



RV COLLEGE OF ENGINEERING®

(Autonomous Institution Affiliated to VTU, Belagavi)

R.V. Vidyaniketan Post, Mysuru Road

Bengaluru – 560 059



Scheme and Syllabus of I to IV Semester

(Autonomous System of 2018 Scheme)

Master of Technology (M.Tech)

in

PRODUCT DESIGN AND MANUFACTURING

**DEPARTMENT OF
MECHANICAL ENGINEERING**

VISION

Leadership in Quality Technical Education, Interdisciplinary Research & Innovation, with a Focus on Sustainable and Inclusive Technology

MISSION

1. To deliver outcome based Quality education, emphasizing on experiential learning with the state of the art infrastructure.
2. To create a conducive environment for interdisciplinary research and innovation.
3. To develop professionals through holistic education focusing on individual growth, discipline, integrity, ethics and social sensitivity.
4. To nurture industry-institution collaboration leading to competency enhancement and entrepreneurship.
5. To focus on technologies that are sustainable and inclusive, benefiting all sections of the society.

QUALITY POLICY

Achieving Excellence in Technical Education, Research and Consulting through an Outcome Based Curriculum focusing on Continuous Improvement and Innovation by Benchmarking against the global Best Practices.

CORE VALUES

Professionalism, Commitment, Integrity, Team Work and Innovation



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Master of Technology (M.Tech)
in
PRODUCT DESIGN AND MANUFACTURING

DEPARTMENT OF
MECHANICAL ENGINEERING

VISION

Quality education in Design, Materials, Thermal and Manufacturing with emphasis on research, sustainable technologies and entrepreneurship for societal symbiosis.

MISSION

- Imparting knowledge in basic and applied areas of Mechanical Engineering.
- Providing state-of-the-art laboratories and infrastructure for academics and research in the areas of design, materials, thermal engineering and manufacturing.
- Facilitating faculty development through continuous improvement programs.
- Promoting research, education and training in materials, design, manufacturing, Thermal Engineering and other multidisciplinary areas.
- Strengthening collaboration with industries, research organizations and institutes for internship, joint research and consultancy.
- Imbibing social and ethical values in students, staff and faculty through personality development programs

PROGRAM OUTCOMES (PO)

M. Tech. in Product Design and Manufacturing graduates will be able to:

- PO1: Independently carry out a research / investigation and development work to solve practical problems related to product design & manufacturing.
- PO2: Write and present a substantial technical report / document in the field of product design & manufacturing.
- PO3: Demonstrate a degree of mastery over the areas of product design. The mastery would be at a level higher than the requirements in the bachelor's in Mechanical Engineering
- PO4: Use modern tools for the design and analysis of static and dynamic systems and mechanisms.
- PO5: Adopt safety, ethical and environmental factors in product design and processes
- PO6: Perform in multidisciplinary teams with sound interpersonal and management skills with a commitment to lifelong learning

ABBREVIATIONS

Sl. No.	Abbreviation	Acronym
1.	VTU	Visvesvaraya Technological University
2.	BS	Basic Sciences
3.	CIE	Continuous Internal Evaluation
4.	SEE	Semester End Examination
5.	CE	Professional Elective
6.	GE	Global Elective
7.	HSS	Humanities and Social Sciences
8.	CV	Civil Engineering
9.	ME	Mechanical Engineering
10.	EE	Electrical & Electronics Engineering
11.	EC	Electronics & Communication Engineering
12.	IM	Industrial Engineering & Management
13.	EI	Electronics & Instrumentation Engineering
14.	CH	Chemical Engineering
15.	CS	Computer Science & Engineering
16.	TE	Telecommunication Engineering
17.	IS	Information Science & Engineering
18.	BT	Biotechnology
19.	AS	Aerospace Engineering
20.	PY	Physics
21.	CY	Chemistry
22.	MA	Mathematics
23.	MCA	Master of Computer Applications
24.	MST	Structural Engineering
25.	MHT	Highway Technology
26.	MPD	Product Design & Manufacturing
27.	MCM	Computer Integrated & Manufacturing
28.	MMD	Machine Design
29.	MPE	Power Electronics
30.	MVE	VLSI Design & Embedded Systems
31.	MCS	Communication Systems
32.	MBS	Bio Medical Signal Processing & Instrumentation
33.	MCH	Chemical Engineering
34.	MCE	Computer Science & Engineering
35.	MCN	Computer Network Engineering
36.	MDC	Digital Communication
37.	MRM	Radio Frequency and Microwave Engineering
38.	MSE	Software Engineering
39.	MIT	Information Technology
40.	MBT	Biotechnology
41.	MBI	Bioinformatics

