

### Civil Engineering

Credit requirement for the award of the degree under academic Regulation 2020 – 2021 for the candidates admitted from the academic year 2021 onwards

	Four Years	Three Years
B. Tech. (Regular Degree)	180	121
B. Tech. (Honors Degree)	180	141
B. Tech. (With Minor specialization other than Chosen Branch of Engg. & Tech.)	180	141

#### Semester I

No.	Code	Course	POs	Contact Hours				
				L	T <sup>1</sup>	P	C	
01	20HSX01	Communicative English	10	3	0	0	3.0	HS
02	20BSX11	Linear Algebra and Differential Equations	1, 12 <sup>2</sup>	3	1	0	3.0	BS
03	20BSX21	Engineering Chemistry	1	3	0	0	3.0	BS
04	20ESX01	Engineering Drawing	1, 5, 10	1	0	4	3.0	ES
05	20ESX02	Programming for Problem Solving Using 'C'	1	3	0	0	3.0	ES
06	20HSX02	Communicative English Lab	10	0	0	3	1.5	HS
07	20BSX22	Engineering Chemistry Lab	1, 4	0	0	3	1.5	BS
08	20ESX07	Programming for Problem Solving Using 'C' Lab	1, 4	0	0	3	1.5	ES
Sub-total				13	01	13	19.5	

#### Semester II

01	20BSX12	Partial Differential Equations and Vector Calculus	1	3	1	0	3.0	BS
02	20BSX31	Engineering Physics	1	3	0	0	3.0	BS
03	20ESX05	Basic Electrical and Electronics Engineering	1	3	1	0	3.0	ES
04	20ESX04	Engineering Mechanics	1	3	1	0	3.0	ES
05	20CE201	Building Materials	2, 5	3	0	0	3.0	CE
06	20BSX32	Engineering Physics Lab	1, 4	0	0	3	1.5	BS
07	20ESX08	Basic Electrical and Electronics Engineering Lab	1, 4	0	0	3	1.5	ES
08	20ESX06	Engineering Workshop	4	0	0	3	1.5	ES
09	20MCX01	Environmental Science	1	2	0	0	-	
Sub-total				17	03	09	19.5	

#### Semester III

01	20BSX13	Numerical Methods and Transforms	1	3	1	0	3.0	BS
02	20CE302	Building Planning and Drawing	1, 10, PSD 1	3	0	0	3.0	PC
03	20CE303	Surveying	1	3	1	0	3.0	PC
04	20CE304	Strength of Materials	1, PSD #1	3	1	0	3.0	PC
05	20CE305	Fluid Mechanics	1, 3, PSD #2	3	1	0	3.0	PC
06	20CE306	Surveying Lab	5, 10	0	0	3	1.5	PC
07	20CE307	Strength of Materials Lab	1, 4	0	0	3	1.5	PC
08	20CE308	Fluid Mechanics and Hydraulic Machinery Lab	1, 4	0	0	3	1.5	PC
09	20CES01	Short-term Skill Oriented Elective	1, 5, 10	0	0	4	2.0	SC
10	20MCX02	Constitution of India <sup>3</sup>	-	2	0	0	-	
Sub-total				18	04	11	21.5	

Commented [d61]: All the newly introduced courses in the program of Civil Engineering are kept in the track mode change

  
24/11/23

Head of the Department  
Dept. of Civil Engineering  
M.S. Raju Institute of Technology  
Sontyam, Vtsakhapatnam-531173.

<sup>1</sup> Suggested tutorial hours will not carry any credits

<sup>2</sup> By default, all courses are mapped to PO 12 as they are weakly contributing

<sup>3</sup> It is mandate for all students to pursue an online certification course for minimum duration of 30 hours covering the areas of Sustainability, Climate changes, Environmental Impact Assessment in line with Sustainable Development Goals (SDG)

**Semester IV**

No.	Code	Course	POs	Contact Hours				
				L	T	P	C	
01	20HSX03	Managerial Economics and Financial Analysis	11	3	0	0	3.0	HS
02	20CE402	Hydraulics and Hydraulic Machinery	1,3, PSO #2	3	1	0	3.0	ES
03	20CE403	Concrete Technology	1,2,6,8	3	0	0	3.0	PC
04	20CE404	Soil Mechanics	1,2,3,6, PSO #1	3	0	0	3.0	PC
05	20CE405	Construction Project Management	11	3	0	0	3.0	PC
06	20CS407	Python Programming Lab	1	0	0	3	1.5	ES
07	20CE407	Concrete Technology Lab	1,2,4	0	0	3	1.5	PC
08	20CE408	Soil Mechanics Lab	1	0	0	3	1.5	PC
09	20CES02	Short-term Skill Oriented Elective	1,5,10	0	0	4	2.0	SC
Sub-total				16	01	11	21.5	

**Semester V**

01	20CE501	Structural Analysis	1, PSO 1	3	1	0	3.0	PC
02	20CE502	Design of Reinforced Concrete Elements	1,1,8, PSO #1	3	1	0	3.0	PC
03	20CE503	Foundation Engineering	1,3,6, PSO #1,2	3	1	0	3.0	PC
04	-	Professional Elective I	-	3	0	0	3.0	PE
05	-	Open Elective I	-	3	0	0	3.0	OE
06	20CE506	Drawing of Reinforced Concrete Structures	1,3, PSO #1	0	0	3	1.5	PC
07	20CE507	Irrigation Design and Drawing	5,10,6, PSO #1,2	0	0	3	1.5	PC
08	-	Technical Paper Writing <sup>a</sup>	1,4,5,10	0	0	4	2.0	SC
09	20MCX03	Intellectual Property Rights and Patents <sup>b</sup>	-	2	0	0	-	
10	-	Summer Internship #1 <sup>c</sup> / CSP	5,8,9,10, PSO 1	0	0	0	1.5	
Sub-total				17	03	08	21.5	

<sup>a</sup> The students are expected to identify one research area in the recent trends, collect recent research articles, prepare a technical research review paper and publish in renowned annual conferences/journals, preferably indexed in Scopus or UGC care

<sup>b</sup> The students are expected to identify one research area in the recent trends, collect recent research articles, prepare a technical research review paper and publish in renowned annual conferences/journals, preferably indexed in Scopus or UGC care

<sup>c</sup> The work pertaining to summer Internship #1 and #2 shall be completed at the end of the semesters IV & VI respectively. The assessment shall be carried out during the semesters V and VII

It is mandate for all the students to undergo 4-6 weeks of industrial training and appear for assessment during Semester V with report. With regard to Community Service Project (CSP), based on the availability the students can opt CSP as an alternate option for summer internship #1 for a duration of 08 weeks

Semester VI								
01	20CE601	Transportation Engineering	PSO 2	3	0	0	3.0	PC
02	20CE602	Design of Steel Structures	3, 18, PSO #1	3	1	0	3.0	PC
03	20CE603	Environmental Engineering	2, 3,8, PSO #2	3	0	0	3.0	PC
04	-	Professional Elective II	-	3	0	0	3.0	PE
05	-	Open Elective III	-	3	0	0	3.0	OE
06	20CE606	Detailing and Drawing of Steel Structures	10, PSO 1	0	0	3	1.5	PC
07	20CE607	Transportation Engineering Lab	4, PSO 2	0	0	3	1.5	PC
08	20CE608	Environmental Engineering Lab	4, PSO 2	0	0	3	1.5	PC
09	20CES04	Sheri-Jam Skill Oriented Elective	1, 5, 10	0	0	4	2.0	SC
10	20MCX04	Indian Traditional Knowledge <sup>7</sup>	-	2	0	0	-	SC
Sub-total				17	01	13	21.5	
Semester VII								
01	-	Professional Elective III	-	3	0	0	3.0	PE
02	-	Professional Elective IV	-	3	0	0	3.0	PE
03	-	Professional Elective V	12	3	0	0	3.0	PE
04	-	Open Elective III	-	3	0	0	3.0	OE
05	-	Open Elective IV	12	3	0	0	3.0	OE
06	20HSX04	Professional Ethics	6	3	0	0	3.0	HS
07	20CES05	Finishing School for Civil Engineering	9, PSO 1	0	0	4	2.0	SC
08	-	Summer Internship #2 <sup>8</sup>	5, 6, 9, 10, PSO 1	0	0	0	3.0	SC
Sub-total				18	0	04	23.0	
Semester VIII								
01	-	Full Semester Internship <sup>9</sup>	5-10, PSO 1, PSO 2	0	0	0	06	SC
02	-	Capstone Project	5-10, PSO 1, PSO 2	0	0	0	06	SC
Sub-total				0	0	0	12.0	
Total Credits				-	-	-	160	

<sup>7</sup> It is mandate for all the students to pursue an online certification course for minimum duration of 30 hours covering the application of ITK in Science Engineering & Technology

<sup>8</sup> It is mandate for all the students to undergo 6-8 weeks of industrial training and appear for assessment during Semester VII with report and those opted FSI during Semester VII shall appear through online for reviews

<sup>9</sup> Students opting for FSI in VII semester have to take up courses of VII semester in VIII semester. The students are expected to do a capstone project parallelly demonstrating their POs & PSOs and submit a separate report

### List of Electives

Professional Elective #1								
1	20CE001	Advanced Concrete Technology	-	3	0	0	3.0	PE
2	20CE002	Environmental Geotechnics	-	3	0	0	3.0	PE
3	20CE003	Transportation Planning and Management	-	3	0	0	3.0	PE
4	20CE004	Water Resources Systems Planning and Management	-	3	0	0	3.0	PE
5	20CE005	Construction Equipment Automation	-	3	0	0	3.0	PE
6	20CE006	Harbor Engineering	-	3	0	0	3.0	PE
Professional Elective #2								
7	20CE007	Pre-Stressed Concrete	-	3	0	0	3.0	PE
8	20CE008	Environmental Impact Assessment	-	3	0	0	3.0	PE
9	20CE009	Pavement Analysis and Design	-	3	0	0	3.0	PE
10	20CE010	Urban Hydrology	-	3	0	0	3.0	PE
11	20CE011	Sustainable Construction Methods	-	3	0	0	3.0	PE
12	20CE012	Advanced Structural Analysis	-	3	0	0	3.0	PE
Professional Elective #3								
13	20CE013	Repair and Rehabilitation of Structures	-	3	0	0	3.0	PE
14	20CE014	Solid Waste Management	-	3	0	0	3.0	PE
15	20CE015	Traffic Engineering	-	3	0	0	3.0	PE
16	20CE016	Hydraulic Structures	-	3	0	0	3.0	PE
17	20CE017	Construction Cost Analysis	-	3	0	0	3.0	PE
18	20CE018	Coastal Zone Management	-	3	0	0	3.0	PE
Professional Elective #4								
19	20CE019	Self-Healing Concrete	-	3	0	0	3.0	PE
20	20CE020	Solid Waste Management	-	3	0	0	3.0	PE
21	20CE021	Urban Transportation Planning	-	3	0	0	3.0	PE
22	20CE022	Hydro Power Engineering	-	3	0	0	3.0	PE
23	20CE023	Safety Engineering	-	3	0	0	3.0	PE
24	20CE024	Ocean Engineering	-	3	0	0	3.0	PE
Professional Elective #5								
The curriculum provides academic flexibility to choose any of the domain specific courses from MOOCs as approved by the respective Board of Studies and Academic Council. The students can take up this course as self-study mode. The course shall be of 45 – 60 hours duration (4-credits) and the assessment shall be as per the academic regulation 2020.								
Open Elective #1								
29	23CE001	Urban Environmental Service	-	3	0	0	3.0	OE
30	23CS001	Data Structures and Algorithms	-	3	0	0	3.0	OE
31	23AI001	Machine Learning for Engineers	-	3	0	0	3.0	OE
32	23CE001	Introduction to Database Management Systems	-	3	0	0	3.0	OE
33	23EC001	Architectures and Algorithms of IoT	-	3	0	0	3.0	OE
34	23EE001	Introduction to Renewable Energy Sources	-	3	0	0	3.0	OE
35	23ME001	Nano Technology	-	3	0	0	3.0	OE
36	23SH001	Women and Society	-	3	0	0	3.0	OE
Open Elective #2								
37	23CE002	Ecology, Environment and Resource Management	-	3	0	0	3.0	OE
38	23CS002	Designing the Internet of Things	-	3	0	0	3.0	OE
39	23AI002	Fundamentals of Deep Learning	-	3	0	0	3.0	OE
40	23DS002	Introduction to Data Science	-	3	0	0	3.0	OE
41	23EC002	IoT for Smart Grids	-	3	0	0	3.0	OE
42	23EE002	Electrical Safety and Management	-	3	0	0	3.0	OE
43	23ME002	Fundamentals of Automobile Engineering	-	3	0	0	3.0	OE
44	23SH002	Constitution of India	-	3	0	0	3.0	OE
Open Elective #3								
44	23CE003	Disaster, Risk Mitigation and Management	-	3	0	0	3.0	OE
45	23CS404	Operating System	-	3	0	0	3.0	OE
46	23AI003	Intelligent Robots and Drone Technology	-	3	0	0	3.0	OE
47	23DS003	Introduction to Big Data	-	3	0	0	3.0	OE
48	23EC003	Privacy and Security in IoT	-	3	0	0	3.0	OE
49	23EE003	Low-Cost Automation	-	3	0	0	3.0	OE
50	23ME003	Industrial Automation	-	3	0	0	3.0	OE
51	23SH003	Design Thinking	-	3	0	0	3.0	OE

Commented [d42]: All the 5a Courses that are under the Professional Elective #3 & #4 are newly introduced.

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**Open Elective #4**

The curriculum provides academic flexibility to choose any of the inter-disciplinary courses from MDOCs as approved by the respective Board of Studies and Academic Council. The students can take up this course on self-study mode. The course shall be of 45 – 60 hours duration and the assessment shall be as per the academic regulation 2023.

