

**KURUKSHETRA UNIVERSITY, KURUKSHETRA**  
 Established by the State Legislature Act XII of 1956  
 ('A+' Grade, NAAC Accredited)  
**MASTER OF TECHNOLOGY IN MECHANICAL ENGINEERING**  
 (CREDIT BASED) (w. e. f. 2018-19)  
**SPECIALIZATION: INDUSTRIAL & PRODUCTION ENGINEERING**

**SEMESTER-III**

| Sr. No.      | Course Code | Course Name           | L | T | P  | Hrs./ Week | Credits   | Major Test | Minor Test | Practical | Total      | Duration of Exam (Hrs.) |
|--------------|-------------|-----------------------|---|---|----|------------|-----------|------------|------------|-----------|------------|-------------------------|
| 1            |             | *Programme Elective-V | 3 | 0 | 0  | 3          | 3         | 60         | 40         | -         | 100        | 3                       |
| 2            |             | **Open Elective       | 3 | 0 | 0  | 3          | 3         | 60         | 40         | -         | 100        | 3                       |
| 3            | MTIP-207A   | Dissertation Phase-I  | 0 | 0 | 20 | 20         | 10        | -          | 100        | -         | 100        | --                      |
| <b>Total</b> |             |                       |   |   |    | <b>26</b>  | <b>16</b> | <b>120</b> | <b>180</b> |           | <b>300</b> |                         |

**\*PROGRAMME ELECTIVE-V (I&P) for 3<sup>rd</sup> Semester**

|    |           |                              |
|----|-----------|------------------------------|
| 1. | MTIP-201A | Enterprise Resource Planning |
| 2. | MTIP-203A | Design of Experiments        |
| 3. | MTIP-205A | Strategic Entrepreneurship   |

**\*\*OPEN ELECTIVE(I&P) for 3<sup>rd</sup> Semester**

|    |           |   |
|----|-----------|---|
| 1. | MTOE-201A | Business Analytics                      |
| 2. | MTOE-203A | Industrial Safety                       |
| 3. | MTOE-205A | Operations Research                     |
| 4. | MTOE-207A | Cost Management of Engineering Projects |
| 5. | MTOE-209A | Composite Materials                     |
| 6. | MTOE-211A | Waste to Energy                         |

**SEMESTER-IV**

| Sr. No.      | Course Code | Course Name           | L | T | P  | Hrs./ Week | Credits   | Major Test | Minor Test | Practical  | Total      | Duration of Exam (Hrs.) |
|--------------|-------------|-----------------------|---|---|----|------------|-----------|------------|------------|------------|------------|-------------------------|
| 1            | MTIP-202A   | Dissertation Phase-II | 0 | 0 | 32 | 32         | 16        | -          | 100        | 200        | 300        | --                      |
| <b>Total</b> |             |                       |   |   |    | <b>32</b>  | <b>16</b> |            | <b>100</b> | <b>200</b> | <b>300</b> |                         |

**Total credits=68**

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| MTIP-201A              |  | ENTERPRISE RESOURCE PLANNING |        |            |            |       |      |
|------------------------|--|------------------------------|--------|------------|------------|-------|------|
| Lecture                | Tutorial   | Practical                    | Credit | Major Test | Minor Test | Total | Time |
| 3                      | 0  | 0                            | 3      | 60         | 40         | 100   | 3    |
| <b>Objective</b>       | The main objective of the course is to impart the students with the knowledge of integrated applications to manage the business and automate many back office functions related to technology, services and human resources. |                              |        |            |            |       |      |
| <b>Course Outcomes</b> |  |                              |        |            |            |       |      |
| <b>CO1</b>             | To study the basic principles and models of an enterprise.   |                              |        |            |            |       |      |
| <b>CO2</b>             | To understand the concepts of technology and architecture in ERP.  |                              |        |            |            |       |      |
| <b>CO3</b>             | To study ERP system packages.  |                              |        |            |            |       |      |
| <b>CO4</b>             | To study the ERP procurement issues.   |                              |        |            |            |       |      |

#### UNIT I

##### **ENTERPRISE RESOURCE PLANNING:**

Introduction, Evolution of ERP, Principle of ERP, Enabling Technologies, ERP Characteristics, Features of ERP, The advantages of ERP, Reasons for the Failure of ERP Implementation, Risk and governance issues in an ERP, ERP Framework, Business Blueprint, Business Engineering Vs. Business Process Re-Engineering, ERP Tools and Software, Demand Chain, Value Chain, and Supply Chain.

