Scheme & Syllabi

for

B.Tech.
(Mechanical Engineering)

(w.e.f. 2018-2019)

Department of Mechanical Engineering

**Guru Jambheshwar University of Science & Technology,
Hisar-125001**

DEPARTMENT OF MECHANICAL ENGINEERING
GURU JAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY, HISAR

Vision and Mission of the Department

Vision
To build a world-class department by excelling in research, design and development areas through sustainable growth, in order to produce the best globally competitive engineers.

Mission
- To develop mechanical engineering graduates and post graduates, for a successful career in industry and academia around the world through effective teaching learning and training.   - To develop the capability of graduates and postgraduates for creating innovative products/systems in order to improve the quality of life.   - To establish an environment which encourages and builds an exemplary professional having ability to solve societal problems through engineering and professional skills.

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Program Educational Objectives (PEOs)

PEO1	Apply technical skill and professional knowledge in engineering practices to face industrial challenges around the world.
PEO2	To prepare the students to lead a successful career in industries or to pursue higher studies or to support entrepreneurial endeavors.
PEO3	Inculcate effective team work, ethics, and leadership with ability to solve societal problems.

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Programme Outcomes (POs)

PO1	**Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem Analysis:** Identify**,** formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern Tool Usage:** Create**,** select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics, responsibilities, and norms of the engineering practice.
PO9	**Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
P10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society. Some of them are, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Lifelong Learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

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Programme Specific Outcomes (PSOs)

PSO1	To prepare the students to understand mechanical systems, components and processes to address technical and engineering challenges.
PSO2	To empower the student to build up career in industry or pursue higher studies in mechanical/interdisciplinary program.
PSO 3	To enhance the skills of the students with the ability to implement the scientific concepts for betterment of the society considering ethical, environmental and social values.

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Template for Course Outcomes with Revised Blooms Taxonomy (RBT's)

S. No.	Course Outcomes	RBT Level
CO1	Students will be able to …………………………………….	**(LOTS) Remembering**
CO2	Students will be able to …………………………………….	**(LOTS) Understanding**
CO3	Students will be able to …………………………………….	**(LOTS) Applying**
CO4	Students will be able to …………………………………….	**(HOTS) Analyzing**
CO5	Students will be able to …………………………………….	**(HOTS) Evaluating**
CO6	Students will be able to …………………………………….	**(HOTS) Creating**

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Structure of B.Tech. (Mechanical Engineering) Programme

Credit Score

(i)   Category wise

S. No.	Category	Category Code	Credits
1	Humanities and Social Sciences including Management Courses	HSMC	07
2	Basic Science Courses	BSC	25
3	Engineering Science Courses	ESC	22
4	Professional Core Courses	PCC	70
5	Professional Elective Courses	PEC	15
6	Open Elective	OE	09
7	Project work, Seminar and Internship in Industry	PROJ	12
8	Mandatory Courses	MC	00
Total			**160**

(ii)   Semester wise

Semester	Credits
1st	17.5
2nd	20.5
3rd	21.0
4th	20.0
5th	23.0
6th	21.0
7th	18.0
8th	19.0
Total	**160.0**

Course list Category Wise

(i) Humanities and Social Sciences including Management Courses (HSMC)

Sr. No.	Semester	Course Title	Course Credits
1.	2nd	English (Theory and Lab)	3.0
2.	5th	Fundamental of Management for Engineers (Theory)	2.0
3.	6th	Economics for Engineers (Theory)	2.0
Total Credits			**7.0**

(ii) Basic Science Courses (BSC)

Sr. No.	Semester	Course Title	Course Credits
1.	1st	Physics: Introduction to Electromagnetic Theory (Theory and Lab)	5.5
2.		Maths –I (Theory)	4.0
3.	2nd	Chemistry (Theory and Lab)	5.5
4.		Maths –II (Theory)	4.0
5.	3rd	Maths-III (Theory)	3.0
6.	4th	Numerical Methods (Theory and Lab)	3.0
Total Credits			**25.0**

(iii) Engineering Science Courses (ESC)

