Punyashlok Ahilyadevi Holkar Solapur University, Solapur

NAAC Accredited-2022
'B++' Grade (CGPA 2.96)

Name of the Faculty: Science & Technology

Revised Structure and Syllabus

CHOICE BASED CREDIT SYSTEM (CBCS)

Syllabus: Mechanical-Design Engineering

Name of the Course: M. Tech. - Semester III & IV

(Syllabus to be implemented with effect from June 2024-25)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

FACULTY OF SCIENCE & TECHNOLOGY

Curriculum for M. Tech. (Mechanical-Design Engineering)

Four Semester Course

Choice Based Credit System (CBCS) - (w.e.f. 2024-25)

Semester III: Theory /Tutorial/ Lab Courses

Course Code	*Name of the Course*	*Engagement Hours*			*Credits*	*SA*	*FA*		*Total*
		L	*T*	*P*		*ESE*	*ISE*	*ICA*	
MDE211	Lab Practices	-	-	2	2	-	-	50	50
OE001	Open Elective	3	-	-	3	70	30	-	100
MDE212	Dissertation Phase I: Synopsis Submission Seminar*	-	-	2	2	-	50	-	50
MDE213	Dissertation Phase II: Progress Seminar	-	-	-	8	100	200	-	300
Total		**3**	**-**	**4**	**15**	**170**	**280**	**50**	**500**
Note: - * indicates student engagement against which faculty contact hour is 2 hours per candidate									

L Lecture
T Tutorial
P Lab Session

FA Formative Assessment
SA Summative Assessment
ESE End Semester Examination
ISE In Semester Evaluation
ICA Internal Continuous Evaluation

List of Open Elective

OE001a Business Analytics
OE001b – Operation Research
OE001c - Cost Management of Engineering Projects
OE001d - Non-Conventional Energy
OE001e - Product Design and Development

- For all activities related to dissertation Phase I (synopsis submission seminar and progress seminar), student must interact regularly every week with the advisor.
- Synopsis submission seminar shall cover detailed synopsis of the proposed work. Student shall submit Synopsis of the Dissertation Work only after delivering this seminar.
- Progress seminar shall be delivered capturing details of the work done by student for dissertation.
- Student shall deliver all seminars using modern presentation tools. A hard copy of the report shall be submitted to the Department before delivering the seminar. A PDF copy of the report must be submitted to the advisor along with other details, if any.
- Lab Practice shall include any of the below activities as recommended by Advisor and student shall submit a report after completion of the activity to Advisor along with other details, if any: Software/hardware assignments, learning new software, literature survey, field work, industrial training, etc. related to dissertation work.
- Details of modes of assessment of seminar and dissertation shall be as specified in 7(III) of PG Engineering Ordinance of Solapur University, Solapur.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

FACULTY OF SCIENCE & TECHNOLOGY

Curriculum for M. Tech. (Mechanical-Design Engineering)

Four Semester Course

Choice Based Credit System (CBCS) -(w.e.f. 2024-25)

Semester IV: Laboratory /Tutorial Courses

Course Code	*Name of the Course*	*Engagement Hours*			*Credits*	*SA*	*FA*		*Total*
		L	*T*	*P*		*ESE*	*ISE*	*ICA*	
MDE221	**Dissertation Phase –III** Progress Report presentation and submission*****	-	-	4	3	-	-	100	100
MDE222	**Dissertation Phase –IV** Final presentation and submission of report*****	-	-	2	6	-	-	100	100
MDE223	Dissertation Viva voice	-	-	-	6	200	-	-	200
	Total	-	-	**6**	**15**	**200**	-	**200**	**400**
Note: - * indicates student engagement against which faculty contact hour is 3 hours per candidate									

L	Lecture	**FA**	Formative Assessment
T	Tutorial	**SA**	Summative Assessment
P	Lab Session	**ESE**	End Semester Examination
		ISE	In Semester Evaluation
		ICA	Internal Continuous Evaluation

- For all activities related to dissertation Phase III and IV, student must interact regularly every week with the advisor.
- Progress seminar shall be delivered capturing details of the work done by student dissertation.
- Student shall deliver all seminars using modern presentation tools. A hard copy of the report shall be submitted to the Department before delivering the seminar. A PDF copy of the report must be submitted to the faculty advisor along with other details, if any.
- Details of modes of assessment of seminar and dissertation shall be as specified in 7(III) of PG Engineering Ordinance of Solapur University, Solapur.

