

Walchand College of Engineering

(Government Aided Autonomous Institute)

Vishrambag, Sangli-416415



Course Content for S. Y. M. Tech. Mechanical (Production Engineering)

Semester - III and IV

2023-24

J. Warkaw

J. K. S.

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)					
AY 2022-23					
Course Information					
Programme		M. Tech. (Mechanical Production Engineering)			
Class, Semester		Second Year M. Tech., Sem III			
Course Code		6PR645			
Course Name		Dissertation Phase I			
Desired Requisites:		Concept knowledge of research methodology, project management, mechanical engineering			
Teaching Scheme		Examination Scheme (Marks)			
Practical	6 Hrs/ Week	LA1	LA2	Lab ESE	Total
Interaction	-	100	00	00	100
Credits: 03					
Course Objectives					
1	To develop the student to apply the knowledge gained to identify problems for research and provide the solutions by self-study and interaction with stakeholders.				
2	Acquire knowledge to tackle real world problems of societal concerns				
3	Impart flexibility to the student to have increased control over his/ her learning				
4	Teachers would serve as mentor/facilitator of inquiry and reflection rather than as an instructor				
5	Enhance a students' learning through increased interaction with peers and colleagues.				
Course Outcomes (CO) with Bloom's Taxonomy Level					
At the end of the course, the students will be able to,					
CO	Course Outcome Statement/s			Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Search the existing literature and identification of research problem			IV	Analyzing
CO2	Design and develop the solution for complex engineering problem			V	Evaluating
CO3	Create the new knowledge in the specialized field			VI	Creating
Course Content					
Students are expected to carry out independent research work on the chosen topic. In this semester it is expected that the student has carried out substantial research work including exhaustive literature survey, formulation of the research problem, development/fabrication of experimental set-up (if any/required) and testing, and analysis of initial results thus obtained. In fourth semester, the students continue their dissertation work. It is expected that the student has completed most of the experimental/computation works and analyzed the results so obtained as proposed in the synopsis. The work should be completed in all respects this semester. The students are required to submit the dissertation work in the form of report as per the institute rule					
Textbooks					
1	As per the research topic				
References					
1	National and International Journals				
Useful Links					
1	https://nptel.ac.in/courses/121/106/121106007/				
2	https://www.youtube.com/watch?v=mAVswCzb_jM&feature=emb_imp_woyt				

3	https://nptel.ac.in/courses/110/104/110104073/
4	https://nptel.ac.in/courses/110/107/110107081/

CO-PO Mapping						
Programme Outcomes (PO)						
	1	2	3	4	5	6
CO1	1			1		2
CO2	1		1		2	1
CO3		2				1

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High
Each CO of the course must map to at least one PO.

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%				
Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)					
AY 2022-23					
Course Information					
Programme	M. Tech. (Mechanical Production Engineering)				
Class, Semester	Second Year M. Tech., Sem III				
Course Code	6PR646				
Course Name	Dissertation Phase II				
Desired Requisites:	Concept knowledge of research methodology, project management, mechanical engineering				
Teaching Scheme		Examination Scheme (Marks)			
Practical	6 Hrs/ Week	LA1	LA2	Lab ESE	Total
Interaction	-	00	100	00	100
Credits: 03					
Course Objectives					
1	To develop the student to apply the knowledge gained to identify problems for research and provide the solutions by self-study and interaction with stakeholders.				
2	Acquire knowledge to tackle real world problems of societal concerns				
3	Impart flexibility to the student to have increased control over his/ her learning				
4	Teachers would serve as mentor/facilitator of inquiry and reflection rather than as an instructor				
5	Enhance a students' learning through increased interaction with peers and colleagues.				
Course Outcomes (CO) with Bloom's Taxonomy Level					
At the end of the course, the students will be able to,					
CO	Course Outcome Statement/s			Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Search the existing literature and identification of research problem			IV	Analyzing
CO2	Design and develop the solution for complex engineering problem			V	Evaluating
CO3	Create the new knowledge in the specialized field			VI	Creating
Course Content					
Students are expected to carry out independent research work on the chosen topic. In this semester it is expected that the student has carried out substantial research work including exhaustive literature survey, formulation of the research problem, development/fabrication of experimental set-up (if any/required) and testing, and analysis of initial results thus obtained. In fourth semester, the students continue their dissertation work. It is expected that the student has completed most of the experimental/computation works and analyzed the results so obtained as proposed in the synopsis. The work should be completed in all respects this semester. The students are required to submit the dissertation work in the form of report as per the institute rule					
Textbooks					
1	As per the research topic				
References					
1	National and International Journals				
Useful Links					
1	https://nptel.ac.in/courses/121/106/121106007/				
2	https://www.youtube.com/watch?v=mAVswCzb_jM&feature=emb_imp_woyt				

3	https://nptel.ac.in/courses/110/104/110104073/
4	https://nptel.ac.in/courses/110/107/110107081/

CO-PO Mapping						
Programme Outcomes (PO)						
	1	2	3	4	5	6
CO1	1			1		2
CO2	1		1		2	1
CO3		2				1

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High
Each CO of the course must map to at least one PO.

