

Course Curriculum (NEP 2020-Version-II) for B. Tech.
In
Mechanical Engineering

(For students admitted in 2025-26 onwards)



National Institute of Technology
Arunachal Pradesh

P.O.:Jote, Dist.: Papumpare, Arunachal Pradesh, Pin-791113
www.nitap.ac.in

UG Curriculum

Semesters	1	2	3	4	5	6	7	8
Minimum Credits	20	42	64	85	105	126	148	160-172
Multiple Entry	ENTRY		ENTRY		ENTRY		ENTRY	
Studebt Support Programs	Intensive Orientation	Finishing School	Bridge Course	Finishing School	Bridge Course	Finishing School	Bridge Course	Finishing School
Degree/ Certification		Certificate		Diploma		B.Sc. Degree		B. Tech B. Tech Honors
Multiple Exit Points		EXIT		EXIT		EXIT		EXIT

Course Structure and Credit Requirement

Course Structure and Credit Requirement										
Description	Details	Total Credits	Comments	Exit Degree						
Mathematics + Science + Humanities + Arts	SMASH	26	Science+ Mathematics + Arts + Social Science + Humanities (SMASH) Basket	Eligible for Diploma in Mechanical Engineering	Eligible for B. S. in Engineering Degree with Major in Mechanical Engineering	Eligible for B. Tech. Degree (4-Year) with Major in Mechanical Engineering	Eligible for B. Tech. With Honours Degree (4 Years) with Major in Mechanical Engineering			
Major	MA1	50	Major for 2-year Diploma							
Project and Internship	AP1	6	If opting for 2-year course							
Electives	E1	3	If opting for 2-year course							
Total (D)	SMASH + MA1 + AP1 + E1	85	Mandatory Credits for 2 Year Course							
Humanities	SMASH	3	Science+ Mathematics + Arts + Social Science + Humanities (SMASH) Basket							
Major	MA2	MA1+13 = 63	Major Basket - 1							
Project and Internship	AP2	AP1+5 =11								
Electives	E2	E1+20= 23	Electives							
Total (B1)	SMASH + MA2 + AP2 + E2	126	Mandatory Credits for 3 Year Course							
/ Elective	MA3	27	Electives							
Project & Internship	AP3	7								
Total (B2)	SMASH + MA2+MA3 + AP2 + AP3+E2	160	Mandatory Credits for 4 Year Course							
Honours*	Theory	12	Additional Subjects							
Total (B3)	Total	172								

1.0 Semester wise Credit point distribution

Sl. No.	Year	Credit Point		Total
		ODD	EVEN	
1	First	20	22	42
2	Second	22	21	43
3	Third	20	21	41
4	Fourth	22	12	34
Total Credit Point		84	76	160

2.0 Year wise Break-up for credit requirements

<u>Year</u>	<u>SMASH</u>	<u>Skill Development Course</u>	<u>Project & Internship + DIY</u>	<u>Major</u>	<u>OE</u>	<u>Electives</u>	<u>Total</u>	<u>Exit Degree with credit</u>
1 st	21	0	2	19	0		42	Certificate (42)
2 nd	5	2	2	31	0	3	43	Diploma (85)
3 rd	3	2	3	13	6	14	41	B.Sc in Engg. (126)
4 th	0	0	7	0	0	27	34	B.Tech in Engg. (160)
Total	29	4	14	63	6	44	160	

