NATIONAL INSTITUTE OF TECHNOLOGY
TIRUCHIRAPPALLI

CURRICULA

Post Graduate Programmes
(M. Tech., M.Sc., MCA, MBA, M.Arch.)
Students Admitted in 2017-2018

CURRICULA

POST GRADUATE PROGRAMMES

(M.Tech., M.Sc., MCA, MBA, M.Arch.)

Students Admitted in 2017 – 18

ACADEMIC OFFICE
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CREDIT DISTRIBUTION

Sl. No.	Programme	Semester / Trimester (for MBA)						
		1	2	3	4	5	6	Total
1.	Chemical Engineering	20	21	12	12	-	-	65
2.	Process Control and Instrumentation	20	20	12	12	-	-	64
3.	Transportation Engineering and Management	21	21	12	12	-	-	66
4.	Structural Engineering	21	21	12	12	-	-	66
5.	Environmental Engineering	21	21	12	12	-	-	66
6.	Construction Technology and Management	20	20	12	12	-	-	64
7.	Computer Science and Engineering	19	23	12	12	-	-	66
8.	Power Electronics	20	18	12	12	-	-	62
9.	Power Systems	18	20	12	12	-	-	62
10.	Energy Engineering	20	22	12	12	-	-	66
11.	Communication Systems	20	22	12	12	-	-	66
12.	VLSI System	20	22	12	12	-	-	66
13.	Industrial Safety Engineering	20	19	12	12	-	-	63
14.	Thermal Power Engineering	18	19	12	12	-	-	61
15.	Materials Science and Engineering	21	20	12	12	-	-	65
16.	Welding Engineering	21	20	12	12	-	-	65
17.	Industrial Metallurgy	21	20	12	12	-	-	65
18.	Industrial Engineering and Management	23	22	9	12	-	-	66
19.	Manufacturing Technology	23	22	9	12	-	-	66
20.	Non - Destructive Testing	20	20	12	12	-	-	64
21.	Data Analytics	20	20	12	12	-	-	64
22.	Computer Science (M.Sc.)	19	19	19	10	-	-	67
23.	Chemistry (M.Sc.)	19	19	19	10	-	-	67
24.	Physics (M.Sc.)	19	19	17	11	-	-	66
25.	Master of Business Administration	14	15	15	16	12	8	80
26.	Master of Computer Applications	19	19	19	19	19	10	105
27.	Energy Efficient and Sustainable Architecture	18	18	12	12	-	-	60

M. Tech. (CHEMICAL ENGINEERING)

The total minimum credits required for completing the M.Tech. Programme in Chemical Engineering is 65.

SEMESTER I

Code	Course of Study	Credit
CL601	Advanced Process Control	3
CL603	Process Modeling and Simulation	3
CL605	Chemical Reactor Analysis and Design	3
	Elective I	3
	Elective II	3
	Elective III	3
CL607	Chemical Process Modeling and Simulation Laboratory	2
	Total	**20**

SEMESTER II

Code	Course of Study	Credit
CL602	Advances in Fluidization Engineering	3
CL604	Chemical Process Design	4
HS611	Technical Communication	3
	Elective IV	3
	Elective V	3
	Elective VI	3
CL608	Analytical Instrumentation Laboratory	2
	Total	**21**

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

LIST OF ELECTIVES

Code	Course of Study	Credit
CL609	Computational Techniques in Engineering	3
CL610	Advanced Separation Processes	3
CL611	Nano Technology	3
CL612	Scale - Up Methods	3
CL613	Industrial Safety and Risk Management	3
CL614	Bioprocess Engineering	3
CL615	Polymer Dynamics	3
CL616	Multiphase Flow	3
CL617	Design and Analysis of Experiments	3
CL618	Fuel Cell Technology	3
CL619	Pinch Analysis and Heat Exchange Network Design	3
CL620	Industrial Energy Systems	3
CL621	Wastewater and Solid Waste treatment	3
CL622	Computational Fluid Dynamics	3
CL623	Process Optimization	3
CL624	Ecology for Engineers	3
CL625	Advanced Food Process Engineering	3
CL626	Bio - Refinery Engineering	3
CL627	Air Pollution Control Equipment Design	3
CL628	Advanced Transport Phenomena	3
CL629	Electro Chemical Engineering	3
CL630	Electro Chemical Reaction Engineering	3
CL631	Bio - Energy	3
CL632	Process Intensification	3

LIST OF OPEN ELECTIVES

Code	Course of Study	Credit
CL610	Advanced Separation Processes	3
CL623	Process Optimization	3

M. Tech. (PROCESS CONTROL AND INSTRUMENTATION)

The total minimum credits required for completing the M.Tech. Programme in Process Control and Instrumentation is 64.

SEMESTER I

Code	Course of Study	Credit
CL651 A/B	Measurement Systems / Chemical Process Systems	3
CL653	Modern Control Engineering	3
CL601	Advanced Process Control	3
	Elective I	3
	Elective II	3
	Elective III	3
CL655	Process Control and Instrumentation Laboratory	2
	Total	**20**

SEMESTER II

Code	Course of Study	Credit
CL652	Computational Techniques in Control Engineering	3
CL654	Chemical Process Flow - Sheeting	3
CL656	Industrial Instrumentation	3
	Elective IV	3
	Elective V	3
	Elective VI	3
CL658	Extramural Lecture Series	2
	Total	**20**

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

LIST OF ELECTIVES

SEMESTER I

Code	Course of Study	Credit
CL661	Applied Mathematics for Process Control and Instrumentation	3
CL663	Signal Conditioning and Processing	3
CL665	Computer Control of Processes	3
CL667	Analytical Instrumentation	3
CL669	Soft Computing Techniques	3
CL671	Multi Sensor Data Fusion	3
CL673	Advanced Instrumentation and controls in Pulp and Paper Industry	3

SEMESTER II

Code	Course of Study	Credit
CL662	Logic and Distributed Control Systems	3
CL664	Industrial Data Communication Systems	3
CL666	System Identification and Adaptive Control	3
CL668	Micro Electro Mechanical Systems	3
CL670	Optimal Control	3
CL672	Real - Time and Embedded Systems	3
CL674	Image Processing	3

ELECTIVES OFFERED FROM OTHER DEPARTMENTS

Code	Course of Study	Credit
HS611	Technical Communication	3
EN631	Instrumentation and Control in Energy Systems	3
ME657	Safety in Engineering Industry	3
HS601	Human Resource Management	3

LIST OF OPEN ELECTIVES

Code	Course of Study	Credit
CL669	Soft Computing Techniques	3
CL672	Real - Time and Embedded Systems	3

M. Tech. (TRANSPORTATION ENGINEERING AND MANAGEMENT)

The total minimum credits required for completing the M.Tech. Programme in Transportation Engineering and Management is 66.

SEMESTER I

Code	Course of Study	Credit
MA601	Numerical Methods and Applied Statistics	3
CE601	Highway Traffic Analysis and Design	3
CE603	Pavement Materials and Design	4
	Elective I	3
	Elective II	3
	Elective III	3
CE609	Traffic and Pavement Engineering Laboratory	2
	Total	**21**

SEMESTER II

Code	Course of Study	Credit
CE602	Urban Transportation Systems	3
CE604	Transportation Planning	4
CE606	Pavement Construction and Management	3
	Elective IV	3
	Elective V	3
	Elective VI	3
CE610	CAD in Transportation Engineering	2
	Total	**21**

SUMMER TERM

Code	Course of Study	Credit
	Practical Training / Industrial Internship (4 Weeks)	-

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

LIST OF ELECTIVES

Code	Course of Study	Credit
CE611	Traffic Flow Theory	3
CE612	Computational Techniques in Transportation Engineering	3
CE613	Transportation Networks Analysis and Optimization	3
CE614	Transportation Systems Reliability and safety	3
CE615	Transportation Economics	3
CE616	Waterway Transportation	3
CE617	Airport Planning and Design	3
CE618	Advanced Highway Materials	3
CE619	Intelligent Transportation Systems	3
CE620	Advanced Surveying and Cartography	3
CE621	Geospatial Techniques	3
CE622	Ground Improvement Techniques	3
CE623	Bridge Engineering	3
CE624	Urban Planning Techniques and Practice	3

ELECTIVES OFFERED FROM OTHER DEPARTMENTS

Code	Course of Study	Credit
MA608	Resource Management	3
HS601	Human Resource Management	3
HS602	Project Management	3
MB601	Systems Analysis	3

LIST OF OPEN ELECTIVES

Code	Course of Study	Credit
CE619	Intelligent Transportation Systems	3
CE621	Geospatial Techniques	3
CE624	Urban Planning Techniques and Practice	3

M. Tech. (STRUCTURAL ENGINEERING)

The total minimum credits required for completing the M.Tech. Programme in Structural Engineering is 66.