Sr. No.	Semester	Course Title	Course Credits
1.	1st	Basic Electrical Engineering (Theory and Lab)	5.0
2.		Workshop/Manufacturing Practices (Theory and Lab)	3.0
3.	2nd	Programming for Problem Solving (Theory and Lab)	5.0
4.		Engineering Graphics & Design (Lab)	3.0
5.	3rd	Basics of Electronics Engineering (Theory)	3.0
6.		Engineering Mechanics (Theory)	3.0
Total Credits			**22.0**

(iv) Professional Core Courses (PCC)

Sr. No.	Semester	Course Title	Course Credits
1.	3rd	Mechanics of Solids-I (Theory and Lab)	5.0
2.		Production Technology (Theory and Lab)	4.0
3.		Thermodynamics (Theory)	3.0
4.	4th	Material Science (Theory and Lab)	4.0
5.		Fluid Mechanics (Theory and Lab)	5.0
6.		Steam and Power Generation (Theory)	3.0
7.		Mechanics of Solids-II (Theory)	4.0
8.	5th	Kinematics of Machines (Theory and Lab)	4.0
9.		Hydraulic Machines (Theory and Lab)	5.0
10.		Internal Combustion Engines and Gas Turbines (Theory and Lab)	4.0
11.		Design of Machine Elements (Theory)	4.0
12.	6th	Dynamics of Machines (Theory and Lab)	4.0
13.		Automobile Engineering (Theory and Lab)	4.0
14.		Heat Transfer (Theory and Lab)	5.0
15.	7th	Refrigeration and Air-Conditioning (Theory and Lab)	5.0
16.	8th	Mechanical Vibrations (Theory)	3.0
17.		Computer Aided Design and Manufacturing (Theory and Lab)	4.0
Total Credits			**70.0**

(v) Professional Elective Courses (PEC)

Sr. No.	Semester	Course Title	Course Credits
		Professional Elective-I	**3.0**
1.		Operation Research (Theory)	
2.		Work Study (Theory)	
3.	6th	Total Quality Control (Theory)	
4.		Production Management (Theory)	
5.		Industrial Engineering (Theory)	
		Professional Elective-II	**3.0**
6.		Automation in Manufacturing (Theory)	
7.	7th	Advanced Welding (Theory)	
8.		Tool Engineering (Theory)	
9.		Modern Manufacturing Processes (Theory)	
		Professional Elective-III	**3.0**
10.		Introduction to Tribology (Theory)	
11.	7th	CNC Technology (Theory)	
12.		Reverse Engineering (Theory)	
13.		Product Design and Development (Theory)	
		Professional Elective-IV	**3.0**
14.		Robotics (Theory)	
15.		Mechatronics (Theory)	
16.	8th	Automatic Control (Theory)	
17.		Flexible Manufacturing Systems (Theory)	
18.		Rapid Prototyping (Theory)	
		Professional Elective-V	**3.0**
19.		Power Plant Engineering (Theory)	
20.		Solar Energy Engineering (Theory)	
21.	8th	Design of Heat Exchangers (Theory)	
22.		Turbo Machinery (Theory)	
23.		Computational Fluid Dynamics (Theory)	
Total Credits			**15.0**

(vi) Open Elective (OE)

Sr. No.	Semester	Course Title	Course Credits
		Open Elective-I	**3.0**
1.		Fundamentals of Printing (Theory)	
2.		Information and Cyber Security (Theory)	
3.	5th	Principles of Digital Electronics (Theory)	
4.		Processing and Preservation of Foods (Theory)	
5.		Introduction to Civil Engineering (Theory)	
6.		Utilization of Electrical Energy (Theory)	
		Open Elective-II	**3.0**
7.		Graphics Design Fundamentals (Theory)	
8.		Introduction to Soft Computing (Theory)	
9.	6th	Fundamentals of Communication Systems (Theory)	
10.		Food Safety, Quality and Regulations (Theory)	
11.		Introduction to Fluid Mechanics (Theory)	
12.		Renewable Energy Resources (Theory)	
		Open Elective-III	**3.0**
13.		Fundamentals of Packaging (Theory)	
14.		Statistical Computing (Theory)	
15.	7th	Introduction to MATLAB and Simulink (Theory)	
16.		Instrumental Analysis of Foods (Theory)	
17.		Environmental Engineering (Theory)	
18.		Energy Management and Audit (Theory)	
Total Credits			**9.0**