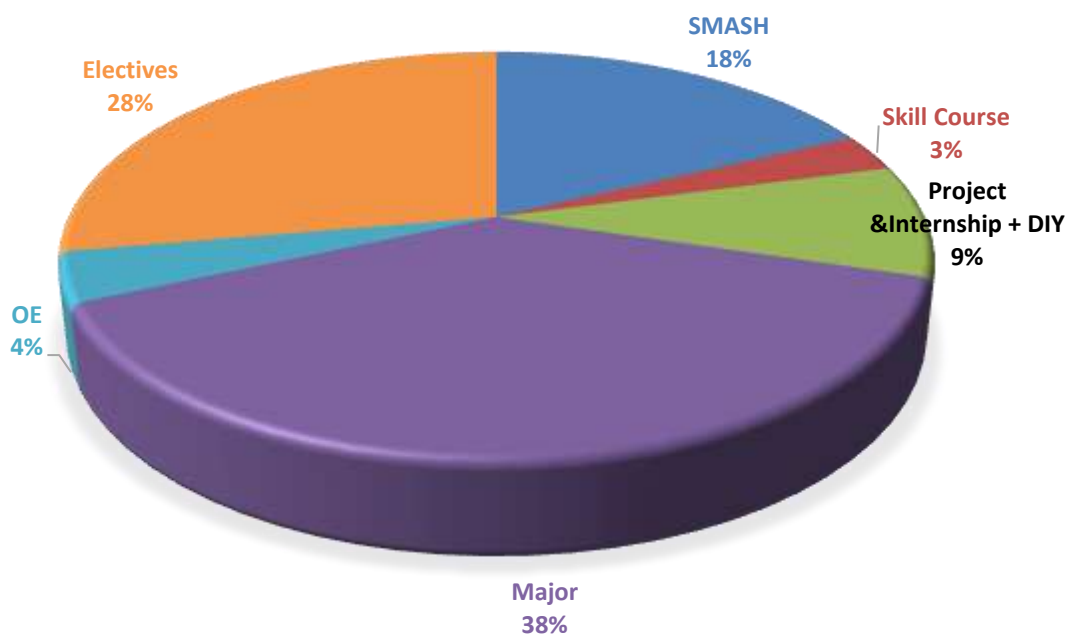
Semester wise Break-up for Credit requirements upto 4th Semester

1st semester		2 nd Semester		3 rd Semester		4 th Semester	
Courses Category	Credits	Courses Category	Credits	Courses Category	Credits	Courses Category	Credits
SMASH	13	SMASH	8	SMASH	5	SMASH	0
Major	7	Major	12	Major	16	Major	15
AP1	0	AP1	2			AP1	2
				SKILL	1	SKILL	1
						Elective	3
Total	20	Total	22	Total	22	Total	21

Semester wise Break-up for Credit requirements upto 8th Semester

5 th semester		6 th Semester		7 th Semester		8 th Semester	
Courses Category	Credits	Courses Category	Credits	Courses Category	Credits	Courses Category	Credits
SMASH	3	SMASH	0	SMASH	0	SMASH	0
MAJOR	12	MAJOR	1	MAJOR	0	MAJOR	0
Electives	0	Electives	14	Electives	18	Electives	9
OE1	3	OE2	3	--	--	--	--
AP2	1	AP2	2	AP2	4	AP2	3
SKILL	1	SKILL	1				
Total	20	Total	21	Total	22	Total	12

Percentage Wise Distribution of Subject Category



[illegible]

3.0 Course Structure

I st Semester						
Sl No	Course Code	Course Title	L	T	P	C
1	BS-1101	SM-01-SC1-Engineering Mathematics-I	2	0	0	2
2	BS-1102	SM-02-SC2-Engineering Chemistry	2	0	0	2
3	BS-1103	SM-03-SC3-Engineering Physics	2	0	0	2
4	ME-1101	MAJOR-01-DSC1-Fundamentals of Mechanical Engineering	3	0	0	3
5	MH-1101	SM-05-SECC1-Communication Skill	2	0	0	2
6	EE-1102	SM-06-ESA2-Basic of Electrical and Electronics Engineering	2	0	0	2
7	CS-1102	MAJOR-03-ESA3-Coding Laboratory	0	1	2	2
8	EE-1103	SM-07-ESA4-Basic of Electrical and Electronics Engineering Laboratory	0	0	2	1
9	BS-1104	SM-08-SC4-Engineering Physics Laboratory	0	0	2	1
10	ME-1102	MAJOR-04-ESA5-Engineering Drawing	0	0	2	1
11	ME-1103	MAJOR-02-DSC2-Basic Mechanical Engineering Laboratory	0	0	2	1
12	MH-1102	SM-09-SECC2-Language Laboratory	0	0	2	1
13	MH-1103	VAC1-NSS/NCC/Yoga (Audit Pass)	0	0	0	0
Contact Hours			13	1	12	
Total Credits						20
II nd Semester						
Sl No	Course Code	Course Title	L	T	P	C
1	BS-1201	SM-10-SC5-Engineering Mathematics-II	2	0	0	2
2	BT-1201	SM-04-ESA1-Biology for Engineers	2	0	0	2
3	CS-1201	MAJOR-05-ESA6-Programming and Data Structure	3	0	0	3
4	CS-1202	MAJOR-06-ESA7-AI in Engineering	2	0	0	2
5	ME-1201	MAJOR-07-ESA9-Engineering Mechanics	3	0	0	3
6	ME-1202	MAJOR-08-DSC3-Material Science and Metallurgy	3	0	0	3
7	MH-1201	SM-11-ESA10-Law and financial aspects in Engineering	2	0	0	2
8	ME-1204	AP1-01-VAC2-Do It Yourself (DIY)/Industry Exposure	0	0	4	2
9	BS-1202	SM-12-SC6-Engineering Chemistry Laboratory	0	0	2	1
10	CS-1205	MAJOR-10-ESA12-Programming and Data Structure Laboratory	0	0	2	1
11	MH-1202	SM-13-VAC3-Indian Knowledge Systems (IKS)	0	0	2	1
Contact Hours			17	0	10	
Total Credits						22
III rd Semester						
Sl No	Course Code	Course Title	L	T	P	C
1	BS-2101	SM-14-SC7-Engineering Mathematics-III	3	0	0	3
2	ME-2101	MAJOR-11-DSC4-Basic Thermodynamics	2	1	0	3
3	ME-2102	MAJOR-12-DSC5-Solid Mechanics	3	1	0	4
4	ME-2103	MAJOR-13-DSC6- Fluid Mechanics-I	2	1	0	3
5	ME-2104	MAJOR-14-DSC7- Manufacturing Processes-I	3	0	0	3