CE

**B. Tech. (Honors)**

**Category I**

1	20CEH01	Cognitive Management of IoT for Smart Cities	-	4	0	0	4.0	HO
2	20CEH02	Energy Efficient Buildings	-	4	0	0	4.0	HO
3	20CEH03	Structural Health Monitoring	-	4	0	0	4.0	HO

**Category II**

4	20CEH04	Structural Failure Protection using AI	-	4	0	0	4.0	HO
5	20CEH05	Architecture and Town Planning	-	4	0	0	4.0	HO
6	20CEH06	Safety Analysis and Risk Management	-	4	0	0	4.0	HO

**Category III**

7	20CEH07	Intelligent Transportation Networks	-	4	0	0	4.0	HO
8	20CEH08	Building Information Modeling	-	4	0	0	4.0	HO
9	20CEH09	Traffic Engineering and Management	-	4	0	0	4.0	HO

**Category IV**

10	20CEH10	Structural Health Monitoring using IoT	-	4	0	0	4.0	HO
11	20CEH11	GIS and Remote Sensing	-	4	0	0	4.0	HO
12	20CEH12	Disaster Risk Mitigation	-	4	0	0	4.0	HO

**B. Tech. (Minor with Specialization)**

**Category I**

1	20CEM01	Air Pollution	-	3	0	0	3.0	MI
2	20CSM01	E-Commerce	-	3	0	0	3.0	MI
3	20MEM01	Biomaterials	-	3	0	0	3.0	MI
4	20EEM01	Basic Control Systems	-	3	0	0	3.0	MI
5	20ECM01	Semiconductor Devices & Circuits	-	3	0	0	3.0	MI
6	20AIM01	Fundamentals of Neural Networks	-	3	0	0	3.0	MI
7	20DSO01	Introduction to R Programming	-	3	0	0	3.0	MI
8	20SHM01	Psychology	-	3	0	0	3.0	MI
9	20SHM02	Statistical Methods	-	3	0	0	3.0	MI
10	20MBM01	General Management	-	3	0	0	3.0	MI
11	20MBM02	Human Resource Planning	-	3	0	0	3.0	MI

**Category II**

12	20CEM02	Climate Change Mitigation and Adaptation	-	3	0	0	3.0	MI
13	20CSM02	Knowledge Discovery and Databases	-	3	0	0	3.0	MI
14	20MEM02	Micro Electromechanical Systems	-	3	0	0	3.0	MI
15	20EEM02	Basics of Electrical Machines and Drives	-	3	0	0	3.0	MI
16	20ECM02	Digital Electronics	-	3	0	0	3.0	MI
17	20AIM02	Machine Learning with Python	-	3	0	0	3.0	MI
18	20DSM02	Data Management and Analysis	-	3	0	0	3.0	MI
19	20SHM03	English for Media	-	3	0	0	3.0	MI
20	20SHM04	Statistical Inference	-	3	0	0	3.0	MI
21	20MBM03	Organizational Behavior	-	3	0	0	3.0	MI
22	20MBM04	Compensation Management & Employee Welfare Laws	-	3	0	0	3.0	MI

**Category III**

23	20CEM03	Sustainability and Pollution Prevention Practices	-	3	0	0	3.0	MI
24	20CSM03	Database Security	-	3	0	0	3.0	MI
25	20MEM03	Surface Engineering	-	3	0	0	3.0	MI
26	20EEM03	Electrical Engineering Material Science	-	3	0	0	3.0	MI
27	20ECM03	Analog Electronic Circuits	-	3	0	0	3.0	MI
28	20AIM03	Interpretable Machine Learning	-	3	0	0	3.0	MI
29	20DSM03	Data Governance	-	3	0	0	3.0	MI
30	20SHM05	Journalism	-	3	0	0	3.0	MI
31	20SHM06	Statistical Quality Control	-	3	0	0	3.0	MI
32	20MBM05	Entrepreneurship and Business Venture Planning	-	3	0	0	3.0	MI
33	20MBM06	Performance Management and Talent Management	-	3	0	0	3.0	MI

**Short Term Skill Oriented Electives**

34	20CES01	Python Programming		0	0	4	2.0	CC
35	20CES02	Computer Applications in Civil Engineering		0	0	4	2.0	CC
36	20CES04	Estimation and Costing		0	0	4	2.0	CC
<b>Industry Connect Courses (Skill Oriented Courses)<sup>10</sup></b>								
37	20ICC01	Competitive Programming	+	2	0	6	6.0	CC
38	20ICC02	Web Technologies – Transferring to Practice	+	2	0	6	6.0	CC
39	20ICC03	Java and Spring boot	+	2	0	6	6.0	CC
40	20ICC04	Robotic Process Automation	+	2	0	6	6.0	CC
41	20ICC05	Information Security and Forensics	+	2	0	6	6.0	CC
42	20ICC06	Battery System – Design Engineering	+	2	0	6	6.0	CC
43	20ICC07	Blockchain Technology	+	2	0	6	6.0	CC
44	20ICC08	Network Administration	+	2	0	6	6.0	CC
45	20ICC09	Product Engineering	-	2	0	14	3.0	CC
46	20ICC10	Machine Learning Engineer	+	2	0	6	6.0	CC
47	20ICC11	Data Scientist	-	2	0	6	6.0	CC
48	20ICC12	Industrial IoT	-	2	0	6	6.0	CC

<sup>10</sup> The credits earned through Industry Connect Courses (Skill Oriented Course) can be tradeoff with any other 3-Credit course other than Professional Core

### Computer Science and Engineering

Credit requirement for the award of the degree under academic Regulation 2020-2021 for the candidates admitted from the academic year 2021 onwards

	Four Years	Three Years
B. Tech (Regular Degree)	160	121
B. Tech (Honors Degree)	180	141
B. Tech (With Minor specialization other than Chosen Branch of Engg & Tech.)	180	141

#### Semester I

No.	Code	Course	POs	Contact Hours				
				L	T <sup>1</sup>	P	C	
01	20HSX01	Communicative English	10	3	0	0	3.0	HS
02	20BSX11	Linear Algebra and Differential Equations	1, 12 <sup>1</sup>	3	1	0	3.0	BS
03	20BSX33	Applied Physics	1	3	1	0	3.0	BS
04	20ESX02	Programming for Problem Solving using C	1	3	0	0	3.0	ES
05	20CS101	Fundamentals of Computer Science	1	3	0	0	3.0	CS
06	20HSX02	Communicative English Lab	1, 10	0	0	3	1.5	HS
07	20BSX34	Applied Physics Lab	1, 4	0	0	3	1.5	BS
08	20ESX07	Programming for Problem Solving using C Lab	1, 4	0	0	3	1.5	ES
Sub-total				15	02	09	19.5	

#### Semester II

01	20BSX12	Partial Differential Equations and Vector Calculus	1	3	1	0	3.0	BS
02	20BSX23	Applied Chemistry	1	3	1	0	3.0	BS
03	20ESX05	Basic Electrical and Electronics Engineering	1	3	1	0	3.0	ES
04	20CS201	Data Structures using C	1	3	1	0	3.0	CS
05	20EC203	Digital Logic Design	1	3	1	0	3.0	ES
06	20BSX24	Applied Chemistry Lab	1, 4	0	0	3	1.5	BS
07	20CS202	Data Structures using C Lab	1, 4	0	0	3	1.5	CS
08	20ESX08	Basic Electrical & Electronics Engineering Lab	1, 4	0	0	3	1.5	ES
09	20MCX01	Environmental Science	-	2	0	0	-	
Sub-total				17	05	09	19.5	

#### Semester III

01	20BSX16	Mathematical Foundations for Computer Science	1	3	1	0	3.0	BS
02	20CS302	Design and Analysis of Algorithms	1, 2, 3	3	1	0	3.0	CS
03	20CS303	Database Management Systems	1, PSOI	3	1	0	3.0	CS
04	20CS304	Object Oriented Programming through C++	1	3	1	0	3.0	CS
05	20CS305	Computer Organization	1	3	0	0	3.0	CS
06	20CS306	Design and Analysis of Algorithms Lab	4	0	0	3	1.5	CS
07	20CS307	Database Management Systems Lab	1, 4, PSOI	0	0	3	1.5	CS
08	20CS308	Object Oriented Programming through C++-Lab	1, 4	0	0	3	1.5	CS
09	20CS301	Short-term Skill Oriented Elective	3, 4, 5	0	0	4	2.0	SC
10	20MCX02	Constitution of India <sup>3</sup>	-	2	0	0	-	
Sub-total				17	05	09	21.5	

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<sup>2</sup>By default, all courses are mapped to PO 12 as they are weakly contributing

<sup>3</sup>It is mandate for all students to pursue an online certification course for minimum duration of 30 hours

Commented [da1]: All the newly introduced courses in the program of Computer Science and Engineering are kept in the Track mode change



Head of the Department  
Computer Science and Engineering  
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Sontyam, Visakhapatnam - 53117

Semester IV

No.	Code	Course	POs	Contact Hours				
				L	T	P	C	
01	20HS403	Managerial Economics & Financial Analysis	11	3	0	0	3.0	HS
02	20CS402	Data Warehousing and Mining	1,2	3	0	0	3.0	PC
03	20CS403	Python Programming	1	3	1	0	3.0	PC
04	20CS404	Operating Systems	1	3	1	0	3.0	PC
05	20CS405	Theory of Computation	1,2	3	1	0	3.0	PC
06	20CS406	Data Mining Lab	4	0	0	3	1.5	PC
07	20CS407	Python Programming Lab	4	0	0	3	1.5	PC
08	20CS408	Operating Systems Lab	1,4	0	0	3	1.5	PC
09	20CS502	Short-term Skill Oriented Elective	3,4,5	0	0	4	2.0	SC
Sub-total				16	03	11	21.5	

Semester V

01	20CS501	Java Programming	1	3	1	0	3.0	PC
02	20CS502	Computer Networks	1,2	3	1	0	3.0	PC
03	20AI405	Artificial Intelligence	1,2	3	1	0	3.0	PC
04	-	Professional Elective I	-	3	0	0	3.0	PE
05	-	Open Elective I	-	3	0	0	3.0	OE
06	20CS506	Java Programming Lab	4	0	0	3	1.5	PC
07	20CS507	Computer Networks Lab	1,4	0	0	3	1.5	PC
08	-	Technical Paper Writing <sup>4</sup>	1,10	0	0	4	2.0	SC
09	20MCX03	Intellectual Property Rights and Patents <sup>5</sup>	-	2	0	0	-	
10	-	Summer Internship <sup>6</sup> / CSP	5,6,9,10,PSO1	0	0	0	1.5	
Subtotal				17	03	06	21.5	


<sup>4</sup>The students are expected to identify one research area in the recent trends, collect recent research articles, prepare a technical research review paper and publish in renowned annual conferences/journals, preferably indexed in Scopus or UGC care

<sup>5</sup>It is mandate for all students to pursue an online certification course for minimum duration of 30 hours

<sup>6</sup>The work pertaining to summer Internship #1 and #2 shall be completed at the end of the semesters IV & V respectively. The assessment shall be carried out during the semesters V and VII.

It is mandate for all the students to undergo 4-6 weeks of industrial training and appear for assessment during Semester V with report. With regard to Community Service Project (CSP), based on the availability the students can opt CSP as an alternate option for summer internship #1 for a duration of 08 weeks.

V

  
 25/11/23  
 Head of the Department  
 Computer Science and Engineering  
 NSRIT Institute of Technology  
 Nadimpalli - 522202



Semester V								
01	20CS601	Cryptography and Network Security	1, 2, 3	3	0	0	3.0	PC
02	20CS602	Web Technologies	1, 2, 3	3	0	0	3.0	PC
03	20CS603	Modern Software Engineering	1, 2, 3	3	0	0	3.0	PC
04	-	Professional Elective II	-	3	0	0	3.0	PE
05	-	Open Elective II	-	3	0	0	3.0	OE
06	20CS606	Cryptography and Network Security Lab	4	0	0	3	1.5	PC
07	20CS607	Web Technologies Lab	4	0	0	3	1.5	PC
08	20CS608	Modern Software Engineering Lab	4	0	0	3	1.5	PC
09	20CS604	Short-term Skill Oriented Elective	5, PSO1, PSO3	0	0	4	2.0	SC
10	20NCX04	Indian Traditional Knowledge <sup>7</sup>	-	0	0	0	-	
Sub-total				17	03	13	21.5	
Semester VI								
01	-	Professional Elective III	-	3	0	0	3.0	PE
02	-	Professional Elective IV	-	3	0	0	3.0	PE
03	-	Professional Elective V	-	3	0	0	3.0	PE
04	-	Open Elective III	-	2	0	2	3.0	OE
05	-	Open Elective IV	-	2	0	2	3.0	OE
06	20HSX04	Professional Ethics	8	3	0	0	3.0	HS
07	20CS995	Finishing School for CSE	PO1 - PO12	0	0	4	2.0	SC
08	-	Summer Internship <sup>8</sup>	All POs, PSO3	0	0	0	3.0	
Sub-total				16	0	04	23.0	
Semester VII								
01	-	Full Semester Internship <sup>9</sup>	5 - 10, PSO3	0	0	0	06	
02	-	Capstone Project	5 - 10, PSO3	0	0	0	06	
Sub-total				0	0	0	12.0	
Total Credits				-	-	-	160	



Head of the Department  
 Computer Science and Engineering  
 Not in palli Satyanarayana Raju Institute of Technology  
 Chittoor, Andhra Pradesh - 531173

<sup>7</sup>It is mandate for all the students to pursue an online certification course for minimum duration of 30 hours

<sup>8</sup>It is mandate for all the students to undergo 6-8 weeks of industrial training and appear for assessment during Semester VII write-report and those opted FSI during Semester VII shall appear through online for reviews

<sup>9</sup>Students opting for FSI in VII semester have to take up courses of VII semester in VIII semester. The students are expected to do a capstone project parallelly demonstrating their POs & PSO3 and submit a separate report