SEMESTER –III

Punyashlok Ahilyadevi Holkar Solapur University

M. Tech.- Mechanical (Design Engineering)

Syllabus W.E.F 2024-25

Semester-III

MDE 211 LAB PRACTICES

Teaching Scheme : Not Applicable
Practical: 02 Hours/week, 02 Credits

Examination Scheme
ICA : 50 Marks

Course Objectives:
During this course, student is expected to:

1. Understand analytical methods of another researcher in selected topic. And able to apply analytical/software tools for selected topic of dissertation.

2. Understand his/her area of research, methodology, tools techniques and make students able to write technical report/research paper.

Course Outcomes:
At the end of this course, student will be able to:

1. Collect and analyze relevant research papers
2. Create multiple thinking strategies to examine research problem.
3. Communicate and convey intended meaning using verbal and non-verbal method of communication

Student should select any contemporary suitable software pertaining to the stream of specialization. The choice of software tool is preferably to be based on the its application in his/her dissertation work. He/ she shall learn it by self-learning approach during the semester. He/she should solve any five assignments with the help of at software and get assessed by the concerned guide on regular basis. He/she shall use the learnt software for analysis work or for problem solving work in his/her dissertation work.

Punyashlok Ahilyadevi Holkar Solapur University

M. Tech.- Mechanical (Design Engineering)

Syllabus W.E.F 2024-25

Semester-III

2. Open Elective Course

OE001a - Business Analytics

Teaching Scheme
Lectures : 03 Hours/week, 03 Credits

Examination Scheme
ESE : 70 Marks
ISE : 30 Marks

Course Introduction:

This course gives an introduction to the area of business analytics. Business Analytics is an interactive process of analyzing and exploring enterprise data to find valuable insights that can be exploited for competitive advantage. Business Analytics makes extensive use of data, mathematical and statistical models using exploratory, descriptive, predictive models under the framework of evidence and fact-based management to drive decisions and actions Technological advances, decreased costs of system hardware and software components, and the global web revolution have allowed for large amounts of data to be generated, collected, stored, analyzed, distributed and used at an ever-increasing rate by organizations. Business Analytics (BA) is an attempt to achieve these goals. This course introduces business analytics as tool to gain competitive advantage and provides a number of practical implementation details using several real-life cases. Specifically, the course shows how to discover subtle patterns and associations from business data and develop and deploy descriptive and predictive models to optimize decision-making throughout the organization.

Course Objectives:

During this course, student is expected to:

1. Understand business analytics and data mining to formulate and solve business problems and to support managerial decision making
2. Acquire and prepare data, develop, fit, validate and deploy models and use them for decision making
3. Apply performance analysis, regression and clustering tools and techniques for business analytics

Course Outcomes:

At the end of this course, student will be able to:

1. Explain basic concept about Business Analytics and Data mining for business problems and determine suitable analytical methods
2. Perform data visualization and data reduction
3. Apply Multiple regression analysis, Classification, Clustering tools and Performance evaluation to optimize decision-making.

Section I

Unit-1: Introduction Business Analytics and Data Mining **No. of lectures- 09**

What Is Business Analytics? Business Analytics Process, Relation of BA process and Organization decision making process. What is Data Mining? Data Mining and Related Terms, Big Data, Data Science, Terminology and Notation in Data mining.

Core Ideas in Data Mining, Classification, Prediction, Association Rules and Recommendation Systems, Predictive Analytics, Data Reduction and Dimension Reduction, Data Exploration and Visualization, Supervised and Unsupervised Learning, Steps in Data Mining, Organization of Data sets.