6	MH-2101	SM-15-ESA8-Introduction to Innovation and Creativity	2	0	0	2
7	ME-2105	MAJOR-15-Laboratory-I – Machine Drawing	0	0	2	1
8	ME-2106	MAJOR-16-Laboratory-II – Strength of Materials Laboratory	0	0	2	1
9	ME-2107	MAJOR-17-Laboratory-III – Workshop Practice -II	0	0	2	1
10	ME-2101S	SKILL-01-SDC1-Learning Modelling software	0	0	2	1
Contact Hours			15	3	8	
Total Credits						22
IV th Semester						
Sl No	Course Code	Course Title	L	T	P	C
1	ME-2201	MAJOR-18-DSC8- Fluid Mechanics-II	2	1	0	3
2	ME-2202	MAJOR-19-DSC9 – Theory of Machines	2	1	0	3
3	ME-2203	MAJOR-20-DSC10 – DSC12 - Manufacturing Processes II	3	0	0	3
4	ME-2204	MAJOR-21-DSC11- Applied Thermodynamics	3	0	0	3
5	ME-220A	ELECTIVE-01-DSE-01- Design of Machine Elements	3	0	0	3
6	ME-2205	AP1-03-VAC4-Minor Project-I	0	0	4	2
7	ME-2206	MAJOR-22-Laboratory-IV – Fluid Mechanics and Machinery Laboratory	0	0	2	1
8	ME-2207	MAJOR-23-Laboratory-V – Theory of Machine Laboratory	0	0	2	1
9	ME-2208	MAJOR-24-Laboratory-VI - Manufacturing Processes Laboratory-I	0	0	2	1
10	ME-2201S	SKILL-02-SDC2-Learning Analysis software	0	0	2	1
Contact Hours			13	2	12	
Total Credits						21
V th Semester						
Sl No	Course Code	Course Title	L	T	P	C
1	ME-3101	MAJOR-25-DSC12 –Heat Transfer	3	0	0	3
2	ME-3102	MAJOR-26-DSC13 –Machine Design	3	0	0	3
3	ME-3103	MAJOR-27-DSC14 – Industrial Engineering & Operations Research	3	0	0	3
4	ME-310X	OE1-Fundamentals of Mechanical Engineering	3	0	0	3
5	MH-3101	SM-16-SECC3-Entrepreneur Essential and Early Stage Start-up	3	0	0	3
6	ME-3104	AP2-01-AECC1-Internship-I	0	0	0	1
7	ME-3105	MAJOR-28-Laboratory-VII–Thermal Laboratory-I	0	0	2	1
8	ME-3106	MAJOR-29-Laboratory-VIII – Manufacturing Process Laboratory- II	0	0	2	1
9	ME-3107	MAJOR-30-Laboratory-XI–Design Practices	0	0	2	1
10	ME-3101S	SKILL-03-SDC3- CNC Machining	0	0	2	1
11	ME-311H	Honours -01-Advanced thermal systems	3	0	0	3*
Contact Hours			15	0	8	
Total Credits						20
VI th Semester						

