.		Open Elective I	3
2.		Open Elective II	3

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course of Study	Credit
		PE courses for all three specializations	
1.	MT661	Physical Metallurgy	4
2.	MT662	Testing, Inspection and Characterization	4
3.	MT663	Mechanical Behavior of Materials	3
4.	MT664	Corrosion Engineering	3
5.	MT665	Computational Techniques	3
6.	MT666	Metallurgical Failure Analyses	3
7.	MT667	Surface Engineering	3
8.	MT668	Modelling in Materials Processing	3
9.	MT669	Automotive Materials	3
10.	MT670	Nanomaterials and Technology	3
11.	MT671	Advanced Electrochemical Techniques	3
12.	MT672	Developments in Iron-Making and Steel-Making	3
13.	MT673	Additive Manufacturing	3
14.	MT674	Phase Transformations	3
15.	MT675	Crystallography	3
16.	MT676	Particulate Technology	3
17.	MT677	Process Modeling	3
18.	MT678	Advanced Material Characterization Techniques	3
19.	MT679	Non-Destructive Testing	3
		PE courses for IM specialization	
1.	MT741	Stainless Steel Technology	3
2.	MT742	Design of Castings and Weldments	3
3.	MT743	Advanced Materials Processing	3
4.	MT744	Special Casting Processes	3
5.	MT745	Special Topics in Metal Forming	3

6.	MT746	Thermodynamics of Solidification	3
7.	MT747	Modelling and Simulation for Metal Processing	3

OPEN ELECTIVES (OE) / ONLINE COURSE (OC) (To be completed between I to IV semester)

Sl. No.	Code	Course of Study	Credit
1.	MT761	Design and Selection of Materials	3
2.	MT762	Statistical Quality Control and Management	3
3.	MT763	Intellectual Property Rights	3
4.	MT764	Innovation and Product Development	3
5.	MT765	Energy Storage Systems	3
6.	MT766	Artificial Intelligence in Materials Engineering	3
7.	MT767	Molecular Modeling of Materials	3
OE for MSE and /or WE			
1.	MT741	Stainless Steel Technology	3
2.	MT742	Design of Castings and Weldments	3
3.	MT743	Advanced Materials Processing	3
4.	MT744	Special Casting Processes	3
5.	MT745	Special Topics in Metal Forming	3
6.	MT746	Thermodynamics of Solidification	3
7.	MT747	Modelling and Simulation for Metal Processing	3

M.Tech. (NON-DESTRUCTIVE TESTING)

The total minimum credits required for completing the M.Tech. Programme in Non-Destructive Testing is 80.

CURRICULUM

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	PH601	Surface NDE Methods	4
2.	PH603	Ultrasonic Testing	4
3.	PH606	Fabrication Technology	4
4.		Programme Elective I	3
5.		Programme Elective II	3
6.		Programme Elective III	3
7.	PH607	Conventional NDE Laboratory	2
		Total	**23**

SEMESTER II

Sl. No.	Code	Course of Study	Credit
1.	PH602	Advanced NDE Techniques	4
2.	PH604	Advanced Ultrasonic Techniques	4
3.	PH605	Radiographic Testing and Radiation Safety	4
4.		Programme Elective IV	3
5.		Programme Elective V	3
6.		Programme Elective VI	3
7.	PH608	Advanced NDE Laboratory and Fieldwork	2
8.	PH622	Radiography and Computational Laboratory	2
		Total	**25**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
PH621	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Code	Course of Study	Credit
PH609	Project Work (Phase I)	12

SEMESTER IV

Code	Course of Study	Credit
PH610	Project Work (Phase II)	12

OPEN ELECTIVES (OE) / ONLINE COURSE (OC) (To be completed between I to IV semester)

Sl. No.	Code	Course of Study	Credit
1.		Open Elective I / Online Course [#]	3
2.		Open Elective II / Online Course [*, #]	3

* A Student may register for one 2-credit course and one 1-credit course instead of one 3 credit course.

\# Every semester, a list of **approved** online courses will be made available to the students to register.

PROGRAMME ELECTIVES (PE) *

Sl. No.	Code	Course of Study	Credit
1.	PH611	Digital Signal and Image Processing	3
2.	PH613	Basics of Engineering Materials	3
3.	PH615	Material Characterization Techniques	3
4.	PH617	Composite Technology	3
5.	PH619	Electrical, Magnetic and Optoelectronic Materials	3
6.	PH612	Digital Radiography and Computed Tomography	3
7.	PH614	Fracture Mechanics and Failures of Materials	3
8.	PH616	Probability, Statistics, Quality and Reliability	3
9.	PH618	Introduction to Data Analytics	3
10.	PH620	Neutron Radiography	3
11.	PH680	Computational Techniques	3
12.	PH685	Sensors And Transducers	3
13.	PH687	Physics and Technology of Thin Films	3

* Electives are not limited to the given list. Courses from other PG Programmes can also be chosen as subjects of study. The courses will be offered based on the availability of the faculty concerned.

