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Sr. No.	Year	Title of the book/chapters published	Page No.
1	2021-22	Leading an Organization through Change and Leadership Elements	1-4
2		Instilling soft skills in engineering studnets for crafting employability in the corporate world	5-8
3		Dynamics of Machinery	9-14
4		Metal Forming Technology	15-18
5		Surface Engineering	19-22
6		Press Tool Design	23-25
7	2020-21	Effect of Plunging and Dwelling Period on Temperature Profile and Energy Dissipation in FSSW and Its Relevance in FSW	26-35
NATIONAL			
Sr. No.	Year	Name of the Conference	Page No.
1	2021-2022	National Conference on Role of Engineers in Nation Building (NCRENB) 2022	36
2	2020-2021	National Conference on Role of Engineers in Nation Building (NCRENB) 2021	36
3	2019-2020	National Conference on Role of Engineers in Nation Building (NCRENB) 2020	36
4	2018-2019	National Conference on Role of Engineers in Nation Building (NCRENB) 2019	36
5	2017-2018	National Conference on Role of Engineers in Nation Building (NCRENB) 2018	36
INTERNATIONAL			
Sr. No.	Year	Name of the Conference	Page No.
1	2020-2021	International Conference on Communication information and Computing Technology (ICCICT), 2021	37
2		6th International Conference for Convergence in Technology (I2CT), 2021	38
3	2019-2020	International Conference on Intelligent Computing and Control Systems (ICICCS)	39
4		2020 6th International Conference on Advanced Computing & Communication Systems (ICACCS)	40
5	2018-2019	ICOEI-2019	41
6	2017-2018	IEEE	42
7		IJEEDC	43



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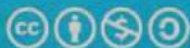
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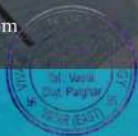


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Contents

Chapters	Page No.
1. Group Dynamics in an Organization <i>(C. Deepa and M. Rama Devy)</i>	01-12
2. The Influence of Digital Media on Purchase Decisions of Consumers: Descriptive Research <i>(M. Vikram Kumar)</i>	13-26
3. Impact of Employer Branding on Organization Commitment in IT Sector <i>(Anjali Goyal and Dr. Bhanupriya Khatri)</i>	27-51
4. Mutual Funds: An Effective Tool for Retirement Planning <i>(Dr. Aashka Thakkar and Hardik Thakkar)</i>	53-67
5. Leading an Organization through Change and Leadership Elements <i>(Dr. Prashant Ramrao Pawar and Dr. Trupti Vikas Patil)</i>	69-79



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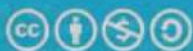
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Contents

Chapters	Page No.
1. Instilling Soft Skills in Engineering Students for Crafting Employability in the Corporate World <i>(Dr. Trupti Vikas Patil and Dr. Prashant Ramrao Pawar)</i>	01-17
2. Introduction to Adult Education <i>(Mayzul Alom Hussain)</i>	19-30
3. Active Blended Learning in Upgrading Bachelor of Nursing Students: A Case Study of a Partnership between a Private and a Public University in Kenya <i>(Cheptum JJ, Bitok LK, Mageto IG, Munyalo B and Muiruri FW)</i>	31-43
4. Knowledge Management in Higher Education Institutes <i>(Rashmi Meena)</i>	45-64
5. Adjustment of Senior Secondary School Teachers in Relation to their Age and Experience <i>(Dr. Deepa Rani)</i>	65-75
6. Possible New Model of Education System <i>(Manisha, Bas Kaur, Rashmi Tyagi and Sahil Boora)</i>	77-96



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(MU - Semester 5/Mech - For New Syll. 2021-2022)

Authors : Prof. (Dr.) H. S. Patil, Prof. Pratik P. Raut

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Course Code	Course/Subject Name	Credits
MEC503	Dynamics of Machinery*	4

Objectives :

1. To acquaint with working principles and applications of Governors / Gyroscope
2. To study static and dynamic force analysis in the mechanisms
3. To familiarise with basics of mechanical vibrations
4. To study the balancing of mechanical systems

Outcomes : Learner will be able to...

1. Demonstrate working Principles of different types of governors and Gyroscopic effects on the mechanical systems
2. Illustrate basic of static and dynamic forces
3. Determine natural frequency of element/system
4. Determine vibration response of mechanical elements /systems
5. Design vibration isolation system for a specific application
6. Demonstrate basic concepts of balancing of forces and couples

Module	Details	Hrs.
1	Governors and Gyroscopes 1.1 Governors : Introduction to Centrifugal and Inertia governors, Study and Force analysis of Porter and Hartnell governors including Performance characteristics, Governors effort and power. (Refer chapter 1) 1.2 Gyroscope : Introduction, Gyroscopic couple and its effect on spinning bodies, naval ships during steering, pitching, rolling and their stabilization. (Refer chapter 2)	09
2	2.1 Static and Dynamic force analysis of Slider crank mechanism (neglecting mass of connecting rod and crank), Turning moment on crank shaft 2.2 Dynamically equivalent systems to convert rigid body into two mass with and without correction couple (Case study - Connecting rod) (Refer chapter 3)	06
	3.1 Basic Concepts of Vibration : Vibration and Oscillation, causes and effects of vibrations, Importance of study of vibrations, Vibration parameters - springs, mass, damper, Motion-	