List of Electives

Professional Elective#1								
1	20CS001	Object Oriented Analysis and Design	-	3	0	0	3.0	PE
2	20BSX15	Probability and Statistics	-	3	0	0	3.0	PE
3	20NE03	Artificial Neural Networks	-	3	0	0	3.0	PE
4	20CS004	Internet of Things	-	3	0	0	3.0	PE
5	20CS005	Mobile Computing	-	3	0	0	3.0	PE
Professional Elective#2								
6	20CS006	Software Quality Management	-	3	0	0	3.0	PE
7	20DS405	Foundations of Data Science	-	3	0	0	3.0	PE
8	20AI902	Machine Learning	-	3	0	0	3.0	PE
9	20CS009	Network Programming and Protocols	-	3	0	0	3.0	PE
10	20CS010	Cloud Computing	-	3	0	0	3.0	PE
Professional Elective#3								
11	20CS011	Software Testing Methodologies	-	3	0	0	3.0	PE
12	20DS902	Big Data	-	3	0	0	3.0	PE
13	20AI902	Deep Learning Principles and Practices	-	3	0	0	3.0	PE
14	20CS014	Block Chain Technologies	-	3	0	0	3.0	PE
15	20CS016	XML and Web Services	-	3	0	0	3.0	PE
Professional Elective#4								
16	20CS015	Software Project Management	-	3	0	0	3.0	PE
17	20DS903	Data Visualization	-	3	0	0	3.0	PE
18	20AI005	Cyber Security	-	3	0	0	3.0	PE
19	20CS019	Ethical Hacking	-	3	0	0	3.0	PE
20	20DS020	Digital Image Processing and Applications	-	3	0	0	3.0	PE
Professional Elective#5								
The curriculum provides academic flexibility to choose any of the domain specific courses from MOOCs as approved by the respective Board of Studies and Academic Council. The students can take up this course on self study mode. The course shall be of 45-60 hours duration (4 credits) and the assessment shall be as per the academic regulation 2020.								
						PE		
Open Elective #1								
21	20CE001	Urban Environmental Services	-	3	0	0	3.0	OE
22	20CS001	Data Structures and Algorithms	-	3	0	0	3.0	OE
23	20AI001	Machine Learning for Engineers	-	3	0	0	3.0	OE
24	20DS001	Introduction to Database Management Systems	-	3	0	0	3.0	OE
25	20EE001	Architecture and Algorithms of IoT	-	3	0	0	3.0	OE
26	20EE001	Introduction to Renewable Energy Sources	-	3	0	0	3.0	OE
27	20ME001	Nano Technology	-	3	0	0	3.0	OE
28	20SH001	Women and Society	-	3	0	0	3.0	OE
Open Elective #2								
29	20CE002	Ecology, Environment and Resource Management	-	3	0	0	3.0	OE
30	20CS002	Designing the Internet of Things	-	3	0	0	3.0	OE
31	20AI002	Fundamentals of Deep Learning	-	3	0	0	3.0	OE
32	20DS002	Introduction to Data Science	-	3	0	0	3.0	OE
33	20EE002	IoT for Smart Cities	-	3	0	0	3.0	OE
34	20EE002	Electrical Safety and Management	-	3	0	0	3.0	OE
35	20ME002	Fundamentals of Automobile Engineering	-	3	0	0	3.0	OE
Open Elective #3								
36	20CE003	Disaster, Risk Mitigation and Management	-	3	0	0	3.0	OE
37	20CS404	Operating Systems	-	3	0	0	3.0	OE
38	20AI003	Fundamentals of AI	-	3	0	0	3.0	OE
39	20DS003	Introduction to Big Data	-	3	0	0	3.0	OE
40	20EE003	Privacy and Security in IoT	-	3	0	0	3.0	OE
41	20EE003	Low-cost Automation	-	3	0	0	3.0	OE
42	20ME003	Industrial Automation	-	3	0	0	3.0	OE
43	20SH002	Design Thinking	-	3	0	0	3.0	OE
Open Elective #4								
The curriculum provides academic flexibility to choose any of the inter-disciplinary courses from MOOCs as approved by the respective Board of Studies and Academic Council. The students can take up this course on self study mode. The course shall be of 45 - 60 hours duration and the assessment shall be as per the academic								
						OE		

Commented [ds1]: All the Five Courses that are under the Professional Elective #3 & #4 are newly introduced.

Commented [ds2]: All the Five Courses that are under the Professional Elective #3 & #4 are newly introduced.

  
25/11/23  
Head of the Department

Computer Science and Engineering  
N.S.Raju Institute of Technology  
Sontyam, Visakhapatnam - 531173

regulation 2020.

**B. Tech. (Honors)**

**Category I**

1	20CSH01	Advanced Computer Architecture	-	4	0	0	4.0	HO
2	20CSH01	Text Analytics	-	4	0	0	4.0	HO
3	20AIH03	Game Theory	-	4	0	0	4.0	HO

**Category II**

4	20CSH04	GPU Architecture and Programming	-	4	0	0	4.0	HO
5	20CSH04	Recommender Systems	-	4	0	0	4.0	HO
6	20AIH06	Game Programming	-	4	0	0	4.0	HO

**Category III**

7	20CSH07	Fault Tolerant Computing	-	4	0	0	4.0	HO
8	20CSH07	Data Analysis with Matlab	-	4	0	0	4.0	HO
9	20AIH09	3D Graphics and Animation	-	4	0	0	4.0	HO

**Category IV**

10	20CSH10	Distributed and Parallel Computing	-	4	0	0	4.0	HO
11	20CSH10	Data Preparation and Cleaning	-	4	0	0	4.0	HO
12	20AIH12	Augmented Reality and Virtual Reality	-	4	0	0	4.0	HO

**B. Tech. (Minor with Specialization)**

**Category I**

1	20CEM01	Air Pollution	-	3	0	0	3.0	M
2	20CSM01	E-Commerce	-	3	0	0	3.0	M
3	20MEM01	Biomaterials	-	3	0	0	3.0	M
4	20EEM01	Basic Control Systems	-	3	0	0	3.0	M
5	20ECM01	Semiconductor Devices & Circuits	-	3	0	0	3.0	M
6	20AIM01	Fundamentals of Neural Networks	-	3	0	0	3.0	M
7	20CSO03	Introduction to R Programming	-	3	0	0	3.0	M
8	20SHM01	Psychology	-	3	0	0	3.0	M
9	20SHM02	Statistical Methods	-	3	0	0	3.0	M
10	20MBU01	General Management	-	3	0	0	3.0	M
11	20MBU02	Human Resource Planning	-	3	0	0	3.0	M

**Category II**

12	20CEM02	Climate Change Mitigation and Adaptation	-	3	0	0	3.0	M
13	20CSM02	Knowledge Discovery and Databases	-	3	0	0	3.0	M
14	20MEM02	Micro Electro Mechanical Systems	-	3	0	0	3.0	M
15	20EEM02	Basics of Electrical Machines and Drives	-	3	0	0	3.0	M
16	20ECM02	Digital Electronics	-	3	0	0	3.0	M
17	20AIM02	Machine Learning with Python	-	3	0	0	3.0	M
18	20CSM02	Data Management and Analysis	-	3	0	0	3.0	M
19	20SHM03	English for Media	-	3	0	0	3.0	M
20	20SHM04	Statistical Inference	-	3	0	0	3.0	M
21	20MBU03	Organizational Behavior	-	3	0	0	3.0	M
22	20MBU04	Compensation Management & Employee Welfare Laws	-	3	0	0	3.0	M

**Category III**

23	20CEM03	Sustainability and Pollution Prevention Practices	-	3	0	0	3.0	M
24	20CSM03	Database Security	-	3	0	0	3.0	M
25	20MEM03	Surface Engineering	-	3	0	0	3.0	M
26	20EEM03	Electrical Engineering Material Science	-	3	0	0	3.0	M
27	20ECM03	Analog Electronic Circuits	-	3	0	0	3.0	M
28	20AIM03	Interpretable Machine Learning	-	3	0	0	3.0	M
29	20CSM03	Data Governance	-	3	0	0	3.0	M
30	20SHM05	Journalism	-	3	0	0	3.0	M
31	20SHM06	Statistical Quality Control	-	3	0	0	3.0	M
32	20MBU05	Entrepreneurship and Business Venture Planning	-	3	0	0	3.0	M
33	20MBU06	Performance Management and Talent Management	-	3	0	0	3.0	M

Short Term Skill Oriented Electives

34	23CS901	Programming Basics	1, 4, 5	0	0	4	2.0	SC
35	23CS902	Competitive Programming Essentials	1, 4, 5	0	0	4	2.0	SC
36	23CS904	Android App Development	5, PG01, PG02	0	0	4	2.0	SC
Industry Connect Courses (Skill Oriented Courses) <sup>10</sup>								
37	20ICC01	Competitive Programming	-	2	0	8	6.0	ICC
38	20ICC02	Web Technologies – Transferring to Practice	-	2	0	8	6.0	ICC
39	20ICC03	Java and Spring boot	-	2	0	8	6.0	ICC
40	20ICC04	Robotics Process Automation	-	2	0	8	6.0	ICC
41	20ICC05	Information Security and Forensics	-	2	0	8	6.0	ICC
42	20ICC06	Battery System – Design Engineering	-	2	0	8	6.0	ICC
43	20ICC07	Blockchain Technology	-	2	0	8	6.0	ICC
44	20ICC08	Network Administration	-	2	0	8	6.0	ICC
45	20ICC09	Product Engineering	-	2	0	14	9.0	ICC
46	20ICC10	Machine Learning Engineer	-	2	0	8	6.0	ICC
47	20ICC11	Data Scientist	-	2	0	8	6.0	ICC
48	20ICC12	Industrial IoT	-	2	0	8	6.0	ICC

List of Hours offered by Computer Science & Engineering Program

1. High Performance Computing
2. Data Analytics
3. Game Programming

List of Minor with Specialization offered by Computer Science & Engineering Program

1. Database Engineering

<sup>10</sup>The credits earned through Industry Connect Courses (Skill Oriented Course) can be traded off with any other 3-Credit course other than Professional Core

### Computer Science and Engineering (Data Science)

Credit requirement for the award of the degree under academic Regulation 2020-2021 for the candidates admitted from the academic year 2021 onwards

	Four Years	Three Years
B.Tech (Regular Degree)	160	121
B.Tech (Flexors Degree)	180	141
B.Tech (With Minor specialization other than Chosen Branch of Engg & Tech.)	180	141

#### Semester I

No.	Code	Course	POs	Contact Hours				
				L	T*	P	C	
01	20HS101	Communicative English	10	3	0	0	3.0	HE
02	20BS111	Linear Algebra and Differential Equations	1,2 <sup>2</sup>	3	1	0	3.0	BS
03	20BS133	Applied Physics	1	3	1	0	3.0	BS
04	20ES102	Programming for Problem Solving using 'C'	1	3	0	0	3.0	ES
05	20CS101	Fundamentals of Computer Science	1	3	0	0	3.0	CS
06	20BS134	Applied Physics Lab	1,4	0	0	3	1.5	BS
07	20HS102	Communicative English Lab	10	0	0	3	1.5	HE
08	20ES107	Programming for Problem Solving using 'C' Lab	1,4	0	0	3	1.5	ES

Sub-total 15 02 09 19.5

#### Semester II

01	20BS112	Partial Differential Equations and Vector Calculus	1	3	1	0	3.0	BS
02	20BS123	Applied Chemistry	1	3	1	0	3.0	BS
03	20ES105	Basic Electrical and Electronics Engineering	1,2	3	1	0	3.0	ES
04	20CS201	Data Structures using 'C'	1	3	1	0	3.0	CS
05	20EC203	Digital Logic Design	1	3	1	0	3.0	EC
06	20BS124	Applied Chemistry Lab	1,4	0	0	3	1.5	BS
07	20ES108	Basic Electrical & Electronics Engineering Lab	1,4	0	0	3	1.5	ES
08	20CS202	Data Structures using 'C' Lab	1,4	0	0	3	1.5	CS
09	20MC204	Environmental Science	1	2	0	0	-	MC

Sub-total 17 05 09 18.5

#### Semester III

01	20BS115	Mathematical Foundations of Computer Science	1	3	1	0	3.0	BS
02	20CS302	Design and Analysis of Algorithms	1,2,3	3	1	0	3.0	CS
03	20CS303	Database Management Systems	1	3	1	0	3.0	CS
04	20CS304	Programming with Python	2	3	1	0	3.0	CS
05	20CS305	Computer Organization	1	3	1	0	3.0	CS
06	20CS307	Database Management Systems Lab	1,4	0	0	3	1.5	CS
07	20CS307	Programming with Python Lab	1,4	0	0	3	1.5	CS
08	20CS306	Design and Analysis of Algorithms Lab	4	0	0	3	1.5	CS
09	20GS301	Short-term Skill Oriented Elective	1,5,10	0	0	4	2.0	GS
10	20MC202	Constitution of India <sup>2</sup>	-	2	0	0	-	MC

Sub-total 17 05 09 21.5

Commented [ds1]: All the newly introduced courses in the program of Computer Science & Engineering (Data Science) are kept in the Track mode change

*Ses*  
25/11/23  
Head of the Department  
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N.S.Raju Institute of Technology  
Sontyam, Visakhapatnam - 531173

<sup>1</sup>Suggested tutorial hours will not carry any credits

<sup>2</sup>By default, all courses are mapped to PO 12 as they are weakly contributing

<sup>3</sup>It is mandate for all students to pursue an online certification course for minimum duration of 30 hours

**Semester IV**

No.	Code	Course	POs	Contact Hours				
				L	T	P	C	
01	20HS403	Managerial Economics and Financial Analysis	11	3	0	0	3.0	ES
02	20BS415	Probability and Statistics	2,5	3	1	0	3.0	ES
03	20CS404	Operating Systems	1	3	1	0	3.0	PC
04	20CS402	Computer Networks	1,2	3	0	0	3.0	PC
05	20DS405	Foundations of Data Science	1,3	3	1	0	3.0	PC
06	20CS406	Operating Systems Lab	1,4	6	0	3	1.5	PC
07	20DS407	Foundations of Data Science Lab	1,4	0	0	3	1.5	PC
08	20DS408	Probability and Statistics Lab with R programming Language	1,4	0	0	3	1.5	PC
09	20DS502	Short-term Skill Oriented Elective	1,5,10	0	0	4	2.0	SC
			Sub-total	16	03	11	21.5	