SEMESTER I

Code	Course of Study	Credit
MA602	Applied Mathematics	4
CE651	Theory of Elasticity and Plasticity	3
CE653	Matrix Methods of Structural Analysis	3
	Elective I	3
	Elective II	3
	Elective III	3
CE659	Structural Engineering Laboratory	2
	Total	**21**

SEMESTER II

Code	Course of Study	Credit
CE652	Advanced Steel Structures	3
CE654	Prestressed Concrete Structures	3
CE656	Theory of Plates	4
	Elective IV	3
	Elective V	3
	Elective VI	3
CE660	CAD in Structural Engineering	2
	Seminar	-
	Total	**21**

SUMMER TERM

Code	Course of Study	Credit
	Practical Training / Industrial Internship (4 Weeks)	-

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

LIST OF ELECTIVES

Code	Course of Study	Credit
CE661	Structural Dynamics	3
CE662	Theory of Shells	3
CE663	Stochastic Processes in Structural Mechanics	3
CE664	Random Vibrations and Structural Reliability	3
CE665	Fracture Mechanics	3
CE666	Structural Optimization	3
CE667	Failure Analysis of Structures	3
CE668	Advanced Concrete Structures	3
CE669	Advanced Steel Structures	3
CE670	Advanced Steel and Concrete Composite Structures	3
CE671	Seismic Design of Structures	3
CE672	Prefabricated Structures	3
CE673	Smart Structures and Applications	3
CE674	Finite Element Methods	3
CE675	Design of Tall Buildings	3
CE676	Structures in Disaster Prone areas	3
CE677	Design of Boiler Structures	3
CE678	Structures for Power Plants	3
CE679	Forensic Engineering and Rehabilitation of Structures	3
CE680	Soil Structure Interaction	3
CE681	Advanced Concrete Technology	3
CE682	Special Concrete	3
CE683	Hydraulic Structures	3
CE684	Analysis of Deep Foundation	3
CE685	Health, Safety and Environmental Management (HSE) Practices	3
CE686	Design of Offshore Structures	3

ELECTIVES OFFERED FROM OTHER DEPARTMENTS

Code	Course of Study	Credit
HS601	Human Resource Management	3

LIST OF OPEN ELECTIVES

Code	Course of Study	Credit
CE661	Structural Dynamics	3
CE685	Health, Safety and Environmental Management (HSE) Practices	3

M. Tech. (ENVIRONMENTAL ENGINEERING)

The total credits required for completing the M.Tech. Programme in Environmental Engineering is 66.

SEMESTER I

Code	Course of Study	Credit
MA601	Numerical Methods and Applied Statistics	3
CE701	Environmental Chemistry and Microbiology	3
CE703	Physico - Chemical Process for Water and Wastewater Treatment	4
	Elective I	3
	Elective II	3
	Elective III	3
CE709	Environmental Quality Measurements Laboratory	2
	Total	**21**

SEMESTER II

Code	Course of Study	Credit
CE702	Biological Process Design for Wastewater Treatment	4
CE704	Transport of Water and Wastewater	3
CE706	Air Quality Management	3
	Elective IV	3
	Elective V	3
	Elective VI	3
CE710	Environmental Microbiology and Engineering Laboratory	2
	Total	**21**

SUMMER TERM

Code	Course of Study	Credit
	Practical Training / Industrial Internship (4 Weeks)	-

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

LIST OF ELECTIVES

Code	Course of Study	Credit
CE711	Process Chemistry for Water and Wastewater Treatment	3
CE712	Industrial Wastewater Management	3
CE713	Membrane Technologies for Water and Wastewater Treatment	3
CE714	Solid and Hazardous Waste Management	3
CE715	Biodegradation and Bioremediation Techniques	3
CE716	Environmental Impact Assessment	3
CE717	Ecological and Ecosystems Engineering	
CE718	Environmental Health and Eco Toxicology	3
CE719	Cleaner Production and Environmental Sustainable Management	3
CE720	Modeling of Natural Systems	3
CE721	Groundwater Flow and Contaminant Transport Through Porous Media	3
CE722	Indoor Air Quality	3
CE723	Analytical Methods for Environmental Monitoring	3
CE724	Environmental Biotechnology	3
CE725	Environmental Geotechnology	3
CE726	Environmental Policies and Legislations	3
CE727	Remote sensing and GIS for environmental applications	3
CE728	Environmental Systems Analysis	3
CE729	Environmental Engineering Structures	3

LIST OF OPEN ELECTIVES

Code	Course of Study	Credit
CE719	Cleaner Production and Environmental Sustainable Management	3
CE723	Analytical Methods for Environmental Monitoring	3

M. Tech. (CONSTRUCTION TECHNOLOGY AND MANAGEMENT)

The total credits required for completing the M.Tech. Programme in Construction Technology and Management is 64.

SEMESTER I

Code	Course of Study	Credit
CE751	Construction Planning and Control	3
CE753	Construction Economics and Finance	3
CE755	Contracts and Specifications	3
CE757	Construction Personnel Management	3
	Elective I	3
	Elective II	3
CE759	Construction Materials Laboratory	2
	Total	**20**

SEMESTER II

Code	Course of Study	Credit
CE752	Construction Methods and Equipment	3
CE754	Construction Quality and Safety Management	3
CE756	Organizational Behaviour	3
	Elective III	3
	Elective IV	3
	Elective V	3
CE760	Construction Software Laboratory	2
	Total	**20**

Code	Course of Study	Credit
	Practical Training / Industrial Internship / Mini Project	-

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

LIST OF ELECTIVES

Code	Course of Study	Credit
CE761	Modern Construction Materials	3
CE762	Functional Efficiency of Buildings	3
CE763	Soil Exploration and Field Test	3
CE764	Disaster Mitigation and Management	3
CE765	Offshore Engineering	3
CE766	Port and Harbor Structures	3
CE767	Airport Planning and Design	3
CE768	Welding Technology	3
CE769	Safety in Material Handling at Construction	3
CE770	Non Destructive Evaluation	3
CE771	Design of Material Handling Equipment	3
CE772	Welding safety in construction Environment	3

ELECTIVES OFFERED FROM OTHER DEPARTMENTS / DISCIPLINES

Code	Course of Study	Credit
CE603	Pavement Materials and Design	3
CE621	Geospatial Techniques	3
CE622	Ground Improvement Techniques	3
CE672	Prefabricated Structures	3
CE678	Structures for Power Plants	3
CE679	Forensic Engineering and Rehabilitation of Structures	3
CE680	Soil Structure Interaction	3
CE681	Advanced Concrete Technology	3
CE684	Analysis of Deep Foundation	3
CE702	Biological Process Design for Wastewater Treatment	3
CE703	Physico chemical Process for Water and Wastewater Treatment	3
CE704	Transport of Water and Wastewater	3
CE714	Solid and Hazardous Waste Management	3
CE716	Environmental Impact Assessment	3
EE601	Advanced Power System Analysis	3
EE602	Power System Operation and Control	3
EE604	High Voltage DC Transmission	3
EE606	Flexible AC Transmission System	3
EE611	Power Conversion Techniques	3
EE621	Renewable Power Generation Technologies	3
EE622	Power System Planning and Reliability	3
EE623	Advanced Power System Protection	3
EE624	Modeling and Analysis of Electrical Machines	3

EE625	Power Quality	3
EE630	Smart Grid Technologies	3
EE631	Electrical Systems in Wind Energy	3
EE633	Distributed Generations and Micro - Grids	3
EE635	Energy Auditing and Management	3
EE656	Microcontroller Applications in Power Converters	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 66.