OPEN ELECTIVES (OE)

Sl. No.	Code	Course of Study	Credit
1.	PH613	Basics of Engineering Materials	3
2.	PH618	Introduction to Data Analytics	3
3.	PH680	Computational Technique	3

M.Tech. (MANUFACTURING TECHNOLOGY)

The total minimum credits required for completing the M.Tech. Programme in Manufacturing Technology is 80.

CURRICULUM

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	PR601	Machining Science and Technology	4
2.	PR603	Advanced Forming Technology	4
3.	PR605	Manufacturing Management	4
4.		Programme Elective I	3
5.		Programme Elective II	3
6.		Programme Elective III / Online (NPTEL)	3
7.	PR607	Advanced Material Processing Laboratory	2
		Total	**23**

SEMESTER II

Sl. No.	Code	Course of Study	Credit
1.	PR602	Welding and Additive Manufacturing	4
2.	PR604	Advanced Tooling and Automated Inspection	4
3.	PR606	Production Automation and CNC Technology	4
4.		Programme Elective IV	3
5.		Programme Elective V	3
6.		Programme Elective VI / Online (NPTEL)	3
7.	PR608	Automation and CIM Laboratory	2
8.	PR610	Process Modelling and Additive Manufacturing Laboratory	2
		Total	**25**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
PR644	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Code	Course of Study	Credit
PR645	Project Work (Phase I)	12

SEMESTER IV

Code	Course of Study	Credit
PR646	Project Work (Phase II)	12

OPEN ELECTIVES (OE) / ONLINE COURSE (OC) (To be completed between I to IV semester)

Sl. No.	Code	Course of Study	Credit
1.		Open Elective I / Online Course	3
2.		Open Elective II / Online Course	3
Online courses shall be dynamically updated based on student request and due approval through circulation.			

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course of Study	Credit
1.	PR611	Modeling of Manufacturing Processes	3
2.	PR612	Advances in Polymer Matrix Composites	3
3.	PR613	Heat Treatment Processes	3
4.	PR614	Industrial Welding Applications	3
5.	PR615	Laser Material Processing	3
6.	PR616	Machine Tool Technology	3
7.	PR617	Manufacturing of Non-metallic Products	3
8.	PR618	Mechanical Behaviour of Materials	3
9.	PR619	Mechanics of Composite Materials	3
10.	PR620	Non-Destructive Testing	3
11.	PR621	Smart Materials and MEMS	3
12.	PR622	Surface Engineering	3
13.	PR623	Tribology	3
14.	PR624	Friction Materials	3
15.	PR625	Advanced Casting Processes	3
16.	PR626	Computational Methods in Manufacturing	3
17.	PR627	Additive Manufacturing	3

18.	PR628	Micro/Nano Manufacturing	3
19.	PR629	Design for Additive Manufacturing	3
20.	PR630	Computer Aided Design and Manufacturing	3
21.	PR631	Control of Manufacturing Processes	3
22.	PR632	Design for Manufacture	3
23.	PR633	Manufacturing Automation and Mechatronics	3
24.	PR634	Product Design and Development	3
25.	PR635	Robotics	3
26.	PR636	Terotechnology	3
27.	PR637	Tolerance Technology	3
28.	PR638	Modeling, Simulation and Analysis	3
29.	PR639	Supply Chain Management	3
30.	PR640	Automation and Control	3
31.	PR641	Data Science for Manufacturing	3
32.	PR642	Condition Monitoring of Machine	3
33.	PR643	Human Machine Interaction for Manufacturing	3

OPEN ELECTIVES (OE)

Sl. No.	Code	Course of Study	Credit
1.	PR628	Micro/Nano Manufacturing	3
2.	PR634	Product Design and Development	3
3.	PR635	Robotics	3
4.	PR641	Data Science for Manufacturing	3
5.	PR642	Condition Monitoring of Machine	3
6.	PR643	Human Machine Interaction for Manufacturing	3
7.	PR675	Financial Management	3

MICROCREDITS (MC) (Students can opt 3 courses of 1 credit (4 weeks) each as microcredits instead of 1 OE/OC)

Sl. No.	Code	Course of Study	Credit
1.		Microcredit courses shall be dynamically updated based on student request and due approval through circulation	

M.Tech. (INDUSTRIAL ENGINEERING AND MANAGEMENT)

The total minimum credits required for completing the M.Tech. Programme in Industrial Engineering and Management is 80.

CURRICULUM

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	PR651	Data Analytics	4
2.	PR652	Modeling, Simulation and Analysis	4
3.	PR653	Analysis and Control of Manufacturing Systems	4
4.		Programme Elective I	3
5.		Programme Elective II	3
6.		Programme Elective III / Online (NPTEL)	3
7.	PR657	Data Analytics Laboratory	2
8.	PR658	Simulation Laboratory	2
		Total	**25**

SEMESTER II

Sl. No.	Code	Course of Study	Credit
1.	PR654	Advanced Operations Research	4
2.	PR655	Project Management	4
3.	PR656	Supply Chain Management	4
4.		Programme Elective IV	3
5.		Programme Elective V	3
6.		Programme Elective VI / Online (NPTEL)	3
7.	PR659	Supply Chain Management Laboratory	2
		Total	**23**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
PR660	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Code	Course of Study	Credit
PR690	Project Work (Phase I)	12

SEMESTER IV

Code	Course of Study	Credit
PR691	Project Work (Phase II)	12

OPEN ELECTIVES (OE) / ONLINE COURSE (OC) (To be completed between I to IV semester)

Sl. No.	Code	Course of Study	Credit
1.		Open Elective I / Online Course	3
2.		Open Elective II / Online Course	3

*Online courses shall be dynamically updated based on the students request and due approvalthrough circulation.

