

SHRI VENKATESHWARA UNIVERSITY



Syllabus

Diploma
Mechanical Engineering (Production)
VI semester
(Three Years Programme)

(w.e.f. 2019-20)

**SCHOOL OF ENGINEERING &
TECHNOLOGY**

Mechanical Engineering (Production)
SEMESTER- VI

| <i>Sl. No.</i> | <i>Subject Codes</i> | <i>Subject</i> | <i>Periods</i> | | | <i>Evaluation Scheme</i> | | | | <i>End Semester</i> | | <i>Total</i> | <i>Credit</i> |
|----------------|----------------------|---|----------------|----------|----------|--------------------------|-----------|--------------|-----------|---------------------|-----------|--------------|---------------|
| | | | <i>L</i> | <i>T</i> | <i>P</i> | <i>CT</i> | <i>TA</i> | <i>Total</i> | <i>PS</i> | <i>TE</i> | <i>PE</i> | | |
| 1 | PPE-601 | <i>Advanced Tool Engineering</i> | 3 | 0 | 0 | 20 | 10 | 30 | | 70 | | 100 | 3 |
| 2 | PPE-602 | <i>Industrial Equipment Maintenance</i> | 3 | 0 | 0 | 20 | 10 | 30 | | 70 | | 100 | 3 |
| 3 | PES-666 | <i>Entrepreneurship and Start-ups</i> | 3 | 1 | 0 | 20 | 10 | 30 | | 70 | | 100 | 3 |
| 4 | POE-061 | <i>Renewable Energy Technologies</i> | 3 | 0 | 0 | 20 | 10 | 30 | | 70 | | 100 | 3 |
| 5 | POE-062 | <i>Disaster Management</i> | 3 | 0 | 0 | 20 | 10 | 30 | | 70 | | 100 | 3 |
| 6 | PPE-611 | <i>Major Project Phase-II</i> | 0 | 0 | 12 | | | | 100 | | 100 | 200 | 6 |
| 7 | PPE-612 | <i>Seminar</i> | 1 | 0 | 0 | | | | 50 | | | 50 | 1 |
| 8 | AUD-111 | <i>Indian Constitution</i> | 2 | 0 | 0 | | | | | | | | 0 |
| | | | | | | | | | | | | 750 | 22 |

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|--------------------------|---|----------------------------------|
| Course Code | : | PPE-601 |
| Course Title | : | Advanced TOOL ENGINEERING |
| Number of Credits | : | 3 (L: 3, T: 0, P: 0) |
| Prerequisites | : | NIL |
| Course Category | : | PE |

Course Objectives:

- To understand metal cutting and forming process and factors affecting machinability.
- To develop knowledge of tools, dies and tool materials.
- To understand processes for increased productivity and quality.

Course Content:

UNIT-I: Metal Cutting: Mechanics of Metal cutting; requirements of tools; cutting forces; types of chips; chip thickness ratio; shear angle ; simple numericals only; types of metal cutting process; orthogonal; oblique and form cutting;

Cutting fluids: types; characteristics and applications.

Tool wear: Types of wear; Tool life; Tool life equations.

Unit-II: Machinability: definition; factors affecting machinability; machinability index.

Tool materials: Types; characteristics; applications; Heat treatment of tool steels; Specification of carbide tips; Types of ceramic coatings.

Cutting Tool Geometry: Single point cutting tool; drills; reamers; milling; cutters.

Unit-III: Types of dies and construction: Simple Die; Compound Die; Progressive Die; Combination Die.

Punch & Die mountings: pilots; strippers; misfeed detectors; Pressure Pads; Knock outs; stock guide; Feed-Stop; guide bush; guide pins.

Unit-IV: Die Design Fundamentals: Die Operations; blanking; piercing; shearing; cropping; notch-

ing; lancing; coining; embossing; stamping; curling; drawing; bending; forming; Die set; Die shoe; Die area; Calculation of clearances on die and punch for blanking and piercing dies; Strip layout; Calculation of material utilization factor.

Unit-V: Forming Dies: Bending methods; Bending Dies; bend allowance; spring back; spanning; bending pressure; pressure pads; development of blank length.