SEMESTER I

Code	Course of Study	Credit
CS601	Advanced Algorithms and Data Structures	3
CS603	Advanced Concepts in Operating Systems	3
CS605	Parallel Computer Architecture	3
	Elective I	3
	Elective II	3
CS607	Advanced Programming Laboratory	2
CS609	Computer System Design Laboratory	2
	Total	**19**

SEMESTER II

Code	Course of Study	Credit
CS602	Mathematical Foundations for Computer Science	3
CS604	Service Oriented Architecture and Web Security	3
CS606	Advanced Database Management System	3
	Elective III	3
	Elective IV	3
CS608	Network Programming Laboratory	2
CS610	Advanced DBMS Laboratory	2
CS648	Seminar	2
CS650	Internship	2
	Total	**23**

SEMESTER III

Code	Course of Study	Credit
CS649	Project Work – Phase I	12

SEMESTER IV

Code	Course of Study	Credit
CS651	Project Work – Phase II	12

LIST OF ELECTIVES

I SEMESTER

Code	Course of Study	Credit
CS611	Advanced Network Principles and Protocols	3
CS613	Design and Analysis of Parallel Algorithms	3
CS615	Digital Forensics	3
CS617	Principles of Cryptography	3
CS619	Computer Graphics and Image Processing	3
CS621	Imaging and Multimedia Systems	3
CS623	Open Source Programming	3

II SEMESTER

Code	Course of Study	Credit
CS612	Distributed Systems	3
CS614	Wireless Sensor Networks	3
CS616	Advanced Digital Design	3
CS618	Real Time Systems	3
CS620	Mobile Network Systems	3
CS622	Network Security	3
CS624	Data Warehousing and Data Mining	3
CS626	Cloud Computing	3

LIST OF OPEN ELECTIVES

Code	Course of Study	Credit
CS611	Advanced Network Principles and Protocols	3
CS617	Principles of Cryptography	3

M. Tech. (POWER ELECTRONICS)

The total credits required for completing the M.Tech. Programme in Power Electronics is 64.

SEMESTER I

Code	Course of Study	Credit
MA603	Advanced Engineering Mathematics	3
EE651	Power Converters	3
EE653	Linear and Non-Linear Systems Theory	3
	Elective I	3
	Elective II	3
	Elective III	3
EE657	Design and Simulation of Power Electronic Circuits Laboratory	2
	Total	**20**

SEMESTER II

Code	Course of Study	Credit
EE652	Switched Mode Power Conversion	3
EE654	Power Electronic Drives	3
EE656	Industrial Control Electronics	3
	Elective IV	3
	Elective V	3
	Elective VI	3
EE658	Power Converters and Drives Laboratory	2
	Total	**20**

SEMESTER III

Code	Course of Study	Credit
EE659	Project Work - Phase I	12

SEMESTER IV

Code	Course of Study	Credit
EE660	Project Work - Phase II	12

LIST OF ELECTIVES

Code	Course of Study	Credit
EE601	Linear and Non-Linear Systems Theory	3
EE602	Power Electronic Drives	3
EE604	Industrial Control Electronics	3
EE661	Flexible AC Transmission System	3
EE662	High Voltage DC Transmission	3
EE663	Microcontroller Applications in Power Converters	3
EE664	Advanced Digital Signal Processing	3
EE665	Advanced Digital System Design	3
EE667	Analysis And Design Of Artificial Neural Networks	3
EE668	Digital Controllers In Power Electronics Applications	3
EE669	Computer Networking	3
EE670	Electrical Distribution Systems	3
EE671	Fuzzy Systems	3
EE672	Transient Over Voltages In Power Systems	3
EE673	Renewable Power Generation Technologies	3
EE674	Power System Planning And Reliability	3
EE675	Modeling And Analysis Of Electrical Machines	3
EE676	Power Quality	3
EE677	Power System Restructuring And Pricing	3
EE678	Computer Relaying And Wide Area Measurement Systems	3
EE679	Swarm Intelligent Techniques	3
EE680	Smart Grid Technologies	3
EE681	Electrical Systems In Wind Energy	3
EE683	Embedded Processors And Controllers	3
EE684	Distributed Generation And Micro-Grids	3
EE685	Control Design Techniques For Power Electronic Systems	3
EE686	Energy Auditing And Management	3
EE687	Electric and Hybrid Vehicles	3
EE688	Principles Of VLSI Design	3
EE689	Advanced Topics in Power Electronics	3
EE690	Design Techniques For SMPS	3
EE691	Energy Storage Systems	3
EE692	Digital Simulation of Power Electronic Systems	3
EE693	PWM Converters and Applications	3
EE694	Embedded System Design	3
EE695	Digital Control Systems	3
EE696	Power System Automation	3

LIST OF OPEN ELECTIVES

Code	Course of Study	Credit
EE671	Fuzzy Systems	3
EE686	Energy Auditing and Management	3

M. Tech. (POWER SYSTEMS)

The total credits required for completing the M.Tech. Programme in Power Systems is 64.

SEMESTER I

Code	Course of Study	Credit
MA603	Advanced Engineering Mathematics	3
EE601	Advanced Power System Analysis	3
EE603	Power Conversion Techniques	3
	Elective I	3
	Elective II	3
	Elective III	3
EE607	Power Conversion Laboratory	2
	Total	**20**

SEMESTER II

Code	Course of Study	Credit
EE602	Power System Operation And Control	3
EE604	Advanced Power System Protection	3
EE606	Power System Stability	3
	Elective IV	3
	Elective V	3
	Elective VI	3
EE608	Power Systems Laboratory	2
	Total	**20**

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

LIST OF ELECTIVES

Code	Course of Study	Credit
EE653	Linear and Non-Linear Systems Theory	3
EE654	Power Electronic Drives	3
EE656	Industrial Control Electronics	3
EE661	Flexible AC Transmission System	3
EE662	High Voltage DC Transmission	3
EE663	Microcontroller Applications in Power Converters	3
EE664	Advanced Digital Signal Processing	3
EE665	Advanced Digital System Design	3
EE667	Analysis And Design Of Artificial Neural Networks	3
EE668	Digital Controllers In Power Electronics Applications	3
EE669	Computer Networking	3
EE670	Electrical Distribution Systems	3
EE671	Fuzzy Systems	3
EE672	Transient Over Voltages In Power Systems	3
EE673	Renewable Power Generation Technologies*	3
EE674	Power System Planning And Reliability	3
EE675	Modeling And Analysis Of Electrical Machines	3
EE676	Power Quality	3
EE677	Power System Restructuring And Pricing	3
EE678	Computer Relaying And Wide Area Measurement Systems	3
EE679	Swarm Intelligent Techniques	3
EE680	Smart Grid Technologies	3
EE681	Electrical Systems In Wind Energy	3
EE683	Embedded Processors And Controllers	3
EE684	Distributed Generation And Micro-Grids*	3
EE685	Control Design Techniques For Power Electronic Systems	3
EE686	Energy Auditing And Management	3
EE687	Electric and Hybrid Vehicles	3
EE688	Principles Of VLSI Design	3
EE695	Digital Control Systems	3
EE696	Power System Automation	3

**Will be offered as an Essential Elective for the benefit of M.Tech. (Power Systems) students*

LIST OF OPEN ELECTIVES

Code	Course of Study	Credit
EE671	Fuzzy Systems	3
EE686	Energy Auditing and Management	3

M.Tech. (ENERGY ENGINEERING)

The total credits required for completing the M.Tech. Programme in Energy Engineering is 66.

SEMESTER I

Code	Course of Study	Credit
EN601	Foundation for energy engineering	3
EN603	Environmental engineering and pollution control	3
EN605	Solar Energy Utilization	3
	Elective I	3
	Elective II	3
	Elective III	3
EN607	Solar and Environmental Engineering Laboratory	1
EN609	Professional Skill Development	1
	Total	**20**

SEMESTER II

Code	Course of Study	Credit
EN602	Bio-Energy Technologies	3
EN604	Computational Fluid Dynamics	3
EN606	Wind Energy and Hydro Power Systems	3
	Elective IV	3
	Elective V	3
	Elective VI – NPTEL / CERTIFIED COURSES	3
EN608	Computational Fluid Dynamics Laboratory	1
EN610	Mini Project	3
	Total	**22**

SEMESTER III

Code	Course of Study	Credit
EN667	Project Work – Phase I	12
EN612	Internship*	-
	Total	**12**

* Students need to undergo an internship for a period of minimum one month in CSIR LABS/ Industries before starting the project work during the vacation of second semester. The outcome of internship will be evaluated (PASS/FAIL) at the starting of third semester.