**Semester V**

01	20CS405	Theory of Computation	1,2	3	1	0	3.0	PC
02	20DS502	Big Data	1,2	3	1	0	3.0	PC
03	20AI502	Machine Learning	1,2,3	3	1	0	3.0	PC
04	-	Professional Elective I	-	3	0	0	3.0	PE
05	-	Open Elective I	-	3	0	0	3.0	OE
06	20AI507	Machine Learning Lab	4	0	0	3	1.5	PC
07	20DS507	Big Data Lab	4,5	0	0	3	1.5	PC
08	20DS503	Technical Paper Writing*	1,4,5,10	0	0	4	2.0	SC
09	20MC003	Intellectual Property Rights and Patents†	-	2	0	0	-	
10	-	Summer Internship#1* / CSP	5,8,9,10,PS01	0	0	0	1.5	
			Sub-total	17	03	08	21.5	

\*The students are expected to identify one research area in the recent trends, collect recent research articles, prepare a technical research review paper and publish in renowned annual conferences/ journals, preferably indexed in Scopus or UGC care

†It is mandate for all students to pursue an online certification course for minimum duration of 30 hours

\*The work pertaining to summer Internship #1 and #2 shall be completed at the end of the semesters IV & VI respectively. The assessment shall be carried out during the semesters V and VII

It is mandate for all the students to undergo 4-6 weeks of industrial training and appear for assessment during Semester V with report. With regard to Community Service Project (CSP), based on the availability the students can opt CSP as an alternate option for summer Internship #1 for a duration of 08 weeks

Semester VI									
01	20CS501	Java Programming	1	3	1	0	30	PC	
02	20CS402	Data Ware Housing and Mining	3.5	3	1	0	30	PC	
03	20CS603	Data Visualization	2, 3, 5	3	0	0	30	PC	
04	-	Professional Elective III	-	3	1	0	30	PE	
05	-	Open Elective II	-	3	0	0	30	OE	
06	20CS506	Data Visualization Lab	4, 5	0	0	3	15	PC	
07	20CS506	Java Programming Lab	4	0	0	3	15	PC	
08	20CS406	Data Mining Lab	4, 5	0	0	3	15	PC	
09	20CS504	Short-term Skill Oriented Elective	1, 5, 10	0	0	4	20	SC	
10	20H2004	Indian Traditional Knowledge <sup>1</sup>	-	2	0	0	-		
			Sub-total	17	03	13	21.5		
Semester VII									
01	-	Professional Elective III	-	3	0	0	30	PE	
02	-	Professional Elective IV	-	3	0	0	30	PE	
03	-	Professional Elective V	-	3	0	0	30	PE	
04	-	Open Elective III	-	2	0	0	30	OE	
05	-	Open Elective IV	-	2	0	0	30	OE	
06	20CS404	Professional Ethics	8	3	0	0	30	HS	
07	20CS505	Finishing School for Data Science	9/PSO1	1	0	4	2.0	SC	
08	-	Summer Internship <sup>2*</sup>	5&6/IE/PSO1	1	0	1	3.0		
			Sub-total	16	0	04	23.0		
Semester VIII									
01	-	Full Semester Internship <sup>3</sup>	5-10/PSO1/PSO2	0	0	0	06		
02	-	Capstone Project	5-10/PSO1/PSO2	0	0	0	06		
			Sub-total	0	0	0	12.0		
			Total Credits	-	-	-	100		

<sup>1</sup>It is mandate for all the students to pursue an online certification course for minimum duration of 30 hours

<sup>2</sup>It is mandate for all the students to undergo 6-8 weeks of industrial training and appear for assessment during Semester VII with report and those opted PSI during Semester VII shall appear through online for reviews

<sup>3</sup>Students opting for PSI in VII semester have to take up courses of VII semester in VIII semester. The students are expected to do a capstone project parallelly demonstrating their PCs & PSCs and submit a separate report

List of Electives

Professional Elective#1								
1	20CS601	Modern Software Engineering	-	3	0	0	3.0	PE
2	20CS602	Computer Vision	-	3	0	0	3.0	PE
3	20A406	Artificial Intelligence	-	3	0	0	3.0	PE
4	20CS604	Fundamentals of Natural Language Processing	-	3	0	0	3.0	PE
5	20CS605	Mobile Computing	-	3	0	0	3.0	PE
Professional Elective#2								
6	20CS801	Object Oriented Analysis and Design	-	3	0	0	3.0	PE
7	20CS807	Digital Image Processing and Applications	-	3	0	0	3.0	PE
8	20A800	Artificial Neural Networks	-	3	0	0	3.0	PE
9	20CS809	Data Acquisition and Production	-	3	0	0	3.0	PE
10	20CS801	Cryptography and Network Security	-	3	0	0	3.0	PE
Professional Elective#3								
11	20CS111	Software Testing Methodologies	-	3	0	0	3.0	PE
12	20CS112	Pattern Recognition	-	3	0	0	3.0	PE
13	20CS113	Deep Learning	-	3	0	0	3.0	PE
14	20CS114	Social Networking and Mining	-	3	0	0	3.0	PE
15	20CS115	Cloud Computing	-	3	0	0	3.0	PE
Professional Elective#4								
16	20CS115	Software Project Management	-	3	0	0	3.0	PE
17	20CS117	Image and Video Analytics	-	3	0	0	3.0	PE
18	20CS118	Web Intelligence	-	3	0	0	3.0	PE
19	20CS119	Cloud Security	-	3	0	0	3.0	PE
20	20CS120	Embedded Systems	-	3	0	0	3.0	PE
Professional Elective#5								
The curriculum provides academic flexibility to choose any of the domain specific courses from MOOCs as approved by the respective Board of Studies and Academic Council. The students can take up this course on self study mode. The course shall be of 45-60 hours duration (4 credits) and the assessment shall be as per the academic regulation 2020.								
								PE
Open Elective #1								
21	20CE001	Urban Environmental Services	-	3	0	0	3.0	CE
22	20CS001	Data Structures and Algorithms	-	3	0	0	3.0	CE
23	20AI001	Machine Learning for Engineers	-	3	0	0	3.0	CE
24	20DS001	Introduction to Database Management Systems	-	3	0	0	3.0	CE
25	20EE001	Architecture and Algorithms of IoT	-	3	0	0	3.0	CE
26	20EE001	Introduction to Renewable Energy Sources	-	3	0	0	3.0	CE
27	20ME001	Nano Technology	-	3	0	0	3.0	CE
28	20SH001	Women and Society	-	3	0	0	3.0	CE
Open Elective #2								
29	20CE002	Ecology, Environment and Resource Management	-	3	0	0	3.0	CE
30	20CS002	Designing the Internet of Things	-	3	0	0	3.0	CE
31	20AI002	Fundamentals of Deep Learning	-	3	0	0	3.0	CE
32	20DS002	Introduction to Data Science	-	3	0	0	3.0	CE
33	20EE002	IoT for Smart Grids	-	3	0	0	3.0	CE
34	20EE002	Electrical Safety and Management	-	3	0	0	3.0	CE
35	20ME002	Fundamentals of Automobile Engineering	-	3	0	0	3.0	CE
Open Elective #3								
36	20CI003	Disaster, Risk mitigation and Management	-	3	0	0	3.0	CE
37	20CS404	Operating Systems	-	3	0	0	3.0	CE
38	20AI003	Fundamentals of AI	-	3	0	0	3.0	CE
39	20DS003	Introduction to Big Data	-	3	0	0	3.0	CE
40	20EE003	Privacy and Security in IoT	-	3	0	0	3.0	CE
41	20EE003	Low-cost Automation	-	3	0	0	3.0	CE
42	20ME003	Industrial Automation	-	3	0	0	3.0	CE
43	20SH002	Design Thinking	-	3	0	0	3.0	CE

Commented [dx2]: All the Five Courses that are under the Professional Elective #3 & #4 are newly introduced.

Commented [dx3]: All the Five Courses that are under the Professional Elective #3 & #4 are newly introduced.

*Sy*  
25/11/23

Head of the Department  
Computer Science and Engineering  
N.S. Raju Institute of Technology  
Sontyam, Visakhapatnam - 531173



**Open Elective #4**

The curriculum provides academic flexibility to choose any of the inter-disciplinary courses from MOCCs as approved by the respective Board of Studies and Academic Council. The students can take up this course on self-study mode. The course shall be of 45 – 60 hours duration and the assessment shall be as per the academic regulation 2020.

**OE**

**B. Tech. (Honors)**

**Category I**

1	200GH01	Text Analytics	-	4	0	0	4.0	HO
2	200GH02	Computational Statistics for Data Science	-	4	0	0	4.0	HO
3	200GH03	Introduction to Tableau	-	4	0	0	4.0	HO

**Category II**

4	200GH04	Recommender Systems	-	4	0	0	4.0	HO
5	200GH05	Programming for Analytics and Data Processing	-	4	0	0	4.0	HO
6	200GH06	Descriptive and inferential statistics	-	4	0	0	4.0	HO

**Category III**

7	200GH07	Data Analysis With Matlab	-	4	0	0	4.0	HO
8	200GH08	The Essential Elements of Predictive Analytics and Data Mining	-	4	0	0	4.0	HO
9	200GH09	Introduction to Computational Thinking and Data Science	-	4	0	0	4.0	HO

**Category IV**

10	200GH10	Data Preparation and Cleaning	-	4	0	0	4.0	HO
11	200GH11	Health care Analytics	-	4	0	0	4.0	HO
12	200GH12	Data Scientist Toolkits	-	4	0	0	4.0	HO

**B. Tech. (Minor with Specialization)**

**Category I**

1	20CEM01	Air Pollution	-	3	0	0	3.0	VI
2	20CSM01	E-Commerce	-	3	0	0	3.0	VI
3	20MEM01	Biomaterials	-	3	0	0	3.0	VI
4	20EEM01	Basic Control Systems	-	3	0	0	3.0	VI
5	20ECM01	Semiconductor Devices & Circuits	-	3	0	0	3.0	VI
6	20AM01	Fundamentals of Neural Networks	-	3	0	0	3.0	VI
7	20SO03	Introduction to R Programming	-	3	0	0	3.0	VI
8	20SHM01	Physiology	-	3	0	0	3.0	VI
9	20SHM02	Statistical Methods	-	3	0	0	3.0	VI
10	20MBM01	General Management	-	3	0	0	3.0	VI
11	20MBM02	Human Resource Planning	-	3	0	0	3.0	VI

**Category II**

12	20CEM02	Climate Change Mitigation and Adaptation	-	3	0	0	3.0	VI
13	20CSM02	Knowledge Discovery and Databases	-	3	0	0	3.0	VI
14	20MEM02	Micro Electro-mechanical Systems	-	3	0	0	3.0	VI
15	20EEM02	Basics of Electrical Machines and Drives	-	3	0	0	3.0	VI
16	20ECM02	Digital Electronics	-	3	0	0	3.0	VI
17	20AM02	Machine Learning with Python	-	3	0	0	3.0	VI
18	20GM02	Data Management and Analytics	-	3	0	0	3.0	VI
19	20SHM03	English for Media	-	3	0	0	3.0	VI
20	20SHM04	Statistical Inference	-	3	0	0	3.0	VI
21	20MBM03	Organization Behavior	-	3	0	0	3.0	VI
22	20MBM04	Compensation Management & Employee Welfare Laws	-	3	0	0	3.0	VI

**Category III**

23	20CEM03	Sustainability and Pollution Prevention Practices	-	3	0	0	3.0	VI
24	20CSM03	Database Security	-	3	0	0	3.0	VI
25	20MEM03	Surface Engineering	-	3	0	0	3.0	VI
26	20EEM03	Electrical Engineering Material Science	-	3	0	0	3.0	VI
27	20ECM03	Analog Electronic Circuits	-	3	0	0	3.0	VI
28	20AM03	Interpretable Deep Learning	-	3	0	0	3.0	VI
29	20GM03	Data Governance	-	3	0	0	3.0	VI

30	20S-M05	Journalism	-	3	0	0	3.0	MC
31	20S-M06	Statistical Quality Control	-	3	0	0	3.0	MC
32	20SBA05	Entrepreneurship & Business Venture Planning	-	3	0	0	3.0	MC
33	20SBA06	Performance Management & Talent Management	-	3	0	0	3.0	MC

#### Short Term Skill Oriented Electives

34	20CS01	Basics of R Programming	-	0	0	4	2.0	SC
35	20CS02	Competitive Programming Essentials	-	0	0	4	2.0	SC
36	20CS03	Technical Paper Writing	-	0	0	4	2.0	SC
37	20CS04	Introduction to Power BI	-	0	0	4	2.0	SC
38	20CS05	Finishing School for Data Science	-	0	0	4	2.0	SC

#### Industry Connect Courses (Skill Oriented Courses)<sup>10</sup>

39	20CC01	Competitive Programming	-	2	0	8	6.0	ICC
40	20CC02	Web Technologies - Transitioning to Practice	-	2	0	8	6.0	ICC
41	20CC03	Java and Spring boot	-	2	0	8	6.0	ICC
42	20CC04	Robotics Process Automation	-	2	0	8	6.0	ICC
43	20CC05	Information Security and Forensics	-	2	0	8	6.0	ICC
44	20CC06	Battery System - Design Engineering	-	2	0	8	6.0	ICC
45	20CC07	Blockchain Technology	-	2	0	8	6.0	ICC
46	20CC08	Network Administration	-	2	0	8	6.0	ICC
47	20CC09	Product Engineering	-	2	0	14	3.0	ICC
48	20CC10	Machine Learning Engineer	-	2	0	8	6.0	ICC
49	20CC11	Data Scientist	-	2	0	8	6.0	ICC
50	20CC12	Industrial IoT	-	2	0	8	6.0	ICC

#### List of Honors offered by Computer Science & Engineering (DS) Program

1. Data Analytics
2. Data Processing
3. Advanced Data Science

#### List of Minor with Specialization offered by Computer Science & Engineering (DS) Program

1. Data Governance

<sup>10</sup>The credits earned through Industry Connect Courses (Skill Oriented Course) can be traded off with any other 3-Credit course other than Professional Core

### Electronics and Communication Engineering

Credit requirement for the award of the degree under academic Regulation 2020 – 2021 for the candidates admitted from the academic year 2021 onwards

	Four Year	Three Year
B. Tech. (Regular Degree)	160	121
B. Tech. (Honors Degree)	160	141
B. Tech. (With minor specialization other than Chosen Branch of Engg. & Tech)	180	141