Unit-2: Data Visualization **No. of lectures- 05**

Uses of Data Visualization, Basic Charts: Bar Charts, Line Graphs, and Scatter Plots, Distribution Plots: Box plots and Histograms, Heat maps: Visualizing Correlations and Missing Values Multidimensional Visualization: Adding Variables: Color, Size, Shape, Multiple Panels, and Animation

Manipulations: Rescaling, Aggregation and Hierarchies, Zooming, Filtering, Reference: Trend Lines and Labels, Scaling up to Large Datasets.

Unit-3: Dimension Reduction **No. of lectures- 04**

Introduction, Curse of Dimensionality, Data Summaries, Summary Statistics, Aggregation and Pivot Tables, Correlation Analysis, Reducing the Number of Categories in Categorical Variables, Converting a Categorical Variable to a Numerical Variable, Principal Components Analysis

Section II

Unit-4: Performance Evaluation **No. of lectures- 05**

Evaluating Predictive Performance, Naive Benchmark: The Average, Prediction Accuracy Measures Comparing Training and Validation Performance, Lift Chart, Judging Classifier Performance, Benchmark: The Naive Rule, Class Separation, The Confusion (Classification) Matrix, Using the Validation Data, Accuracy Measures.

Unit-5: Multiple Linear Regression **No. of lectures-04**

Explanatory vs. Predictive Modeling, Estimating the Regression Equation and Prediction, Variable Selection in Linear Regression, Reducing the Number of Predictors

Unit-6: Classification & Regression Trees and Clustering **No. of lectures-09**

Introduction, Classification Trees, Recursive Partitioning, Measures of Impurity, Tree Structure, Classifying a New Record, Evaluating the Performance of a Classification Tree, Navie Bayes Classifier

Regression Trees: Prediction, Measuring Impurity, Evaluating

Performance Advantages and Weaknesses of a Tree.

Clustering: Introduction, Feature selection for clustering: Filter models and Wrapper models, k-Means algorithm

In Semester Evaluation (ISE)

ISE shall be based upon minimum 6 assignments based on curriculum and consisting of literature survey, case study, data compilation and analysis etc.

Reference Books

1. Data Mining for Business Analytics - Concepts, Techniques, And Applications In R, Galit Shmueli Peter C. Bruce Inbal Yahav Nitin R. Patel Kenneth C. Lichtendahl, Jr., Wiley Publication https://edu.kpfu.ru/pluginfile.php/274079/mod_resource/content/2/DatMiningBusAnalytics.pdf
2. Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and PresentingData by EMC Education Services (2015)
3. Business Analytics – Principles, Concepts and Applications, Marc J. Schniederjans, Dara G.Schniederjans, Christopher M. Starkey, Pearson Education Limited
4. Data Mining : The Textbook, Charu C. Agrawal, Springer Publications

Punyashlok Ahilyadevi Holkar Solapur University

M. Tech.- Mechanical (Design Engineering)

Syllabus W.E.F 2024-25

Semester-III

Open Elective Course

OE001b - Operation Research

Teaching Scheme
Lectures: 03 Hours/week, 03 Credits

Examination Scheme
ESE:70Marks
ISE: 30Marks

Course Introduction:
Operations Research establishes standards based on performance and measures productivity. Hence, to identify problem areas, business Design Engineer can track deviations from the standard. Operation Research is a helpful tool used to solve complex problems under uncertainty.

Course Objectives:
During this course, student is expected to:

1. Formulate the appropriate O.R. model
2. Apply quantitative techniques in solving the real life problems
3. Evaluate alternative courses of actions in actual decision making under conditions of uncertainty

Course Outcomes:
At the end of this course, student will be able to:

1. Formulate the real life managerial problems in an appropriate mathematical model
2. Provide the optimum solution to the real life problems within the constraints
3. Apply network techniques in project management
4. Evaluate alternative courses of actions in actual decision making under conditions of uncertainty using Simulation techniques.

