



**SARALA
BIRLA
UNIVERSITY**

Established under the Sarala Birla University Act 2017 Govt. of Jharkhand as per Section 2(f) of UGC Act. 1956

CURRICULUM FOR

B.Tech

in

Mechanical Engineering

(Specialization with Mechatronics)

(Based on UGC & AICTE- CBCS)

Effective from 2021-22

Breakup of Credits

Sl. No.	Category	Credits
1	Humanities & Social Sciences including Management courses	6
2	Basic Science courses	23
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc	33
4	Professional Core Courses	52
5	Professional Elective Courses for Specialization	39
6	Open subjects – Electives from other technical and /or emerging subjects	11
7	Project work, seminar and internship in industry or elsewhere	16
8	Mandatory Courses	2
Total Credits:		182

	CREDITS DISTRIBUTION (SEMESTER-WISE AND COURSE-WISE)								
Semester	HSMC	BSC	ESC	PCC	PECS	OEC	PROJECT	MC	Total Credit Semester-wise
1st	3	9.5	13	0	0	0	0	0	25.5
2nd	3	9.5	13	0	0	0	0	2	27.5
3rd	0	4	5	14	0	0	0	0	23
4th	0	0	2	19	0	3	0	0	24
5th	0	0	0	9	10	3	0	0	22
6th	0	0	0	10	8	5	2	0	25
7th	0	0	0	0	13	0	5	0	18
8th	0	0	0	0	8	0	9	0	17
Total Credit Course-wise	6	23	33	52	39	11	16	2	182

Definition of Credit		
1 Hr. Lecture (L) Per Week		1 Credit
1 Hr. Tutorial (T) Per Week		1 Credit
1 Hr. Practical (P) Per Week		0.5 Credit
2 Hr. Practical (P) Per Week		1 Credit
Course Code Definitions		
Course code	Definitions	
BSC	Basic Science Course	
ESC	Engineering Science Course	
HSMC	Humanities & Social Sciences including Management Course	
MC	Mandatory Course	
PCC-ME	Professional Core Course	
PECS-ME	Professional Elective Courses for Specialization	
OEC	Open Electives Course	
MOOC'S	Massive Open Online Courses	
PDP	Personality Development Programme	
ME-P1	Project Stage-I	
ME-P2	Project Stage-II	
ME-P3	Project Stage-III	

HUMANITIES & SOCIAL SCIENCES INCLUDING MANAGEMENT COURSE							
Sl. No.	Course Code	Course Title	Hours per week			Credits	Preferred Semester
			L	T	P		
1	HSMC-101	English	3	0	0	3	I
2	HSMC-102	Technical Communication	2	0	0	2	II
3	HSMC-103	Technical Communication Lab	0	0	2	1	II
			Total Credit:			6	

BASIC SCIENCE COURSES							
Sl. No.	Course Code	Course Title	Hours Per Week			Credits	Preferred Semester
			L	T	P		
1	BSC-101	Chemistry	3	1	0	4	I
2	BSC-102	Chemistry Lab	0	0	2	1.5	I
3	BSC-103	Physics	3	1	0	4	II
4	BSC-104	Physics Lab	0	0	2	1.5	II
5	BSC-105	Mathematics-I	3	1	0	4	I
6	BSC-106	Mathematics-II	3	1	0	4	II
7	BSC-107	Mathematics-III	3	1	0	4	III
			Total Credit:			23	

ENGINEERING SCIENCE COURSES							
Sl. No.	Course Code	Course Title	Hours Per Week			Credits	Preferred Semester
			L	T	P		
1	ESC-101	Basic Electrical & Electronics Engineering	3	1	0	4	I
2	ESC-102	Basic Electrical & Electronics Engineering Lab	0	0	2	1	I
3	ESC-103	Introduction to Unix & C Programming	3	1	0	4	I
4	ESC-104	Introduction to Unix & C Programming Lab	0	0	2	1	I
5	ESC-105	Engineering Graphics & Design	1	0	4	3	I
6	ESC-106	Electronic Devices	3	0	0	3	II
7	ESC-107	Electronic Devices Lab	0	0	2	1	II
8	ESC-108	Data Structure	3	1	0	4	II
9	ESC-109	Data Structure Lab	0	0	2	1	II
10	ESC-110	Workshop & Manufacturing Practices	1	0	4	3	II
11	ESC-111	Engineering Mechanics	3	1	0	4	III
12	ESC-112	Programming using MATLAB	0	0	2	1	III
13	ESC-113	Python Programming	1	0	2	2	VI
			Total Credit			32	