SEMESTER IV

Code	Course of Study	Credit
EN668	Project Work – Phase II	12

LIST OF ELECTIVES

Electives I, II, III

Code	Course of Study	Credit
EN613	Energy Systems Modeling and Analysis	3
EN615	Fuels and Combustion Technology	3
EN617	Heat and Mass Transfer	3
EN619	Air Conditioning and Refrigeration	3
EN621	Thermal Engineering	3
EN623	Power Plant Technology	3
EN625	Electrical Energy Technology	3
EN627	Power Generation, Transmission and Distribution	3
EN629	Power Systems Planning and Operation	3
EN631	Instrumentation and Control in Energy Systems	3

Electives IV, V and VI

Code	Course of Study	Credit
EN614	Batteries and Fuel Cells	3
EN616	Design of Heat Transfer Equipments	3
EN618	Direct Energy Conversion	3
EN620	Energy Efficient Buildings	3
EN622	Optimum Utilization of Heat and Power	3
EN624	Power Generation and Systems Planning	3
EN626	Renewable Power Generation Sources	3
EN646	Wind Energy and Hydro Power Systems	3

RESERVED ELECTIVES

Code	Course of Study	Credit
EN628	Advanced Heat Transfer	3
EN630	Advanced Thermodynamics	3
EN632	Advanced Reaction Engineering	3
EN633	Computational Heat Transfer	3
EN634	Energy Resources, Economics and Environment	3
EN635	Environmental Impact Assessment and Economic Analysis	3
EN636	Nuclear, Hydel and OTEC Power Plants	3
EN637	Nuclear Reactor Theory	3
EN638	Optimization	3
EN639	Power Sources for Electric Vehicles	3
EN640	Technology Management	3
EN641	Thermal Environmental Engineering	3
EN642	Unit Operations in Industries	3

EN643	Waste Management and Energy Generation Technologies	3
EN644	Waste to Energy	3
EN645	Instrumentation in Assessment of Water and Wastewater Quality	3
EN811	Principles of Downstream Techniques in Bioprocess	3

LIST OF OPEN ELECTIVES

Code	Course of Study	Credit
EN601	Foundation for energy engineering	3
EN622	Optimum Utilization of Heat and Power	3

M. Tech. (COMMUNICATION SYSTEMS)

The total minimum credits required for completing the M.Tech. programme in Communication Systems is 66.

SEMESTER I

Code	Course of Study	Credit
EC601	Linear Algebra and Stochastic Processes	3
EC603	Advanced Digital Signal Processing	3
EC605	Microwave Circuits	3
	Elective I	3
	Elective II	3
	Elective III	3
EC607	Microwave and MIC Laboratory	2
	Total	**20**

SEMESTER II

Code	Course of Study	Credit
EC602	Advanced Digital Communication	3
EC604	Broadband Wireless Technologies	3
EC606	Optical Communication Systems	3
	Elective IV	3
	Elective V	3
	Elective VI	3
EC608	Fiber Optics and Communication Laboratory	2
EC610	Digital Signal and Image Processing Laboratory	2
	Total	**22**

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

LIST OF ELECTIVES

Code	Course of Study	Credit
EC611	Detection and Estimation	3
EC612	DSP Architecture	3
EC613	High Speed Communication Networks	3
EC614	Spectral Analysis of Signal	3
EC615	Digital Image Processing	3
EC616	RF MEMS	3
EC617	Smart Antennas	3
EC618	Ad Hoc Networks	3
EC619	Wavelet Signal Processing	3
EC620	WDM Optical Networks	3
EC621	Advanced Techniques for Wireless Reception	3
EC622	Error Control Coding	3
EC623	Digital Communication Receivers	3
EC624	Passive MIC	3
EC625	Electromagnetic Metamaterials	3
EC626	Bio MEMS	3
EC627	Substrate Integrated Waveguide Technology: Design and Analysis	3
EC628	Pattern Recognition and Computational Intelligence	3
EC629	Photonic Integrated Circuits	3
EC630	Fiber - Optic Sensors	3
EC631	Optical Wireless Communications	3
EC656	Design of ASICs	3
EC662	Modeling and Synthesis with Verilog HDL	3
EC663	Optimization of Digital Signal Processing Structures for VLSI	3
EC664	Cognitive Radio	3

LIST OF OPEN ELECTIVES

Code	Course of Study	Credit
EC603	Advanced Digital Signal Processing	3
EC613	High Speed Communication Networks	3

M. Tech. (VLSI SYSTEM)

The total minimum credits required for completing the M.Tech. programme in VLSI System is 66.

SEMESTER I

Code	Course of Study	Credit
MA604	Graph Theory and Discrete Optimization	3
EC651	Analog IC Design	3
EC653	Basics of VLSI	3
	Elective I	3
	Elective II	3
	Elective III	3
EC655	HDL Programming Laboratory	2
	Total	**20**

SEMESTER II

Code	Course of Study	Credit
EC652	VLSI System Testing	3
EC654	Electronic Design Automation Tools	3
EC656	Design of ASICs	3
	Elective IV	3
	Elective V	3
	Elective VI	3
EC658	Analog IC Design Laboratory	2
EC660	ASIC – CAD Laboratory	2
	Total	**22**

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

LIST OF ELECTIVES

Code	Course of Study	Credit
EC661	Digital System Design	3
EC662	Modeling and Synthesis with Verilog HDL	3
EC663	Optimization of Digital Signal Processing Structures for VLSI	3
EC664	Cognitive Radio	3
EC665	VLSI Process Technology	3
EC666	Analysis and Design of Digital Systems Using VHDL	3
EC667	Advanced Computer Architecture	3
EC668	Low Power VLSI Circuits	3
EC669	VLSI Digital Signal Processing Systems	3
EC670	Asynchronous System Design	3
EC671	Advanced Digital Design	3
EC672	Physical Design Automation	3
EC673	Mixed - Signal Circuit Design	3
EC674	Electronic Packaging	3
EC675	RF Circuits	3
EC676	Thermal Design of Electronic Equipment	3
EC677	Functional Verification Using Hardware Verification Languages	3
EC678	Testability of Analog / Mixed - Signal Circuits and High Speed Circuits Design	3
EC679	High Speed System Design	3
EC612	DSP Architecture	3
EC613	High Speed Communication Networks	3
EC615	Digital Image Processing	3
EC616	RF MEMS	3
EC626	Bio MEMS	3

LIST OF OPEN ELECTIVES

Code	Course of Study	Credit
EC653	Basics of VLSI	3
EC662	Modeling and Synthesis with Verilog HDL	3

M. Tech. (INDUSTRIAL SAFETY ENGINEERING)

The total minimum credits required for completing the M. Tech. programme in Industrial Safety Engineering is 63.

SEMESTER I

Code	Course of Study	Credit
MA606	Probability and Statistics	4
ME653	Safety Management	3
ME655	Occupational Health and Hygiene	4
ME657	Safety in Engineering Industry	3
ME659	Regulation for Health, Safety and Environment	3
	Elective I	3
	Total	**20**

SEMESTER II

Code	Course of Study	Credit
ME652	Computer Aided Risk Analysis	3
ME654	Safety in Chemical Industry	3
ME656	Fire Engineering and Explosion Control	3
ME658	Industrial Safety Laboratory	1
	Elective II	3
	Elective III	3
	Elective IV	3
	Total	**19**

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

LIST OF ELECTIVES

Code	Course of Study	Credit
ME671	Environmental Pollution Control	3
ME672	Safety in Construction	3
ME673	Human Factors Engineering	3
ME674	Electrical Safety	3
ME675	Safety in Material Handling	3
ME676	Design of Air Pollution Control System	3
ME677	Industrial Noise and Vibration Control	3
ME678	Biomechanics and Human Body Vibration	3
ME679	Work Study and Ergonomics	3
ME680	Transport Safety	3
ME681	Safety in Textile Industry	3
ME682	Safety in Mines	3
ME683	Dock Safety	3
ME684	Sensitivity Measurements and Evaluation of Energetic Material	3
ME685	Safety in Powder Handling	3
ME686	Nuclear Engineering and Safety	3
ME687	Disaster Management	3
ME688	OHSAS 18000 and ISO 14000	3
ME689	Safety in On and Offshore Drilling	3

LIST OF OPEN ELECTIVES

Code	Course of Study	Credit
ME653	Safety Management	3
ME657	Safety in Engineering Industry	3

M. Tech. (THERMAL POWER ENGINEERING)

The total minimum credits required for completing the M.Tech. programme in Thermal Power Engineering is 61.