Section I

Unit-1: Linear Programming Problems **No. of lectures- 5**

OR Models, model formulation, Linear Programming models, Graphical solution, Simplex techniques, Two Phase method

Unit-2: Duality theory in Linear Programming Problems **No. of lectures- 5**

Duality theory - Properties of Primal and Dual Optimal Solutions, Duality Simplex method ,Shadow Price- Sensitivity analysis

Unit-3: Simulation Techniques **No. of lectures- 5**

Need of Simulation techniques, Monto-Carlo Simulation, random number concept, applications of Simulation technique.

Unit-4: Queuing Models **No. of lectures- 5**

Introduction, Structure of queuing system, Terminology (Kendal‘s Notations) and Applications. Queuing Model M/M/1: /FIFO

Section II

Unit-5: Inventory control **No. of lectures- 5**

Inventory costs, Economic order quantity, deterministic models with or without shortages - probabilistic models - Price break model, Selective Inventory management techniques

Unit-6: Replacement analysis **No. of lectures- 5**

Replacement models - Replacement policy for items considering change in money value with time - Individual replacement policy - Group replacement policy.

Unit-7: Network flow models **No. of lectures- 5**

Minimal Spanning Tree problems -Shortest route probems - Dijiktra's algorithm - Maximal Flow problem

Unit-8: PERT and CPM Networks **No. of lectures- 5**

floats and applications - Network crashing - Cost optimization - Resource allocation and scheduling

In Semester Evaluation (ISE)

ISE shall be based upon minimum 6 assignments based on curriculum and consisting of literature survey, case study, data compilation and analysis etc.

Text Books:

1. Operations Research by Hillier and Lieberman TMGH
2. HamdyTaha, "Operations Research – An Introduction", 7th edition PHI (2003)
3. S. D. Sharma, "Operation Research", Kedarnath and Rannalt Pub.
4. Hira and Gupta, "Operation Research", S. Chand and Co.
5. N. D. Vohra, "Quantitative Techniques in Management", TMGH

Reference Books

1. Shrinath L.S.: PERT & CPM –Affiliate East West Press
2. Anand Sharma " Quantitative Techniques for decision making" Himalaya publishing house
3. Billy E. Gillet - " Introduction to Operations Research" TMGH

Punyashlok Ahilyadevi Holkar Solapur University

M. Tech.- Mechanical (Design Engineering)

Syllabus W.E.F 2024-25

Semester-III

2. Open Elective Course

OE001C- COST MANAGEMENT OF ENGINEERING PROJECTS

Teaching Scheme
Lectures : 03 Hours/week, 03 Credits

Examination Scheme
ESE : 70 Marks
ISE : 30 Marks

Course Outcomes:
At the end of this course, student will be able to:

1. Analyze various elements of the cost associated with the engineering project
2. Measure and assess the performance of engineering projects
3. Control the cost of project
4. carry out value analysis in an engineering project

Section I

Unit-1: Cost and Cost Analysis **No. of lectures- 08**

Cost :
Cost Elements - Pricing, Materials , Labor , Engineering , Equipment, Parts and Tools; Economic Costs ;

Cost Analysis: Direct Cost, indirect Cost, Overhead, allowance, Contingency

Unit-2: Cost Estimating **No. of lectures- 07**

Cost Estimating:
Estimating Models; Parametric estimating- moduler estimating, parametric model , Analogous estimating- ratio estimating, The Three-quarters rule, The Square root rule, Two-Thirds rule, Range estimating

Unit-3: Progress & Cost Control: **No. of lectures- 07**

Progress Measurement and Earned Values; Earned Value for Variable Budgets; Tracking Cost and Schedule Performance;

Section II

Unit-4: Cost Management **No. of lectures- 08**

Causes of Change, Feed Forward Techniques, Impact of schedule on cost, Lifecycle costs, Impact of project risk, integrated cost management programme