#### Semester I

No.	Course Code	Course	PDs	Contact Hours				C	Grade
				L	T	P	C		
01	20HS001	Communicative English	10	1	0	0	3.0	15	HS
02	20BSX11	Linear Algebra and Differential Equation	1,12	3	1	0	3.0	15	BS
03	20BSX23	Applied Chemistry	1	3	1	0	3.0	15	BS
04	20ES002	Programming for Problem Solving using 'C'	1	1	1	0	3.0	15	ES
05	20ES005	Basic Electrical and Electronics Engineering	1	3	0	0	3.0	15	ES
06	20BSX24	Applied Chemistry Lab	1,4	-	-	3	1.5	15	BS
07	20HS002	Communicative English Lab	10	-	-	3	1.5	15	HS
08	20ES007	Programming for Problem Solving using 'C' Lab	1	-	-	3	1.5	15	ES
Sub-total			15	03	09	15.5			

#### Semester II

01	20BSX12	Partial Differential Equations and Vector Calculus	1	3	1	0	3.0	15	BS
02	20BSX23	Applied Physics	1,3	3	1	0	3.0	15	BS
03	20EE201	Engineering Drawing	1,5,10	1	0	4	3.0	15	EE
04	20EE201	Network Analysis & Synthesis	1,3,6,PS01	3	1	0	3.0	15	EE
05	20EE201	Principles of Electronics & Communication System	1	3	0	0	3.0	15	EE
06	20BSX24	Applied Physics Lab	1,4	0	0	3	1.5	15	BS
07	20EE202	Network Analysis and Electrical Technology Lab	1,4	-	-	3	1.5	15	EE
08	20EC202	Electronics Workshop	4	0	0	3	1.5	15	EC
09	20MCX01	Environmental Science	1	3	0	0	-	15	MC
Sub-total			16	03	13	15.5			

#### Semester III

01	20BSX14	Complex Variables and Transforms	1	3	1	0	3	15	BS
02	20EC302	Electronic Devices and Circuits	1,2,3,PS01	3	0	0	3	15	EC
03	20EC303	Signals and Systems	1,2,PS02	3	1	0	3	15	EC
04	20EC304	Random Variables and Stochastic Processes	1,2	3	1	0	3	15	EC
05	20EC305	Digital System Design	1,2,3,PS02	3	0	0	3	15	EC
06	20EC306	Electronic Devices and Circuits Lab	4,8,PS01	0	0	3	1.5	15	EC
07	20EC307	Signals and Systems Lab	4,5,8,PS02	0	0	3	1.5	15	EC
08	20EC308	Digital System Design Lab	4,8,PS02	0	0	3	1.5	15	EC
09	20EC501	Printed Circuit Board Design	4	1	0	2	2.0	15	EC
10	20MCX02	Constitution of India <sup>1</sup>	-	2	0	0	0	15	MC
Sub-total			18	03	11	21.5			

Commented [Dr1]: All the newly introduced courses in the program of Electronics & Communication Engineering are kept in the Track mode change

*Siva Prasad*  
25/10/23

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Electronics & Communication Engg.  
NSRIT, Vittalhattanam-531 173

<sup>1</sup> Suggested tutorial hours will not carry any credits

<sup>2</sup> By default, all courses are mapped to PD 12 as they are weakly contributing

<sup>3</sup> It is mandatory for all students to pursue an online certification course for minimum duration of 30 hours covering the areas of Sustainability, Climate changes, Environmental Impact Assessment in line with Sustainable Development Goals (SDG)

Semester IV

No.	Course Code	Course	POs	Contact Hours				
				L	T	P	C	
01	20HE403	Managerial Economics & Financial Analysis	11	3	0	0	3.0	HS
02	20EE403	Control Systems	3P501	3	1	0	3.0	ES
03	20EC403	Pulse and Digital Circuits	1,2,3,P501	3	0	0	3.0	PC
04	20EC404	Electromagnetic Waves & Transmission Lines	1,2,3,P501	3	1	0	3.0	PC
05	20EC405	Electronic Circuit Analysis	1,2,3,P501	3	1	0	3.0	PC
06	20EC406	Pulse and Digital Circuits Lab	43.P501	0	2	2	1.5	PC
07	20EC407	Electronic Circuit Analysis Lab	4,5,9.P501	0	2	2	1.5	PC
08	20EE408	Control Systems Lab	4.P501	0	2	2	1.5	ES
09	20EC502	Basis of Python Programming	15	1	0	2	2.0	ES
Sub-total				18	3	11	21.5	

Semester V

01	20EC501	Analog & Digital Communications	1,2,3.P501	3	1	0	3	PC
02	20EC502	Linear & Digital IC Applications	1,2,3.P501	3	1	0	3	PC
03	20EC503	Antennas & Wave Propagation	1,2,3,7.P501	3	1	0	3	PC
04	-	Professional Elective I	-	3	0	0	3	PE
05	-	Open Elective I	-	3	0	0	3	OE
06	20EC506	Linear & Digital IC Applications Lab	4,5,9.P502	0	2	2	1.5	PC
07	20EC507	Analog & Digital Communications Lab	4,5,9.P501,2	0	2	2	1.5	PC
08	20EC903	Fundamentals of Internet of Things	1,2,3,4,5.P501	0	0	4	2.0	SD
09	-	Technical Paper Writing <sup>4</sup>	-	-	-	2	-	AC
10	20MC303	Intellectual Property Rights and Patents <sup>5</sup>	-	2	0	0	0.0	
11	-	Summer Internship #1 / CSP	4,5,9.P501	6	0	0	1.5	
Sub-total				17	3	12	25.5	

<sup>4</sup> The students are expected to identify one research area in the recent trends, collect recent research articles, prepare a technical research review paper and publish in renowned annual conferences/journals, preferably indexed in Scopus or UGC care

<sup>5</sup> The students are expected to identify one research area in the recent trends, collect recent research articles, prepare a technical research review paper and publish in renowned annual conferences/journals, preferably indexed in Scopus or UGC care

<sup>6</sup> The work pertaining to summer internship #1 and #2 shall be completed at the end of the semesters IV & VI respectively. The assessment shall be carried out during the semesters V and VI. It is mandate for all the students to undergo 4-6 weeks of industrial training and appear for assessment during Semester V with report. With regard to Community Service Project (CSP), based on the availability the students can opt CSP as an alternate option for summer internship #1 for a duration of 03 weeks.

Semester VI

No.	Course Code	Course	POs	Contact Hours				
				L	T	P	C	
01	20EC601	Microvave Engineering	1,2,3,7.PS01	3	1	0	3.0	PC
02	20EC602	Digital Signal Processing	1,2,3,4.PS01	3	1	0	3.0	PC
03	20EC603	Microprocessors and Microcontrollers	1,2,3	3	1	0	3.0	PC
04	-	Professional Elective III	-	3	0	0	3.0	PE
05	-	Open Elective II	-	3	0	0	3.0	OE
06	20EC606	Microprocessors and Microcontrollers Lab	4,5,6.PS02	0	-	3	1.5	PC
07	20EC607	Digital Signal Processing Lab	4,5.PS02	0	-	3	1.5	PC
08	20EC608	Microvave and Radiating Systems Lab	4,5,6.PS01,2	0	-	3	1.5	PC
09	20EC604	Fundamentals of Machine Learning	1,2,3	1	-	2	2.0	OE
10	20MC904	Indian Traditional Knowledge <sup>7</sup>	-	2	-	-	-	IE
Sub-total				18	3	11	21.5	

Semester VII

01	-	Professional Elective III	-	3	0	0	3	PE
02	-	Professional Elective IV	-	3	0	0	3	PE
03	-	Professional Elective V	-	3	0	0	3	PE
04	-	Open Elective III	-	3	0	0	3	OE
05	-	Open Elective IV	-	3	0	0	3	OE
06	20HS004	Professional Ethics	8	3	0	0	3	HS
07	20EC505	Android App Development	1,2,3,5.PS01	1	0	2	2	PC
08	-	Summer Internship (8) <sup>8</sup>	4,5,6,10.PS01	-	-	-	3	IE
Sub-total				19	0	2	23.0	

Semester VIII

01	-	Full Semester Internship <sup>9</sup>	5,8,9,10.PS01	0	0	1	6	IE
02	-	Capstone Project	1,10.PS01&2	0	0	1	6	IE
Sub-total				-	-	-	12.0	
Total Credits							160	

<sup>7</sup> It is mandate for all the students to pursue an online certification course for minimum duration of 30 hours covering the application of ITK in Science Engineering & Technology

<sup>8</sup> It is mandate for all the students to undergo 6-8 weeks of industrial training and appear for assessment during Semester VII with report and these opted FSI during Semester VII shall appear through online for reviews

<sup>9</sup> Student's opting for FSI in VII semester have to take up courses of VII semester in VIII semester. The students are expected to do a capstone project parallelly demonstrating their POs & PSOs and submit a separate report

List of Electives

Professional Elective #1

1	2BEC001	Computer Hardware Description Language	3	0	0	3.0	PE
2	2BEC002	Communication Systems	3	0	0	3.0	PE
3	2BEC003	Artificial Intelligence	3	0	0	3.0	PE
4	2BEC004	Computer Architecture and Organization	3	0	0	3.0	PE
5	2BEC005	Advanced Electromagnetics	3	0	0	3.0	PE
6	2BEC006	Electronic Measurements & Instrumentation	3	0	0	3.0	PE

Professional Elective #2

7	2BEC007	VLSI Design	3	0	0	3.0	PE
8	2BEC008	Wireless Communications and Networks	3	0	0	3.0	PE
9	2BEC009	Speech Processing	3	0	0	3.0	PE
10	2BEC010	Computer Networks	3	0	0	3.0	PE
11	2BEC011	RF Components and Circuit Design	3	0	0	3.0	PE
12	2BEC012	Bio-Medical Instrumentation	3	0	0	3.0	PE

Professional Elective #3

13	2BEC013	Digital VLSI	3	0	0	3.0	PE
14	2BEC014	Satellite Communications	3	0	0	3.0	PE
15	2BEC015	Digital Image Processing Techniques	3	0	0	3.0	PE
16	2BEC016	Embedded System Design	3	0	0	3.0	PE
17	2BEC017	Smart Antennas	3	0	0	3.0	PE
18	2BEC018	Process Control Instrumentation	3	0	0	3.0	PE

Professional Elective #4

19	2BEC019	Analog VLSI	3	0	0	3.0	PE
20	2BEC020	Radar Engineering	3	0	0	3.0	PE
21	2BEC021	Video Processing and Applications	3	0	0	3.0	PE
22	2BEC022	Embedded Internet of Things	3	0	0	3.0	PE
23	2BEC023	Micro Electro Mechanical Systems	3	0	0	3.0	PE
24	2BEC024	Modern Industrial Automation	3	0	0	3.0	PE

Professional Elective #5

The curriculum provides academic flexibility to choose any of the domain specific courses from MOOCs as approved by the respective Board of Studies and Academic Council. The students can take up this course on self-study mode. The course shall be of 45 - 60 hours duration (4-credits) and the assessment shall be as per the academic regulation 2020.

Open Elective #1

25	2XCE001	Urban Environmental Service	3	0	0	3.0	OE
26	2XCS001	Data Structures and Algorithms	3	0	0	3.0	OE
27	2XAI001	Machine Learning for Engineers	3	0	0	3.0	OE
28	2XDS001	Introduction to Database Management Systems	3	0	0	3.0	OE
29	2XEC001	Architectures and Algorithms of IoT	3	0	0	3.0	OE
30	2XEE001	Introduction to Renewable Energy Sources	3	0	0	3.0	OE
31	2XME001	Nano Technology	3	0	0	3.0	OE
32	2XSH001	Women and Society	3	0	0	3.0	OE

Open Elective #2

33	2XCE002	Ecology, Environment and Resources	3	0	0	3.0	OE
34	2XCS002	Internet of Things	3	0	0	3.0	OE
35	2XAI002	Fundamentals of Deep Learning	3	0	0	3.0	OE
36	2XDS002	Introduction to Data Science	3	0	0	3.0	OE
37	2XEC002	IoT for Smart Grids	3	0	0	3.0	OE
38	2XEE002	Electrical Safety and Management	3	0	0	3.0	OE
39	2XME002	Fundamentals of Automobile Engineering	3	0	0	3.0	OE

Open Elective #3

40	2XCS003	Disaster, Risk Mitigation and Management	3	0	0	3.0	OE
41	2XCS004	Operating Systems	3	0	0	3.0	OE
42	2XAI003	Fundamentals of AI	3	0	0	3.0	OE

Commented [ds2]: All the Six Courses that are under the Professional Elective #3 & #4 are newly introduced.

Commented [ds3]: All the Six Courses that are under the Professional Elective #3 & #4 are newly introduced.

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25/11/23

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43	20DSO03	Introduction to Big Data	-	3	0	0	3.0	OE
44	20ECO03	Privacy and Security in IoT	-	3	0	0	3.0	OE
45	20EEO03	Low-cost Automation	-	3	0	0	3.0	OE
46	20MEO03	Industrial Automation	-	3	0	0	3.0	OE
47	20SHO02	Design Thinking	-	3	0	0	3.0	OE

Open Elective #4

The curriculum provides academic flexibility to choose any of the inter-disciplinary courses from MOOCs as approved by the respective Board of Studies and Academic Council. The students can take up this course on self-study mode. The course shall be of 45 - 60 hours duration and the assessment shall be as per the academic regulation 2020.