SEMESTER I

Code	Course of Study	Credit
MA605	Mathematical Methods	3
ME601	Fuels, Combustion and Emission Control	3
ME603	Advanced Fluid Mechanics	3
ME605	Advanced Heat Transfer	3
ME607	Analysis and Design of Pressure Vessels	3
	Elective I	3
	Total	**18**

SEMESTER II

Code	Course of Study	Credit
ME602	Fluid Mechanics of Turbo machines	3
ME604	Heat Transfer Equipment Design	3
ME606	Computational Fluid Dynamics	3
ME608	Computation Fluid Dynamics Laboratory	1
	Elective II	3
	Elective III	3
	Elective IV	3
	Total	**19**

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

LIST OF ELECTIVES

Code	Course of Study	Credit
ME631	Energy Conservation, Management, and Audit	3
ME632	Boiler Auxiliaries and Performance Evaluation	3
ME633	Tribology	3
ME634	Finite Element Method in Heat Transfer Analysis	3
ME635	Analysis of Thermal Power Cycles	3
ME636	Safety in Thermal and Nuclear Power Plants	3
ME637	Installation, Testing and Operation of Boilers	3
ME638	Instrumentation	3
ME639	Boiler Production Technology	3
ME640	Thermal Piping Analysis and Design	3
ME641	Design and Optimisation of Thermal Energy Systems	3
ME642	Cogeneration and Waste Heat Recovery Systems	3
ME643	Advanced IC Engines	3
ME671	Environmental Pollution Control	3

LIST OF OPEN ELECTIVES

Code	Course of Study	Credit
ME603	Advanced Fluid Mechanics	3
ME605	Advanced Heat Transfer	3

M. Tech. (MATERIALS SCIENCE AND ENGINEERING)

The total minimum credits required for completing the M.Tech. Programme in Materials Science and Engineering is 65**.**

SEMESTER I

Code	Course of Study	Credit
MA607	Engineering Mathematics	3
MT651	Electrical, Magnetic and Optical Materials	3
MT653	Thermodynamics and Kinetics	4
	Elective I	3
	Elective II	3
	Elective III	3
MT659	Metallography, Materials Testing and Characterization Laboratory	2
	Total	**21**

SEMESTER II

Code	Course of Study	Credit
MT652	Ceramic Science and Technology	3
MT654	Polymers and Composites	3
MT656	Metallic Materials	3
	Elective IV	3
	Elective V	3
	Elective VI	3
MT660	Advanced Materials Processing Laboratory	2
	Total	**20**

SEMESTER III

Code	Course of Study	Credit
MT697	Project Work – Phase I	12

SEMESTER IV

Code	Course of Study	C
MT698	Project Work – Phase II	12

ELECTIVES

Code	Course of Study	Credit
MT611	Physical Metallurgy (Compulsory for Non Metallurgy Students)	3
MT612	Mechanical Behaviour of Materials	3
MT613	Corrosion Engineering	3
MT614	Design and Selection of Materials	3
MT615	Computational Techniques	3
MT616	Metallurgical Failure Analyses	3
MT617	Surface Engineering	3
MT618	Testing, Inspection and Characterization	3
MT619	Process Modeling	3
MT620	Statistical Quality Control and Management	3
MT621	Particulate Technology	3
MT622	Developments in Iron Making and Steel Making	3
MT623	Intellectual Property Rights	3
MT624	Non Destructive Testing	3
MT661	High Temperature Materials	3
MT662	Polymer Processing	3
MT663	Biomaterials	3
MT664	Nuclear Materials	3
MT665	Manufacturing Processes	3
MT667	Severe Plastic Deformation	3
MT668	Nanomaterials and Technology	3
MT669	Automotive Materials	3
MT670	Advanced Bioceramics	3
MT671	Processing of Aluminium Alloys	3

LIST OF OPEN ELECTIVES

Code	Course of Study	Credit
MT611	Physical Metallurgy	3
MT618	Testing, Inspection and Characterization	3

M.Tech. (WELDING ENGINEERING)

The total minimum credits required for completing the M.Tech. Programme in Welding Engineering is 65.

SEMESTER I

Code	Course of Study	Credit
MA607	Engineering Mathematics	3
MT601	Design of Weldments	4
MT603	Welding Processes - I	3
	Elective I	3
	Elective II	3
	Elective III	3
MT659	Metallography, Materials Testing and Characterization Laboratory	2
	Total	**21**

SEMESTER II

Code	Course of Study	Credit
MT602	Welding Metallurgy	3
MT604	Welding Codes and Standards	3
MT606	Welding Processes - II	3
	Elective IV	3
	Elective V	3
	Elective VI	3
MT610	Welding Laboratory	2
	Total	**20**

SEMESTER III

Code	Course of Study	Credit
MT647	Project Work – Phase I	12

SEMESTER IV

Code	Course of Study	Credit
MT648	Project Work – Phase II	12

LIST OF ELECTIVES

Code	Course of Study	Credit
MT611	Physical Metallurgy (Compulsory for Non Metallurgy Students)	3
MT612	Mechanical Behavior of Materials	3
MT613	Corrosion Engineering	3
MT614	Design and Selection of Materials	3
MT615	Computational Techniques	3
MT616	Metallurgical Failure Analyses	3
MT617	Surface Engineering	3
MT618	Testing, Inspection and Characterization	3
MT619	Process Modeling	3
MT620	Statistical Quality Control and Management	3
MT621	Particulate Technology	3
MT622	Developments in Iron Making and Steel Making	3
MT623	Intellectual Property Rights	3
MT624	Non Destructive Testing	3
MT625	Electrical Aspects of welding	3
MT626	Welding Application Technology	3
MT627	Repair Welding and Reclamation	3
MT628	Life Assessment of Welded Structure	3
MT629	Welding Economics and Management	3

LIST OF OPEN ELECTIVES

Code	Course of Study	Credit
MT601	Design of Weldments	3
MT617	Surface Engineering	3

M.Tech. (INDUSTRIAL METALLURGY)

The total minimum credits required for completing the M.Tech. Programme in Industrial Metallurgy is 65.

SEMESTER I

Code	Course of Study	Credit
MA607	Engineering Mathematics	3
MT701	Foundry Technology	3
MT703	Metal Joining	4
	Elective I	3
	Elective II	3
	Elective III	3
MT659	Metallography, Materials Testing and Characterization Laboratory	2
	Total	**21**

SEMESTER II

Code	Course of Study	Credit
MT702	Industrial Heat Treatment	3
MT704	Foundry Metallurgy	3
MT706	Metal Forming	3
	Elective IV	3
	Elective V	3
	Elective VI	3
MT660	Advanced Materials Processing Laboratory	2
	Total	**20**

SEMESTER III

Code	Course of Study	Credit
MT747	Project Work – Phase I	12

SEMESTER IV

Code	Course of Study	Credit
MT748	Project Work – Phase II	12

ELECTIVES

Code	Course of Study	Credit
MT611	Physical Metallurgy (Compulsory for Non Metallurgy Students)	3
MT612	Mechanical Behaviour of Materials	3
MT613	Corrosion Engineering	3
MT614	Design and Selection of Materials	3
MT615	Computational Techniques	3
MT616	Metallurgical Failure Analyses	3
MT617	Surface Engineering	3
MT618	Testing, Inspection and Characterization	3
MT619	Process Modeling	3
MT620	Statistical Quality Control and Management	3
MT621	Particulate Technology	3
MT622	Developments in Iron Making and Steel Making	3
MT623	Intellectual Property Rights	3
MT624	Non Destructive Testing	3
MT711	Stainless Steel Technology	3
MT712	Design of Castings and Weldments	3
MT713	Advanced Materials Processing	3
MT714	Special Casting Processes	3
MT715	Special Topics in Metal Forming	3
MT716	Advanced Metal Joining Techniques	3

LIST OF OPEN ELECTIVES

Code	Course of Study	Credit
MT701	Foundry Technology	3
MT703	Metal Joining	3

M.Tech. (INDUSTRIAL ENGINEERING AND MANAGEMENT)

The total minimum credits required for completing the M.Tech. programme in Industrial Engineering and Management is 66.