Unit-5: Value Management **No. of lectures-07**

Value Management:

Concept of Value, Dimensions and Measures of Value, Overview of Value Management, Definition‟ Scope, Key Principles of VM, Key Attributes of VM ,Value Management Terms , Need for Value Management in Projects, The Value Management Approach, Cross-functional Framework „ Use of Functions, Structured Decision Process, The VM Process, Benefits of Value Management, Other VM requirements

Relationship between Project Value and Risk, Value Management as an Aid to Risk Assessment

Unit-6: Value Analysis **No. of lectures-07**

Value Analysis:

Earned Value Management for assessing project performance, Earned Value Management , Earned Value Management Model, Fundamentals of Earned Value, EVM Terminology, Relevancy of Earned Value Management, Conducting an Earned Value Analysis , Performing an Earned Value Assessment, Managing a Portfolio of Projects with Earned Value Management, Important Issues in the Effective Use of Earned Value Management.

Integrating Cost and Value in Projects.

In Semester Evaluation (ISE)

ISE shall be based upon minimum 5 assignments and at least one case study.

Reference Books

1. Project Estimating and Cost Management By Parivs F. Rad PhD, PMP
2. Project Cost Management guide from PMBOK 5th edition
3. Project Scheduling and Cost Control: Planning, Monitoring and Controlling the Baselineby James Taylor
4. Systems Life Cycle Costing: Economic Analysis, Estimation, and Management, John V.Farr, Draft Textbook, Version 1.0.
5. COST AND VALUE MANAGEMENT IN PROJECTS Ray R. Venkataraman and Jeffrey
6. K. Pinto John Wiley & Sons, Inc Inc., Hoboken, New Jersey
7. American Association of Cost Engineers, “SKILLS AND KNOWLEDGE OF COSTENGINEERING”, 1996

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Semester-III

2.Open Elective Course

OE001d -Non-Conventional Energy

Teaching Scheme
Lectures : 03 Hours/week, 03 Credits

Examination Scheme
ESE : 70 Marks
ISE : 30 Marks

Course Introduction:

The subject of Non-Conventional Energy deals with the exploration of sustainable and environmentally friendly energy sources. With a focus on renewable energy technologies, the course offers an in-depth understanding of various non-conventional energy sources, including solar, wind, biomass, and fuel cells. Emphasizing the current scenario, students will analyze the interplay between energy, economy, and social development while evaluating the environmental aspects of conventional energy sources. The curriculum covers energy conservation techniques, energy storage methods, and the design and implementation of solar thermal and photovoltaic systems. Furthermore, students will study wind energy estimation, turbine types, and biomass conversion technologies, gaining insights into emerging fuel cell technology and its potential as an efficient power generation option. Throughout the course, students will be equipped to propose sustainable and practical energy solutions to address the pressing global challenges of energy security and climate change.

Course Objectives:

During this course, student is expected to:

1. compare conventional and non-conventional energy sources, emphasizing their environmental impacts and potential for sustainable development.
2. understand the principles of energy efficiency, energy conservation, and the role of energy audits in optimizing energy use.
3. explain the principles of solar radiation conversion and the various applications of solar thermal systems.
4. explore the fundamentals of solar cells and their integration into photovoltaic systems for electricity generation.
5. analyze wind energy potential, various wind turbine technologies, and the conversion of biomass resources into energy
6. explain the fuel cell technology and it’s potential as an efficient and sustainable power generation option.

Course Outcomes:
At the end of this course, student will be able to:

1. Explain the significance of adopting non-conventional energy sources for promoting sustainable development.
2. Conduct energy audits and proposing methods to conserve energy and reduce wastage in various applications.
3. Design and propose solar thermal systems for specific applications, such as water heating, power generation, and industrial heating, considering efficiency and practicality.
4. Evaluate solar photovoltaic systems for maximum efficiency and ensure efficient energy conversion.
5. Determine the feasibility of wind power projects and biomass energy conversion systems in different regions.
6. Explain classifications and efficiencies of fuel cells, evaluate their applications as power plants, and comprehend the role of hydrogen as an energy carrier in fuel cell technology.