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%				
Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
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Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

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Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)					
AY 2022-23					
Course Information					
Programme		M. Tech. (Mechanical Design Engineering)			
Class, Semester		Second Year M. Tech., Sem III			
Course Code		6PR647			
Course Name		Dissertation Phase III			
Desired Requisites:		Concept knowledge of research methodology, project management, mechanical engineering			
Teaching Scheme		Examination Scheme (Marks)			
Practical	8 Hrs/ Week	LA1	LA2	Lab ESE	Total
Interaction	-	00	00	100	100
Credits: 04					
Course Objectives					
1	To develop the student to apply the knowledge gained to identify problems for research and provide the solutions by self-study and interaction with stakeholders.				
2	Acquire knowledge to tackle real world problems of societal concerns				
3	Impart flexibility to the student to have increased control over his/ her learning				
4	Teachers would serve as mentor/facilitator of inquiry and reflection rather than as an instructor				
5	Enhance a students' learning through increased interaction with peers and colleagues.				
Course Outcomes (CO) with Bloom's Taxonomy Level					
At the end of the course, the students will be able to,					
CO	Course Outcome Statement/s			Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Search the existing literature and identification of research problem			IV	Analyzing
CO2	Design and develop the solution for complex engineering problem			V	Evaluating
CO3	Create the new knowledge in the specialized field			VI	Creating
Course Content					
Students are expected to carry out independent research work on the chosen topic. In this semester it is expected that the student has carried out substantial research work including exhaustive literature survey, formulation of the research problem, development/fabrication of experimental set-up (if any/required) and testing, and analysis of initial results thus obtained. In fourth semester, the students continue their dissertation work. It is expected that the student has completed most of the experimental/computation works and analyzed the results so obtained as proposed in the synopsis. The work should be completed in all respects this semester. The students are required to submit the dissertation work in the form of report as per the institute rule					
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3	https://nptel.ac.in/courses/110/104/110104073/
4	https://nptel.ac.in/courses/110/107/110107081/

CO-PO Mapping						
Programme Outcomes (PO)						
	1	2	3	4	5	6
CO1	1			1		2
CO2	1		1		2	1
CO3		2				1

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High
Each CO of the course must map to at least one PO.

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%				
Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)					
AY 2022-23					
Course Information					
Programme		M.Tech. (Mechanical Production Engineering)			
Class, Semester		Second Year M. Tech., Sem III			
Course Code		6PR611			
Course Name		Material Handling Systems			
Desired Requisites:					
Teaching Scheme		Examination Scheme (Marks)			
Lecture	3 Hrs/week	MSE	ISE	ESE	Total
Tutorial	-	30	20	50	100
		Credits: 3			
Course Objectives					
1	To develop a holistic, integrated approach to improve the material handling system considering the existing production system with constrains.				
2	To provide the necessary inputs to students to make them capable to develop all the elements of selected material handling system.				
3	To prepare the student for recommending the tailor made MHS for a particular application.				
Course Outcomes (CO) with Bloom's Taxonomy Level					
At the end of the course, the students will be able to,					
CO	Course Outcome Statement/s			Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Analyze material flows in plants and warehouses.			IV	Analyzing
CO2	Recommend the material handling systems as per the requirement of production system.			V	Evaluating
CO3	Design and develop material handling equipment's.			VI	Creating
Module	Module Contents				Hours
I	Plant Layout and Material Handling Principle Plant Layout: Need for layout planning, Layout objectives and Determinants, Types of Layout, Computer Aided Plant Layout Planning: CRAFT, ALDEP, and CORELAP. Material Handling objective, benefits of better handling, relationship between layout and material handling, principles of Material Handling, Unit load concept, Material Handling Types, Equipment selection and Applications.				7
II	Mechanized Assembly Principles and operating characteristics of part feeders such as vibratory bowl feeder, Reciprocating tube hopper feeder, Centrifugal hopper feeder, Center board hopper feeder, Orientation of parts : In bowl and out bowl tooling, different types of Escapement, Transfer Systems and Indexing Mechanism.				7
III	Material Transport and Storage System Industrial trucks: non-powered and powered industrial trucks, AGVS: Types, Vehicle guidance technology, traffic and safety, Monorail and other rail guided vehicles, types of cranes, hoists and elevators.				6
IV	Conveyors Types and Storage System Belt conveyors, Slat conveyors, Gravity conveyors, Apron, escalators, pneumatic conveyors, screw conveyors, vibrating conveyor, Analysis of material transport system. Automated Storage system, AS/RS System, Carousel storage system, WIP storage system.				7