Module	Details	Hrs.
3	periodic, non-periodic, degree of freedom, static equilibrium position, vibration classification, steps involved in vibration analysis (Refer chapter 4)	08
	3.2 Free Undamped Single Degree of Freedom Vibration System : Longitudinal, transverse, torsional vibration system, Methods for formulation of differential equations by Newton, Energy, Lagrangian and Rayleigh's method (Refer chapter 5)	
4	4.1 Free Damped Single Degree of Freedom Vibration System : Introduction to different methods of damping, Study and analysis of (1) Viscous damped system (under damped, critically damped, over damped; Logarithmic decrement) (2) Coulomb's damping (Combined Viscous and Coulomb damping excluded) (Refer chapter 6) 4.2 Equivalent Single Degree of Freedom Vibration System : Conversion of multi- springs, multi masses, multi-dampers into a single spring and damper with linear or rotational co-ordinate system (Refer chapters 4 and 7)	07
5	5.1 Forced Single Degree of Freedom Vibratory System : Analysis of linear and torsional systems subjected to harmonic force excitation and harmonic motion excitation (excluding elastic damper) (Refer chapter 8) 5.2 Vibration Isolation and Transmissibility : Force Transmissibility, motion transmissibility, typical isolators & mounts. (Refer chapter 8) 5.3 Vibration Measuring Instruments: Principle of seismic instruments, vibrometer, accelerometer - undamped and damped, Introduction to conditioning monitoring and fault diagnosis. (Refer chapter 9)	10
6	6.1 Rotor Dynamics : Critical speed of single rotor, undamped and damped (Refer chapter 10) 6.2 Balancing : Static and Dynamic balancing of multi rotor system(up to four rotors), balancing of reciprocating masses in In-line engines(up to four cylinders) , Introduction to V-engines (excluding other radial engines) (Refer chapter 11)	08

□□□





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MEC502	Thermal Engineering
MEC503	Dynamics of Machinery
MEC504	Finite Elements Analysis
Course Code	Departmental Elective
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Table of Contents

Module 1

Chapter 1 : Introduction to Metal Forming

1-1 to 1-28

1.1	Elastic and Plastic Deformations.....	1-1
1.2	Mechanism of plastic deformation.....	1-3
1.2.1	Slip.....	1-3
1.2.2	Twinning	1-4
1.2.3	Comparison between Slip and Twinning.....	1-5
1.3	Effect of various parameters on metal forming.....	1-6
1.3.1	Temperature	1-6
1.3.2	Friction	1-7
1.3.3	Lubrication	1-8
1.3.4	Strain rate	1-9
1.4	Yield Criteria.....	1-10
1.4.1	Effective Stress and Effective Strain.....	1-12
1.5	Metal Working.....	1-12
1.6	Metal Forming Process.....	1-13
1.7	Classification of Metal Forming Process	1-14
1.7.1	Based on Working Temperature.....	1-14
1.7.1.1	Cold Forming or Cold Working.....	1-14
1.7.1.2	Hot Forming or Hot Working	1-15
1.7.1.3	Warm or Semi Hot Forming	1-15
1.7.2	Based on form of raw material used	1-15
1.7.2.1	Bulk Forming Processes.....	1-16
1.7.2.2	Powder Metal Forming.....	1-18
1.7.2.3	Sheet Metal Forming	1-18
1.7.3	Advantages of Metal Forming Processes over other Manufacturing Processes	1-19
1.7.4	Disadvantages of Metal Forming Processes.....	1-20
1.8	Flow Stresses.....	1-20
1.8.1	Why Flow Stress is Important?.....	1-21





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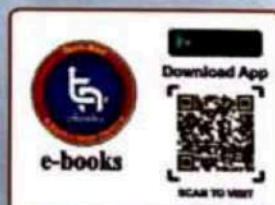



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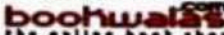
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MEC602	Turbo Machinery
MEC603	Heating, Ventilation, Air conditioning & Refrigeration
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Table of Contents

Unit 1

Chapter 1 : Introduction to Surface Engineering and Surface Degradation **1-1 to 1-28**