Section I

Unit-1: Energy Resources **No. of lectures- 6 Hrs**

Energy, economy and social development, Indian scenario, conventional energy sources-electric, nuclear, hydroelectric, environmental aspects, renewable energy sources, comparison between conventional and non-conventional energy sources

Unit-2: Energy Conservation and Storage **No. of lectures-8 Hrs**

Energy efficiency, conservation, energy audit, cogeneration, Energy Storage Necessity, specifications of energy storage devices, methods of energy storage

Unit-3: Solar Thermal Energy **No. of lectures-6 Hrs**

Introduction to solar radiation and energy, solar thermal energy collectors, solar thermal systems water heater, distillation, power plant, cookers, kilns, air conditioning, greenhouse, furnace, dryer, industrial heating

Section II

Unit-4: Solar Photovoltaic System **No. of lectures-6 Hrs**

Solar cell fundamentals, characteristics, design consideration, classification, module and arrays, maximizing the output and load matching, balance of system, applications

Unit-5: Wind & Bio-mass Energy **No. of lectures- 9 Hrs**

Fundamentals, wind energy estimation, turbines: types, construction and characteristics, modes of power generation, wind energy conversion system, wind –diesel hybrid system, wind energy storage, environmental aspects, applications, Fundamentals of Biomass Energy and resources, conversion technologies, urban waste to energy conversion, gasification, ethanol, biogas

Unit-6: Emerging Technologies **No. of lectures-5 Hrs**

Fuel cell, classification, comparisons, fuel for fuel cells, efficiency and VI characteristics, fuel cell power plant, hydrogen as energy carrier.

Text Books:

Internal Continuous Assessment (ICA):

ISE shall be based upon minimum 6 assignments based on curriculum and consisting of literature Survey, case study, data compilation and analysis etc.

1. Non-Conventional Energy Resources, B H Khan, McGraw Hill Education, Third Edition
2. Renewable Energy Sauces and Emerging Technologies, D P Kothari, K C Singal, Rakesh Ranjan,PHI Learning Pvt. Ltd., Second Edition.
3. Non-Conventional Energy Resources by G. D. Rai
4. Solar Energy: Principles of Thermal Collection and Storage by S. P. Sukhatme

Reference Books

1. Introduction to Renewable Energy by R. Chidambaram
2. Bioenergy: Biomass to Biofuels" by Anju Dahiya
3. Fuel Cells: Principles, Design, and Analysis by G. Srinivasan
4. Photovoltaic Power Generation: Solar Energy R&D in the European Community by Bruno César Rocha and Eduardo Lorenzo

Punyashlok Ahilyadevi Holkar Solapur University

M. Tech.- Mechanical (Design Engineering)

Syllabus W.E.F 2024-25

Semester-III

2. Open Elective Course-

OE001e - Product Design & Development

Teaching Scheme
Lectures : 03 Hours/week, 03 Credits

Examination Scheme
ESE : 70 Marks
ISE : 30 Marks

Course Outcomes:
At the end of this course, student will be able to:

1. Formulate the real life managerial problems in an appropriate mathematical model
2. Provide the optimum solution to the real life problems within the constraints.
3. Use network techniques in project management
4. evaluate alternative courses of actions in actual decision making under conditions of uncertainty using Simulation techniques.