CONTENTS

I Semester			
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1	18MAT11A	Applied Mathematics	1
2	18MPD12	Product Design & Development	3
3	18MPD13	Finite Element Analysis	5
4	18HSS14	Professional Skills Development	7
GROUP A: PROFESSIONAL ELECTIVES			
1.	18MPD1A1	Product Design for Quality	9
2.	18MMD1A2	Tribology	11
3.	18MCM1A3	Design of Hydraulic & Pneumatic Systems	13
GROUP B: PROFESSIONAL ELECTIVES			
1.	18MPD1B1	Product Data Management	15
2.	18MCE1B2	Intelligent Systems	17
3.	18MCM1B3	Non-Traditional Machining & Testing	19

II Semester			
Sl. No.	Course Code	Course Title	Page No.
1.	18MMD21	Robust Design	21
2.	18MPD 22	Product Life Cycle Management	23
3.	18IM 23	Research Methodology	25
4.	18MPD24	Minor Project	27
GROUP C: PROFESSIONAL ELECTIVES			
1.	18MPD 2C1	Creative Engineering	29
2.	18MPD 2C2	Design for Manufacture and Assembly	31
3.	18MPD 2C3	Reliability Engineering	33
GROUP D: PROFESSIONAL ELECTIVES			
1.	18MPD 2D1	Product Cost Analysis & Optimization	35
2.	18MCM2D2	Robotics & Automation	37
3.	18MPD 2D3	Systems Engineering	39
GROUP G: GLOBAL ELECTIVES			
1.	18CS2G01	Business Analytics	41
2.	18CV2G02	Industrial & Occupational Health and Safety	43
3.	18IM2G03	Modelling using Linear Programming	45
4.	18IM2G04	Project Management	47
5.	18CH2G05	Energy Management	49
6.	18ME2G06	Industry 4.0	51
7.	18ME2G07	Advanced Materials	53
8.	18CHY2G08	Composite Materials Science and Engineering	55
9.	18PHY2G09	Physics of Materials	57
10.	18MAT2G10	Advanced Statistical Methods	59

SEMESTER : III			
Sl. No.	Course Code	Course Title	Page No.
1.	18MPD31	Advanced Materials & Processes	62
2.	18MPD32	Internship	64
3.	18MPD33	Major Project : Phase I	66
4.	18XXX3EX	Professional Elective -E	67-72
GROUP E: PROFESSIONAL ELECTIVES			
1.	18MPD3E1	Sheet Metal Forming and Plastic Moulding	67
2.	18MPD3E2	Surface Engineering	69
3.	18MCM3E3	Advanced Manufacturing Practices	71
SEMESTER : IV			
Sl. No.	Course Code	Course Title	Page No.
1.	18MPD41	Major Project : Phase II	73
2.	18MPD42	Technical Seminar	75

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DEPARTMENT OF MECHANICAL ENGINEERING

M.Tech in PRODUCT DESIGN AND MANUFACTURING

FIRST SEMESTER CREDIT SCHEME							
Sl. No.	Course Code	Course Title	BoS	Credit Allocation			
				L	T	P	Total Credits
1	18 MAT11A	Applied Mathematics	MAT	4	0	0	4
2	18 MPD12	Product Design & Development	ME	4	0	1	5
3	18MPD13	Finite Element Analysis	ME	4	0	1	5
4	18HSS14	Professional Skills Development	HSS	0	0	0	0
5	18XXX1AX	Elective – A	ME	3	1	0	4
6	18XXX1BX	Elective – B	ME/CSE	4	0	0	4
Total number of Credits				19	1	2	22
Total Number of Hours / Week				19	2	4	25