V	Packaging and Economic Analysis of Material Handling Packaging: Functions, materials, palletizing, packaging equipment. Economic Analysis of material handling equipment: Factors in material handling selection, break event analysis, equipment operating cost per unit distance, work volume analysis – illustrative problems, productivity / indicator ratios.	6
VI	Industrial applications Lean-based material handling, Advanced material handling equipment, Design of MHS for industries like Foundries, Forging industries, Assembly plants etc. (with plant layout and cost estimation)	6

Textbooks

1	Jon R. Immer, “Material Handling”, Mc-Graw Hill Company, 1950
2	Sharma, S. C., “Materials Management and Materials Handling” Khanna Publishers., 2004.
3	Dr.K.C.Arora, Vikas .V.Shinde, ” Aspects of Materials Handling”, Laxmi Publishers, 2007.

References

1	K.H.E. Kroemer, Karl Kroemer, ”Ergonomics Design for Materials Handling systems”, CRC Press, 1997.
2	Raymond A. Kulwiec, “Materials handling – Handbook”, A Wiley – Interscience publication” 1984.
3	Apple, J. M., “Plant Layout and material handling system design”, John Wiley & Sons, 1995.

Useful Links

1	https://nptel.ac.in/courses/112/107/112107142/
2	https://nptel.ac.in/courses/112/107/112107143/
3	https://nptel.ac.in/courses/112/103/112103293/

CO-PO Mapping

Programme Outcomes (PO)						
	1	2	3	4	5	6
CO1			2		3	
CO2	2			2		
CO3		2				2

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher’s assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)					
AY 2022-23					
Course Information					
Programme		M.Tech. (Mechanical Production Engineering)			
Class, Semester		Second Year M. Tech., Sem - III			
Course Code		6PR612			
Course Name		Manufacturing Planning and Control			
Desired Requisites:					
Teaching Scheme		Examination Scheme (Marks)			
Lecture	3Hrs/week	MSE	ISE	ESE	Total
Tutorial	-	30	20	50	100
		Credits: 3			
Course Objectives					
1	Students should get an exposure to the various manufacturing systems and do proper planning and further exercise control for proper execution				
2	Students should be given some situations and should be asked to do brain storming in groups and give possible solutions				
3	To discuss various case studies				
4					
Course Outcomes (CO) with Bloom's Taxonomy Level					
At the end of the course, the students will be able to,					
CO	Course Outcome Statement/s			Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Perceive the manufacturing systems, the approach to pre planning and required decision making for the same with the help of case studies			II	Understand
CO2	Perceive about the planning activity, MRP and operations and apply the same for a manufacturing system as a case study			III	apply
CO3	Study and perceive the international scenario and recent trends			IV	Analyzing
Module	Module Contents				Hours
I	Manufacturing Systems Overview of manufacturing systems and various issues of interest: Assembly Line, Repetitive batch manufacturing, Cellular manufacturing, Flexible Manufacturing Systems, Just in Time, Computer Integrated Manufacturing				5
II	Preplanning and Decision Making Preplanning: Forecasting, Economic analysis, Aggregate planning, Capacity planning Inventory planning. Group Technology, Line balancing.				5
III	Operations Planning Operations planning : MRP (Materials Requirement Planning), MRP II (Manufacturing Resource Planning), Hierarchical planning systems, JIT systems, FMS				4
IV	Operations and Control Operation and control: Lot sizing decisions, production scheduling, cost planning and control, productivity planning and control and applications of theory of constraints.				4
V	World class manufacturing Road map to World Class Manufacturing Systems: Ideal Manufacturing, Intelligent Manufacturing and Agile Manufacturing Systems.				4