(vii) Project work, Seminar and Internship in Industry (PROJ)

Sr. No.	Semester	Course Title	Course Credits
1.	4th	Skill and Innovation Lab	1.0
2.	5th	Industrial Training Presentation-I	1.0
3.	7th	Minor Project	3.0
4.		Industrial Training Presentation-II	1.0
5.	8th	Major Project	5.0
6.		Seminar	1.0
Total Credits			**12.0**

(viii) Mandatory Courses (MC)

Sr. No.	Semester	Course Title	Course Credits
1.	1st	Induction training	0.0
2.	2nd	Environmental Sciences (Theory)	0.0
3.	3rd	Indian Constitution (Theory)	0.0
4.	4th	Essence of Indian Traditional Knowledge (Theory)	0.0
5.	5th	Technical Presentation (Lab)	0.0
6.	6th	Entrepreneurship (Theory)	0.0
7.	7th	General Proficiency (Lab)	0.0
Total Credits			**0.0**

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B.Tech. (Mechanical Engineering) Programme

I- Semester

Sr. No.	Category	Course Code		Course Title	Hours per week			Course Credits		
		Theory	Practical		L	T	P	Theory	Practical	Total
1	Basic Science Courses	BSC101(I)-T	BSC101(I)-P	Physics: Introduction to Electromagnetic Theory	3	1	3	4.0	1.5	5.5
2	Basic Science Courses	BSC103-T	--	Maths –I	3	1	0	4.0	--	4.0
3	Engineering Science Courses	ESC101-T	ESC101-P	Basic Electrical Engineering	3	1	2	4.0	1.0	5.0
4	Engineering Science Courses	ESC104-T	ESC104-P	Workshop/ Manufacturing Practices	1	0	4	1.0	2.0	3.0
5	Mandatory Courses	MC 101		Induction Training	3 weeks			--	--	0.0
Total										17.5

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II- Semester

Sr. No.	Category	Course Code		Course Title	Hours per week			Course Credits		
		Theory	Practical		L	T	P	Theory	Practical	Total
1	Basic Science Courses	BSC 102 -T	BSC 102 -P	Chemistry	3	1	3	4.0	1.5	5.5
2	Basic Science Courses	BSC104-T	--	Maths –II	3	1	0	4.0	--	4.0
3	Engineering Science Courses	ESC103 -T	ESC103 -P	Programming for Problem Solving	3	0	4	3.0	2.0	5.0
4	Engineering Science Courses	--	ESC102-P	Engineering Graphics & Design	1	0	4	--	3.0	3.0
5	Humanities & Social Sciences including Management Courses	HSMC101-T	HSMC101-P	English	2	0	2	2.0	1.0	3.0
6	Mandatory Courses	MC102-T	--	Environmental Sciences	3	0	0	0.0	--	0.0
Total										20.5

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B.Tech. (Mechanical Engineering) Programme

III- Semester

Sr. No.	Category	Course Code		Course Title	Hours per week			Course Credits		
		Theory	Practical		L	T	P	Theory	Practical	Total
1.	Basic Science Courses	BSC201-T	--	Maths-III	3	0	0	3.0	--	3.0
2.	Engineering Science Courses	ESC-ECE201-T	--	Basics of Electronics Engineering	3	0	0	3.0	--	3.0
3.	Engineering Science Courses	ESC-ME201-T	--	Engineering Mechanics	3	0	0	3.0	--	3.0
4.	Professional Core Courses	PCC-ME201-T	PCC-ME201-P	Mechanics of Solids-I	3	1	2	4.0	1.0	5.0
5.	Professional Core Courses	PCC-ME202-T	PCC-ME202-P	Production Technology	2	0	4	2.0	2.0	4.0
6.	Professional Core Courses	PCC-ME203-T	--	Thermodynamics	3	0	0	3.0	--	3.0
7.	Mandatory Courses	MC103-T	--	Indian Constitution	3	0	0	0.0	--	0.0
					20	1	6			
Total credits										21