Drawing: operations; Metal flow during drawing; Calculation of Drawing blank size; variables affecting metal flow during drawing; single action and double action dies; combination dies.

Fundamentals of other Tools: Constructional features of - Pressure Die casting dies; metal extrusion dies; injection molding dies; forging dies; plastic extrusion dies.

Reference Books:

1. Tool Design - Donaldson Anglin, Tata McGraw Hill.
2. Production Technology- H.M.T.Jain, Tata McGraw Hill.
3. A Text Book of Production engineering – P.C. Sharma, S.Chand & Co.
4. Production Technology, R.K.Jain, Khanna Publishers.

Course outcomes:

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

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| CO1 | Understand concepts, principles and procedures of tool engineering |
| CO2 | Classify and explain various tools and tool operations |
| CO3 | Select proper tool and a die for a given manufacturing operation to achieve highest productivity |
| CO4 | Estimate tool wear and tool life |

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|--------------------------|---|---|
| <i>Course Code</i> | : | <i>PPE-602</i> |
| <i>Course Title</i> | : | <i>INDUSTRIAL EQUIPMENT MAINTENANCE</i> |
| <i>Number of Credits</i> | : | <i>3 (L: 3, T: 0, P: 0)</i> |
| <i>Prerequisites</i> | : | <i>NIL</i> |
| <i>Course Category</i> | : | <i>PC</i> |

Course Learning Objectives:

- To achieve minimum breakdown and to keep the plant in good working condition at the lowest possible cost.
- Machines and other facilities should be kept in such a condition which permits them to be used at their optimum (profit making) capacity without any interruption or hindrance.
- Maintenance division of the factory ensures the availability of the machines, buildings and services required by other sections of the factory for the performance of their functions at optimum return on investment whether this investment be in material, machinery or personnel.

Course Content:

UNIT-I: Introduction: Maintenance, Need of Maintenance Management, Maintenance Policies, Strategies and options in Maintenance management. Maintenance forms/actions and their inter relationships, Brief descriptions of various Maintenance actions.

UNIT-II: Maintenance Organizations: Prerequisites, factors determining effectiveness of a Maintenance organization, objectives of organization design, types of organization. Maintenance Planning and Control: Establishing a Maintenance Plan-Preliminary consideration, Systematic method of Maintenance Plan and schedule planning and schedule of Plant shut downs

UNIT-III: Maintenance practices on production machines: Lathe, Drilling, Milling, Welding, Shaper. Use of computer in maintenance, Machine Reconditioning. Evaluation of Maintenance Management: Need for evaluation a to z objectives, criterion of evaluation.

UNIT-IV: Spare Parts Management: Capacity utilization, cost reduction approach to spares, reliability and quality of spares, spare parts procurement, inventory control of spare parts.

UNIT-V: Introduction: friction, wear and lubrication, Historical background, Purpose of lubrication, Lubrication regimes, Characteristics of lubricants - viscosity, viscosity index, oxidation stability, flash

point and fire point, pour point and cloud point, carbon residue, ash content, iodine value, neutralization number, dielectric strength, Composition and classification of lubricants, Lubricating oils – oil refining, types, categories, grading, Grease - composition, function, characteristics, thickeners and additives, soap and its complexes, selection and its practices, solid lubricants, Functional additives – surface, performance enhancing, lubricant protective , Lubricants applications – tribological components and industrial machinery, Lubricants testing and test methods, Organization and management of lubrication, lubricant storage and handling, Safety and health hazards, Environmental regulations.

Reference Books:

1. Maintenance Management Policies, Strategies and Options: July 27–29, 2000, Lecture notes MACT, Bhopal.
2. Maintenance & Spare Parts Management, P.Gopal Krishnan & A.K.Banerji
3. Hand Book of Reliability Engineering & Management: W. Grant Ireson and Clyde F McGraw Hill
4. Maintenance Planning & Control: Anthony Kelley – East West Press.