#### UNIT-II

**ERP ARCHITECTURE:** Need to Study ERP Architecture, Layered Architecture, Types of ERP Architecture, Two-tier Implementations, Three-tier Client/Server Implementations, Web-based architecture, Service-Oriented Architectures, Logical Architecture of an ERP System, Physical Architecture of an ERP System, and Evaluation Framework for ERP Acquisition.

#### UNIT III

**ERP PACKAGE INTEGRATION AND IMPLEMENTATION:** ERP market, SAP, People soft, BAAN company, ORACLE corporation, A comparative assessment and selection of ERP packages and modules, Sales Force Automation, Integration of ERP, Integration of ERP and the Internet, ERP implementation strategies, Comparison of Big Bang vs. Phased Approach, Implementation Strategy in Small and Medium Enterprise, Post Implementation Issues.

#### UNIT IV

**OVERVIEW OF ARCHITECTURE OF DIFFERENT ERP SOFTWARES:** Oracle overview, Architecture, A.I.M. and applications, SAP Software architecture overview, ERP before and after Y2K, Impact of Y2K on ERP Development, Risk and Governance Issues in an ERP

**ERP MODULES:** Finance module, Sales & Distribution module, Human Resources module, Plant Maintenance module, Quality Management module, Material management module, manufacturing management module.

##### **RECOMMENDED BOOKS:**

1. Sadagopan. S, ERP-A Managerial Perspective, Tata Mcgraw Hill,1999.
2. Jose Antonio Fernandez, the SAP R/3 Handbook, Tata Mcgraw Hill,1998.
3. Vinod Kumar Crag and N.K. Venkitakrishnan, Enterprise Resource Planning- Concepts and Practice, Prentice Hall of India,1998.
4. Garg & Venkitakrishnan, ERPWARE, ERP Implementation Framework, Prentice Hall,1999.
5. Thomas E Vollmann and BeryWhybark, Manufacturing and Control Systems, Galgothia Publications,1998.
6. Alexis Leon, Enterprise resource planning, Tata Mcgraw-Hill

**Note:** The paper will have a total of NINE questions. Question No. 1, which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal weight of 12 marks. The student will attempt a total of FIVE questions, each of 12 marks. Q. No. 1 is compulsory. The student shall attempt remaining four questions by selecting only one question from each unit.

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| MTOE-203A              | INDUSTRIAL SAFETY  |           |         |            |            |       |             |
|------------------------|--|-----------|---------|------------|------------|-------|-------------|
| Lecture                | Tutorial   | Practical | Credits | Major Test | Minor Test | Total | Time (Hrs.) |
| 3                      | 0  | 0         | 3       | 60         | 40         | 100   | 3           |
| <b>Objective</b>       | The main objective of this course is to aware students about the industrial safety maintenance and fault findings. |           |         |            |            |       |             |
| <b>Course Outcomes</b> |  |           |         |            |            |       |             |
| <b>CO1</b>             | Understand the industrial safety.  |           |         |            |            |       |             |
| <b>CO2</b>             | Analyze fundamentals of maintenance engineering.   |           |         |            |            |       |             |
| <b>CO3</b>             | Understand the wear and corrosion and fault tracing.   |           |         |            |            |       |             |
| <b>CO4</b>             | Understanding when to do periodic inceptions and apply the preventing maintenance.                                 |           |         |            |            |       |             |

#### Unit-I

Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, washrooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

#### Unit-II

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion, Types of corrosion, Corrosion prevention methods.