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IV- Semester

Sr. No.	Category	Course Code		Course Title	Hours per week			Course Credits		
		Theory	Practical		L	T	P	Theory	Practical	Total
1.	Basic Science Courses	BSC202-T	BSC202-P	Numerical Methods	2	0	2	2.0	1.0	3.0
2.	Professional Core Courses	PCC-ME204-T	PCC-ME204-P	Material Science	3	0	2	3.0	1.0	4.0
3	Professional Core Courses	PCC-ME205-T	PCC-ME205-P	Fluid Mechanics	3	1	2	4.0	1.0	5.0
4	Professional Core Courses	PCC-ME206-T	--	Steam and Power Generation	3	0	0	3.0	--	3.0
5	Professional Core Courses	PCC-ME207-T	--	Mechanics of Solids-II	3	1	0	4.0	--	4.0
6	Project work, Seminar and Internship in Industry	--	PROJ-ME201-P	Skill and Innovation Lab	0	0	2	--	1.0	1.0
7.	Mandatory Courses	MC104-T	--	Essence of Indian Traditional Knowledge	3	0	0	0.0	--	0.0
					17	2	8			
Total credits										20.0

Note- At the end of the IV-semester each student would undergo 4-6 weeks practical training in an industry/research laboratory.

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B.Tech. (Mechanical Engineering) Programme

V- Semester

Sr. No.	Category	Course Code Theory	Course Code Practical	Course Title	L	T	P	Theory	Practical	Total
1.	Open Elective Courses	OE (refer to list)#	--	Open Elective-I	3	0	0	3.0	--	3.0
2.	Humanities & Social Sciences including Management Courses	HSMC302-T	--	Fundamental of Management for Engineers	2	0	0	2.0	--	2.0
3.	Professional Core Courses	PCC-ME301-T	PCC-ME301-P	Kinematics of Machines	3	0	2	3.0	1.0	4.0
4.	Professional Core Courses	PCC-ME302-T	PCC-ME302-P	Hydraulic Machines	3	1	2	4.0	1.0	5.0
5.	Professional Core Courses	PCC-ME303-T	PCC-ME303-P	Internal Combustion Engines and Gas Turbines	3	0	2	3.0	1.0	4.0
6.	Professional Core Courses	PCC-ME304-T	--	Design of Machine Elements	2	2	0	4.0	--	4.0
7.	Project work, Seminar and Internship in Industry	--	PROJ-ME301-P	Industrial Training Presentation-I	0	0	2	--	1.0	1.0
8.	Mandatory Courses	--	MC-ME301-P	Technical Presentation	0	0	2	--	0.0	0.0
					16	3	10			
Total credits										**23.0**

#Open Elective -I	
Course Code	**Course Name**
OE-PTG391-T	Fundamentals of Printing
OE-CSE391-T	Information and Cyber Security
OE-ECE391-T	Principles of Digital Electronics
OE-FT391-T	Processing and Preservation of Foods
OE-CE391-T	Introduction to Civil Engineering
OE-EE391-T	Utilization of Electrical Energy

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VI- Semester

Sr. No.	Category	Course Code		Course Title	Hours per week			Course Credits		
		Theory	Practical		L	T	P	Theory	Practical	Total
1.	Open Elective Courses	OE (refer to list)##	--	Open Elective-II	3	0	0	3.0	--	3.0
2.	Professional Elective Courses	PEC (refer to list)*	--	Professional Elective -I	3	0	0	3.0	--	3.0
3.	Humanities & Social Sciences including Management Courses	HSMC301-T	--	Economics for Engineers	2	0	0	2.0	--	2.0
4.	Professional Core Courses	PCC-ME305-T	PCC-ME305-P	Dynamics of Machines	3	0	2	3.0	1.0	4.0
5.	Professional Core Courses	PCC-ME306-T	PCC-ME306-P	Automobile Engineering	3	0	2	3.0	1.0	4.0
6.	Professional Core Courses	PCC-ME307-T	PCC-ME307-P	Heat Transfer	3	1	2	4.0	1.0	5.0
7.	Mandatory Courses	MC-ME302-T	--	Entrepreneurship	3	0	0	0.0	--	0.0
					20	1	6			
Total credits										**21.0**

Note- At the end of the VI-semester each student would undergo 4-6 weeks practical training in an industry/research laboratory.