Sl No	Course Code	Course Title	L	T	P	C
1	ME-320A ME-320B	ELECTIVE-02-DSE-02–Additive Manufacturing ELECTIVE-03-DSE-03- IC Engine & EV	3	0	0	3
2	ME-321A ME-321B	ELECTIVE-04-DSE-04– Control System Engineering ELECTIVE-05-DSE-05-Viscous Fluid Flow	3	0	0	3
3	ME-322A ME-322B	ELECTIVE-06-DSE-06-Refrigeration and Air-conditioning ELECTIVE-07-DSE-07- Optimization Techniques ELECTIVE-08-DSE-08- Sustainable Energy Conversion	3	0	0	3
4	ME-323A ME-323B	ELECTIVE-09-DSE-09-Mechatronics and Automation ELECTIVE-10-DSE-10- Materials Characterization Methods	3	0	0	3
5	YY-XXX	OE2- Mechatronics and Automation	3	0	0	3
6	ME-3201	AP2-03-VAC5-Minor Project-II	0	0	4	2
7	ME-3202	MAJOR-31-Laboratory-X – Thermal Laboratory-II	0	0	2	1
11	ME-313A	ELECTIVE-11- DSE-11-Laboratory-IX–Advanced Manufacturing Laboratory ELECTIVE-12-DSE-12-IC Engine Lab	0	0	2	1
9	ME-326A	ELECTIVE-13-DSE-13-Laboratory-XII–Mechatronics and Automation Laboratory	0	0	2	1
10	ME-3201S	SKILL-04-SDC4- 3D printing	0	0	2	1
11	ME-327A	Honours -02-Sustainable Manufacturing	3	0	0	3*
Contact Hours			15	0	12	
Total Credits						21
VII th Semester						
Sl No	Course Code	Course Title	L	T	P	C
1	ME-410A ME-410B ME-410C	ELECTIVE-14-DSE-14-Convective Heat Transfer ELECTIVE-15-DSE-15-Mechanical Vibration ELECTIVE-16-DSE-16-Nanotechnology	3	0	0	3
2	ME-411A ME-411B	ELECTIVE-17-DSE-17-Robotics ELECTIVE-18-DSE-18-Gas Turbine Technology	3	0	0	3
3	ME-412A	ELECTIVE-19-DSE-19-Gas Dynamics ELECTIVE-20-DSE-20-Composite Materials and Structure	3	0	0	3
4	ME-413A ME-413B	ELECTIVE-21-DSE-21-Energy Storage System ELECTIVE-22-DSE-22--Principle of Tribology	3	0	0	3
5	ME-414A ME-414B ME-414C	ELECTIVE-23-DSE-23-Automobile Engineering ELECTIVE-24-DSE-24-Advanced Machine Tools and Operations ELECTIVE-25-DSE-25-Introduction to Aeronautics	3	0	0	3
6	ME-415A ME-415B	ELECTIVE-26-DSE-26- -CAD/CAM ELECTIVE-27-DSE-27- Finite Element Analysis	3	0	0	3
7	ME-4101	AP2-05-AECC2-Internship-II	0	0	2	1
8	ME-4102	AP2-06-VAC6-Major Project-I	0	0	6	3
9	ME-415A	Honours -01-Advanced Mechatronics	3	0	0	3*
Contact Hours			15	0	8	

Total Credits						22
VIII th Semester						
Sl No	Course Code	Course Title	L	T	P	C
1	ME-421A ME-421B ME-421C ME-XXX	ELECTIVE-28-DSE-28-Materials selection and Design ELECTIVE-29-DSE-29-Product Design and Development ELECTIVE-30-DSE-30-Industry 4.0 and Machine Learning ELECTIVE-31-DSE-31-SWAYAM Course*	3	0	0	3
2	ME-XXX	ELECTIVE-32-DSE-32-SWAYAM Course	3	0	0	3
3	ME-XXX	ELECTIVE-33-DSE-33-SWAYAM Course	3	0	0	3
4	ME-4201	AP2-07-VAC7-Major Project-II	0	0	6	3
5	ME-426A	Honours -01-AI and Machine Learning in Mechanical Engineering	3	0	0	3*
Contact Hours			12	0	6	
Total Credits						12

****Students choosing for B.Tech with Honours, need to take additional subjects of 12 credits.***

*** Students who will go for Internship required for joining a job may opt for equivalent SWAYAM Course**

***One OE is needed to opt in the 5th Semester. Students need to fulfilled the prerequisite of any regarding**

**Need to deduct 01 credit from Major Project-I and add it with any of the major courses in the 3rd semester. E.g. for that particular subject LTPC will be 3-1-0-4*

***Workshop is merged with DIY in 2nd Semester**

****For minor degree in other Department, additional 20 credits need to be studied and earned, and to opt for minor degree, students need to have CGPA of 7.5 after 1st year with no backlog. Fail in any of the subjects will lead to discontinuation of the minor degree.***