OE

B. Tech. (Honors)

Category I

1	20ECH01	Low Power VLSI Design	-	4	0	0	4.0	HO
2	20ECH02	DSP Processors and Architectures	-	4	0	0	4.0	HO
3	20ECH03	Informatics Theory and Coding	-	4	0	0	4.0	HO

Category II

4	20ECH04	Hardware Design using Verilog	-	4	0	0	4.0	HO
5	20ECH05	Advanced Digital Signal Processing	-	4	0	0	4.0	HO
6	20ECH06	Advanced Digital Communications	-	4	0	0	4.0	HO

Category III

7	20ECH07	Design of Digital Integrated Circuits	-	4	0	0	4.0	HO
8	20ECH08	Pattern Recognition	-	4	0	0	4.0	HO
9	20ECH09	Advanced 3G and 4G Mobile Communications	-	4	0	0	4.0	HO

Category IV

10	20ECH10	Simulation and Testing Methods for VLSI Design	-	4	0	0	4.0	HO
11	20ECH11	Digital Signal & Image Processing using MATLAB	-	4	0	0	4.0	HO
12	20ECH12	5G Mobile and Wireless Technology	-	4	0	0	4.0	HO

B. Tech. (Major with Specialization)

Category I

1	20CEM01	Air Pollution	-	3	0	0	3.0	ME
2	20CSM01	E-Commerce	-	3	0	0	3.0	ME
3	20MEM01	Biomaterials	-	3	0	0	3.0	ME
4	20EEM01	Basic Control Systems	-	3	0	0	3.0	ME
5	20ECM01	Semiconductor Devices and Circuits	-	3	0	0	3.0	ME
6	20AIM01	Fundamentals of Neural Networks	-	3	0	0	3.0	ME
7	20DSM01	Introduction to R Programming	-	3	0	0	3.0	ME
8	20SHM01	Psychology	-	3	0	0	3.0	ME
9	20SHM02	Statistical Methods	-	3	0	0	3.0	ME
10	20MBM01	General Management	-	3	0	0	3.0	ME
11	20MBM02	Human Resource Planning	-	3	0	0	3.0	ME

Category II

12	20CEM02	Climate Change Mitigation and Adaptation	-	3	0	0	3.0	ME
13	20CSM02	Knowledge Discovery and Databases	-	3	0	0	3.0	ME
14	20MEM02	Micro Electro-mechanical Systems	-	3	0	0	3.0	ME
15	20EEM02	Basics of Electrical Machines and drives	-	3	0	0	3.0	ME
16	20ECM02	Digital Electronics	-	3	0	0	3.0	ME
17	20AIM02	Machine Learning with Python	-	3	0	0	3.0	ME
18	20DSM02	Data Management and Analysis	-	3	0	0	3.0	ME
19	20SHM03	English for Media	-	3	0	0	3.0	ME
20	20SHM04	Statistical Inference	-	3	0	0	3.0	ME
21	20MBM03	Organization Behaviour	-	3	0	0	3.0	ME
22	20MBM04	Compensation Management & Employee Welfare Laws	-	3	0	0	3.0	ME

Category III

23	20CEM03	Sustainability and Pollution Prevention Practices	-	3	0	0	3.0	ME
24	20CSM03	Database Security	-	3	0	0	3.0	ME
25	20MEM03	Surface Engineering	-	3	0	0	3.0	ME
26	20EEM03	Electrical Engineering Material Science	-	3	0	0	3.0	ME

27	20ECM03	Analog Electronic Circuits	-	3	0	0	3.0	MC
28	20AIM03	Integrable Machine Learning	-	3	0	0	3.0	MC
29	20DSM03	Data Governance	-	3	0	0	3.0	MC
30	20S-M05	Journalism	-	3	0	0	3.0	MC
31	20SHM07	Statistical Quality Control	-	3	0	0	3.0	MC
32	20BEM05	Entrepreneurship & Business Venture Planning	-	3	0	0	3.0	MC
33	20MEM05	Performance Management & Talent Management	-	3	0	0	3.0	MC

**Short Term Skill Oriented Electives**

34	20EC501	Printed Circuit Board Design	4	0	0	4.0	SC
35	20EC502	Basics of Python Programming	1.5	0	0	1.5	SC
36	20EC503	Fundamentals of Machine Learning	1.5	0	0	1.5	SC

**Long Term Skill Oriented Courses (Industry Oriented)\***

37	20CC01	Competitive Programming	-	2	0	0	6.0	ICC
38	20CC02	Web Technologies – Theory to Practice	-	2	0	0	6.0	ICC
39	20CC03	Java and Springboot	-	2	0	0	6.0	ICC
40	20CC04	Robotics Process Automation (RPA)	-	2	0	0	6.0	ICC
41	20CC05	Information Security and Forensics	-	2	0	0	6.0	ICC
42	20CC06	Battery Technologies for EV	-	2	0	0	6.0	ICC
43	20CC07	Blockchain Technology	-	2	0	0	6.0	ICC
44	20CC08	Network Administration	-	2	0	0	6.0	ICC
45	20CC09	Proced. Engineering	-	2	0	0	6.0	ICC
46	20CC10	Machine Learning Engineer	-	2	0	0	6.0	ICC
47	20CC11	Data Scientist	-	2	0	0	6.0	ICC
48	20CC12	Industrial IoT	-	2	0	0	6.0	ICC

**List of Honors offered by Electronics & Communication Engineering Program**

1. VLSI System Design
2. Digital Signal & Image Processing
3. Advanced Communication Systems

**List of Minor with Specialization offered by Electronics & Communication Engineering Program**

1. Semiconductor Devices and Circuits
2. Digital Electronics
3. Analog Electronic Circuits

**List of Minor's offered by the Freshman Engineering and Management studies such as**

1. Liberal Arts
2. Statistics
3. General Management
4. Human Resource Management (these will be implemented for the 2021 admitted students)

\* The credits earned through industry Connect Courses (Skill Oriented Course) can be tradeoff with any other 3-Credit course other than Professional Core



### Electrical and Electronics Engineering

Credit requirement for the award of the degree under academic Regulation 2020 – 2021 for the candidates admitted from the academic year 2021 onwards

	Four Years	Three Years
B. Tech. (Regular Degree)	160	121
B. Tech. (Honors Degree)	180	141
B. Tech. (With Minor specialization other than Chosen Branch of Engg. & Tech.)	180	141

#### Semester I

No.	Code	Course	POs	Contact Hours					
				L	T <sup>1</sup>	P <sup>2</sup>	C		
01	20HSX01	Communicative English	10	3	0	0	3.0	ES	
02	20BSX11	Linear Algebra and Differential Equations	1, 12 <sup>1</sup>	3	1	0	3.0	ES	
03	20BSX33	Applied Physics	1	3	1	0	3.0	ES	
04	20ESX03	Basic Electrical Engineering	1	3	0	0	3.0	ES	
05	20ESX02	Programming for Problem Solving Using 'C'	1	3	0	0	3.0	ES	
06	20HSX02	Communicative English Lab	10	0	0	3	1.5	ES	
07	20BSX34	Applied Physics Lab	1, 4	0	0	3	1.5	ES	
08	20ESX07	Programming for Problem Solving Using 'C' Lab	1, 4	0	0	3	1.5	ES	
Sub-total				15	02	09	19.5		

#### Semester II

01	20BSX12	Partial Differential Equations and Vector Calculus	1	3	1	0	3.0	ES
02	20BSX23	Applied Chemistry	1	3	1	0	3.0	ES
03	20CS403	Python Programming	1	3	1	0	3.0	ES
04	20ESX04	Engineering Mechanics	1	3	1	0	3.0	ES
05	20ESX01	Engineering Drawing	1, 5, 10	1	0	4	3.0	ES
06	20BSX24	Applied Chemistry Lab	1, 4	0	0	3	1.5	ES
07	20CS407	Python Programming Lab	1	0	0	3	1.5	ES
08	20ESX06	Engineering Workshop	4	0	0	3	1.5	ES
09	20MCX01	Environmental Science	1	2	0	0	-	MC
Sub-total				15	04	13	19.5	

#### Semester III

01	20BSX13	Numerical Methods and Transforms	1	3	1	0	3.0	ES
02	20EC302	Electronic Devices and Circuits	1, 3, 10	3	0	0	3.0	PC
03	20EE303	Electrical Circuit Analysis	1, 3, 10, PSO	3	1	0	3.0	PC
04	20EE304	DC Machines and Transformers	2, 3, PSO 1	3	0	0	3.0	PC
05	20EE305	Power Generation and Transmission	2, 7, 10, PSO	3	0	0	3.0	PC
06	20EC306	Electronic Devices and Circuits Lab	4, PSO 1	0	0	3	1.5	PC
07	20EE307	DC Machines and Transformers Lab	4, PSO 1	0	0	3	1.5	PC
08	20EE308	Electrical Circuit Analysis Lab	4, PSO 1	0	0	3	1.5	PC
09	20EES01	Short-term Skill Oriented Elective	5	1	0	2	2.0	ES
10	20MCX02	Constitution of India <sup>3</sup>	-	2	0	0	-	MC
Sub-total				18	02	11	21.5	

Commented [d51]: All the newly introduced courses in the program of Electrical & Electronics Engineering are kept in the Track mode change

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25/11/23

Head of the Department  
Dept of Electrical & Electronics Engg.  
N S Raju Institute of Technology Autonomous  
Buntiyam, Visakhapatnam - 531 173

<sup>1</sup> Suggested tutorial hours will not carry any credits

<sup>2</sup> By default, all courses are mapped to PO 12 as they are Weekly contributing

<sup>3</sup> It is mandate for all students to pursue an online certification course for minimum duration of 30 hours covering the areas of Sustainability, Climate changes, Environmental Impact Assessment in line with Sustainable Development Goals (SDG)

**Semester IV**

No.	Code	Course	POs	Contact Hours				
				L	T	P	C	
01	20HSX03	Managerial Economics and Financial Analysis	11	3	0	0	3.0	HS
02	20BSX15	Probability and Statistics	1	3	1	0	3.0	BS
03	20EE403	Control Systems	3, PSD 1	3	0	0	3.0	PC
04	20EE404	Induction Motors and Synchronous Machines	2, 3, PSD 1	3	1	0	3.0	PC
05	20EE405	Electro Magnetic Field Theory	3, PSD 1	3	0	0	3.0	ES
06	20EE406	Induction Motors and Synchronous Machines Lab	4	0	0	3	1.5	PC
07	20EE407	Industrial Automation for Electrical & Electronics Engg	4	0	0	3	1.5	PC
08	20EE408	Control Systems Lab	4, PSD 1	0	0	3	1.5	PC
09	20EES02	Short-term Skill Oriented Elective	3, 4	1	0	2	2.0	SOE
Sub-total				16	02	11	21.5	

**Semester V**

01	20EC303	Signals and Systems	1, 2	3	0	0	3.0	PC
02	20EE502	Power Electronics	2, 3, PSD 1	3	1	0	3.0	PC
03	20EC305	Digital System Design	1, 3	3	0	0	3.0	PC
04	-	Professional Elective I	-	3	0	0	3.0	PE
05	-	Open Elective I	-	3	0	0	3.0	OE
06	20EC308	Digital System Design Lab	4	0	0	3	1.5	PC
07	20EE507	Power Electronics Lab	4, PSD 1	0	0	3	1.5	PC
08	20EES03	Technical Paper Writing*	-	0	0	4	2.0	TE
09	20MCX03	Intellectual Property Rights and Patents <sup>†</sup>	-	2	0	0	-	MC
10	-	Summer Internship #1/ CSP <sup>‡</sup>	5, 8, 9, 10, PSD 1	0	0	0	1.5	IN
Sub-total				17	01	08	21.5	

**Semester VI**

01	20EC603	Micro Processors and Micro Controllers	3	3	0	0	3.0	PC
02	20EE602	Electrical Measurements and Instrumentation	2, PSD 1	3	0	0	3.0	PC
03	20EE603	Power Systems Analysis	2, 3, 6, PSD 1	3	1	0	3.0	PC
04	-	Professional Elective II	-	3	0	0	3.0	PE
05	-	Open Elective II	-	3	0	0	3.0	OE
06	20EC606	Micro Processors and Micro Controllers Lab	4, 9	0	0	3	1.5	PC
07	20EE607	Electrical Measurements and Instrumentation Lab	4, PSD 1	0	0	3	1.5	PC
08	20EE608	Power Systems and Simulation Lab	4, PSD 1	0	0	3	1.5	PC
09	20EES04	Short-term Skill Oriented Elective	5	1	0	2	2.0	SOE
10	20MCX04	Indian Traditional Knowledge <sup>†</sup>	-	2	0	0	-	MC
Sub-total				18	01	11	21.5	

**Semester VII**

- \* The students are expected to identify one research area in the recent trends, collect recent research articles, prepare a technical research review paper and publish in renowned annual conferences/ journals, preferably indexed in Scopus or UGC care
- † The students are expected to identify one research area in the recent trends, collect recent research articles, prepare a technical research review paper and publish in renowned annual conferences/ journals, preferably indexed in Scopus or UGC care
- ‡ The work pertaining to summer Internship #1 and #2 shall be completed at the end of the semesters IV & VI respectively. The assessment shall be carried out during the semesters V and VII  
It is mandate for all the students to undergo 4-6 weeks of industrial training and appear for assessment during Semester V with report. With regard to Community Service Project (CSP), based on the availability the students can opt CSP as an alternate option for summer internship #1 for a duration of 08 weeks
- † It is mandate for all the students to pursue an online certification course for minimum duration of 30 hours covering the application of ITK in Science Engineering & Technology

01	-	Professional Elective II	-	3	0	0	3.0	PE
02	-	Professional Elective IV	-	3	0	0	3.0	PE
03	-	Professional Elective V	-	3	0	0	3.0	PE
04	-	Open Elective II	-	3	0	0	3.0	OE
05	-	Open Elective IV	-	3	0	0	3.0	OE
06	20HS004	Professional Ethics	8	3	0	0	3.0	PSO
07	20EES05	Finishing School for Electrical and Electronics Engineering	9, PSO #1	1	0	2	2.0	PSO
08	-	Summer Internship #2 <sup>a</sup>	5, 8, 9, 10, PSO 1	0	0	0	3.0	IN
		Sub-total		19	0	02	23.0	
<b>Semester VII</b>								
01	-	Full Semester Internship <sup>b</sup>	5-10, PSO 1, PSO	0	0	0	06	IN
02	-	Capstone Project <sup>c</sup>	5-10, PSO 1, PSO	0	0	0	06	IN
		Sub-total		0	0	0	12.0	
		Total Credits		-	-	-	150	

<sup>a</sup> It is mandate for all the students to undergo 6-8 weeks of industrial training and appear for assessment during Semester VII with report and those opted FSI during Semester VII shall appear through online for reviews