VI	Recent development Applications of recent developments in IT including ERP, e-Business, Enterprise Applications Integration (EAI) and Virtual Manufacturing	4
Textbooks		
1	D. D. Bedworth and J. E. Bailey, Integrated Production Control System- Management, Analysis and Design, John Wiley. (1983)	
2	E. A. Elsayed and T. O. Boucher, Analysis and Control of Production Systems, Prentice Hall. (1985)	
3	M. Pinedo and X. Chao, Operations Scheduling, McGraw Hill, (1999)	
4	R. B. Chase, N. J. Aanilano and F. R. Jacobs, Production and Operations Management- Manufacturing and Services, Tata McGraw Hill, Second Edition. (1999)	
References		
1	H. Noori and R. Radford, Production and Operations Management, McGraw Hill Inc., (1995)	
2	S. Nahmias, Production and Operations Analysis, R. Irwin., (1997)	
3	K. Hitomi, Manufacturing Systems Engineering, Viva Books Pvt. Ltd, India., (1996)	
Useful Links		
1	https://nptel.ac.in/courses/110/106/110106044/	
2	https://nptel.ac.in/courses/112/107/112107238/	
3	https://nptel.ac.in/courses/110/107/110107141/	

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1			3	2		
CO2	3			2		
CO3					3	2
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High Each CO of the course must map to at least one PO.						

Assessment
<p>The assessment is based on MSE, ISE and ESE.</p> <p>MSE shall be typically on modules 1 to 3.</p> <p>ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.</p> <p>ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.</p> <p>For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)</p>

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)					
AY 2022-23					
Course Information					
Programme	M.Tech. (Mechanical Production Engineering)				
Class, Semester	Second Year M. Tech., Sem III				
Course Code	6PR613				
Course Name	Organizational Behaviour				
Desired Requisites:					
Teaching Scheme		Examination Scheme (Marks)			
Lecture	3 Hrs/week	MSE	ISE	ESE	Total
Tutorial	-	30	20	50	100
Credits: 3					
Course Objectives					
1	To understand the implications of individual and group behaviour in organizational context.				
2	To understand effect of personality, values, decision making and motivation on organizational behaviour.				
3	To know leadership and its use in conflict management and negotiations.				
Course Outcomes (CO) with Bloom's Taxonomy Level					
At the end of the course, the students will be able to,					
CO	Course Outcome Statement/s			Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Grasp and perceive the concept of Organisational Behaviour and its effect on functioning of the organisation			II	Understand
CO2	Compare and perceive group behaviour, communication and leadership, and apply the same in conflict management and negotiations.			III	Apply
CO3	Analysis, through various case studies, the contribution of various human attributes / qualities on performance of organisation			IV	Analyse
Module	Module Contents				Hours
I	What is Organizational Behaviour? Understanding Organizational Behaviour, Effectiveness in organizations, A review of the manager's job, Disciplines, Challenges and opportunities for OB, Basic OB model				4
II	Diversity in Organizations, Attitudes and Job Satisfaction Concept of diversity, Biographical Characteristics, Intellectual and physical abilities, Diversity management strategies, Main components of attitudes, Measure of job satisfaction and Outcomes influenced by job satisfaction				4
III	Emotions and Moods What are Emotions and Moods?, Sources of emotions and moods, Strategies for emotion regulation, Emotional Intelligence, Applications of Emotions and Moods				4
IV	Personality and Values, Decision Making, Motivation What is personality?, Factors affecting Personality and behaviour at work place, Values and importance of values, Perception and individual decision making, Factors affecting decision making, Definition of motivation, Maslow's Hierarchy of Needs theory,				5
V	Group behaviour, Communication Need to form groups, Group properties: Roles, Norms, Status, Size, Cohesiveness, and Diversity, Group decision making and techniques, Barriers to effective communication				4

VI	Leadership, Conflict Management and Negotiation What is leadership?, Charismatic leadership and transformational leadership, Definition of conflict, Negotiation, Bargaining strategies, Negotiation process, Organizational change, Forces for change, Creating a culture for change	5
Textbooks		
1	Robbins, Judge & Sanghi , Organizational Behaviour, Pearson Education Publication.2013	
2	Stephen Robbins, Organisational Behaviour, Prentice Hall of India, 2008	
3	Udai Pareek, Understanding Organisational Behaviour, Oxford University Press, 2004	
References		
1	L.M.Prasad , Organizational Behaviour, Sultan Chand & Sons, 2014	
2	Fred Luthans, Organizational Behaviour, McGraw Hill Book Co., 2010	
Useful Links		
1	https://nptel.ac.in/courses/110/105/110105033/	
2	https://nptel.ac.in/courses/110/106/110106145/	
3	https://onlinecourses.nptel.ac.in/noc20_mg51/preview	

CO-PO Mapping						
Programme Outcomes (PO)						
	1	2	3	4	5	6
CO1				2		1
CO2					3	2
CO3			2	2		

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High
Each CO of the course must map to at least one PO.