Professional Core Courses(Sem-III & IV)

Branch: B.Tech in Mechanical Engineering Specialization with Mechatronics

Sl. No.	Course Code	Course Title	Hrs. /Week L: T: P	Credits	Preferred Semester
1	PCC-ME-201	Fundamental of Thermodynamics and Heat transfer	3:01:00	4	III/IV
2	PCC-ME-202	Thermal Engineering Lab	0:00:02	1	III/IV
3	PCC-ME-203	Production Technology	3:01:00	4	III/IV
4	PCC-ME-204	Mechanics of Solid	3:01:00	4	III/IV
5	PCC-ME-205	Mechanics of Solid Lab	0:00:02	1	III/IV
6	PCC-ME-206	Fluid Mechanics and Hydraulic Machinery	3:01:00	4	III/IV
7	PCC-ME-207	Fluid Mechanics and Hydraulic Machinery Lab	0:00:02	1	III/IV
8	PCC-ME-208	Material Technology	3:01:00	4	III/IV
9	PCC-ME-209	Fundamental of CAD	3:01:00	4	III/IV
10	PCC-ME-210	Fundamental of CAD Lab	0:00:02	1	III/IV
11	PCC-ME-211	Internal Combustion Engine	3:01:00	4	III/IV
12	PCC-ME-212	Internal Combustion Engine Lab	0:00:02	1	III/IV
			Total Credit:	33	

Professional Core Courses(Sem-V & VI)

Branch: B.Tech in Mechanical Engineering Specialization with Mechatronics

Sl. No.	Course Code	Course Title	Hrs. /Week L: T: P	Credits	Preferred Semester
1	PCC-ME-301	Kinematics & Theory of Machines	3:01:00	4	V/VI
2	PCC-ME-302	Theory of Machine Lab	0:00:02	1	V/VI
3	PCC-ME-303	Power Plant Engineering	3:01:00	4	V/VI
4	PCC-ME-304	Design of Machine Element	3:01:00	4	V/VI
5	PCC-ME-305	Production Technology Lab	0:00:02	1	V/VI
6	PCC-ME-306	Refrigeration & Air Conditioning	3:01:00	4	V/VI
7	PCC-ME-307	Refrigeration & Air Conditioning Lab	0:00:02	1	V/VI
			Total Credit:	19	

Professional Elective Courses for Specialization						
Branch: B.Tech in Mechanical Engineering Specialization with Mechatronics						
Sl. No.	Course Code	Course Title	Hrs./ Week L: T: P	Credits	Preferred Semester	Selection of Courses
1	PECS-ME-301	Design of Mechatronic System	3:01:00	4	V/VI	Student can opt any Two Course in Sem-V and Two Courses in Sem-VI
2	PECS-ME-302	Mechatronics Lab	0:00:02	1		
3	PECS-ME-303	Microprocessors & Microcontroller	3:01:00	4		
4	PECS-ME-304	Microprocessors & Microcontroller Lab	0:00:02	1		
5	PECS-ME-305	Sensor and Actuator Technology	3:01:00	4		
6	PECS-ME-306	Linear Integrated Circuit	3:01:00	4		
7	PECS-ME-307	Industrial Automation and Programmable Controllers	3:01:00	4		
8	PECS-ME-308	Fluid Power Automation	3:01:00	4		
9	PECS-ME-309	Modelling and Control of Mechatronic Systems	3:01:00	4		
10	PECS-ME-310	Autotronics and Vehicle Automation	0:00:02	1		
11	PECS-ME-311	Micro and Nano Mechatronics Systems	3:01:00	4		
12	PECS-ME-312	Advanced Electronics Systems	3:01:00	4		
1	PECS-ME-401	Fundamental of Robotics	3:01:00	4	VII/VIII	Student can opt any three Course in Sem-VII and Two Courses in Sem-VIII
2	PECS-ME-402	Instrumentation and Control system	3:01:00	4		
3	PECS-ME-403	Power Electronics	3:01:00	4		
4	PECS-ME-404	Power Electronics Lab	0:00:02	1		
5	PECS-ME-405	Fluid Power Control	3:01:00	4		
6	PECS-ME-406	Digital Signal Processing	3:01:00	4		
7	PECS-ME-407	Data Acquisition and System Design	3:01:00	4		
8	PECS-ME-408	Virtual Instrumentation	3:01:00	4		
9	PECS-ME-409	Embedded System	3:01:00	4		
10	PECS-ME-410	Medical Mechatronics	3:01:00	4		
11	PECS-ME-411	Instrumentation for Environmental Analysis	3:01:00	4		
12	PECS-ME-412	Mobile Application Development	3:01:00	4		