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course of Study	Credit
		INDUSTRIAL ENGINEERING STREAM	
1.	PR661	Industrial Engineering Economic Analysis	3
2.	PR662	Intelligent Manufacturing Systems	3
3.	PR663	Research Methodology	3
4.	PR664	Design and Analysis of Experiments	3
5.	PR665	Lean and Agile Manufacturing	3
6.	PR666	Facilities Planning and Design	3
7.	PR667	Production Management Systems	3
8.	PR668	Industry 4.0 and Cloud Manufacturing	3
9.	PR669	Work Design and Ergonomics	3
10.	PR670	Sustainable Manufacturing	3
11.	PR671	Quality and Reliability Engineering	3
12.	PR672	Value Engineering	3
13.	PR673	Cost Measurement and Productivity Measurement	3
		MANAGEMENT STREAM	
1.	PR674	Industrial Engineering and Productivity Management	3

2.	PR675	Financial Management	3
3.	PR676	Marketing Management	3
4.	PR677	Total Quality Management and Six Sigma	3
5.	PR678	Human Resource Management	3
6.	PR679	Product Life Cycle Management	3
7.	PR680	Technology Management	3
8.	PR681	Advanced Optimization Techniques	3
9.	PR682	Product Design and Development	3
10.	PR683	E-waste Assessment and Management	3
INDUSTRIAL INFORMATION SYSTEM STREAM			
1.	PR684	Enterprise Resource Planning	3
2.	PR685	Decision Support Systems	3
3.	PR686	Knowledge Management	3
4.	PR687	Multi-Criteria Decision Making Techniques	3
5.	PR688	Intelligent Industrial Systems	3
6.	PR689	Human Machine Interaction for Manufacturing	3

OPEN ELECTIVES (OE)

Sl. No.	Code	Course of Study	Credit
1.	PR669	Work Design and Ergonomics	3
2.	PR670	Sustainable Manufacturing	3
3.	PR675	Financial Management	3
4.	PR680	Technology Management	3
5.	PR682	Product Design and Development	3
6.	PR684	Enterprise Resource Planning	3

MICROCREDITS (MC) (Students can opt 3 courses of 1 credit (4 weeks) each as microcredits instead of 1 OE/OC)

Sl. No.	Code	Course of Study	Credit
1.		Microcredits courses shall be dynamically updated based on the students request and due approval through circulation.	

M.Sc. (CHEMISTRY)

The total minimum credits required for completing the M.Sc. Programme in Chemistry is 80.

CURRICULUM

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	CHPC601	Organic Reaction Mechanisms and Aromaticity	3
2.	CHPC603	Coordination Chemistry	3
3.	CHPC605	Quantum Chemistry and Group Theory	3
4.	CHPC607	Analytical Chemistry	3
5.	CHPC609	Theory of Spectroscopy and Molecular Excitons	3
6.		Program Elective I / *Online courses	3
7.	CHLR601	Inorganic and Analytical Chemistry Laboratory	2
		Total	**20**

SEMESTER II

Sl. No.	Code	Course of Study	Credit
1.	CHPC602	Stereochemistry, Photochemistry, Pericyclic and Rearrangement Reactions	3
2.	CHPC604	Organometallic Chemistry and Inorganic Spectroscopy	3
3.	CHPC606	Rates and Energetics of Chemical Reactions	3
4.	CHPC608	Spectroscopy-Applications in Organic Chemistry	3
5.		Program Elective II / *Online courses	3
6.	CHLR602	Organic Chemistry Laboratory	2
7.	CHLR604	Physical Chemistry and Spectroscopy Laboratory	2
		Total	**19**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
*CHPC611	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

* Evaluation methodology as per senate decision

SEMESTER III

Sl. No.	Code	Course of Study	Credit
1.	CHPC613	Synthetic Organic Chemistry	3
2.	CHPC615	Main Group, Bioinorganic and Nuclear Chemistry	3

3.	CHPC617	Statistical Thermodynamics, Photochemistry, and Surfaces	3
4.	CHPC619	Project Work (Phase I)	12
		Total	**21**

SEMESTER IV

Sl. No.	Code	Course of Study	Credit
1.	CHPC610	Project Work (Phase II)	12
2.		Program Elective III / *Online courses	3
3.		Program Elective IV / *Online courses	3
		Total	**18**