Assessment
<p>The assessment is based on MSE, ISE and ESE.</p> <p>MSE shall be typically on modules 1 to 3.</p> <p>ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.</p> <p>ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.</p> <p>For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)</p>

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AY 2022-23					
Course Information					
Programme		M.Tech. (Mechanical Production Engineering)			
Class, Semester		Second Year M. Tech., Sem III			
Course Code		6PR614			
Course Name		Flexible Manufacturing Systems			
Desired Requisites:					
Teaching Scheme		Examination Scheme (Marks)			
Lecture	3 Hrs/week	MSE	ISE	ESE	Total
Tutorial	-	30	20	50	100
		Credits: 3			
Course Objectives					
1	To impart the knowledge of the fundamentals of flexible manufacturing systems and other different types of manufacturing systems.				
2	To prepare the student for the use of the recent developments in manufacturing such as machining centres and co-ordinate measuring machines, etc.				
3	To enable the student for selection of appropriate method of automatic storage systems and cutting tool management techniques				
Course Outcomes (CO) with Bloom's Taxonomy Level					
At the end of the course, the students will be able to,					
CO	Course Outcome Statement/s			Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Classify and distinguish FMS and other manufacturing systems including job-shop and mass production systems.			II	Understanding
CO2	Explain processing stations and material handling systems used in FMS environments			IV	Analyzing
CO3	Recommend tool management in FMS.			V	Evaluating
Module	Module Contents				Hours
I	Introduction: Limitations with conventional manufacturing, Need for FMS Introduction, Definition, Basic Component of FMS, Significance of FMS, General layout and configuration of FMS, Principle Objectives of FMS, Benefits and limitations of FMS, CIM Technology, Hierarchy of CIM.				5
II	Manufacturing Cell: Introduction, Description and Classifications of Cell, Unattended Machining, Cellular versus Flexible Manufacturing: Group Technology: Benefits and Obstacles of Group Technology Affecting Many Areas of a Company.				5
III	Turning and Machining Centres: Introduction, Types ,Construction and Operation Performed on Turning enter, Automated Features and Capabilities of Turning Centres, Pallet and Part Loading and Programming Options in Machining Centres.				4
IV	Coordinate Measuring Machines: Introduction, Types, Construction and General Functions of CMM, Operational Cycle Description, CMM Applications, Importance to Flexible Cells and Systems				4
V	Automated Material Movement and Storage System: Introduction, Types of AGV and Limitations, Industrial Robots, Basic components and benefits of Automated Storage and Retrieval Systems, Conveyors and Pallet Flotation System, Queuing Carrousel and Automatic Work Changers,				4

VI	Cutting Tools and Tool Management:Introduction, Control of Cutting Tools, Tool Management, Identification and Data Transfer, Tool Monitoring and Fault Detection: FMS Installation and Implementation: FMS Installation, FMS implementation.	4
Textbooks		
1	William W Luggen, “Flexible Manufacturing Cells and System” Prentice Hall of Inc New Jersey, 1991	
2	Reza A Maleki “Flexible Manufacturing system” Prentice Hall of Inc New Jersey, 1991	
References		
1	John E Lenz “Flexible Manufacturing” marcel Dekker Inc New York ,1989	
2	Groover, M.P “Automation, Production Systems and Computer Integrated Manufacturing”, Prentice Hall of India Pvt.Ltd. New Delhi 2009	
Useful Links		
1	https://nptel.ac.in/courses/110/106/110106044/	
2	https://nptel.ac.in/courses/112/104/112104188/	
3	https://onlinecourses.nptel.ac.in/noc19_me45/preview	