Section I

Unit-1: Introduction To Product Design And Development **No. of lectures- 05**

Product life cycle Product policy of an organization and profitable product selection Product design Product design steps and analysis

Unit-2: Value Engineering and analysis **No. of lectures- 05**

Value Engineering and analysis

Value Engineering concepts Problem Identification
Functional analysis
Functional analysis system steps
Case study on Value Engineering and analysis

Unit-3: Quality Function Deployment **No. of lectures- 05**

Quality Function Deployment

Computer Aided Design Robust Design

Design for X

Ergonomics in product design

Section II

Unit-4: Ergonomics in product design **No. of lectures- 05**

Ergonomics in product design

Ergonomics/ Human factors, Posture and movement, Ergonomic design process, Performance support and design intervention, Design Ergonomics in India: scope for exploration

Unit-5: DFMA: Design for Manufacturing and Assembly **No. of lectures-05**

DFMA: Design for Manufacturing and Assembly

DFMA guidelines

Product Design for manual assembly Design guidelines for different processes

Rapid prototyping – concepts and advantages

Prototyping processes

Unit-6: Economic Decision- **No. of lectures-05**

Economic Decision- Making/Cost Evaluation, Life cycle analysis Planning and Scheduling, Planning for manufacturing Project planning, Risk and Opportunity Management, Metrics for Design and Development, Program Leadership, Management, and Control, Project start-up, Plans/schedules Design for Cost: Design for Six Sigma: process, Invent, Innovate, Develop, Optimize and Verify.

In Semester Evaluation (ISE)

ISE shall be based upon minimum 6 assignments based on curriculum and consisting of literature survey, case study, data compilation and analysis etc.

Reference Books

1. Ulrich, Karl, and Steven Eppinger. Product Design and Development. McGraw-Hill,
2. Kemnneth Crow: Concurrent Engg./Integrated Product Development, DRM
3. Staurt Pugh: Tool Design -Integrated Methods for Successful Product Engineering, AddisonWesley Publishing, New York, NY.

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Semester-III

MDE 212 DISSERTATION PHASE-I
(Synopsis Submission Seminar)

Teaching Scheme : Not Applicable **Examination Scheme**
Practical: 02 Hours/week, 02 Credits **ISE : 50 Marks**

Course Objectives:
During this course, student is expected to:

1. It should be helpful to understanding methodology review of other researcher in selected topic. And able to formulate research objective and methodology for topic of dissertation.
2. It is expected students to finalize his/her area of research, methodology, tools techniques and make students able to write synopsis.

Course Outcomes:
At the end of this course, student will be able to:

1. Learn and integrate through independent learning able to collect and analyze relevant research papers
2. To think and create multiple thinking strategies to examine research problem.
3. Communicate and convey intended meaning using verbal and non-verbal method of communication

Synopsis shall be based on topic of the Dissertation Work. It may include literature review, required theoretical input, study and comparison of various approaches for the proposed dissertation work. The candidate shall prepare a report of about 25pages. The report typed on A4sized sheets and bound in the prescribed format shall be submitted after approval by the Guide and endorsement of the Head of Department. Candidate has to present the synopsis seminar in front of **internal committee** (Guide and two PG approved teachers) at the start of semester.

The candidates shall submit the synopsis in the prescribed format before the due date to the University authorities for approval.

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Semester-III

MDE 213 DISSERTATION PHASE-II
(Progress Seminar)

Teaching Scheme : Not Applicable
08 Credits

Examination Scheme
ISE : 200 Marks
ESE: 100 Marks

Course Objectives:
During this course, student is expected to:

The purpose of a Dissertation is to enable the student to grow deeper knowledge, understanding, capabilities and attitudes in the context of the programme of study. The thesis should be written at the end of the programme and offers the opportunity to investigate more deeply into and synthesize knowledge acquired in previous studies. A thesis for a Master of Technology program should place importance on the technical/scientific/artistic aspects of the subject matter

Course Outcomes:
At the end of this course, student will be able to:

1. Design and engage in, an independent and critical investigation and evaluation of a chosen research topic.
2. Identify relevant theory and concepts, relate these to appropriate methodologies and evidence, apply correct techniques and draw suitable conclusions
3. Involve in systematic finding and critical review of appropriate and relevant information sources.
4. Understand and apply ethical standards of conduct in the collection and analysis of data and other resources.
5. Communicate research concepts and contexts clearly and effectively.