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course of Study	Credit
1.	CHPE601	Catalysis	3
2.	CHPE602	Polymer Chemistry	3
3.	CHPE603	Principles and Applications of Fluorescence Spectroscopy	3
4.	CHPE604	Computational Methods in Chemistry	3
5.	CHPE605	Medicinal Chemistry	3
6.	CHPE606	Interfacial Chemistry and Sonochemistry	3
7.	CHPE607	Nano Science and Technology	3
8.	CHPE608	Lanthanide and Actinide Chemistry	3
9.	CHPE609	Electronic Structure Methods and Modelling	3
10.	CHPE610	Fuel Cells for Stationary and Automotive Applications	3
11.	CHPE611	Natural Products Chemistry	3
12.	CHPE612	Inorganic Rings, Cages and Clusters	3
13.	CHPE613	Advanced Heterocyclic Chemistry	3
14.	CHPE614	Advanced Bioinorganic Chemistry	3
15.	CHPE616	Organometallic Chemistry for Organic Synthesis	3
16.	CHPE618	Environmental Chemistry	3
17.	CHPE620	Biocatalytic Processes in Chemical Industries	3
18.	CHPE622	Photoredox and Electro-Catalysis	3
19.	CHPE624	Multiscale Simulation Methods	3
20.		NPTEL, SWAYAM, Coursera, edX Online courses	3

M.Sc. (COMPUTER SCIENCE)

The total minimum credits required for completing the M.Sc. Programme in Computer Science is 80.

CURRICULUM

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	CAS711	Mathematical Foundations of Computer Sciences	4
2.	CAS713	Computer Organization and Architecture	4
3.	CAS715	Data Structures and Algorithms	3
4.	CAS717	Database Management Systems	3
5.	CAS719	Operating Systems Fundamentals	4
6.	CAS7AX	Programme Elective I	4
7.	CAS701	Data Structures and Algorithms Laboratory using C/C++	2
8.	CAS703	Database Management Systems Laboratory	2
		Total	**26**

SEMESTER II

Sl. No.	Code	Course of Study	Credit
1.	CAS712	Networking Technologies	3
2.	CAS7BX	Programme Elective II	4
3.	CAS7CX	Programme Elective III	4
4.	CAS7DX	Programme Elective IV	3
5.	CAS7EX	Open Elective I	3
6.	CAS7FX	Programme Elective V	3
7.	CAS702	Internet Programming Laboratory	2
		Total	**22**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
CAS748	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Code	Course of Study	Credit
CAS749	Project Work (Phase I)	12

SEMESTER IV

Code	Course of Study	Credit
CAS750	Project Work (Phase II)	12

ONLINE COURSE (OC) (To be completed between I to IV semester)

Sl. No.	Code	Course of Study	Credit
1.		Online Course I	3
2.		Online Course II	3

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course of Study	Credit
		ELECTIVE I	
1.	CAS7A1	Artificial Intelligence	4
2.	CAS7A2	Cryptography	4
3.	CAS7A3	Distributed Computing	4
4.	CAS7A4	Soft Computing Techniques	4
		ELECTIVE II	
5.	CAS7B1	Digital Image Processing	4
6.	CAS7B2	Theory of Computation	4
7.	CAS7B3	Fault Tolerance Systems and Techniques	4
8.	CAS7B4	Mobile Computing	4
		ELECTIVE III	
9.	CAS7C1	GPGPU Programming	4
10.	CAS7C2	Software Engineering	4
11.	CAS7C3	Computer Vision and Pattern Recognition	4
12.	CAS7C4	Web Applications Development	4
		ELECTIVE IV	
13.	CAS7D1	Defensive and Secure Software Development	3
14.	CAS7D2	Software Verification and Validation	3
15.	CAS7D3	Machine Learning and Deep Learning Techniques	3
16.	CAS7D4	Compiler Design	3
		ELECTIVE V	
17.	CAS7E1	Big Data Analytics	3

18.	CAS7E2	Quantum Computing	3
19.	CAS7E3	Mobile Applications Development	3
20.	CAS7E4	Augmented Reality and Virtual Reality	3
ELECTIVE VI			
21.	CAS7F1	Blockchain Technologies	3
22.	CAS7F2	Design Patterns	3
23.	CAS7F3	Internet of Things	3
24.	CAS7F4	Real Time Systems	3

OPEN ELECTIVE (OE) offered by the Department

Sl. No.	Code	Course of Study	Credit
1.	CAS7E1	Big Data Analytics	3

M.Sc. (MATHEMATICS)

The total minimum credits required for completing the M.Sc. Programme in Mathematics is 80.

CURRICULUM

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	MA701	Real Analysis	4
2.	MA702	Linear Algebra	4
3.	MA703	Ordinary Differential Equations	4
4.	MA704	Numerical Analysis	4
5.	MA705	Probability and Statistics	4
6.	MA706	R-Language	2
		Total	**22**

SEMESTER II

Sl. No.	Code	Course of Study	Credit
1.	MA707	Abstract Algebra	4
2.	MA708	Complex Analysis	4
3.	MA709	Topology	4
4.	MA710	Partial Differential Equations	4
5.	MA7**	Program Elective I	3
6.	MA711	Scientific Computing using Python	2
		Total	**21**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
MA716	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

Sl. No.	Code	Course of Study	Credit
1.	MA712	Functional Analysis	4
2.	MA713	Operations Research	4
3.	MA7**	Program Elective II	3
4.	MA7**	Program Elective III	3