#### Unit-III

Fault tracing: Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, i. Any one machine tool, ii. Pump iii. Air compressor iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

#### Unit-IV

Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: i. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

#### RECOMMENDED BOOKS:

1. Higgins & Morrow, "Maintenance Engineering Handbook", Da Information Services.
2. H. P. Garg, "Maintenance Engineering", S. Chand and Company.
3. Audels, "Pump-hydraulic Compressors", Mcgraw Hill Publication.
4. Winterkorn, Hans, "Foundation Engineering Handbook", Chapman & Hall London.

**Note:** The paper will have a total of *NINE* questions. Question No. 1, which is compulsory, shall be OBJECTIVE Type and have contents from the entire syllabus (all Four Units).

All questions will have equal *weightage* of 12 marks. The student will attempt a total of *FIVE* questions, each of 12 marks. Q. No. 1 is compulsory. *The student shall attempt remaining four questions by selecting only one question from each unit.*

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| MTIP-207A              |   | DISSERTATION PHASE – I |         |            |            |                 |       |             |
|------------------------|---|------------------------|---------|------------|------------|-----------------|-------|-------------|
| Lecture                | Tutorial  | Practical              | Credits | Major Test | Minor Test | Practical Marks | Total | Time (Hrs.) |
| 0                      | 0   | 20                     | 10      | -          | 100        | -               | 100   | -           |
| <b>Objective</b>       | The main objective of this course is to plan a research work (which includes the problem formulation/literature review, proposed objectives, proposed methodologies and references) in the field of Industrial and Production Engineering or interrelated fields of applications. |                        |         |            |            |                 |       |             |
| <b>Course Outcomes</b> |   |                        |         |            |            |                 |       |             |
| <b>CO 1</b>            | Students will be exposed to various self-learning topics.   |                        |         |            |            |                 |       |             |
| <b>CO 2</b>            | Students will be exposed to an exhaustive survey of the literature such as books, national/international refereed journals, resource persons and industrial surveys for the selection/identification of engineering/research problem.   |                        |         |            |            |                 |       |             |
| <b>CO 3</b>            | Students will be able to set the research objectives of the identified engineering/research problem.  |                        |         |            |            |                 |       |             |
| <b>CO 4</b>            | Students will learn modern tools/techniques related to the identified engineering/research problem for the solution and able to learn technical report writing skills.  |                        |         |            |            |                 |       |             |
| <b>CO 5</b>            | Students will develop oral and written communication skills to present and defend their work in front of technically qualified audience.  |                        |         |            |            |                 |       |             |

The students will start their research work in third semester with a research problem having research potential involving scientific research, design, generation/collection and analysis of data, determining solution and must preferably bring out the individual contribution.

The examination shall consist of the preparation of report consisting of a detailed problem statement and a literature review. The preliminary results (if available) of the problem may also be discussed in the report. The work has to be presented in front of the examiners panel set by Head and PG coordinator. The candidate has to be in regular contact with his/her supervisor and the topic of dissertation must be mutually decided by the supervisor and student.

The students will be required to submit a progress report related to their dissertation work by the end of September. The progress report will cover the following:

- The goal set for the period.
- Research papers studied.
- Methodology used in achieving the goal.
- The extent of fulfillment of the goal.

The progress report must be at least of 3-4 pages and the cover page should include the tentative topic, name of the candidate, name of the supervisor, period of progress report, signature of candidate and supervisor.

The students will be required to appear for comprehensive Seminar & Viva-voce and submit a synopsis report based on their progress related to the dissertation as per the presentation date mentioned in the academic calendar for the session. The synopsis report will be submitted in the same format as that of the thesis and will contain the following:

1. Introduction
2. Literature Survey
3. Gaps in Literature
4. Objectives of the Proposed Work
5. Methodology
6. References

**\* Student will choose his/her guide in the end of second semester.**