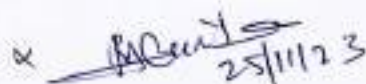
<sup>b</sup> Students opting for FSI in VII semester have to take up courses of VII semester in VIII semester. The students are expected to do a capstone project parallelly demonstrating their PCs & PSOs and submit a separate report

List of Electives

Professional Elective #1								
1	20EE001	Advanced Power Electronics	-	3	0	0	3.0	PE
2	20EE002	Digital Control Systems	-	3	0	0	3.0	PE
3	20EE003	Utilization of Electrical Energy	-	3	0	0	3.0	PE
4	20EE004	Machine Modelling and Analysis	-	3	0	0	3.0	PE
5	20EE005	Sensors and Transducers	-	3	0	0	3.0	PE
Professional Elective #2								
6	20EE006	Solid State Electric Drives	-	3	0	0	3.0	PE
7	20EE007	Advanced Control Systems	-	3	0	0	3.0	PE
8	20EE008	Reactive Power Compensation and Management	-	3	0	0	3.0	PE
9	20EE009	Basic Industrial Automation	-	3	0	0	3.0	PE
10	20EE010	Process Instrumentation	-	3	0	0	3.0	PE
Professional Elective #3								
11	20EE011	Switchgear Protection	-	3	0	0	3.0	PE
12	20EE012	Digital Signal Processing	-	3	0	0	3.0	PE
13	20EE013	HVDC and FACTS	-	3	0	0	3.0	PE
14	20EE014	Programmable Control Devices and Applications	-	3	0	0	3.0	PE
15	20EE015	Virtual Instrumentation	-	3	0	0	3.0	PE
Professional Elective #4								
16	20EE016	Analysis of Power Converters	-	3	0	0	3.0	PE
17	20EE017	Multivariable Control System	-	3	0	0	3.0	PE
18	20EE018	Power System Operation and Control	-	3	0	0	3.0	PE
19	20EE019	Automotive Electrical Engineering	-	3	0	0	3.0	PE
20	20EE020	Wireless Sensors and Instrument Networks	-	3	0	0	3.0	PE
Professional Elective #5								
The curriculum provides academic flexibility to choose any of the domain specific courses from MOOCs as approved by the respective Board of Studies and Academic Council. The students can take up this course on self-study mode. The course shall be of 45 - 60 hours duration (4-credits) and the assessment shall be as per the academic regulation 2020.								
Open Elective #1								
21	20CE001	Urban Environmental Service	-	3	0	0	3.0	OE
22	20CS001	Data Structures and Algorithms	-	3	0	0	3.0	OE
23	20AI001	Machine Learning for Engineers	-	3	0	0	3.0	OE
24	20DS001	Introduction to Database Management Systems	-	3	0	0	3.0	OE
25	20EC001	Architectures and Algorithms of IoT	-	3	0	0	3.0	OE
26	20EE001	Introduction to Renewable Energy Sources	-	3	0	0	3.0	OE
27	20ME001	Nano Technology	-	3	0	0	3.0	OE
28	20SH001	Women and Society	-	3	0	0	3.0	OE
Open Elective #2								
29	20CE002	Ecology, Environment and Resources	-	3	0	0	3.0	OE
30	20CS002	Designing the Internet of Things	-	3	0	0	3.0	OE
31	20AI002	Fundamentals of Deep Learning	-	3	0	0	3.0	OE
32	20DS002	Introduction to Data Science	-	3	0	0	3.0	OE
33	20EC002	IoT for Smart Grids	-	3	0	0	3.0	OE
34	20EE002	Electrical Safety and Management	-	3	0	0	3.0	OE
35	20ME002	Fundamentals of Automobile Engineering	-	3	0	0	3.0	OE
Open Elective #3								
36	20CE003	Disaster, Risk Mitigation and Management	-	3	0	0	3.0	OE
37	20CS003	Operating Systems	-	3	0	0	3.0	OE
38	20AI003	Fundamentals of AI	-	3	0	0	3.0	OE
39	20DS003	Introduction to Big Data	-	3	0	0	3.0	OE
40	20EC003	Privacy and Security in IoT	-	3	0	0	3.0	OE
41	20EE003	Low-cost Automation	-	3	0	0	3.0	OE
42	20ME003	Industrial Automation	-	3	0	0	3.0	OE
43	20SH002	Design Thinking	-	3	0	0	3.0	OE
Open Elective #4								

Commented [ds2]: All the Five Courses that are under the Professional Elective #3 & #4 are newly introduced.

Commented [ds3]: All the Five Courses that are under the Professional Elective #3 & #4 are newly introduced.

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25/11/23

*Printed text:*  
Head of the Department  
Dept. of Electrical & Electronics Engg.  
N S Raju Institute of Technology, Puttaparthi  
Sathyan. Vasudevan - 531 173

The curriculum provides academic flexibility to choose any of the inter-disciplinary courses from MOOCs as approved by the respective Board of Studies and Academic Council. The students can take up this course on self-study mode. The course shall be of 45 - 60 hours duration and the assessment shall be as per the academic regulation 2020.

**B. Tech. (Honors)**

**Category I**

1	20EEH01	Smart Grid	-	4	0	0	4.0	EE
2	20EEH02	Advanced Smart Power Grids	-	4	0	0	4.0	EE
3	20EEH03	Electric Power Quality	-	4	0	0	4.0	EE

**Category II**

4	20EEH04	Electric Vehicle Technologies	-	4	0	0	4.0	EE
5	20EEH05	Energy Audit Conservation and Management	-	4	0	0	4.0	EE
6	20EEH06	Electrical Load Estimation	-	4	0	0	4.0	EE

**Category III**

7	20EEH07	Challenges and Impact of Electric Vehicle on Smart Grids	-	4	0	0	4.0	EE
8	20EEH08	Optimization Techniques	-	4	0	0	4.0	EE
9	20EEH09	Illumination Engineering	-	4	0	0	4.0	EE

**Category IV**

10	20EEH10	Design and Testing of Battery Management System for Electric Vehicle	-	4	0	0	4.0	EE
11	20EEH11	Advanced Power System Protection	-	4	0	0	4.0	EE
12	20EEH12	Power System Stability	-	4	0	0	4.0	EE

**B. Tech. (Minor with Specialization)**

**Category I**

1	20CEM01	Air Pollution	-	3	0	0	3.0	M
2	20CSM01	E-Commerce	-	3	0	0	3.0	M
3	20MEM01	Biomaterials	-	3	0	0	3.0	M
4	20EEM01	Basic Control Systems	-	3	0	0	3.0	M
5	20ECM01	Semi-Conductor Devices and Circuits	-	3	0	0	3.0	M
6	20AIM01	Fundamentals of Neural Networks	-	3	0	0	3.0	M
7	20OS003	Introduction to R Programming	-	3	0	0	3.0	M
8	20SHM01	Psychology	-	3	0	0	3.0	M
9	20SHM02	Statistical Methods	-	3	0	0	3.0	M
10	20MBM01	General Management	-	3	0	0	3.0	M
11	20MBM02	Human Resource Planning	-	3	0	0	3.0	M

**Category II**

12	20CEM02	Climate Change Mitigation and Adaptation	-	3	0	0	3.0	M
13	20CSM02	Knowledge Discovery and Databases	-	3	0	0	3.0	M
14	20MEM02	Micro Electromechanical Systems	-	3	0	0	3.0	M
15	20EEM02	Basics of Electrical Machines and Drives	-	3	0	0	3.0	M
16	20ECM02	Digital Electronics	-	3	0	0	3.0	M
17	20AIM02	Machine Learning with Python	-	3	0	0	3.0	M
18	20DSM02	Data Management and Analysis	-	3	0	0	3.0	M
19	20SHM03	English for Media	-	3	0	0	3.0	M
20	20SHM04	Statistical Inference	-	3	0	0	3.0	M
21	20VBM03	Organization Behaviour	-	3	0	0	3.0	M
22	20VBM04	Compensation Management & Employee Welfare Laws	-	3	0	0	3.0	M

**Category III**

23	20CEM03	Sustainability and Pollution Prevention Practices	-	3	0	0	3.0	M
24	20CSM03	Database Security	-	3	0	0	3.0	M
25	20MEM03	Surface Engineering	-	3	0	0	3.0	M
26	20EEM03	Electrical Engineering Material Science	-	3	0	0	3.0	M
27	20ECM03	Analog Electronic Circuits	-	3	0	0	3.0	M
28	20AIM03	Interpretable Machine Learning	-	3	0	0	3.0	M
29	20DSM03	Data Governance	-	3	0	0	3.0	M
30	20SHM05	Journalism	-	3	0	0	3.0	M
31	20SHM06	Statistical Quality Control	-	3	0	0	3.0	M
32	20VBM05	Entrepreneurship & Business Venture Planning	-	3	0	0	3.0	M
33	20VBM06	Performance Management & Talent Management	-	3	0	0	3.0	M

Short Term Skill Oriented Electives

34	23EES01	MATLAB		0	0	4	2.0	SE
35	23EES02	P-SPICE		0	0	4	2.0	SE
36	23EES04	ECAD		0	0	4	2.0	SE

Industry Connect Courses (Skill Oriented Courses)<sup>14</sup>

37	23ICC01	Competitive Programming	-	2	0	8	6.0	ICC
38	23ICC02	Web Technologies - Theory to Practice	-	2	0	8	6.0	ICC
39	23ICC03	Java and Springboard	-	2	0	8	6.0	ICC
40	23ICC04	Robotics Process Automation (RPA)	-	2	0	8	6.0	ICC
41	23ICC05	Information Security and Forensics	-	2	0	8	6.0	ICC
42	23ICC06	Battery System Design Engineering	-	2	0	8	6.0	ICC
43	23ICC07	Blockchain Technology	-	2	0	8	6.0	ICC
44	23ICC08	Network Administration	-	2	0	8	6.0	ICC
45	23ICC09	Product Engineering	-	2	0	14	9.0	ICC
46	23ICC10	Machine Learning Engineer	-	2	0	8	6.0	ICC
47	23ICC11	Data Scientist	-	2	0	8	6.0	ICC
48	23ICC12	Industrial IoT	-	2	0	8	6.0	ICC

<sup>14</sup> The credits earned through Industry Connect Courses (Skill Oriented Course) can be traded off with any other 3-Credit course other than Professional Core

### Mechanical Engineering

Credit requirement for the award of the degree under academic Regulation 2020 – 2021 for the candidates admitted from the academic year 2021 onwards

	Four Years	Three Years
B. Tech. (Regular Degree)	160	121
B. Tech. (Honors Degree)	180	141
B. Tech. (With Minor specialization other than Chosen Branch of Engg. & Tech.)	180	141

#### Semester I

No.	Code	Course	Pos	Contact Hours				
				L	T*	P	C	
01	20HSX01	Communicative English	10	3	0	0	3.0	BS
02	20BSX11	Linear Algebra and Differential Equations	1, 12 <sup>1</sup>	3	1	0	3.0	BS
03	20BSX21	Engineering Chemistry	1	3	0	0	3.0	BS
04	20ESX01	Engineering Drawing	1, 5, 10	1	0	4	3.0	PC
05	20ESX02	Programming for Problem Solving Using 'C'	1	3	0	0	3.0	PC
06	20HSX02	Communicative English Lab	10	0	0	3	1.5	BS
07	20BSX22	Engineering Chemistry Lab	1, 4	0	0	3	1.5	BS
08	20ESX07	Programming for Problem Solving Using 'C' Lab	1	0	0	3	1.5	PC
Sub-total				13	01	13	19.5	

#### Semester II

01	20BSX12	Partial Differential Equations and Vector Calculus	1	3	1	0	3.0	BS
02	20BSX31	Engineering Physics	1	3	0	0	3.0	BS
03	20ESX05	Basic Electrical and Electronics Engineering	1	3	1	0	3.0	PC
04	20ESX04	Engineering Mechanics	1, 2, 4	3	1	0	3.0	PC
05	20ME201	Computer Aided Engineering Drawing	1, 5, 10	1	0	4	3.0	PC
06	20BSX32	Engineering Physics Lab	1, 4	0	0	3	1.5	BS
07	20ESX08	Basic Electrical and Electronics Engineering Lab	1, 4	0	0	3	1.5	PC
08	20ESX06	Engineering Workshop	4	0	0	3	1.5	PC
09	20MCX01	Environmental Science	-	2	0	0	-	PC
Sub-total				15	03	13	19.5	

#### Semester III

01	20BSX13	Numerical Methods and Transforms	1	3	1	0	3.0	BS
02	20ME302	Thermodynamics	1, 2, 4, PSO 1	3	1	0	3.0	PC
03	20ME303	Material Science and Metallurgy	1, 7, 12	3	0	0	3.0	PC
04	20ME304	Mechanics of Solids	2, 3, 12, PSO 1	3	1	0	3.0	PC
05	20ME305	Manufacturing Processes	1, 5, 12	3	0	0	3.0	PC
06	20ME306	Material Science and Metallurgy Lab	1, 4	0	0	3	1.5	PC
07	20ME307	Mechanics of Solids Lab	1, 4	0	0	3	1.5	PC
08	20ME308	Manufacturing Processes Lab	1, 4	0	0	3	1.5	PC
09	20MES01	Short-term Skill Oriented Elective	5, 10, PSO 1	1	0	2	2.0	SC
10	20MCX02	Constitution of India	-	2	0	0	-	PC
Sub-total				18	03	11	21.5	

<sup>1</sup>Suggested tutorial hours will not carry any credits

<sup>2</sup>By default, all courses are mapped to PO-12 as they are weakly contributing

<sup>3</sup>It is mandate for all students to pursue an online certification course for minimum duration of 30 hours covering the areas of Sustainability, Climate changes, Environmental Impact Assessment in line with Sustainable Development Goals (SDG)

Commented [dcl3]: All the newly introduced courses in the program of Mechanical Engineering are kept in the Track mode change

V. Ananda Babu  
25/11/23

Head of the Department  
Mechanical Engineering  
N. S. Saijanarayanan Raju Institute of Technology  
Nadimpati, Hyderabad - 501 301