Course outcomes:

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

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| C01 | Demonstrates the proper use of safety equipment, devices, and procedures in classroom and lab environments |
| C02 | Understanding of the Industrial Equipment Maintenance and practical laboratory experience to set up and repair industrial equipment and facilities |
| C03 | Compares and contrasts the operations of various industrial machines |
| C04 | Applies theoretical study and the knowledge of metering tools to troubleshoot mechanical, electrical, and electromechanical systems and repair them |
| C05 | Understand the friction, wear and lubrication properties at mating parts of machines and its tribological characteristics |

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|------------------------------------|----------|---------------------------------------|
| Course Code | : | PES-666 |
| Course Title | : | Entrepreneurship and Start-ups |
| Number of Credits | : | 3 |
| Prerequisites (Course code) | : | None |
| Course Category | : | HS |

Course Learning Objectives:

1. Acquiring Entrepreneurial spirit and resourcefulness.
2. Familiarization with various uses of human resource for earning dignified means of living.
3. Understanding the concept and process of entrepreneurship - its contribution and role in the growth and development of individual and the nation.
4. Acquiring entrepreneurial quality, competency, and motivation.
5. Learning the process and skills of creation and management of entrepreneurial venture.

Course Content:

Unit 1 - Introduction to Entrepreneurship and Start – Ups

- Definitions, Traits of an entrepreneur, Intrapreneurship, Motivation
- Types of Business Structures, Similarities/differences between entrepreneurs and managers.

Unit 2 – Business Ideas and their implementation

- Discovering ideas and visualizing the business
- Activity map
- Business Plan

Unit 3 – Idea to Start-up

- Market Analysis – Identifying the target market,
- Competition evaluation and Strategy Development,
- Marketing and accounting,
- Risk analysis

Unit 4 – Management

- Company’s Organization Structure,
- Recruitment and management of talent.
- Financial organization and management

Unit 5 - Financing and Protection of Ideas

- Financing methods available for start-ups in India
- Communication of Ideas to potential investors – Investor Pitch
- Patenting and Licenses

Unit 6: Exit strategies for entrepreneurs, bankruptcy, and succession and harvesting strategy

Learning Outcome:

Upon completion of the course, the student will be able to demonstrate knowledge of the following topics:

1. Understanding the dynamic role of entrepreneurship and small businesses
2. Organizing and Managing a Small Business
3. Financial Planning and Control
4. Forms of Ownership for Small Business
5. Strategic Marketing Planning
6. New Product or Service Development
7. Business Plan Creation

SUGGESTED LEARNING RESOURCES:

| S. No. | Title of Book | Author | Publication |
|--------|---|-------------------------------------|---|
| 1. | The Startup Owner’s Manual: The Step-by-Step Guide for Building a Great Company | Steve Blank and Bob Dorf | K & S Ranch ISBN – 978-0984999392 |
| 2. | The Lean Startup: How Today’s Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses | Eric Ries | Penguin UK ISBN – 978-0670921607 |
| 3. | Demand: Creating What People Love Before They Know They Want It | Adrian J. Slywotzky with Karl Weber | Headline Book Publishing ISBN – 978-0755388974 |
| 4. | The Innovator’s Dilemma: The Revolutionary Book That Will Change the Way You Do Business | Clayton M. Christensen | Harvard business ISBN: 978-142219602 |

SUGGESTED SOFTWARE/LEARNING WEBSITES:

- a. <https://www.fundable.com/learn/resources/guides/startup>
- b. <https://corporatefinanceinstitute.com/resources/knowledge/finance/corporate-structure/>
- c. <https://www.finder.com/small-business-finance-tips>
- d. <https://www.profitbooks.net/funding-options-to-raise-startup-capital-for-your-business/>

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|------------------------------------|----------|--------------------------------------|
| Course Code | : | POE-061 |
| Course Title | : | Renewable Energy Technologies |
| Number of Credits | : | 3 (L: 3, T: 0, P: 0) |
| Prerequisites (Course code) | : | NIL |
| Course Category | : | PC |

Course Learning Objectives:

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- Maintain the renewable energy technology equipment.