5.	MA714	Mathematical Software Laboratory	2
6.	MA715	Project Work (Phase I)	2
		Total	**18**

SEMESTER IV

Sl. No.	Code	Course of Study	Credit
1.	MA7**	Program Elective IV	3
2.	MA717	Project Work (Phase II)	8
		Total	**11**

OPEN ELECTIVES (OE) / ONLINE COURSE (OC)/Program Elective (PE)
(To be completed between I to IV semester)

Sl. No.	Code	Course of Study	Credit
1.		Open Elective I / Online Course/ Program Elective (PE)	6

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course Name
		Semester II
1.	MA721	Integral Transforms
2.	MA722	Graph Theory
3.	MA723	Mathematics of Machine Learning (newly proposed)
		Semester III
1.	MA731	Fluid Dynamics
2.	MA732	Integral Equations and Calculus of Variations
3.	MA733	Measure Theory
4.	MA734	Optimization Techniques
5.	MA735	Stochastic Processes
		Semester IV (6 options are kept since 2-3 PE will be offered in this semester)
6.	MA741	Numerical Solution of Differential Equations
7.	MA742	Operator Theory
8.	MA743	Introduction of Fuzzy Mathematics and its applications
9.	MA744	Introduction to Singularly Perturbed Differential Equations
10.	MA745	Matrix Analysis
11.	MA746	Advanced Partial Differential Equations
		Advanced Electives for Ph.D. coursework
12.	MA751	Nonlinear Programming
13.	MA752	Advanced Fuzzy Mathematics and its Applications
14.	MA753	Matrix Theory and Stochastic Programming

15.	MA754	Advanced Numerical Analysis for Singularly Perturbed Differential Equations
16.	MA755	Bio-rheology
17.	MA756	Advanced Complex Analysis
18.	MA757	Geometric Function Theory
19.	MA758	Approximation Theory
20.	MA759	Convex Analysis
21.	MA760	Graphs and Matrices
22.	MA761	Fitted Mesh and Fitted Operator Methods for Singular Perturbation problems
23.	MA762	Queueing Theory
24.	MA763	Finite Element Methods
25.	MA764	Particulate Processes: Theory and Modelling
26.	MA765	Introduction to Hydrodynamics Stability
27.	MA766	Fixed Point Theory and its Applications
28.	MA767	Advanced Functional Analysis
29.	MA768	Theory and Geometry of Banach Spaces
30.	MA769	Applied Functional Analysis
31.	MA781	Research Methodology in Mathematical Sciences
32.	MA782	Advanced Mathematics

M.Sc. (PHYSICS)

The total minimum credits required for completing the M.Sc. Programme in Physics is 80.

CURRICULUM

SEMESTER I

SI. No.	Code	Course of Study	Credit
1.	PH651	Mathematical Physics	4
2.	PH653	Classical Mechanics	4
3.	PH655	Quantum Mechanics	4
4.		Programme Elective I	3
5.		Programme Elective II	3
6.	PH657	General Physics Laboratory	2
		Total	**20**

SEMESTER II

SI. No.	Code	Course of Study	Credit
1.	PH652	Electromagnetic Theory	4
2.	PH654	Statistical Mechanics	4
3.	PH656	Solid State Physics	4
4.		Programme Elective III	3
5.	PH658	Computational Laboratory	2
6.	PH662	Electronics Laboratory	2
		Total	**19**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
PH697	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

SEMESTER III

SI. No.	Code	Course of Study	Credit
1.	PH661	Project Work (Phase I)	10
2.	PH659	Nuclear And Particle Physics	4
3.	PH675	Atomic And Molecular Spectroscopy	4
		Total	**18**

SEMESTER IV

Sl. No.	Code	Course of Study	Credit
1.	PH660	Project Work (Phase II)	12
2.		Programme Elective IV	3
		Total	**15**

OPEN ELECTIVES (OE) / ONLINE COURSE (OC) (To be completed between I to IV semester)

Sl. No.	Code	Course of Study	Credit
1.		Open Elective I / Online Course [#]	3
2.		Open Elective II / Online Course [*][#]	3

* A student may register for one 2 credit course and one 1 credit course instead of one 3 credit course.

Every semester, a list of approved online courses will be made available for students to register.

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course of Study	Credit
1.	PH611	Digital Signal and Image Processing	3
2.	PH613	Basics of Engineering Materials	3
3.	PH618	Introduction to Data Analytics	3
4.	PH671	Electronics	3
5.	PH672	Instrumentation	3
6.	PH673	Numerical Methods	3
7.	PH674	Nanoscience and Technology	3
8.	PH676	Advanced Mathematical Physics	3
9.	PH677	Waveguides and Modern Optics	3
10.	PH678	Astrophysics and Cosmology	3
11.	PH679	Solar Photovoltaic Technology	3
12.	PH680	Computational Techniques	3
13.	PH681	Advanced Electromagnetic Theory	3
14.	PH682	Non-Destructive Testing	3
15.	PH683	Fiber Optic Sensors	3
16.	PH684	Quantum Electronics and Lasers Applications	3