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1		2	2			
CO2			2		2	
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AY 2022-23					
Course Information					
Programme		M.Tech. (Mechanical Production Engineering)			
Class, Semester		Second Year M. Tech., Sem III			
Course Code		6PR615			
Course Name		Digital Manufacturing and Industry 4.0			
Desired Requisites:					
Teaching Scheme		Examination Scheme (Marks)			
Lecture	3 Hrs/week	MSE	ISE	ESE	Total
Tutorial	-	30	20	50	100
Credits: 3					
Course Objectives					
1	To illustrate the knowledge to students on various concepts of digital manufacturing and industry 4.0				
2	To evolve towards interdisciplinary approach, to incorporate communication and information technologies.				
3	To develop skills, those allow students to adopt skills related to digital manufacturing and industry 4.0				
Course Outcomes (CO) with Bloom's Taxonomy Level					
At the end of the course, the students will be able to,					
CO	Course Outcome Statement/s			Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Illustrate concepts of digital manufacturing and industry 4.0			IV	Analyzing
CO2	Recommend the communication and information technologies			V	Evaluating
CO3	Produce programs for small part of digital manufacturing.			VI	Creating
Module	Module Contents				Hours
I	The Various Industrial Revolutions, Digitalisation and the Networked Economy, Drivers, Enablers, Compelling Forces and Challenges for Industry 4.0, The Journey so far: Developments in USA, Europe, China and other countries, Comparison of Industry 4.0 Factory and Today's Factory.				5
II	Internet of Things (IoT) & Industrial Internet of Things (IIoT) & Internet of Services, Smart Manufacturing, Smart Devices and Products, Smart Logistics, Smart Cities.				5
III	Cyberphysical Systems, Robotic Automation and Collaborative Robots, Support System for Industry 4.0, Mobile Computing, Related Disciplines, Cyber Security				4
IV	Resource-based view of a firm, Data as a new resource for organizations, , Cloud Computing Basics, Cloud Computing and Industry 4.0				4
V	Industry 4.0 laboratories, IIoT case studies.				4
VI	Opportunities and Challenges, Future of Works and Skills for Workers in the Industry 4.0 Era, Strategies for competing in an Industry 4.0 world.				4
Textbooks					
1	Lane Thames, Dirk Schaefer, "Cyber security for Industry 4.0: Analysis for Design and Manufacturing", Springer Series in Advanced Manufacturing by Publisher: Springer; 1st ed. 2017 edition (May 6, 2017)				
2	Tessaleno Devezas, Askar Sarygulov, "Industry 4.0: Entrepreneurship and Structural Change in the New Digital Landscape" by Publisher: Springer; 1st ed. 2017 edition (March 2, 2017)				

References	
1	Klaus Schwab, “The Fourth Industrial Revolution”by Publisher: Crown Business (January 3, 2017).
2	Luan Casagrande, Vilson Gruber and Roderval Marcelino, “IoT and the Industry 4.0: Principles and Educational Applications”, Publisher: Scholars’ Press (October 7, 2016).
Useful Links	
1	https://nptel.ac.in/courses/106/105/106105195/
2	https://onlinecourses.nptel.ac.in/noc20_cs69/preview
3	https://nptel.ac.in/courses/110/106/110106146/

CO-PO Mapping						
Programme Outcomes (PO)						
	1	2	3	4	5	6
CO1			1			
CO2			3			1
CO3					3	
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High Each CO of the course must map to at least one PO.						

Assessment
<p>The assessment is based on MSE, ISE and ESE.</p> <p>MSE shall be typically on modules 1 to 3.</p> <p>ISE shall be taken throughout the semester in the form of teacher’s assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.</p> <p>ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.</p> <p>For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)</p>

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)					
AY 2022-23					
Course Information					
Programme	M. Tech. (Mechanical Production Engineering)				
Class, Semester	Second Year M. Tech., Sem III				
Course Code	6IC602				
Course Name	Constitution of India				
Desired Requisites:					
Teaching Scheme		Examination Scheme (Marks)			
Lecture	2 Hrs/week	MSE	ISE	ESE	Total
Tutorial	-	30	20	50	100
		Credits: 0			
Course Objectives					
1	To review and create awareness on various provisions in the constitution of India.				
Course Outcomes (CO) with Bloom's Taxonomy Level					
At the end of the course, the students will be able to,					
CO	Course Outcome Statement/s			Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Explain the premises informing the twin themes of liberty and freedom from a civil rights perspective.			II	Understanding
CO2	Address the growth of Indian opinion regarding modern Indian intellectuals constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism			II	Understanding
CO3	Address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution			II	Understanding
Module	Module Contents				Hours
I	History of Making of the Indian Constitution Drafting Committee, (Composition & Working)				4
II	Philosophy of the Indian Constitution : Preamble, Salient Feature				4
III	Contours of Constitutional Rights: Fundamental Rights; Right to Equality; Right to Freedom; Right against Exploitation; Right to Freedom of Religion; Cultural and Educational Rights; Right to Constitutional Remedies; Directive Principles of State Policy; Fundamental Duties.				5
IV	Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions				5

V	Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy	5
VI	Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.	5

Textbooks

1	Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
2	M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014
3	D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015

References

1	The Constitution of India, 1950 (Bare Act), Government Publication
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Useful Links

1	https://en.wikipedia.org/wiki/Constituent_Assembly_of_India
2	https://nptel.ac.in/courses/129/106/129106003/
3	https://nptel.ac.in/noc/courses/noc20/SEM2/noc20-1w02/
4	https://eci.gov.in/about/about-eci/the-functions-electoral-system-of-india-r2/

CO-PO Mapping

Programme Outcomes (PO)						
	1	2	3	4	5	6
CO1			1			
CO2	2					
CO3				1		2

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High
Each CO of the course must map to at least one PO.