SEMESTER I

Code	Course of Study	Credit
PR651	Data Analytics	4
PR653	Advanced Operations Research	3
PR655	Analysis and Control of Manufacturing Systems	3
	Elective I	3
	Elective II	3
	Elective III	3
PR657	Data Analytics Laboratory	2
PR659	Operations Management Laboratory	2
	Total	**23**

SEMESTER II

Code	Course of Study	Credit
PR652	Quality and Reliability Engineering	3
PR654	Modeling and Simulation	3
PR656	Supply Chain Management	3
	Elective IV	3
	Elective V	3
	Elective VI	3
PR658	Simulation Laboratory	2
PR660	Supply Chain Management Laboratory	2
	Total	**22**

SEMESTER III

Code	Course of Study	Credit
PR691	Project Work – Phase I	9

SEMESTER IV

Code	Course of Study	Credit
PR692	Project Work – Phase II	12

LIST OF ELECTIVES

INDUSTRIAL ENGINEERING STREAM

Code	Course of Study	Credit
PR661	Industrial Engineering and Productive Management	3
PR662	Intelligent Manufacturing Systems	3
PR663	Research Methodology	3
PR664	Design and Analysis of Experiments	3
PR665	Enterprise Resource Planning	3
PR666	Lean and Agile Manufacturing	3
PR667	Facilities Planning and Design	3
PR668	Production Management Systems	3
PR669	Advanced Optimization Techniques	3
PR670	Work Design and Ergonomics	3
PR671	Sustainable Manufacturing	3

MANAGEMENT STREAM

Code	Course of Study	Credit
PR672	Project Management	3
PR673	Financial Management	3
PR 674	Marketing Management	3
PR675	Total Quality Management and Six Sigma	3
PR676	Human Resource Management	3
PR677	Decision Support Systems	3
PR678	Knowledge Management	3
PR679	Product Life Cycle Management	3
PR680	Technology Management	3
PR681	Multi-Criteria Decision Making Techniques	3

Common Electives with M.Tech. Manufacturing Technology

Code	Course of Study	Credit
PR630	Product Design and Development	3

M.Tech. (MANUFACTURING TECHNOLOGY)

The total minimum credits required for completing the M.Tech. programme in Manufacturing Technology is 66.

SEMESTER I

Code	Course of Study	Credit
PR601	Advanced Machining Technology	3
PR603	Flexible Tooling and Automated Inspection	4
PR605	Advanced Welding Process	3
	Elective I	3
	Elective II	3
	Elective III	3
PR607	Advanced Production Processes Laboratory	2
PR609	Advanced Material Processing and Tribology Laboratory	2
	Total	**23**

SEMESTER II

Code	Course of Study	Credit
PR602	Precision Machining	3
PR604	Theory of Plasticity	3
PR606	Flexible Manufacturing Systems	3
	Elective IV	3
	Elective V	3
	Elective VI	3
PR608	Auromation and CIM Laboratory	2
PR610	Process Modeling, Design and Rapid Manufacturing Laboratory	2
	Total	**22**

SEMESTER III

Code	Course of Study	Credit
PR641	Project Work – Phase I	9

SEMESTER IV

Code	Course of Study	Credit
PR642	Project Work – Phase II	12

LIST OF ELECTIVES

MATERIAL AND PROCESS STREAM

Code	Course of Study	Credit
PR611	Modeling of Manufacturing Processes	3
PR612	Advance in Polymer Matrix Composited	3
PR613	Heat Treatment	3
PR614	Industrial Welding Applications	3
PR615	Lasers in Manufacturing	3
PR616	Machine Tool Technology	3
PR617	Manufacturing of Non - Metallic Products	3
PR618	Materials Technology	3
PR619	Mechanical Behaviour of Materials	3
PR620	Mechanics of Composite Materials	3
PR621	Non-Destructive Testing	3
PR622	Smart Materials and MEMS: Design and Fabrication	3
PR623	Surface Engineering	3
PR624	Tribology	3

PRODUCTS AND SYSTEMS STREAM

Code	Course of Study	Credit
PR625	Manufacturing Management	3
PR626	Computer Aided Design and Manufacturing	3
PR627	Control of Manufacturing Processes	3
PR628	Design for Manufacture	3
PR629	Industrial Automation and Mechatronics	3
PR630	Product Design and Development	3
PR631	Product Automation and CNC Technology	3
PR632	Rapid Manufacturing	3
PR633	Robotics	3
PR634	Terotechnology	3
PR635	Tolerance Technology	3

COMMON ELECTIVE WITH M.Tech. INDUSTRIAL ENGINEERING AND MANAGEMENT

Code	Course of Study	Credit
PR654	Modeling and Simulation	3
PR662	Intelligent Manufacturing Systems	3
PR671	Sustainable Manufacturing	3
PR672	Project Management	3
PR679	Product Life Cycle Management	3

M.Tech. (NON-DESTRUCTIVE TESTING)

The total minimum credits required for completing the M. Tech. programme in Non-Destructive Testing is 64.

SEMESTER I

Code	Course of Study	Credit
PH601	Surface NDE Techniques	3
PH603	Ultrasonic Testing	3
PH605	Radiographic Testing and Radiation Safety	3
	Elective I	3
	Elective II	3
	Elective III	3
PH607	Conventional NDE Laboratory	2
	Total	**20**

SEMESTER II

Code	Course of Study	Credit
PH602	Advanced NDE Techniques I	3
PH604	Advanced NDE Techniques II	3
PH606	Field Work	3
	Elective IV	3
	Elective V	3
	Elective VI	3
PH608	Advanced NDE Laboratory	2
	Total	**20**

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

LIST OF ELECTIVES*

SEMESTER I

Code	Course of Study	Credit
PH611	Digital Signal and Image Processing	3
PH613	Basics of Engineering Materials	3
PH615	Material Characterization Techniques	3
PH617	Composite Technology	3
PH679	Sensors and Transducers	3

SEMESTER II

Code	Course of Study	Credit
PH612	Fabrication Technology	3
PH614	Fracture Mechanics and Failures of Materials	3
PH616	Probability, Statistics, Quality and Reliability	3
PH618	Electrical, Magnetic and Optoelectronic Materials	3
PH674	Computational Techniques	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 convenience of the faculty concerned.

LIST OF OPEN ELECTIVES

Code	Course of Study	Credit
PH605	Radiographic Testing and Radiation Safety	3
PH603	Ultrasonic Testing	3

M.Tech. (DATA ANALYTICS)

The total minimum credits required for completing the M. Tech. programme in Non-Destructive Testing is 64.

SEMESTER I

Code	Course of Study	Credit
CA601	Statistical Computing	3
CA603	Big Data Analytics	3
CA605	Machine Learning Techniques	3
	Elective I	3
	Elective II	3
	Elective III	3
CA609	Big Data Management and Data Analytics Lab	2
	Total	**20**

SEMESTER II

Code	Course of Study	Credit
CS618	Real Time Systems	3
CA602	Next Generation Databases	3
CA604	High Performance Computing	3
	Elective IV	3
	Elective V	3
	Elective VI	3
CA610	Machine Learning Lab	2
	Total	**20**

SEMESTER III

Code	Course of Study	Credit
CA647	Project work-Phase I	12

SEMESTER IV

Code	Course of Study	Credit
CA648	Project work-Phase II	12

LIST OF ELECTIVES

SEMESTER I

Code	Course of Study	Credit
CS655	Digital Forensics	3
CA611	Cyber Security and Information Assurance	3
CA612	Natural Language Computing	3
CA613	Massive Graph Analysis	3
CA614	Bioinformatics	3
CA615	Parallel and Distributed Computing	3
CA616	Data Acquisition and Productization	3
CA617	Essentials of Human Resource Analytics	3
CA618	Customer Relationship and Management	3

SEMESTER II

Code	Course of Study	Credit
CA619	Principles of Deep Learning	3
CA620	Image and Video Analytics	3
CA621	Social Networking and Mining	3
CA622	Web Intelligence	3
CA623	Internet of Things	3
CA624	Health care Data Analytics	3
CA625	Linked Open Data and Semantic Web	3
CA626	Financial Risk Analytics and Management	3
CA627	Logistics and Supply Chain Management	3

M.Sc. (COMPUTER SCIENCE)

The total minimum credits required for completing the M.Sc. programme in Computer Science is 67.