17.	PH685	Sensors and Transducers	3
18.	PH686	Advanced Statistical Methods and Phase Transition	3
19.	PH687	Physics and Technology of Thin Films	3
20.	PH688	Semiconductor Physics	3
21.	PH689	Magnetic Characterization and Superconducting Materials	3
22.	PH690	Quantum Computation and Information	3
23.	PH691	Micro-Electro-Mechanical Systems	3
24.	PH692	Carbon Nanomaterials and their Applications	3
25.	PH693	Fluid Mechanics and Characteristics of Nanofluids	3
26.	PH694	Advanced Electronic Materials and Devices	3
27.	PH695	Nanophotonics	3

Note: Electives are not limited to the given list. Courses from other PG Programmes can also be chosen as subjects of study. The courses will be offered based on the availability of the faculty concerned.

MASTER OF COMPUTER APPLICATIONS

The total minimum credits required for completing the MCA Programme is 120.

SEMESTER I

Sl. No.	Code	Course of Study	Credit
1.	CA711	Problem Solving and Programming	3
2.	CA713	Mathematical Foundations of Computer Applications	3
3.	CA715	Digital Logic and Computer Organization	3
4.	CA717	Data Structures and Applications	3
5.	CA719	Operating Systems	4
6.	CA701	Problem Solving Laboratory using Python	2
7.	CA703	Data Structures Laboratory using C	2
		Total	**20**

SEMESTER II

Sl. No.	Code	Course of Study	Credit
1.	CA710	Design and Analysis of Algorithms	3
2.	CA712	Database Management Systems	3
3.	CA714	Probability and Statistical Methods	4
4.	CA716	Object-oriented Programming	4
5.	CA718	Computer Networks	3
6.	CA702	DBMS Laboratory	2
7.	CA704	Computer Networks Laboratory	2
		Total	**21**

SEMESTER III

Sl. No.	Code	Course of Study	Credit
1.	CA721	Machine Learning Techniques	3
2.	CA723	Computational Intelligence	3
3.	CA725	Software Engineering	3
4.	CA727	Accounting and Financial Management	3
5.	CA7A_	Programme Elective I	3
6.	CA705	Machine Learning Laboratory	2
7.	CA707	Business Communication	2
8.	CA709	Computational Intelligence Laboratory	2
		Total	**21**

SEMESTER IV

Sl. No.	Code	Course of Study	Credit
1.	CA720	Deep Learning and Its Applications	3
2.	CA722	Web Technology and Its Applications	4
3.	CA724	Distributed and Cloud Computing	3
4.	CA7A_	Programme Elective II	3
5.	CA7B_	Programme Elective III	3
6.	CA706	Deep Learning Laboratory	2
7.	CA708	Distributed and Cloud Computing Laboratory	2
		Total	**20**

SEMESTER V

Sl. No.	Code	Course of Study	Credit
1.	CA731	Cyber Security	3
2.	CA733	Mobile Applications Development	3
3.	CA735	Organizational Behavior	3
4.	CA7C_	Programme Elective IV	3
5.	CA7D_	Programme Elective V	3
6.	CA70A	Cyber Security Laboratory	2
7.	CA70B	Mobile Applications Development Laboratory	2
8.	CA749	Project Work (Phase I)	2
		Total	**21**

SEMESTER VI

Code	Course of Study	Credit
CA750	Project work (Phase II)	12

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
CA748	Internship / Industrial Training / Academic Attachment (I/A) (6 weeks to 8 weeks)	2

OPEN ELECTIVES (OE) (To be completed between I to IV Semester)

Sl. No.	Code	Course of Study	Credit
1.		Open Elective I	3

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course of Study	Credit
		ELECTIVE I & II	
1.	CA7A1	Data Science	3
2.	CA7A2	Big Data Management	3
3.	CA7A3	Advanced Database Technology	3
4.	CA7A4	Data Mining and Warehousing	3
5.	CA7A5	Marketing Management	3
6.	CA7A6	Business Ethics	3
7.	CA7A7	Business Intelligence	3
		ELECTIVE III	
8.	CA7B1	Software Architecture and Project Management	3
9.	CA7B2	Service Oriented Architecture	3
10.	CA7B3	Agile Technology	3
11.	CA7B4	Modelling and Computer Simulation	3
12.	CA7B5	Block Chain Technology	3
13.	CA7B6	Internet of Things	3
		ELECTIVE IV	
14.	CA7C1	Bioinformatics	3
15.	CA7C2	Evolutionary Computing	3
16.	CA7C3	Image Processing	3
17.	CA7C4	Natural Language Processing	3
18.	CA7C5	DevOps	3
19.	CA7C6	MEAN Stack Development	3
		ELECTIVE V	
20.	CA7D1	Resource Management Techniques	3
21.	CA7D2	Green Computing	3
22.	CA7D3	Mobile Computing	3
23.	CA7D4	Human Computer Interaction	3
24.	CA7D5	Multi-core Programming	3
25.	CA7D6	Social Network Analysis	3
26.	CA7D7	Computer Vision	3

OPEN ELECTIVES (OE)

Sl. No.	Code	Course of Study	Credit
1.	CA7B5	Block Chain Technology	3

MASTER OF BUSINESS ADMINISTRATION

The total minimum credits required for completing the MBA Programme is 80.