Assessment

The assessment is based on MSE, ISE and ESE.
MSE shall be typically on modules 1 to 3.
ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.
ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.
For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2023-24

Course Information

Programme	M. Tech. (Mechanical Production Engineering)
Class, Semester	Second Year M. Tech., Sem IV
Course Code	6PR691
Course Name	Dissertation Phase IV
Desired Requisites:	

Teaching Scheme (Hrs)		Examination Scheme (Marks)			
Practical	10	LA1	LA2	ESE	Total
Interaction	-	100	0	0	100
Credits: 5					

Course Objectives

1	To develop the student to apply the knowledge gained to identify problem for research provide the solutions by self-study and interaction with stake holders
2	Acquire knowledge to tackle real world problems of societal concerns
3	Impart flexibility to the student to have increased control over his/ her learning.
4	Teachers would serve as mentor/facilitator of inquiry and reflection rather than as an instructor
5	Enhance student's learning through increased interaction with peers and colleagues.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, students will be able to,

CO	Course Outcome Statement/s	Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Search the existing literature and identification of research problem	IV	Analysing
CO2	Design and develop the solution for complex engineering problem	V	Evaluating
CO3	Create the new knowledge in the specialized field	VI	Creating

Course Contents

Students are expected to carry out independent research work on the chosen topic. In this semester it is expected that the student has carried out substantial research work including exhaustive literature survey, formulation of the research problem, development/fabrication of experimental set-up (if any/required) and testing, and analysis of initial results thus obtained. In fourth semester, the students continue their dissertation work. It is expected that the student has completed most of the experimental/computation works and analyzed the results so obtained as proposed in the synopsis. The work should be completed in all respects in this semester. The students are required to submit the dissertation work in the form of report as per the institute rule.

Text Books

1	As per the research topic
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References

1	National and International Journals
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Useful Links

1	https://nptel.ac.in/courses/110/104/110104073/
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CO-PO Mapping						
Programme Outcomes (PO)						
	1	2	3	4	5	6
CO1	1			1		2
CO2			1		2	
CO3		2				2
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High Each CO of the course must map to at least one PO.						

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.				
Assessment	Based on	Conducted by	Typical Schedule (for 26-week Sem)	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.				

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)					
AY 2023-24					
Course Information					
Programme		M. Tech. (Mechanical Production Engineering)			
Class, Semester		Second Year M. Tech., Sem IV			
Course Code		6PR692			
Course Name		Dissertation Phase V			
Desired Requisites:					
Teaching Scheme (Hrs)		Examination Scheme (Marks)			
Practical	10	LA1	LA2	ESE	Total
Interaction	-	0	100	0	100
		Credits: 5			
Course Objectives					
1	To develop the student to apply the knowledge gained to identify problem for research provide the solutions by self-study and interaction with stake holders				
2	Acquire knowledge to tackle real world problems of societal concerns				
3	Impart flexibility to the student to have increased control over his/ her learning.				
4	Teachers would serve as mentor/facilitator of inquiry and reflection rather than as an instructor				
5	Enhance student's learning through increased interaction with peers and colleagues.				
Course Outcomes (CO) with Bloom's Taxonomy Level					
At the end of the course, students will be able to,					
CO	Course Outcome Statement/s	Bloom's Taxonomy Level		Bloom's Taxonomy Description	
CO1	Search the existing literature and identification of research problem	IV		Analysing	
CO2	Design and develop the solution for complex engineering problem	V		Evaluating	
CO3	Create the new knowledge in the specialized field	VI		Creating	
Course Contents					
Students are expected to carry out independent research work on the chosen topic. In this semester it is expected that the student has carried out substantial research work including exhaustive literature survey, formulation of the research problem, development/fabrication of experimental set-up (if any/required) and testing, and analysis of initial results thus obtained. In fourth semester, the students continue their dissertation work. It is expected that the student has completed most of the experimental/computation works and analyzed the results so obtained as proposed in the synopsis. The work should be completed in all respects in this semester. The students are required to submit the dissertation work in the form of report as per the institute rule.					
Text Books					
1	As per the research topic				
References					
1	National and International Journals				
Useful Links					
1	https://nptel.ac.in/courses/110/104/110104073/				

CO-PO Mapping						
Programme Outcomes (PO)						
	1	2	3	4	5	6
CO1				1		
CO2	1		1		2	2
CO3		2				2
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High Each CO of the course must map to at least one PO.						

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.				
Assessment	Based on	Conducted by	Typical Schedule (for 26-week Sem)	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.				