SECOND SEMESTER CREDIT SCHEME							
Sl. No.	Course Code	Course Title	BoS	Credit Allocation			
				L	T	P	Total Credits
1	18 MPD 21	Robust Design	ME	4	0	1	5
2	18 MPD 22	Product Life Cycle Management	ME	3	1	0	4
3	18 IM 23	Research Methodology	IEM	3	0	0	3
4	18MPD24	Minor Project	ME	0	0	2	2
5	18XXX2CX	Elective – C	ME	4	0	0	4
6	18XXX2DX	Elective – D	ME	4	0	0	4
7	18XXX2GXX	Global Elective	Respective boards	3	0	0	3
Total number of Credits				21	1	3	25
Total Number of Hours / Week				21	2	6	29

SEMESTER: II						
RESEARCH METHODOLOGY						
(Common to all programs)						
Course Code	:	18IM23		CIE Marks	:	100
Credits L: T: P	:	3:0:0		SEE Marks	:	100
Hours	:	36L		SEE Duration	:	3 Hrs

Unit – I	
Overview of Research: Research and its types, identifying and defining research problem and introduction to different research designs. Essential constituents of Literature Review. Basic principles of experimental design, completely randomized, randomized block, Latin Square, Factorial.	07 Hrs
Unit – II	
Data and data collection: Overview of probability and data types, Primary data and Secondary Data, methods of primary data collection, classification of secondary data, designing questionnaires and schedules. Sampling Methods: Probability sampling and Non-probability sampling	08 Hrs
Unit – III	
Processing and analysis of Data: Statistical measures of location, spread and shape, Correlation and regression, Hypothesis Testing and ANOVA. Interpretation of output from statistical software tools	07 Hrs
Unit – IV	
Advanced statistical analyses: Non parametric tests, Introduction to multiple regression, factor analysis, cluster analysis, principal component analysis. Usage and interpretation of output from statistical analysis software tools.	07 Hrs
Unit-V	
Essentials of Report writing and Ethical issues: Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Ethical issues related to Research, Publishing, Plagiarism. Case studies: Discussion of case studies specific to the domain area of specialization	07 Hrs

Course Outcomes: After going through this course the student will be able to:	
CO1	Explain the principles and concepts of research types, data types and analysis procedures.
CO2	Apply appropriate method for data collection and analyze the data using statistical principles.
CO3	Present research output in a structured report as per the technical and ethical standards
CO4	Create research design for a given engineering and management problem situation.

Reference Books:	
1	Kothari C.R., Research Methodology Methods and techniques, New Age International Publishers, 4th edition, ISBN: 978-93-86649-22-5
2	Krishnaswami, K.N., Sivakumar, A. I. and Mathirajan, M., Management Research Methodology, Pearson Education: New Delhi, 2006. ISBN: 978-81-77585-63-6
3	William M. K. Trochim, James P. Donnelly, The Research Methods Knowledge Base, 3 rd Edition, Atomic Dog Publishing, 2006. ISBN: 978-1592602919
4	Levin, R.I. and Rubin, D.S., Statistics for Management, 7th Edition, Pearson Education: New Delhi.

Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE is executed by way of quizzes (Q), tests (T) and assignments. A minimum of two quizzes are conducted and each quiz is evaluated for 10 marks adding up to 20 marks. Faculty may adopt innovative methods for conducting quizzes effectively. Three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50 marks. A minimum of two assignments

are given with a combination of two components among 1) solving innovative problems 2) seminar/new developments in the related course 3) Laboratory/field work 4) Minor project.

Total CIE (Q+T+A) is 20+50+30=100 Marks.

Scheme of Semester End Examination (SEE) for 100 marks:

The question paper will have FIVE questions with internal choice from each unit. Each question will carry 20 marks. Student will have to answer one full question from each unit.