Semester IV								
No.	Code	Course	Pos	Contact Hours				
				L	T	P	C	
01	20HSX03	Managerial Economics and Financial Analysis	11	3	0	0	3.0	HS
02	20CS403	Python Programming	1	3	1	0	3.0	ES
03	20ME403	Kinematics of Machinery	2, 3, PSO 1	3	1	0	3.0	PC
04	20ME404	Fluid Mechanics and Hydraulic Machines	2, 3, PSO 1	3	1	0	3.0	PC
05	20ME405	Internal Combustion Engines and Gas Turbines	2, 3, PSO 2	3	1	0	3.0	PC
06	20ME406	Fluid Mechanics and Hydraulic Machines Lab	1, 4	0	0	3	1.5	PC
07	20ME407	Thermal Engineering Lab	1, 4	0	0	3	1.5	PC
08	20CS407	Python Programming Lab	1	0	0	3	1.5	ES
09	20MES02	Short-term Skill Oriented Elective	1, 2, 4, 5, 10	1	0	2	2.0	SC
Sub-total				16	04	11	21.5	
Semester V								
01	20ME501	Dynamics of Machinery	2, 3, 4, 12, PSO 1	3	1	0	3.0	PC
02	20ME502	Design of Machine Elements I	2, 3, 4, 12, PSO 1	2	1	0	3.0	PC
03	20ME503	Metal Cutting and Machine Tools	1, 6, 12	3	0	0	3.0	PC
04	-	Professional Elective I	-	3	0	0	3.0	PE
05	-	Open Elective I	-	3	0	0	3.0	OE
06	20ME506	Dynamics of Machinery Lab	1, 4	0	0	3	1.5	PC
07	20ME507	Metal Cutting and Machine Tools Lab	1, 3, 4	0	0	3	1.5	PC
08	-	Technical Paper Writing	12	0	0	4	2.0	SC
09	20MCX03	Intellectual Property Rights and Patents	-	2	0	0	-	
10	-	Summer Internship #1	5, 8, 9, 10, PSU 1	0	0	0	1.5	
Sub-total				15	02	14	21.5	

\*The students are expected to identify one research area in the recent trends, collect recent research articles, prepare a technical research review paper and publish in renowned annual conferences/journals, preferably indexed in Scopus or UGC care

\*The students are expected to identify one research area in the recent trends, collect recent research articles, prepare a technical research review paper and publish in renowned annual conferences/journals, preferably indexed in Scopus or UGC care

\*The work pertaining to summer Internship #1 and #2 shall be completed at the end of the semesters IV & VI respectively. The assessment shall be carried out during the semesters V and VII

It is mandate for all the students to undergo 4-6 weeks of industrial training and appear for assessment during Semester V with report. With regard to Community Service Project (CSP), based on the availability the students can opt CSP as an alternate option for summer internship #1 for a duration of 08 weeks



Semester VI								
01	20ME601	Mechanical Measurements and Metrology	1, 6, 12	3	0	0	3.0	PC
02	20ME602	Design of Machine Elements II	2, 3, 4, PSD 1	3	1	0	3.0	PC
03	20ME603	Heat Transfer	1, 2, 3, 4, PSD 2	3	1	0	3.0	PC
04	-	Professional Elective II	-	3	0	0	3.0	PE
05	-	Open Elective II	-	3	0	0	3.0	OE
06	20ME606	Computer Aided Machine Drawing	1, 5, 10, PSD 1	0	0	3	1.5	PC
07	20ME607	Mechanical Measurements and Metrology Lab	1, 4	0	0	3	1.5	PC
08	20ME608	Heat Transfer Lab	1, 3, 4, PSD 2	0	0	3	1.5	PC
09	20MES04	Short-term Skill Oriented Elective	1, 4, 5	0	0	4	2.0	SC
10	20MCX04	India Traditional Knowledge	-	2	0	0	-	
				Sub-total	16	02	15	21.5
Semester VII								
01	-	Professional Elective III	-	3	0	0	3.0	PE
02	-	Professional Elective IV	-	3	0	0	3.0	PE
03	-	Professional Elective V	12	3	0	0	3.0	PE
04	-	Open Elective III	-	3	0	0	3.0	OE
05	-	Open Elective IV	12	3	0	0	3.0	OE
06	20MSX04	Professional Ethics	8	3	0	0	3.0	IS
07	20MES05	Finishing School for Mechanical Engineering	-	0	0	4	2.0	SC
08	-	Summer Internship <sup>1,2,4</sup>	5, 8, 9, 10, PSD 1	0	0	0	3.0	
				Sub-total	16	0	08	23.0
Semester VIII								
01	-	Full Semester Internship <sup>1</sup>	5-10, PSD 1, PSD 2	0	0	0	06	
02	-	Capstone Project <sup>3</sup>	5-10, PSD 1, PSD 2	0	0	0	06	
				Sub-total	0	0	0	12.0
				Total Credits	-	-	-	160

<sup>1</sup>It is mandate for all the students to pursue an online certification course for minimum duration of 30 hours covering the application of ITK in Science Engineering & Technology

<sup>2</sup>It is mandate for all the students to undergo 6-8 weeks of industrial training and appear for assessment during Semester VII with report and those opted FSI during Semester VII shall appear through online for reviews

<sup>3</sup>Students opting for FSI in VII semester have to take up courses of VII semester in VIII semester. The students are expected to do a capstone project parallelly demonstrating their POs & PSCs and submit a separate report

List of Electives

Professional Elective #1							
1	20ME001	Applied Thermodynamics	3	0	0	3.0	PE
2	20ME002	Unconventional Machining Processes	3	0	0	3.0	PE
3	20ME003	Rotor Dynamics	3	0	0	3.0	PE
4	20ME004	Composite Materials	3	0	0	3.0	PE
5	20ME005	Product Design	3	0	0	3.0	PE
6	20ME006	Production Planning and Control	3	0	0	3.0	PE
Professional Elective #2							
7	20ME007	Refrigeration and Air Conditioning	3	0	0	3.0	PE
8	20ME008	Flexible Manufacturing Systems	3	0	0	3.0	PE
9	20ME009	Optimization Techniques	3	0	0	3.0	PE
10	20ME010	Material Characterization	3	0	0	3.0	PE
11	20ME011	CAD/CAM	3	0	0	3.0	PE
12	20ME012	Total Quality Management	3	0	0	3.0	PE
Professional Elective #3							
13	20ME013	Power Plant Engineering	3	0	0	3.0	PE
14	20ME014	Advanced Welding Technology	3	0	0	3.0	PE
15	20ME015	Finite Element Method	3	0	0	3.0	PE
16	20ME016	Condition Monitoring	3	0	0	3.0	PE
17	20ME017	Computer Integrated Manufacturing	3	0	0	3.0	PE
18	20ME018	Operations Research	3	0	0	3.0	PE
Professional Elective #4							
19	20ME019	Gas Dynamics and Jet Propulsion	3	0	0	3.0	PE
20	20ME020	Advance Metal Casting	3	0	0	3.0	PE
21	20ME021	Design Innovations	3	0	0	3.0	PE
22	20ME022	Non Destructive Evaluation	3	0	0	3.0	PE
23	20ME023	Robotics and Automation	3	0	0	3.0	PE
24	20ME024	Project Planning and Management	3	0	0	3.0	PE
Professional Elective #5							
The curriculum provides academic flexibility to choose any of the domain specific courses from MOOCs as approved by the respective Board of Studies and Academic Council. The students can take up this course on self-study mode. The course shall be of 45 – 60 hours duration (4-credits) and the assessment shall be as per the academic regulation 2020.							
Open Elective #1							
25	20CE001	Urban Environmental Service	3	0	0	3.0	OE
26	20CS001	Data Structures and Algorithms	3	0	0	3.0	OE
27	20AI001	Machine Learning for Engineers	3	0	0	3.0	OE
28	20DS001	Introduction to Database Management Systems	3	0	0	3.0	OE
29	20EC001	Architectures and Algorithms of IoT	3	0	0	3.0	OE
30	20EE001	Introduction to Renewable Energy Sources	3	0	0	3.0	OE
31	20ME001	Nano Technology	3	0	0	3.0	OE
32	20SH001	Women and Society	3	0	0	3.0	OE
Open Elective #2							
33	20CE002	Ecology Environment and resource Management	3	0	0	3.0	OE
34	20CS004	Internet of Things	3	0	0	3.0	OE
35	20AI002	Fundamentals of Deep Learning	3	0	0	3.0	OE
36	20DS002	Introduction to Data Science	3	0	0	3.0	OE
37	20EC002	IoT for Smart Grids	3	0	0	3.0	OE
38	20EE002	Electrical Safety and Management	3	0	0	3.0	OE
39	20ME002	Fundamentals of Automobile Engineering	3	0	0	3.0	OE
40	20SH002	Design the Thinking	3	0	0	3.0	OE
Open Elective #3							
41	20CE003	Disaster, Risk Mitigation and Management	3	0	0	3.0	OE
42	20CS004	Operating Systems	3	0	0	3.0	OE
43	20AI003	Intelligent Robots and Drone Technology	3	0	0	3.0	OE
44	20DS003	Introduction to Big Data	3	0	0	3.0	OE

Commented [ds2]: All the Six Courses that are under the Professional Elective #1 & #2 are newly introduced.

Commented [ds3]: All the Six Courses that are under the Professional Elective #3 & #4 are newly introduced.

Nadimpalli Satyanarayana Raju Institute of Technology (NSRIT) | Mechanical | Curriculum (Revision 1) | Academic Regulation 2020  
(Revision 1) | Approved in 8<sup>th</sup> ACM | Applicable for the students admitted in 2022-23 w.e.f. ACY 2023-24 onwards

45	20ECO03	Privacy and Security in IoT	-	-	3	0	0	3.0	OE
46	20EE003	Low-cost Automation	-	-	3	0	0	3.0	OE
47	20ME003	Industrial Automation	-	-	3	0	0	3.0	OE

**Open Elective #4**

The curriculum provides academic flexibility to choose any of the inter-disciplinary courses from MOOCs as approved by the respective Board of Studies and Academic Council. The students can take up this course on self-study mode. The course shall be of 45 – 60 hours duration and the assessment shall be as per the academic regulation 2020.

OE

**B. Tech. (Honors)**

**Category I**

1	20MEH01 Advanced Thermodynamics	-	4	0	0	4.0	HO
2	20MEH02 Advanced Heat Transfer	-	4	0	0	4.0	HO
3	20MEH03 Jet Propulsion and Rocket Engineering	-	4	0	0	4.0	HO

**Category II**

4	20MEH04 Design and Analysis of Engineering Materials	-	4	0	0	4.0	HO
5	20MEH05 Advanced Manufacturing Methods	-	4	0	0	4.0	HO
6	20MEH06 Rapid Prototyping	-	4	0	0	4.0	HO

**Category III**

7	20MEH07 Advanced Strength of Materials	-	4	0	0	4.0	HO
8	20MEH08 Advanced Finite Element Analysis	-	4	0	0	4.0	HO
9	20MEH09 Advanced Optimization Techniques	-	4	0	0	4.0	HO

**Category IV**

10	20MEH10 Integrated Computer Aided Design	-	4	0	0	4.0	HO
11	20MEH11 Industrial Robotics	-	4	0	0	4.0	HO
12	20MEH12 Design of Smart Technologies	-	4	0	0	4.0	HO

**B. Tech. (Minor with Specialization)**

**Category I**

1	20CEM01 Air Pollution	-	3	0	0	3.0	MI
2	20CSM01 E-Commerce	-	3	0	0	3.0	MI
3	20MEM01 Biomaterials	-	3	0	0	3.0	MI
4	20EEM01 Basic Control Systems	-	3	0	0	3.0	MI
5	20ECM01 Fundamentals of Electronics	-	3	0	0	3.0	MI
6	20AIM01 Fundamentals of Neural Networks	-	3	0	0	3.0	MI
7	20DSC03 Introduction to R Programming	-	3	0	0	3.0	MI

**Category II**

8	20CEM02 Climate Change Mitigation and Adaptation	-	3	0	0	3.0	MI
9	20CSM02 Knowledge Discovery and Databases	-	3	0	0	3.0	MI
10	20MEM02 Micro Electromechanical Systems	-	3	0	0	3.0	MI
11	20EEM02 Design of Photovoltaic systems	-	3	0	0	3.0	MI
12	20ECM02 Digital Electronics	-	3	0	0	3.0	MI
13	20AIM02 Machine Learning with Python	-	3	0	0	3.0	MI
14	20DSM02 Data Management and Analysis	-	3	0	0	3.0	MI

**Category III**

15	20CEM03 Sustainability and Pollution Prevention Practices	-	3	0	0	3.0	MI
16	20CSM03 Database Security	-	3	0	0	3.0	MI
17	20MEM03 Surface Engineering	-	3	0	0	3.0	MI
18	20EEM03 Electrical Engineering Material Science	-	3	0	0	3.0	MI
19	20ECM03 Analog Electronic Circuits	-	3	0	0	3.0	MI
20	20AIM03 Interpretable Machine learning	-	3	0	0	3.0	MI
21	20DSM03 Data Governance	-	3	0	0	3.0	MI

**Short Term Skill Oriented Electives**

34	23MES01	Computer Aided Modeling	0	0.4	2.0	SC
35	23MES02	Computer Numerical Control Programming	0	0.4	2.0	SC
36	23MES04	Computer Aided Analysis	0	0.4	2.0	SC
<b>Long Term Skill Oriented Courses (Industry Oriented)†</b>						
37	20ICC01	Competitive Programming	2	0.8	6.0	LTS
38	20ICC02	Web Technologies – Theory to Practice	2	0.8	6.0	LTS
39	20ICC03	Java and Springboard	2	0.8	6.0	LTS
40	20ICC04	Robotics Process Automation (RPA)	2	0.8	6.0	LTS
41	20ICC05	Information Security and Forensics	2	0.8	6.0	LTS
42	20ICC06	Battery Technologies for EV	2	0.8	6.0	LTS
43	20ICC07	Block chain Technology	2	0.8	6.0	LTS
44	20ICC08	Network Administration	2	0.8	6.0	LTS
45	20ICC09	Product Engineering	2	0.14	9.0	LTS
46	20ICC10	Machine Learning Engineer	2	0.8	6.0	LTS
47	20ICC11	Data Scientist	2	0.8	6.0	LTS
48	20ICC12	Technical and Business Communication	2	0.8	6.0	LTS