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)					
AY 2023-24					
Course Information					
Programme		M. Tech. (Mechanical Production Engineering)			
Class, Semester		Second Year M. Tech., Sem IV			
Course Code		6PR693			
Course Name		Dissertation Phase VI			
Desired Requisites:					
Teaching Scheme (Hrs)		Examination Scheme (Marks)			
Practical	12	LA1	LA2	ESE	Total
Interaction	-	0	0	100	100
		Credits: 6			
Course Objectives					
1	To develop the student to apply the knowledge gained to identify problem for research provide the solutions by self-study and interaction with stake holders				
2	Acquire knowledge to tackle real world problems of societal concerns				
3	Impart flexibility to the student to have increased control over his/ her learning.				
4	Teachers would serve as mentor/facilitator of inquiry and reflection rather than as an instructor				
5	Enhance student's learning through increased interaction with peers and colleagues.				
Course Outcomes (CO) with Bloom's Taxonomy Level					
At the end of the course, students will be able to,					
CO	Course Outcome Statement/s			Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Search the existing literature and identification of research problem			IV	Analysing
CO2	Design and develop the solution for complex engineering problem			V	Evaluating
CO3	Create the new knowledge in the specialized field			VI	Creating
Course Contents					
Students are expected to carry out independent research work on the chosen topic. In this semester it is expected that the student has carried out substantial research work including exhaustive literature survey, formulation of the research problem, development/fabrication of experimental set-up (if any/required) and testing, and analysis of initial results thus obtained. In fourth semester, the students continue their dissertation work. It is expected that the student has completed most of the experimental/computation works and analyzed the results so obtained as proposed in the synopsis. The work should be completed in all respects in this semester. The students are required to submit the dissertation work in the form of report as per the institute rule.					
Text Books					
1	As per the research topic				
References					
1	National and International Journals				
Useful Links					
1	https://nptel.ac.in/courses/110/104/110104073/				
CO-PO Mapping					
Programme Outcomes (PO)					

	1	2	3	4	5	6
CO1	1			1		2
CO2	1		1		2	2
CO3		2				2
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High Each CO of the course must map to at least one PO.						

Assessment				
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.				
Assessment	Based on	Conducted by	Typical Schedule (for 26-week Sem)	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.				

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)					
AY 2023-24					
Course Information					
Programme	M. Tech. (Mechanical Production Engineering)				
Class, Semester	Second Year M. Tech., Sem IV				
Course Code	6IC601				
Course Name	Value Education				
Desired Requisites:					
Teaching Scheme		Examination Scheme (Marks)			
Lecture	2 Hrs/week	MSE	ISE	ESE	Total
Tutorial	-	30	20	50	100
Credits: 0					
Course Objectives					
1	To impart knowledge on value of education and self- development.				
2	To imbibe good values in students.				
3	To highlight importance of character.				
Course Outcomes (CO) with Bloom's Taxonomy Level					
At the end of the course, students will be able to,					
CO	Course Outcome Statement/s			Bloom's Taxonomy Level	Bloom's Taxonomy Description
CO1	Explain value of education and self- development.			II	Understanding
CO2	Summarize importance of good character, and Behaviour development.			V	Evaluating
Module	Module Contents				Hours
I	Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism, Moral and non- moral valuation. Standards and principles, Value judgments.				6
II	Importance of cultivation of values, Sense of duty. Devotion, Self-reliance, confidence, Concentration. Truthfulness, Cleanliness, Honesty, Humanity, Power of faith, National Unity, Patriotism, Love for nature, Discipline.				6
III	Personality and Behaviour Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline, Punctuality, Love and Kindness, Avoid fault Thinking, Free from anger, Dignity of labour universal brotherhood and religious tolerance, True friendship, Happiness vs. suffering, love for truth, Aware of self-destructive habits, Association and Cooperation, Doing best for saving nature				7
IV	Character and Competence –Holy books vs. Blind faith, Self-management and Good health, science of reincarnation, Equality, Nonviolence, Humility, Role of Women, All religions and same message, Mind your Mind, Self-control. Honesty, Studying effectively				7
Text Books					
1	Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi				
References					
1					
Useful Links					

1	https://nimsuniversity.org/wp-content/uploads/2018/02/Value-Education-Human-Rights-and-Legislative-Procedures.pdf
2	http://cbseacademic.nic.in/web_material/ValueEdu/Value%20Education%20Kits.pdf
3	https://www.verywellmind.com/personality-development-2795425
4	https://trudreadz.com/2019/09/10/blind-faith-in-religion-destroys-our-ability-to-critically-think-for-ourselves/

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1	2				1	2
CO2	1		1			2
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High Each CO of the course must map to at least one PO.						