SEMESTER I

Code	Course of Study	Credit
CAS761	Mathematical Foundations of Computer Science	3
CAS763	Computer Organization and Architecture	3
CAS765	Data Structures and Algorithms	3
CAS767	Data Base Management System	3
CAS769	Operating Systems	3
CAS751	Programming Laboratory for DSA	2
CAS753	Operating Systems Laboratory – Unix and Shell Programming	2
	Total	**19**

SEMESTER II

Code	Course of Study	Credit
CAS762	Fundamentals of Parallel Programming	3
CAS764	Data Mining	3
CAS766	Computer Networks	3
CAS768	Computer Graphics and Multimedia	3
CAS7A_	Elective I	3
CAS752	Parallel Programming Laboratory	2
CAS754	DBMS and Data Mining Laboratory	2
	Total	**19**

SEMESTER III

Code	Course of Study	Credit
CAS771	Web Technology	3
CAS773	Mobile and Pervasive Computing	3
CAS775	Object Oriented Software Engineering	3
CAS7B_	Elective II	3
CAS7C_	Elective III	3
CAS755	Project Work – Phase I	2
CAS757	FOSS Laboratory	2
	Total	**19**

SEMESTER IV

Code	Course of Study	Credit
CAS799	Project Work – Phase II	10

LIST OF ELECTIVES

Code	Course of Study	Credit
CAS7A1	Big Data Analytics	3
CAS7A2	Soft Computing	3
CAS7A3	Computer Security	3
CAS7B1	GPGPU programming	3
CAS7B2	Image Processing	3
CAS7B3	Cryptography	3
CAS7C1	Design Patterns	3
CAS7C2	Internet of Things	3
CAS7C3	Cloud Computing	3

M.Sc. (CHEMISTRY)

The total minimum credits required for completing the M.Sc. programme in Chemistry is 67.

SEMESTER I

Code	Course of Study	Credit
CH601	Organic Chemistry - Reaction Mechanisms and Their Types	3
CH603	Coordination Chemistry: Bonding, Reactions and Spectra	3
CH605	Quantum Chemistry and Group Theory	3
CH607	Instrumental Methods of Chemical Analysis	3
CH609	Organic Preparations and Separations Laboratory	2
CH611	Inorganic Preparations and Qualitative Analysis Laboratory	2
	Elective I	3
	Total	**19**

SEMESTER II

Code	Course of Study	Credit
CH602	Stereochemistry, Photochemistry, and Rearrangement Reactions	3
CH604	Organometallic and Bioinorganic Chemistry	3
CH606	Thermodynamics, Electrochemistry and Kinetics	3
CH608	Molecular Spectroscopy	3
CH610	Physical Chemistry Laboratory	2
CH612	Analytical Chemistry Laboratory	2
	Elective II	3
	Total	**19**

SEMESTER III

Code	Course of Study	Credit
CH613	Synthetic Organic Chemistry	3
CH615	Solid State, Nuclear and Main Group Chemistry	3
CH617	Statistical Thermodynamics, Photochemistry and Surface Chemistry	3
CH619	Fundamentals and Applications of Spectroscopy	3
CH621	Organic and Inorganic Quantitative Analysis Laboratory	2
CH623	Instrumental Methods and Spectroscopy Laboratory	2
	Elective III	3
	Total	**19**

SEMESTER IV

Code	Course of Study	Credit
CH614	Project Work	10

LIST OF ELECTIVES

ODD SEMESTER

Code	Course of Study	Credit
CH625	Catalysis	3
CH627	Environmental Chemistry	3
CH629	Inorganic Rings, Cages and Clusters	3
CH631	Medicinal Chemistry	3
CH633	Nano Science and Technology	3
CH635	Nuclear Chemistry	3

EVEN SEMESTER

Code	Course of Study	Credit
CH616	Computational Methods in Chemistry	3
CH618	Natural Products Chemistry	3
CH620	Polymer Chemistry	3

M.Sc. (PHYSICS)

The total minimum credits required for completing the M.Sc. programme in Physics is 66.

SEMESTER I

Code	Course of Study	Credit
PH651	Mathematical Physics – I	3
PH653	Classical Mechanics	4
PH655	Quantum Mechanics	4
PH657	Electronics	3
PH659	General Physics Laboratory	2
	Elective I	3
	Total	**19**

SEMESTER II

Code	Course of Study	Credit
PH652	Mathematical Physics –II	3
PH654	Electromagnetic Theory	4
PH656	Statistical Mechanics	4
PH658	Instrumentation	3
PH660	Electronics Laboratory	2
	Elective II	3
	Total	**19**

SEMESTER III

Code	Course of Study	Credit
PH661	Solid State Physics	3
PH663	Atomic and Molecular Spectroscopy	3
PH665	Nuclear and Particle Physics	3
PH667	Numerical and Computational Methods	3
PH669	Advanced Physics Laboratory	2
	Elective III	3
	Total	**17**

SEMESTER IV

Code	Course of Study	Credit
PH662	Project Work	8
	Elective IV	3
	Total	**11**

LIST OF ELECTIVES*

ODD SEMESTER

Code	Course of Study	Credit
PH611	Digital Signal and Image Processing	3
PH613	Basics of Engineering Materials	3
PH671	Waveguides and Modern Optics	3
PH673	Solar Photovoltaic Technology	3
PH675	Advanced Electromagnetic Theory	3
PH677	Fiber Optic Sensors	3
PH679	Sensors and Transducers	3
PH681	Physics and Technology of Thin Films	3
PH683	Magnetism and Superconducting Levitation	3
PH685	Micro - Electro - Mechanical Systems	3

EVEN SEMESTER

Code	Course of Study	Credit
PH618	Electrical, Magnetic and Optoelectronic Materials	3
PH672	Micro Processors	3
PH674	Computer Applications in Physics	3
PH676	Non - Destructive Testing	3
PH678	Lasers and Applications	3
PH680	Advanced Statistical Methods and Phase Transition	3
PH682	Semiconductor Physics	3
PH684	Nanoscience and Technology and Applications	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 convenience of the faculty concerned

MASTER OF BUSINESS ADMINISTRATION

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

TRIMESTER I

Code	Course of Study	Credit
MB701	Business Statistics	2
MB702	Legal Aspects of Business	2
MB703	Fundamentals of Financial Accounting	2
MB704	Marketing Management – Concepts and Design	2
MB705	Micro Economics	2
MB706	Organizational Structures and Design	2
MB707	Business Communication I	2
	Total	**14**

TRIMESTER II

Code	Course of Study	Credit
MB711	Advanced Financial Accounting	2
MB712	Cost and Management Accounting	2
MB713	Operations Research	2
MB714	Macro Economics	2
MB715	Managing People in Organizations	2
MB716	Marketing Management – Planning and Control	2
MB717	Information Management	2
MB718	Business Communication II	1
	Total	**15**

TRIMESTER III

Code	Course of Study	Credit
MB721	Financial Management	2
MB722	Production and Operations Management	2
MB723	Human Resource Management	2
MB724	Information Strategy and Management	2
MB725	Marketing Research	2
MB726	Business Communication III	1
	Elective I	2
	Elective II	2
	Total	**15**

TRIMESTER IV

Code	Course of Study	Credit
MB731	Strategic Management	2
MB732	Supply Chain Management	2
MB733	Summer Project*	2
	Elective III	2
	Elective IV	2
	Elective V	2
	Elective VI	2
	Elective VII	2
	Total	**16**

*Students take up summer projects during May-July and is evaluated along with IV trimester course.