It shall include the problem definition, literature survey, approaches for handling the problem, finalizing the methodology for the dissertation work and design calculations / experimental design etc. A report of the work shall be submitted after approval by the Guide and endorsement of the Head of Department, for appropriateness, sufficiency of contents and offer suggestions if any. Candidate has to present the progress seminar in front of **External Examiner and Internal committee** (Guide and two PG approved teachers) at the End of semester.

SEMESTER –IV

Punyashlok Ahilyadevi Holkar Solapur University

M. Tech.- Mechanical (Design Engineering)

Syllabus W.E.F 2024-25

Semester-IV

MDE 221 DISSERTATION PHASE-III

(Progress Report presentation and submission)

Teaching Scheme : Not Applicable **Examination Scheme**
Practical: 04 Hours/week, 03 Credits **ICA : 100 Marks**

Course Objectives:
During this course, student is expected to:

The purpose of a Dissertation is to enable the student to grow deeper knowledge, understanding, capabilities and attitudes in the context of the programme of study. The thesis should be written at the end of the programme and offers the opportunity to investigate more deeply into and synthesize knowledge acquired in previous studies. A thesis for a Master of Technology program should place importance on the technical/scientific/artistic aspects of the subject matter

Course Outcomes:
At the end of this course, student will be able to:

1. Identify relevant theory and concepts, relate these to appropriate methodologies and evidence, apply correct techniques and draw suitable conclusions
2. Involve in systematic finding and critical review of appropriate and relevant information sources.
3. Understand and apply ethical standards of conduct in the collection and analysis of data and other resources.
4. Communicate research concepts and contexts clearly and effectively.

The candidate shall submit the detailed report as per the synopsis approved by the university, of the dissertation work in the prescribed format after approval by the Guide and endorsement by the Head of the Department. It will be assessed for term work by the internal committee for completion of the proposed work. Candidate has to present the progress seminar in front of **internal committee** (Guide and two PG approved teachers) at the start of semester.

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M. Tech.- Mechanical (Design Engineering)

Syllabus W.E.F 2024-25

Semester-IV

MDE 222 DISSERTATION PHASE-IV

(Final Report presentation and submission)

Teaching Scheme : Not Applicable **Examination Scheme**
Practical: 02 Hours/week, 06 Credits **ICA : 100 Marks**

Course Objectives:

During this course, student is expected to:

The purpose of a Dissertation is to enable the student to grow deeper knowledge, understanding, capabilities and attitudes in the context of the programme of study. The thesis should be written at the end of the programme and offers the opportunity to investigate more deeply into and synthesize knowledge acquired in previous studies. A thesis for a Master of Technology program should place importance on the technical/scientific/artistic aspects of the subject matter

Course Outcomes:

At the end of this course, student will be able to:

1. Analyze systematic finding and critical review of appropriate and relevant information sources.
2. Apply ethical standards of conduct in the collection and analysis of data and other resources.
3. Communicate research concepts and contexts clearly and effectively and defend own research work.

The candidate shall submit the detailed report as per the synopsis approved by the university, of the dissertation work in the prescribed format after approval by the Guide and endorsement by the Head of the Department. It will be assessed for term work by the internal committee for completion of the proposed work.

Candidate has to present the Final Report in front of internal committee (Guide and two PG approved teachers) at the end of semester before submission of thesis report/ dissertation work.

Punyashlok Ahilyadevi Holkar Solapur University

M. Tech.- Mechanical (Design Engineering)

Syllabus W.E.F 2024-25

Semester-IV

MDE 223 DISSERTATION VIVA- VOCE

Teaching Scheme: Not Applicable
06 Credits

Examination Scheme
ESE : 200 Marks

Open defense of the student on his/her dissertation shall be arranged by the university. This defense shall be in front of the panel of examiners as appointed by university authority. The evaluation will be done by panel of examiners as appointed by university authority.

The final assessment of Dissertation and open defense (Viva voce) will be conducted by internal committee & External Examiner & appointed by University Authorities at the respective centers.