Course Contents:

Unit – I Ocean Energy Technologies

Ocean energy map of India and its implications; Specification, Construction and working of the following ocean energy technologies:

- Tidal power technologies
- Wave power technologies
- Marine current technologies
- Ocean Thermal Energy Conversion (OTEC) technologies

Unit – II Solar PV and Concentrated Solar Power Plants

- Solar Map of India: Global solar power radiation, Solar PV
- Concentrated Solar Power (CSP) plants, construction and working of: Power Tower, Parabolic Trough, Parabolic Dish, Fresnel Reflectors
- Solar Photovoltaic (PV) power plant: components layout, construction, working.
- Rooftop solar PV power system

Unit – III Large Wind Power Plants

Wind Map of India: Wind power density in watts per square meter, Lift and drag principle; long path theory, Geared type wind power plants: components, layout and working, Direct drive type wind power plants: components, layout and working, Constant Speed Electric Generators: Squirrel Cage Induction Generators (SCIG), Wound Rotor Induction Generator (WRIG), Variable Speed Electric Generators: Doubly-fed induction generator (DFIG), wound rotor synchronous generator (WRSG), permanent magnet synchronous generator (PMSG).

Unit– IV Small Wind Turbines

- Horizontal axis small wind turbine: direct drive type, components and working.
- Horizontal axis small wind turbine: geared type, components and working.
- Vertical axis small wind turbine: direct drive and geared, components and working.
- Types of towers and installation of small wind turbines on roof tops and open fields.
- Electric generators used in small wind power plants.

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Unit– V Biomass-based Power Plants

- Properties of solid fuel for biomass power plants: bagasse, wood chips, rice husk, municipal waste.
- Properties of liquid and gaseous fuel for biomass power plants: Jatropha, bio-diesel gobar gas.
- Layout of a Bio-chemical based (e.g. biogas) power plant.
- Layout of a Thermo-chemical based (e.g. Municipal waste) power plant.
- Layout of a Agro-chemical based (e.g. bio-diesel) power plant.

Reference Books:

1. O.P. Gupta, Energy Technology, Khanna Publishing House, New Delhi
2. Neill, Simon P.; Hashemi, M. Reza: Fundamentals of Ocean Renewable Energy: Generating Electricity from the Sea, Academic Press, ISBN:978-0-12-810448-4
3. David M. Buchla, Thomas E. Kissell, Thomas L. Floyd, Renewable Energy Systems, Pearson Education New Delhi , ISBN: 9789332586826,
4. Rachel, Sthuthi, Earnest, Joshua; -Wind Power Technologies, PHI Learning, New Delhi, ISBN: 978-93-88028-49- 3; E-book 978-93-88028-50-9
5. Deambi, Suneel: From Sunlight to Electricity: a practical handbook on solar photovoltaic application; TERI, New Delhi ISBN:9788179935736
6. Gipe, Paul: Wind Energy Basics, Chelsea Green Publishing Co; ISBN: 978-1603580304
7. Wizelius, Tore, Earnest, Joshua - Wind Power Plants and Project Development, PHI Learning, New Delhi, ISBN:978-8120351660
8. Kothari, D.P. et al: Renewable Energy Sources and Emerging Technologies, PHI Learning, New Delhi, ISBN: -978-81-203-4470-9
9. Bhadra, S.N., Kastha, D., Banerjee, S, Wind Electrical Systems installation; Oxford University Press, New Delhi, ISBN: 9780195670936.

Course Outcomes:

The theory, practical experiences and relevant soft skills associated with this course are

to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

- Maintain ocean thermal energy technologies
- Maintain the optimised working of solar PV and CS power plants.
- Maintain the optimised working of large wind power plants
- Maintain the optimised working of small wind turbines.
- Maintain the optimised working of biomass-based power plants.

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| Course Code | : | POE-062 |
| Course Title | : | Disaster Management |
| Number of Credits | : | 3 (L:3, T: 0, P: 0) |
| Prerequisites | : | NIL |
| Course Category | : | OE |

Course Learning Objectives:

Following are the objectives of this course:

- To learn about various types of natural and man-made disasters.
- To know pre- and post-disaster management for some of the disasters.
- To know about various information and organisations in disaster management in India.
- To get exposed to technological tools and their role in disaster management.

Course Content:

Unit – I: Understanding Disaster

Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity
– Disaster and Development, and disaster management.