TRIMESTER I

Sl. No.	Code	Course of Study	Credit
1.	MB711	Organizational Structure and Design	2
2.	MB712	Legal Aspects of Business	2
3.	MB713	Business Statistics	2
4.	MB714	Financial Reporting and Analysis	2
5.	MB715	Marketing Management - Concepts and Design	2
6.	MB716	Business Communication	2
7.	MB717	Microeconomics	2
8.	MB718	Indian Ethos and Business Ethics	1
		Total	**15**

TRIMESTER II

Sl. No.	Code	Course of Study	Credit
1.	MB721	Managing People in Organization	2
2.	MB722	Information Management	2
3.	MB723	Operations Research	2
4.	MB724	Cost and Management Accounting	2
5.	MB725	Marketing Management - Planning and Control	2
6.	MB726	Macro Economics	2
7.	MB727	Business Intelligence Tools	1
8.	MB728	Design Thinking	1
		Total	**14**

TRIMESTER III

Sl. No.	Code	Course of Study	Credit
1.	MB731	Human Resource Management	2
2.	MB732	Corporate Information Strategy and Management	2
3.	MB733	Production and Operations Management	2
4.	MB734	Financial Management	2
5.	MB735	Business Research Methods	2
6.		Programme Elective - 1	2
7.		Programme Elective - 2	2
		Total	**14**

TRIMESTER IV

Sl. No.	Code	Course of Study	Credit
1.	MB741	Strategic Management	2
2.	MB742	Summer Project*	3
3.		Programme Elective - 3	2
4.		Programme Elective - 4	2
5.		Programme Elective - 5	2
6.		Programme Elective - 6	2
7.		Programme Elective - 7	2
		Total	15

* Students take up summer projects at the end of First year during the vacation for 8 Weeks

TRIMESTER V

Sl. No.	Code	Course of Study	Credit
1.	MB751	Project Management	2
2.	MB752	Strategic Total Quality Management	2
3.		Programme Elective - 8	2
4.		Programme Elective - 9	2
5.		Programme Elective - 10	2
6.		Programme Elective - 11	2
		Total	12

TRIMESTER VI

Sl. No.	Code	Course of Study	Credit
1.	MB761	Entrepreneurship Development	2
2.		Programme Elective - 12	2
3.		Programme Elective - 13	2
4.		Programme Elective - 14	2
5.		Programme Elective - 15	2
		Total	10

PROGRAMME ELECTIVES (PE)

Sl. No.	Code	Course of Study	Credit
		Human Resource Management	
1.	MB811	Talent Management	2
2.	MB812	Training and Development	2
3.	MB813	Interpersonal Effectiveness	2

4.	MB814	Compensation and Benefits	2
5.	MB815	Counselling in the Workplace	2
6.	MB816	Change Management	2
7.	MB817	Strategic Human Resource Development	2
8.	MB818	Negotiation and Conflict Management	2
9.	MB819	Industrial Psychology	2
10.	MB820	HR Analytics	2
11.	MB821	Industrial Relations and Labor Laws	2
12.	MB822	International Human Resource Management	2
13.	MB823	Knowledge Management and Innovation	2
14.	MB824	Managing HR in the Digital Age	2
Marketing Management			
1.	MB831	Strategic Brand Management	2
2.	MB832	Retail Management	2
3.	MB833	Consumer Behaviour	2
4.	MB834	Services Marketing	2
5.	MB835	Customer Relationship Management	2
6.	MB836	Marketing Research	2
7.	MB837	Advertising Management	2
8.	MB838	Sales Management	2
9.	MB839	Strategic Marketing	2
10.	MB840	Marketing Metrics	2
11.	MB841	Analytics for Strategic Market Planning	2
12.	MB842	Analytics for Strategic Market Implementation	2
13.	MB843	Business Market Management	2
14.	MB844	International Marketing	2
15.	MB845	Digital Marketing	2
16.	MB846	Neuro Marketing	2
Financial Management			
1.	MB851	Financial Institution and Services	2
2.	MB852	Investment Security Analysis and Portfolio Management	2
3.	MB853	Financial Derivatives	2

4.	MB854	Investment Banking	2
5.	MB855	Asset Based Financing	2
6.	MB856	Behavioral Finance	2
7.	MB857	Personal Finance	2
8.	MB858	Advanced Corporate Finance	2
9.	MB859	Insurance and Pension Schemes	2
10.	MB860	Strategic cost Accounting and Management control	2
11.	MB861	Tax Laws and Tax Planning	2
12.	MB862	Treasury Management	2
13.	MB863	International Finance	2
14.	MB864	Corporate Valuation	2
15.	MB865	Financial Risk Analytics	2
16.	MB866	Introduction to FinTech	2
Operations Management			
1.	MB871	Production Planning and Control	2
2.	MB872	Logistics Management	2
3.	MB873	Supply Chain Management	2
4.	MB874	Services Operation Management	2
5.	MB875	Advanced Materials Management	2
6.	MB876	Advanced Operation Research	2
7.	MB877	Technology Forecasting	2
8.	MB878	Manufacturing Strategy	2
9.	MB879	Supply Chain Analytics	2
10.	MB880	Lean Manufacturing	2
11.	MB881	Game Theory and Applications	2
Business Analysis and IT Consulting			
1.	MB891	Introduction to Business Analysis and IT Consulting	2
2.	MB892	Business Analysis and ITC in Marketing and Retail	2
3.	MB893	Business Analysis and ITC in Banking and Financial Services	2
4.	MB894	Business Analysis and ITC in Manufacturing	2
5.	MB895	Systems Analysis and Design	2