TRIMESTER V

Code	Course of Study	Credit
MB741	Project System Management	2
MB742	Strategic Total Quality Management	2
	Elective VIII	2
	Elective IX	2
	Elective X	2
	Elective XI	2
	Total	**12**

TRIMESTER VI

Code	Course of Study	Credit
	Elective XII	2
	Elective XIII	2
	Elective XIV	2
	Elective XV	2
	Total	**8**

LIST OF ELECTIVES

FINANCIAL MANAGEMENT

Code	Course of Study	Credit
MB761	Asset Based Financing	2
MB762	Advanced Corporate Finance	2
MB763	Financial Derivatives	2
MB764	Financial Institution and Services	2
MB765	Insurance and Pension Schemes	2
MB766	Investment Banking	2
MB767	Investment Security Analysis and Portfolio Management	2
MB768	Strategic Cost Accounting and Management Control	2
MB769	Tax Laws and Tax Planning	2
MB770	Treasury Management	2
MB771	Personal Finance	2
MB772	Behavioural Finance	2
MB773	International Finance	2
MB774	Corporate Valuation	2

HUMAN RESOURCES MANAGEMENT

Code	Course of Study	Credit
MB781	Personal Growth Programme	2
MB782	Change Management	2
MB783	Compensation and Benefits	2
MB784	Counseling in the Workplace	2
MB785	Strategic Human Resource Development	2
MB786	Training and Development	2
MB787	Talent Management	2
MB788	Industrial Relations and Labour Laws	2
MB789	International Human Resource Management	2

BUSINESS ANALYSIS and IT CONSULTING

Code	Course of Study	Credit
MB801	Introduction to Business Analysis and IT consulting	2
MB802	Business Analysis and ITC in Banking and Financial Services	2
MB803	Business Analysis and ITC in Marketing and Retail	2
MB804	Business Analysis and ITC in Manufacturing	2
MB805	Systems Analysis and Design and CASE	2
MB806	Software Project Management	2
MB807	Software Quality Management	2

BUSINESS ANALYTICS

Code	Course of Study	Credit
MB821	Basic Data Analytics	2
MB822	Advanced Data Analytics	2
MB823	Data Mining Techniques	2
MB824	Introduction to Business Analytics	2
MB825	Supply Chain Analytics	2
MB826	Financial Risk Analytics	2
MB827	HR Analytics	2
MB828	Digital Analytics	2
MB829	Analytics for Strategic Market Planning	2
MB830	Analytics for Strategic Market Implementation	2
MB831	Big Data Analytics and Data Science	2
MB832	Advanced Data Mining	2
MB833	Data Analytics Software Laboratory	2
MB834	Game Theory and Applications	2
MB835	Machine Learning and NLP	2

MARKETING MANAGEMENT

Code	Course of Study	Credit
MB841	Marketing Metrics	2
MB842	Consumer Behaviour	2
MB843	Customer Relationship Management	2
MB844	Direct Marketing	2
MB845	Business Market Management	2
MB846	International Marketing	2
MB847	Rural Marketing	2
MB848	Services Marketing	2
MB849	Advertising Management	2
MB850	Distribution Management	2
MB851	Retail Management	2
MB852	Sales Management	2
MB853	Strategic Brand Management	2
MB854	Strategic Marketing	2
MB855	Digital Marketing	2

TECHNOLOGY AND OPERATIONS MANAGEMENT

Code	Course of Study	Credit
MB871	Advanced Materials Management	2
MB872	Advanced Operation Research	2
MB873	Innovation and R and D Management	2
MB874	Logistics Management	2
MB875	Production Planning and Control	2
MB876	Technology Forecasting	2
MB877	Manufacturing Strategy	2
MB878	Services Operation Management	2
MB879	Technology Management	2

GENERAL MANAGEMENT

Code	Course of Study	Credit
MB890	Course of Independent Study	2
MB891	Intellectual Property Rights Management	2
MB892	Entrepreneurship and Small Business Management	2
MB893	Information and Internet Economics	2
MB894	Knowledge Management and Innovation	2
MB895	International Business and Strategy	2
MB896	Design Thinking and Innovation	2

MASTER OF COMPUTER APPLICATIONS

The total minimum credits required for completing the MCA programme is 105.

SEMESTER I

Code	Course of Study	Credit
CA711	Problem Solving and Programming	3
CA713	Mathematical Foundations of Computer Applications	3
CA715	Computer Organization and Architecture	3
CA717	Accounting and Financial Management	3
CA719	Probability and Statistical Methods	3
CA701	Programming in C Laboratory	2
CA703	Business Communication	2
	Total	**19**

SEMESTER II

Code	Course of Study	Credit
CA710	Data Structures and Applications	3
CA712	Database Management Systems	3
CA714	Operating Systems	3
CA716	Object - Oriented Programming	3
CA718	Resource Management Techniques	3
CA702	DBMS Laboratory	2
CA704	Data Structures Laboratory	2
	Total	**19**

SEMESTER III

Code	Course of Study	Credit
CA721	Data Mining Techniques	3
CA723	Graphics and Multimedia	3
CA725	Software Engineering	3
CA727	Computer Networks	3
CA729	Design and Analysis of Algorithms	3
CA705	OS and Networks Laboratory	2
CA707	Graphics and Multimedia Laboratory	2
	Total	**19**

SEMESTER IV

Code	Course of Study	Credit
CA722	Organizational Behaviour	3
CA724	Information Security	3
CA726	Distributed Technology	3
CA728	Object - Oriented Analysis and Design	3
	Elective I (from List A)	3
CA706	Distributed Technology Laboratory	2
CA708	Information Security Laboratory	2
	Total	**19**

SEMESTER V

Code	Course of Study		Credit
CA731	Web Technology		3
CA733	Cloud Computing		3
	Elective II	From List B and C	3
	Elective III		3
	Elective IV		3
CA709	Web Technology Laboratory		2
CA749	Mini Project Work		2
	Total		**19**

SEMESTER VI

Code	Course of Study	Credit
CA750	Project Work	10

LIST OF ELECTIVES

LIST A

Code	Course of Study	Credit
CA7A1	Business Intelligence	3
CA7A2	Unix and Shell Programming	3
CA7A3	Visual Programming	3
CA7A4	Software Architecture and Project Management	3
CA7A5	Business Ethics	3

LIST B

Code	Course of Study	Credit
CA7B1	Green Computing	3
CA7B2	Image Processing	3
CA7B3	Software Agents	3
CA7B4	Marketing Management	3
CA7B5	Soft Computing	3
CA7B6	Advanced Database Technology	3
CA7B7	Modeling and Computer Simulation	3
CA7B8	Business Processes Modeling	3

LIST C

Code	Course of Study	Credit
CA7C1	Human Computer Interaction	3
CA7C2	Bioinformatics	3
CA7C3	Mobile and Pervasive Computing	3
CA7C4	Multi - Core Programming	3
CA7C5	Mobile Application Development	3
CA7C6	Big Data Management	3
CA7C7	Evolutionary Computing	3
CA7C8	Social Network Analysis	3

M. Arch. (ENERGY EFFICIENT AND SUSTAINABLE ARCHITECTURE)

The total minimum credits required for completing the M.Arch. Programme in Energy Efficient and Sustainable Architecture is 60.

SEMESTER I

Code	Course of Study	Credit
AR701	Energy, Environment and Buildings	2
AR703	Building Science and Sustainability	3
AR705	Solar Passive Architecture	3
AR707	Assessment of Built Environment	3
AR709	Building Energy Analysis Studio	3
	Elective – I	2
	Elective – II	2
	Total	**18**

SEMESTER II

Code	Course of Study	Credit
AR702	Building Energy Audit and Management	3
AR704	Green Architecture	2
AR706	Lighting Design	3
AR708	Energy Efficient Landscape Design	3
AR710	Building Modeling and Simulation Laboratory	3
	Elective – III	2
	Elective – IV	2
	Total	**18**

SEMESTER III

Code	Course of Study	Credit
AR747	Dissertation Phase – I	12

SEMESTER IV

Code	Course of Study	Credit
AR748	Dissertation Phase – II	12

LIST OF ELECTIVES

Code	Course of Study	Credit
AR711	Statistics for Environmental Design	2
AR713	Environment and Behaviour	2
AR715	Environmental Lighting	2
AR717	Natural Ventilation	2
AR712	Research Methods	2
AR714	Healthy Buildings	2
AR716	Intelligent Buildings	2
AR718	Post Occupancy Evaluation of Buildings	2

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