Unit – II: Types, Trends, Causes, Consequences and Control of Disasters

Geological Disasters (earthquakes, landslides, tsunami, mining); Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves) Biological Disasters (epidemics, pest attacks, forest fire);

Technological Disasters (chemical, industrial, radiological, nuclear) and Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters) Global Disaster Trends – Emerging Risks of Disasters – Climate Change and Urban Disasters

Unit- III: Disaster Management Cycle and Framework

Disaster Management Cycle – Paradigm Shift in Disaster Management.

Pre-Disaster – Risk Assessment and Analysis, Risk Mapping, zonation and Microzonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness.

During Disaster – Evacuation – Disaster Communication – Search and Rescue – Emergency Operation Centre – Incident Command System – Relief and Rehabilitation –

Post-disaster – Damage and Needs Assessment, Restoration of Critical Infrastructure – Early Recovery – Reconstruction and Redevelopment; IDNDR, Yokohama Strategy, Hyogo Framework of Action.

Unit– IV: Disaster Management in India

Disaster Profile of India – Mega Disasters of India and Lessons Learnt.

Disaster Management Act 2005 – Institutional and Financial Mechanism, National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national), Non-Government and Inter Governmental Agencies

Unit– V: Applications of Science and Technology for Disaster Management

Geo-informatics in Disaster Management (RS, GIS, GPS and RS).

Disaster Communication System (Early Warning and Its Dissemination).

Land Use Planning and Development Regulations, Disaster Safe Designs and Constructions, Structural and Non Structural Mitigation of Disasters

S&T Institutions for Disaster Management in India

References

1. Publications of National Disaster Management Authority (NDMA) on Various Templates and Guidelines for Disaster Management
2. Bhandani, R. K., An overview on natural & man-made disasters and their reduction, CSIR, New Delhi
3. Srivastava, H. N., and Gupta G. D., Management of Natural Disasters in developing countries, Daya Publishers, Delhi
4. Alexander, David, Natural Disasters, Kluwer Academic London
5. Ghosh, G. K., Disaster Management, A P H Publishing Corporation
6. Murthy, D. B. N., Disaster Management: Text & Case Studies, Deep & Deep Pvt. Ltd.

Course outcomes:

After competing this course, student will be:

- Acquainted with basic information on various types of disasters

- Knowing the precautions and awareness regarding various disasters
 - Decide first action to be taken under various disasters
 - Familiarised with organisation in India which are dealing with disasters
- Able to select IT tools to help in disaster management

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| <i>Course Code</i> | <i>:</i> | <i>AUD-111</i> |
| <i>Course Title</i> | <i>:</i> | <i>Indian Constitution</i> |
| <i>Number of Credits</i> | <i>:</i> | <i>0 (L: 2, T:0; P:0)</i> |
| <i>Prerequisites (Course code)</i> | <i>:</i> | <i>None</i> |
| <i>Course Category</i> | <i>:</i> | <i>AU</i> |

Course Content

Unit 1 – The Constitution - Introduction

- The History of the Making of the Indian Constitution
- Preamble and the Basic Structure, and its interpretation
- Fundamental Rights and Duties and their interpretation
- State Policy Principles

Unit 2 – Union Government

- Structure of the Indian Union
- President – Role and Power
- Prime Minister and Council of Ministers
- Lok Sabha and Rajya Sabha

Unit 3 – State Government

- Governor – Role and Power
- Chief Minister and Council of Ministers
- State Secretariat

Unit 4 – Local Administration

- District Administration
- Municipal Corporation
- Zila Panchayat

Unit 5 – Election Commission

- Role and Functioning
- Chief Election Commissioner

- State Election Commission

Suggested Learning Resources:

| S. No. | Title of Book | Author | Publication |
|--------|--|-----------------|--|
| 1. | Ethics and Politics of the In- dian Constitution | Rajeev Bhargava | Oxford University Press, New Delhi, 2008 |
| 2. | The Constitution of India | B.L. Fadia | Sahitya Bhawan; New edition (2017) |
| 3. | Introduction to the Consti- tution of India | DD Basu | Lexis Nexis; Twenty-Third 2018 edition |

Suggested Software/Learning Websites:

- <https://www.constitution.org/cons/india/const.html>
- <http://www.legislative.gov.in/constitution-of-india>
- <https://www.sci.gov.in/constitution>
- <https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-of-india/>