Minor Degree in Mechanical Engineering

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BASKET OF SMASH COURSES						
Sl No	Course Code	Course Title	L	T	P	C
1	BS-1101	SM-01-SC1-Engineering Mathematics-I	2	0	0	2
2	BS-1102	SM-02-SC2-Engineering Chemistry	2	0	0	2
3	BS-1103	SM-03-SC3-Engineering Physics	2	0	0	2
4	MH-1101	SM-05-SECC1-Communication Skill	2	0	0	2
5	EE-1102	SM-06-ESA2-Basic of Electrical and Electronics Engineering	2	0	0	2
6	EE-1103	SM-07-ESA4-Basic of Electrical and Electronics Engineering Laboratory	0	0	2	1
7	BS-1104	SM-08-SC4-Engineering Physics Laboratory	0	0	2	1
8	MH-1102	SM-09-SECC2-Language Laboratory	0	0	2	1
9	BS-1201	SM-10-SC5-Engineering Mathematics-II	2	0	0	2
10	BT-1201	SM-04-ESA1-Biology for Engineers	2	0	0	2
11	MH-1201	SM-11-ESA10-Law and financial aspects in Engineering	2	0	0	2
13	BS-1202	SM-12-SC6-Engineering Chemistry Laboratory	0	0	2	1
14	MH-1202	SM-13-VAC3-Indian Knowledge Systems (IKS)	0	0	2	1
15	BS-2101	SM-14-SC7-Engineering Mathematics-III	3	0	0	3
16	MH-2101	SM-15-ESA8-Introduction to Innovation and Creativity	2	0	0	2
17	MH-3101	SM-16-SECC3-Entrepreneur Essential and Early Stage Start-up	3	0	0	3
Total			24	0	10	29

BASKET OF MAJORS						
Sl No	Course Code	Course Title	L	T	P	C
1	ME-1101	MAJOR-01-DSC1-Fundamentals of Mechanical Engineering	3	0	0	3
2	CS-1102	MAJOR-03-ESA3-Coding Laboratory	0	1	2	2
3	ME-1102	MAJOR-04-ESA5-Engineering Drawing	0	0	2	1
4	ME-1103	MAJOR-02-DSC2-Basic Mechanical Engineering Laboratory	0	0	2	1
5	CS-1201	MAJOR-05-ESA6-Programming and Data Structure	3	0	0	3
6	CS-1202	MAJOR-06-ESA7-AI in Engineering	2	0	0	2
7	ME-1201	MAJOR-07-ESA9-Engineering Mechanics	3	0	0	3
8	ME-1202	MAJOR-08-DSC3-Material Science and Metallurgy	3	0	0	3
9	CS-1205	MAJOR-10-ESA12-Programming and Data Structure Laboratory	0	0	2	1
10	ME-2101	MAJOR-11-DSC4-Basic Thermodynamics	2	1	0	3
11	ME-2102	MAJOR-12-DSC5-Solid Mechanics	3	1	0	4
12	ME-2103	MAJOR-13-DSC6- Fluid Mechanics-I	2	1	0	3
13	ME-2104	MAJOR-14-DSC7- Manufacturing Processes-I	3	0	0	3
14	ME-2105	MAJOR-15-Laboratory-I – Machine Drawing	0	0	2	1
15	ME-2106	MAJOR-16-Laboratory-II – Strength of Materials Laboratory	0	0	2	1
16	ME-2107	MAJOR-17-Laboratory-III – Workshop Practice -II	0	0	2	1
17	ME-2201	MAJOR-18-DSC8- Fluid Mechanics-II	2	1	0	3

18	ME-2202	MAJOR-19-DSC9 – Theory of Machines	2	1	0	3
19	ME-2203	MAJOR-20-DSC10 – DSC12 - Manufacturing Processes II	3	0	0	3
20	ME-2204	MAJOR-21-DSC11- Applied Thermodynamics	3	0	0	3
21	ME-2206	MAJOR-22-Laboratory-IV – Fluid Mechanics and Machinery Laboratory	0	0	2	1
22	ME-2207	MAJOR-23-Laboratory-V – Theory of Machine Laboratory	0	0	2	1
23	ME-2208	MAJOR-24-Laboratory-VI - Manufacturing Processes Laboratory-I	0	0	2	1
24	ME-3101	MAJOR-25-DSC12 –Heat Transfer	3	0	0	3
25	ME-3102	MAJOR-26-DSC13 –Machine Design	3	0	0	3
26	ME-3102	MAJOR-27-DSC14 – Industrial Engineering & Operations Research	3	0	0	3
27	ME-312A	MAJOR-28-Laboratory-VII–Thermal Laboratory-I	0	0	2	1
28	ME-3104	MAJOR-29-Laboratory-VIII – Manufacturing Process Laboratory- II	0	0	2	1
29	ME-3105	MAJOR-30-Laboratory-XI–Design Practices	0	0	2	1
30	ME-3202	MAJOR-31-Laboratory-X – Thermal Laboratory-II	0	0	2	1
Total			43	6	28	63