6.	MB896	Software Project Management	2
7.	MB897	Software Quality Management	2
Business Analytics			
1.	MB911	Introduction to Business Analytics	2
2.	MB912	Basic Data Analytics	2
3.	MB913	Big Data Analytics and Data Science	2
4.	MB914	Advanced Data Analytics	2
5.	MB915	Machine Learning Techniques	2
6.	MB916	Advanced Machine Learning Techniques	2
7.	MB917	Data Mining Techniques	2
8.	MB918	Google Analytics	2
9.	MB919	Text Analytics	2
10.	MB920	Digital Analytics	2
11.	MB921	Data Analytics Software Laboratory	2
General Management			
1.	MB931	Innovation and R&D Management	2
2.	MB932	Technology Management	2
3.	MB933	Course of Independent Study	2
4.	MB934	Intellectual Property Rights Management	2
5.	MB935	Information and Internet Economics	2
6.	MB936	International Business and Strategy	2

MA (ENGLISH)

The total minimum credits required for completing the MA Programme in English is 80.

CURRICULUM

SEMESTER I

SI. No.	Code	Course of Study	Credit
1.	HS603	Language and Linguistics	3
2.	HS605	Indian Writing in English	3
3.	HS607	Renaissance to Neoclassical Literature	3
4.	HS609	Romantic and Victorian Literature	4
5.	HS617	English Language Teaching	4
6.		Programme Elective I	3
		Total	**20**

SEMESTER II

SI. No.	Code	Course of Study	Credit
1.	HS602	Modern Literature	3
2.	HS606	Postmodern Literature	3
3.	HS608	Language through Literature	3
4.	HS610	Reading, Writing and Cognition	3
5.	HS614	English for Specific Purposes	4
6.		Programme Elective II	3
		Total	**19**

SUMMER TERM (Evaluation in the III Semester)

Code	Course of Study	Credit
HS650	Internship / Industrial Training / Academic Attachment (I/A) / Seminar (6 weeks to 8weeks)	2

SEMESTER III

SI. No.	Code	Course of Study	Credit
1.	HS613	Second Language Acquisition	3
2.	HS615	Biolinguistics	3
3.	HS619	Translation Studies	3

4.	HS621	Introduction to Cultural Studies	3
5.	HS623	American Literature	3
6.		Programme Elective III	3
		Total	**18**

SEMESTER IV

SI. No.	Code	Course of Study	Credit
1.	HS604	Research Methodology	3
2.	HS612	Literary Theory and Aesthetics: East and West	3
3.	HS647	Project Work	12
		Total	**18**

OPEN ELECTIVES (OE) / ONLINE COURSE (OC) (To be completed between I to IV semester)

SI. No.	Code	Course of Study	Credit
1.		NPTEL	3

PROGRAMME ELECTIVES (PE)

SI. No.	Code	Course of Study	Credit
1.	HS611	Technical Communication	3
2.	HS616	Language Learning and Teaching	3
3.	HS618	Comics and Graphic Storytelling	3
4.	HS620	Health Humanities	3
5.	HS622	Film Studies	3
6.	HS624	Introduction to Cognitive Sciences	3
7.	HS625	Elements of Literature	3
8.	HS626	Communicative Language Teaching	3
9.	HS627	Critical Discourse Analysis	3
10.	HS628	Journalism and Media Studies	3
11.	HS631	The Neuroscience of Reading	3
12.	HS632	Language and the Human Brain	3
13.	HS633	Learning, Memory and Cognition	3
14.	HS634	Assessment and Teaching of 21st Century Skills Education	3

15.	HS635	Applied Linguistics and Language Pedagogy	3
16.	HS636	Research Methodology in Applied Linguistics	3
17.	HS637	Introduction to Theories for the Humanities	3
18.	HS638	Texts and Contexts in Gender Studies	3
19.	HS639	Visual Cultural Studies Using Film and Media	3
20.	HS640	Introduction to Graphic Medicine	3
21.	HS641	Cultural Politics, Ideologies, and Representation	3
22.	HS642	Artificial Intelligence in English Language Education	3
23.	HS643	Teaching English to Young Learners	3

OPEN ELECTIVES (OE)

Sl. No.	Code	Course of Study	Credit
1.	HS611	Technical Communication	3

MICROCREDITS (MC) (Students can opt 3 courses of 1credit (4weeks) each as microcredits instead of 1 OE/OC)

Sl. No.	Code	Course of Study	Credit
1.			