##Open Elective –II	
Course Code	**Course Name**
OE-PTG392-T	Graphics Design Fundamentals
OE-CSE392-T	Introduction to Soft Computing
OE-ECE392-T	Fundamentals of Communication Systems
OE-FT392-T	Food Safety, Quality and Regulations
OE-CE392-T	Introduction to Fluid Mechanics
OE-EE392-T	Renewable Energy Resources

*Professional Elective -I	
Course Code	**Course Name**
PEC-ME351-T	Operation Research
PEC-ME352-T	Work Study
PEC-ME353-T	Total Quality Control
PEC-ME354-T	Production Management
PEC-ME355-T	Industrial Engineering

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VII- Semester

Sr. No.	Category	Course Code Theory	Course Code Practical	Course Title	L	T	P	Theory	Practical	Total
1.	Open Elective Courses	OE (refer to list)###	--	Open Elective-III	3	0	0	3.0	--	3.0
2.	Professional Elective Courses	PEC (refer to list)**	--	Professional Elective -II	3	0	0	3.0	--	3.0
3	Professional Elective Courses	PEC (refer to list)***	--	Professional Elective -III	3	0	0	3.0	--	3.0
4.	Professional Core Courses	PCC-ME401-T	PCC-ME401-P	Refrigeration and Air-Conditioning	3	1	2	4.0	1.0	5.0
5.	Project work, Seminar and Internship in Industry	--	PROJ-ME401-P	Minor project	0	0	6	--	3.0	3.0
6.	Project work, Seminar and Internship in Industry	--	PROJ-ME402-P	Industrial Training Presentation-II	0	0	2	--	1.0	1.0
7.	Mandatory Courses	--	MC-ME401-P	General Proficiency	0	0	2	--	0.0	0.0
					12	1	12			
Total credits										**18.0**

###Open Elective –III	
Course Code	**Course Name**
OE-PTG491-T	Fundamentals of Packaging
OE-CSE491-T	Statistical Computing
OE-ECE491-T	Introduction to MATLAB and Simulink
OE-FT491-T	Instrumental Analysis of Foods
OE-CE491-T	Environmental Engineering
OE-EE491-T	Energy Management and Audit

**Professional Elective -II	
Course Code	**Course Name**
PEC-ME451-T	Automation in Manufacturing
PEC-ME452-T	Advanced Welding
PEC-ME453-T	Tool Engineering
PEC-ME454-T	Modern Manufacturing Processes

***Professional Elective -III	
Course Code	**Course Name**
PEC-ME455-T	Introduction to Tribology
PEC-ME456-T	CNC Technology
PEC-ME457-T	Reverse Engineering
PEC-ME458-T	Product Design and Development

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VIII- Semester

Sr. No.	Category	Course Code		Course Title	Hours per week			Course Credits		
		Theory	Practical		L	T	P	Theory	Practical	Total
1.	**Professional Elective Courses**	**PEC (refer to list)******	--	**Professional Elective -IV**	3	0	0	3.0	--	3.0
2.	**Professional Elective Courses**	**PEC (refer to list)*******	--	**Professional Elective -V**	3	0	0	3.0	--	3.0
3.	**Professional Core Courses**	**PCC-ME402-T**	--	**Mechanical Vibrations**	3	0	0	3.0	--	3.0
4.	**Professional Core Courses**	**PCC-ME403-T**	**PCC-ME403-P**	**Computer Aided Design and Manufacturing**	3	0	2	3.0	1.0	4.0
5.	**Project Work, Seminar and Internship in Industry**	--	**PROJ-ME403-P**	**Major Project**	0	0	10	--	5.0	5.0
6.	**Project Work, Seminar and Internship in Industry**	--	**PROJ-ME404-P**	**Seminar**	0	0	2	--	1.0	1.0
					12	0	14			
Total credits										19.0

****Professional Elective -IV	
Course Code	**Course Name**
PEC-ME459-T	Robotics
PEC-ME460-T	Mechatronics
PEC-ME461-T	Automatic Control
PEC-ME462-T	Flexible Manufacturing Systems
PEC-ME463-T	Rapid Prototyping

*****Professional Elective -V	
Course Code	**Course Name**
PEC-ME464-T	Power Plant Engineering
PEC-ME465-T	Solar Energy Engineering
PEC-ME466-T	Design of Heat Exchangers
PEC-ME467-T	Turbo Machinery
PEC-ME468-T	Computational Fluid Dynamics