Open Elective Course

Sl. No.	Course Code	Course Title	Hrs./ Week L: T: P	Credits	Preferred Semester	Selection of Courses
1	OEC-101	Philosophy	3:00:00	3	IV	Student can opt any one Course
2	OEC-102	Introduction to Psychology	3:00:00	3		
3	OEC-103	Entrepreneurship & Startups	3:00:00	3		
4	OEC-104	Economics for Engineers	3:00:00	3		
5	OEC-105	Organisational Behaviour	3:00:00	3		
6	OEC-106	Principles of Management	3:00:00	3		
7	OEC-107	Supply Chain Management	3:00:00	3		
8	OEC-108	Intellectual Property Rights	3:00:00	3		
9	OEC-109	Digital & Social Media Marketing	3:00:00	3		
10	OEC-110	Consumer Behaviour	3:00:00	3		
11	OEC-121	Sanskrit	3:00:00	3	V	Student can opt any one Course
12	OEC-122	Indian Constitution	3:00:00	3		
13	OEC-123	Vedic Mathematics	3:00:00	3		
14	OEC-124	Essence of Indian Traditional Knowledge	3:00:00	3		
15	OEC-125	Indian Classical Music	3:00:00	3		
16	OEC-126	Mass Media and Society	3:00:00	3		
17	OEC-127	Values & Ethics	3:00:00	3		
18	OEC-141	Computer Networks	3:01:00	4	VII	Student can opt any one Course
19	OEC-142	Computer Networks Lab	0:02:00	1		
20	OEC-143	Fundamentals of Cyber Laws	3:01:00	4		
21	OEC-144	Artificial Intelligence with Python	3:01:00	4		
22	OEC-145	Data Mining	3:01:00	4		
23	OEC-146	Applied Linear Algebra	3:01:00	4		
24	OEC-147	Cloud Computing and Information Security	3:01:00	4		

Mandatory Courses

Sl. No.	Course Code	Course Title	Hours per week			Credits	Preferred Semester
			L	T	P		
1	MC-101	Induction Programme	0	0	0	0	I
2	MC-102	Environmental Science	2	0	0	2	IV
3	MC-103	PDP-I	2	0	0	0	I
4	MC-104	PDP-II	2	0	0	0	II
5	MC-105	PDP-III	2	0	0	0	III
6	MC-106	PDP-IV	2	0	0	0	IV
7	MC-107	PDP-V	2	0	0	0	V
8	MC-108	PDP-VI	2	0	0	0	VI
9	MC-109	PDP-VII	2	0	0	0	VII
10	MC-110	PDP-VIII	2	0	0	0	VIII
11	MC-111	PT & Games/NSS/NCC-I	0	0	0	0	I
12	MC-112	PT & Games/NSS/NCC-II	0	0	0	0	II
			Total Credit:			2	

Massive Open Online Courses

Branch: B.Tech in Mechanical Engineering Specialization with Mechatronics

Sl. No.	Course Code	Course Title	Hrs./ Week L: T: P	Credits
1	MOOCs -101	Artificial Intelligence for Real-World Application	3:01:00	4
2	MOOCs -102	Applications of Deep Learning & Neural Networks	3:01:00	4
3	MOOCs -103	Usability Design of Software Applications	3:01:00	4
4	MOOCs -104	Applied Cloud Computing	3:01:00	4
5	MOOCs -105	Information Security - Practitioner's Perspective	3:01:00	4
6	MOOCs -106	Innovation & Entrepreneurship	3:01:00	4
7	MOOCs -107	Practical Approach to Data Mining & Analytics	3:01:00	4
8	MOOCs -108	IoT & its Applications	3:01:00	4
9	MOOCs -109	Intelligent Game Design & its Applications	3:01:00	4
10	MOOCs -110	Industrial Mechatronic Systems	3:01:00	4
11	MOOCs -111	Solar Energy Technology & its Applications	3:01:00	4

Note: A student will be eligible to get Under Graduate degree with Honours or additional Minor Engineering, if he/she completes an additional 20 credits. These could be acquired through MOOCs.