BASKET OF ELECTIVES						
Sl No	Course Code	Course Title	L	T	P	C
1	ME-220A	ELECTIVE-01-DSE-01- Design of Machine Elements	3	0	0	3
2	ME-320A ME-320B	ELECTIVE-02-DSE-02– Additive Manufacturing ELECTIVE-03-DSE-03- IC Engine & EV	3	0	0	3
3	ME-321A ME-321B	ELECTIVE-04-DSE-04– Control System Engineering ELECTIVE-05-DSE-05 Viscous Fluid Flow	3	0	0	3
4	ME-322A ME-322B ME-322C	ELECTIVE-06-DSE-06-Refrigeration and Air-conditioning ELECTIVE-07-DSE-07- Optimization Techniques ELECTIVE-08-DSE-08- Sustainable Energy Conversion	3	0	0	3
5	ME-323A ME-323B	ELECTIVE-09-DSE-09-Mechatronics and Automation ELECTIVE-10-DSE-10- Materials Characterization Methods	3	0	0	3
6	ME-313A	ELECTIVE-11-DSE-11-Laboratory-IX–Advanced Manufacturing Laboratory ELECTIVE-12-DSE-12- IC Engine Laboratory	0	0	2	1
7	ME-326A	ELECTIVE-13-DSE-13-Laboratory-XII–Mechatronics and Automation Laboratory	0	0	2	1
8	ME-410A ME-410B ME-410C	ELECTIVE-14-DSE-14-Convective Heat Transfer ELECTIVE-15-DSE-15-Mechanical Vibration ELECTIVE-16-DSE-16-Nanotechnology	3	0	0	3
9	ME-411A ME-411B	ELECTIVE-17-DSE-17-Robotics ELECTIVE-18-DSE-18-Gas Turbine Technology	3	0	0	3
10	ME-412A	ELECTIVE-19-DSE-19-Gas Dynamics	3	0	0	3

	ME-412B	ELECTIVE-20-DSE-20-Composite Materials and Structure				
11	ME-413A ME-413B	ELECTIVE-21-DSE-21-Energy Storage System ELECTIVE-22-DSE-22--Principle of Tribology	3	0	0	3
12	ME-414A ME-414B ME-414C	ELECTIVE-23-DSE-23-Automobile Engineering ELECTIVE-24-DSE-25-Advanced Machine Tools and Operations ELECTIVE-25-DSE-25-Introduction to Aeronautics	3	0	0	3
13	ME-415A ME-415B	ELECTIVE-26-DSE-26- -CAD/CAM ELECTIVE-27-DSE-27- Finite Element Analysis	3	0	0	3
14	ME-421A ME-421B ME-421C ME-XXX	ELECTIVE-28-DSE-28-Materials selection and Design ELECTIVE-29-DSE-29-Product Design and Development ELECTIVE-30-DSE-30-Industry 4.0 and Machine Learning ELECTIVE-31- DSE-31-SWAYAM Course*	3	0	0	3
15	ME-XXX	ELECTIVE-32-DSE-32-SWAYAM Course	3	0	0	3
16	ME-XXX	ELECTIVE-33-DSE-33-SWAYAM Course	3	0	0	3
Total			42	0	4	44

Open Electives for other Departments						
1	YY-XXX (for other Department)	Open Elective OE1-Fundamentals of Mechanical Engineering	3	0	0	3
2	YY-XXX (for other Department)	OE2- Mechatronics and Automation	3	0	0	3
Total			6	0	0	6

SKILL DEVELOPMENT COURSES						
1	ME-2101S	SKILL-01-SDC1-Learning Modelling software	0	0	2	1
2	ME-2201S	SKILL-02-SDC2-Learning Analysis software	0	0	2	1
3	ME-3101S	SKILL-03-SDC3- CNC Machining	0	0	2	1
4	ME-3201S	SKILL-04-SDC4- 3D printing	0	0	2	1
Total			0	0	8	4