1.1	Introduction	1-1
1.2	Surface Dependant Properties	1-3
1.2.1	Properties Influenced by Surface Roughness	1-4
1.3	Importance and SCOPE of Surface Engineering	1-8
1.3.1	Importance of Surface Engineering in Manufacturing	1-9
1.4	Scope of Surface Engineering	1-9
1.4.1	Surface Technology	1-9
1.4.2	Surface Energy	1-9
1.5	Importance of Surface Energy	1-10
1.5.1	Causes of Surface Energy	1-10
1.5.2	Surface Energy Modification Technique	1-10
1.6	Determination of Surface Energy	1-10
1.6.1	Interfacial Energy (Surface Free Energy)	1-11
1.7	Surface interface	1-12
1.7.1	How is the Interface Structured?	1-12
1.7.2	Best Practices for Designing an Interface	1-12
1.7.3	Interface Structure Diagram (ISD)	1-13
1.8	Types of Wear	1-13
1.8.1	Adhesive Wear	1-13
1.8.2	Abrasive Wear	1-13
1.8.3	Erosive Wear	1-14
1.8.4	Polishing Wear	1-14
1.9	Corrosion	1-15
1.9.1	Surface Corrosion	1-15
1.9.2	Forms of Corrosion	1-15
1.9.3	Corrosion Triangle	1-16
1.10	The Pilling-Bedworth Rule	1-17
1.10.1	As per Pilling-Bedworth Rule	1-18

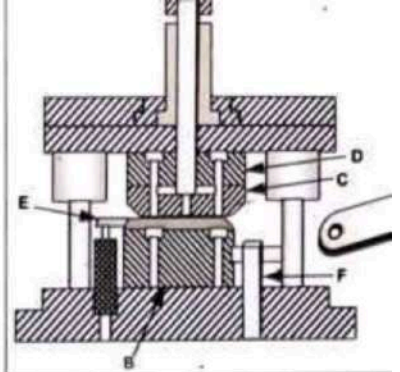
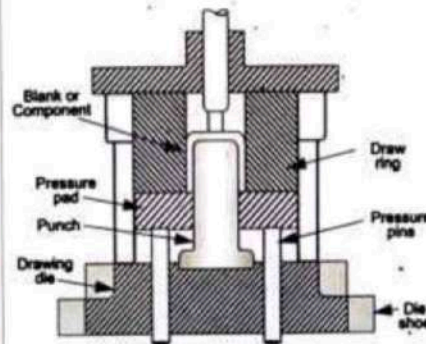


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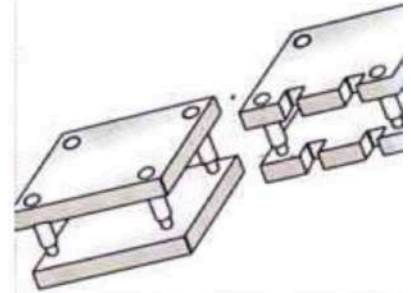


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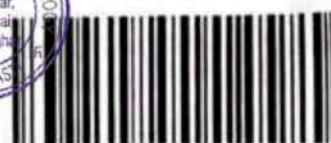
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Preface

Advanced technologies in the current era ensure that we are in turbulent and challenging times as we attempt for wealth creation and business in the fields of manufacturing and automation. Industries are currently looking up to manufacturing and automation engineers for their assistance in increasing the overall productivity in their organizations. It is also the time when policymakers across the globe have started to focus more of their attention on the manufacturing sector due to the presence of disruptive technologies in manufacturing. The International Conference on Intelligent Manufacturing and Automation 2020 (ICIMA 2020) was therefore designed to encourage discussions and research on advancements and applications in the areas of manufacturing and automation. The primary focus of this conference was to bring together academicians, researchers and scientists for knowledge sharing in various areas of manufacturing, automation and other allied domains. This conference covered topics encompassing automation, mechatronics, robotics, manufacturing processes, management and other related areas, such as product design and development, green manufacturing and smart materials with the objective of brainstorming and with specific emphasis on the applications in the field of intelligent manufacturing and automation. The response to the call for papers was overwhelming with 181 articles submitted for this conference. Finally, 82 articles, covering a wide spectrum of topics related to the theme of this conference, were accepted after a thorough review process. We express our sincere appreciation to the authors for their contribution to this book. We would also like to express our sincere gratitude to all the experts and referees for their valuable comments and support extended during the review process. Thank you everyone once again!

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Analysis and Manufacturing of Aerodynamic Components	187
Rajnarayan Yadav, Vinit Katira, Ruchit Doshi, Shakshi Himmatramka, Parshva Mehta, and Harshil Mody	
Design and Manufacturing of Compact and Portable Smart CNC Machine	201
Amit Choudhari, Shamir Talkar, Pavan Rayar, and Aditya Rane	
Effect of Plunging and Dwelling Period on Temperature Profile and Energy Dissipation in FSSW and Its Relevance in FSW	211
Niyati N. Raut, Vivek Yakkundi, Akshay Vartak, and S. N. Teli	
Prediction of Optimum Sheet Metal Blanking Clearance for IS513CR Steel Using Artificial Neural Network	221
Pradip P. Patil, Vijaya P. Patil, and R. Ramaswamy	
Improving the On-Time Delivery of Projects in a Complex Industrial Environment	231
Hari Vasudevan, Rajendra Khavekar, and Krishnan Kaushik	
Investigating the Influence of Infill Pattern on the Compressive Strength of Fused Deposition Modelled PLA Parts	239
Sanket Parab and Nilay Zaveri	



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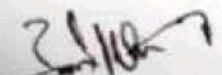
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