Project Work					
Branch: B.Tech in Mechanical Engineering Specialization with Mechatronics					
Sl. No.	Course Code	Course Title	Hrs. /Week L: T: P	Credits	Preferred Semester
1	ME-P1	Project Stage-I (Mini Project/ Industrial Training)	0:00:04	2	VI
2	ME-P2	Project Stage-II (Minor Project) (To be continued in next Semester)	0:00:10	5	VII
3	ME-P3	Project Stage-III (Major Project Work & Dissertation)	0:00:18	9	VIII
		Total Credits:		16	

SEMESTER-I (1st YEAR)

Sl. No.	Category	Course Code	Course Title	Hours			Credit	Marks		
				L	T	P		IA	ESE	Total
Theory										
1	Basic Science Course	BSC-101	Chemistry	3	1	0	4	30	70	100
2	Basic Science Course	BSC-105	Mathematics-I	3	1	0	4	30	70	100
3	Engineering Science Course	ESC-101	Basic Electrical & Electronics	3	1	0	4	30	70	100
4	Engineering Science Course	ESC-103	Introduction to Unix & C Programming	3	1	0	4	30	70	100
5	Humanities & Social Sciences including Management Course	HSMC-101	English	3	0	0	3	30	70	100
Total(A)							19	150	350	500
Practical/Drawing/Design										
1	Engineering Science Course	ESC-105	Engineering Graphics & Design	1	0	4	3	30	20	50
2	Basic Science Course	BSC-102	Chemistry Lab	0	0	3	1.5	30	20	50
3	Engineering Science Course	ESC-102	Basic Electrical & Electronics Lab	0	0	2	1	30	20	50
4	Engineering Science Course	ESC-104	Introduction to Unix & C Programming Lab	0	0	2	1	30	20	50
Total(B)							6.5	120	80	200
Mandatory Courses/MOOC'S										
1	Mandatory Course	MC-101	Induction Programme	0	0	0	0	0	0	0
2	Mandatory Course	MC-110	PT & Games/NSS/NCC-I	0	0	2	0	0	0	0
3	Mandatory Course	MC-103	PDP-I	2	0	0	0	0	0	0
Total(C)							0	0	0	0
Grand Total (A+B+C)							25.5	270	430	700
L-Lecture, T-Tutorial, P-Practical										
IA- Internal Assessment, ESE-End Semester Examination										

COURSE STRUCTURE

SEMESTER-II (1st YEAR)

Branch: B.Tech in Mechanical Engineering Specialization with Mechatronics

Sl. No.	Category	Course Code	Course Title	Hours			Credit	Marks		
				L	T	P		IA	ESE	Total
Theory										
1	Basic Science Course	BSC-106	Mathematics-II	3	1	0	4	30	70	100
2	Humanities & Social Sciences including Management Course	HSMC-102	Technical Communication	2	0	0	2	30	70	100
3	Professional Core Courses	ESC-106	Electronic Devices	3	1	0	4	30	70	100
4	Basic Science Course	BSC-103	Physics	3	1	0	4	30	70	100
5	Engineering Science Course	ESC-108	Data Structures	3	1	0	4	30	70	100
Total(A)							18	150	350	500
Practical/Drawing/Design										
1	Engineering Science Course	ESC-110	Engineering Workshop Practices	1	0	4	3	30	20	50
2	Engineering Science Course	ESC-107	Electronic Devices Lab	0	0	2	1	30	20	50
3	Basic Science Course	BSC-104	Physics Lab	0	0	3	1.5	30	20	50
4	Humanities & Social Sciences including Management Course	HSMC-103	Technical Communication Lab	0	0	2	1	30	20	50
5	Engineering Science Course	ESC-109	Data Structures Lab	0	0	2	1	30	20	50
Total(B)				1	0	13	7.5	150	100	250
Mandatory Courses/MOOC'S										
1	Mandatory Course	MC-102	Environmental Science	2	0	0	2	30	70	100
2	Mandatory Course	MC-111	PT & Games/NSS/NCC-II	0	0	2	0	0	0	0
3	Mandatory Course	MC-104	PDP-II	2	0	0	0	0	0	0
Total(C)							2	30	70	100
Grand Total (A+B+C)							27.5	330	520	850
L-Lecture, T-Tutorial, P-Practical										
IA- Internal Assessment, ESE-End Semester Examination										

SEMESTER-III (2nd YEAR)

Sl. No.	Category	Course Code	Course Title	Hours			Credit	Marks		
				L	T	P		IA	ESE	Total
Theory										
1	Basic Science Course	BSC-107	Mathematics-III	3	1	0	4	30	70	100
2	Engineering Science Course	ESC-112	Engineering Mechanics	3	1	0	4	30	70	100
3	Professional Core Course	PCC-ME-201	Fundamental of Thermodynamics and Heat transfer	3	1	0	4	30	70	100
4	Professional Core Course	PCC-ME-203	Production Technology	3	1	0	4	30	70	100
5	Professional Core Course	PCC-ME-204	Mechanics of Solid	3	1	0	4	30	70	100
Total(A)							20	150	350	500
Practical/Drawing/Design										
1	Professional Core Course	PCC-ME-205	Mechanics of Solid Lab	0	0	2	1	30	20	50
2	Engineering Science Course	ESC-111	Programming using MATLAB	0	0	2	1	30	20	50
3	Professional Core Course	PCC-ME-202	Thermal Engineering Lab	0	0	2	1	30	20	50
Total(B)							3	90	60	150
Mandatory Courses/MOOC'S										
2	Mandatory Course	MC-105	PDP-III	2	0	0	0	0	0	0
Total(C)							0	0	0	0
Grand Total (A+B+C)							23	240	410	650
L-Lecture, T-Tutorial, P-Practical										
IA- Internal Assessment, ESE-End Semester Examination										

COURSE STRUCTURE										
SEMESTER-IV (2nd YEAR)										
Branch: B.Tech in Mechanical Engineering Specialization with Mechatronics										
Sl. No.	Category	Course Code	Course Title	Hours			Credit	Marks		
				L	T	P		IA	ESE	Total
Theory										
1	Professional Core Course	PCC-ME-206	Fluid Mechanics & Hydraulic Machinery	3	1	0	4	30	70	100
2	Professional Core Course	PCC-ME-208	Material Technology	3	1	0	4	30	70	100
3	Professional Core Course	PCC-ME-209	Fundamental of CAD	3	1	0	4	30	70	100
4	Professional Core Course	PCC-ME-211	Internal Combustion Engine	3	1	0	4	30	70	100
5	Open Elective Course	OEC-103	Entrepreneurship & Startups	3	0	0	3	30	70	100
Total(A)							19	150	350	500
Practical/Drawing/Design										
1	Professional Core Course	PCC-ME-207	Fluid Mechanics & Hydraulic Machinery Lab	0	0	2	1	30	20	50
2	Professional Core Course	PCC-ME-212	Internal Combustion Engine Lab	0	0	2	1	30	20	50
3	Engineering Science Course	ESC-113	Python Programming	1	0	2	2	30	20	50
4	Professional Core Course	PCC-ME-210	Fundamental of CAD Lab	0	0	2	1	30	20	50
Total(B)							5	120	80	200
Mandatory Courses/MOOC'S										
1	Mandatory Course	MC-105	PDP-IV	2	0	0	0	0	0	0
Total(C)							0	0	0	0
Grand Total (A+B+C)							24	270	430	700
L-Lecture, T-Tutorial, P-Practical										
IA- Internal Assessment, ESE-End Semester Examination										

COURSE STRUCTURE										
SEMESTER-V (3rd YEAR)										
Branch: B.Tech in Mechanical Engineering Specialization with Mechatronics										
Sl. No.	Category	Course Code	Course Title	Hours			Credit	Marks		
				L	T	P		IA	ESE	Total
Theory										
1	Professional Elective Courses for Specialization	PECS-ME-301	Design of Mechatronic System	3	1	0	4	30	70	100
2	Professional Core Course	PCC-ME-301	Kinematics & Theory of Machines	3	1	0	4	30	70	100
3	Professional Core Course	PCC-ME-303	Power Plant Engineering	3	1	0	4	30	70	100
4	Professional Elective Courses for Specialization	PECS-ME-303	Microprocessors & Microcontroller	3	1	0	4	30	70	100
5	Open Elective Course	OEC-122	Indian Constitution	3	0	0	3	30	70	100
Total(A)							19	150	350	500
Practical/Drawing/Design										
1	Professional Core Course	PCC-ME-302	Theory of Machine Lab	0	0	2	1	30	20	50
2	Professional Elective Courses for Specialization	PECS-ME-302	Mechatronics Lab	0	0	2	1	30	20	50
3	Professional Elective Courses for Specialization	PECS-ME-304	Microprocessors & Microcontroller Lab	0	0	2	1	30	20	50
Total(B)							3	90	60	150
Mandatory Courses/MOOC'S										
1	Mandatory Course	MC-107	PDP-V	2	0	0	0	0	0	0
Total(C)							0	0	0	0
Grand Total (A+B+C)							22	240	410	650
L-Lecture, T-Tutorial, P-Practical										
IA- Internal Assessment, ESE-End Semester Examination										

SEMESTER-VI (3rd YEAR)

Sl. No.	Category	Course Code	Course Title	Hours			Credit	Marks		
				L	T	P		IA	ESE	Total
Theory										
1	Professional Core Course	PCC-ME-304	Design of Machine Element	3	1	0	4	30	70	100
2	Professional Core Course	PCC-ME-306	Refrigeration & Air Conditioning	3	1	0	4	30	70	100
3	Professional Elective Courses for Specialization	PECS-ME-305	Sensor and Actuator Technology	3	1	0	4	30	70	100
4	Professional Elective Courses for Specialization	PECS-ME-306	Linear Integrated Circuit	3	1	0	4	30	70	100
5	Open Elective Course	OEC-141	Computer Networks	3	1	0	4	30	70	100
Total(A)							20	150	350	500
Practical/Drawing/Design										
1	Professional Core Course	PCC-ME-307	Refrigeration and Air conditioning Lab	0	0	2	1	30	20	50
2	Professional Core Course	PCC-ME-305	Production Technology Lab	0	0	2	1	30	20	50
3	Open Elective Course	OEC-142	Computer Networks Lab	0	0	2	1	30	20	50
4	Project Work	ME-P1	Project Stage-I (Mini Project/ Industrial Training)	0	0	4	2	75	25	100
Total(B)							5	165	85	250
Mandatory Courses/MOOC'S										
1	Mandatory Course	MC-109	PDP-VI	2	0	0	0	0	0	0
Total(C)							0	0	0	0
Grand Total (A+B+C)							25	315	435	750
L-Lecture, T-Tutorial, P-Practical										
IA- Internal Assessment, ESE-End Semester Examination										

SEMESTER-VII (4th YEAR)

Branch: B.Tech in Mechanical Engineering Specialization with Mechatronics

L-Lecture, T-Tutorial, P-Practical
IA- Internal Assessment, ESE-End Semester Examination

SEMESTER-VIII (4th YEAR)

Sl. No.	Category	Course Code	Course Title	Hours			Credit	Marks		
				L	T	P		IA	ESE	Total
Theory										
1	Professional Elective Courses for Specialization	PECS-ME-405	Fluid Power Control	3	1	0	4	30	70	100
2	Professional Elective Courses for Specialization	PECS-ME-406	Digital Signal Processing	3	1	0	4	30	70	100
Practical/Drawing/Design							8	60	140	200
Practical/Drawing/Design										
1	Project Work	ME-P3	Project Stage-III (Major Project Work & Dissertation)	0	0	18	9	75	25	100
Total(B)							9	75	25	100
Mandatory Courses/MOOC'S										
1	Mandatory Course	MC-110	PDP-VIII	2	0	0	0	0	0	0
Total(C)							0	0	0	0
Grand Total (A+B+C)							17	135	165	300
L-Lecture, T-Tutorial, P-Practical										
IA- Internal Assessment, ESE-End Semester Examination										