

# SHRI VENKATESHWARA UNIVERSITY



## Syllabus

### M.TECH Production Engineering II<sup>nd</sup> SEMESTER

*(Two Years Post Graduation Programme)*

**(w.e.f. 2019-20)**

**SCHOOL OF ENGINEERING & TECHNOLOGY**

# Production Engineering

## SEMESTER-II

Sl. No	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	MPR-201	Automation In Manufacturing	3	0	0	20	10	30		70		100	3
2	MPR-202	Modern Machining Processes	3	0	0	20	10	30		70		100	3
3	MPR-031	Machine Tools Engineering	3	0	0	20	10	30		70		100	3
4	MPR-041	Quality Management	3	0	0	20	10	30		70		100	3
5	MPR-211	Manufacturing Process And Systems Lab	0	0	4				25		25	50	2
6	MPR-212	Design Lab	0	0	4				25		25	50	2
7	MPR-221	Mini Project	0	0	4				50		50	100	2
8	AUD-102	Disaster Management	2	0	0								0
		Total										600	18

**Course:-** M.Tech  
**Subject:-** Automation In Manufacturing  
**Max. Marks: a) Internal/Practical-** 30  
**b) External-** 70

**Year/Semester:-** I/II  
**Subject Code:-** MPR-201

Credit Hours		
L	T	P
3	0	0

### **Syllabus Contents:**

#### **UNIT-I**

Review of basic principles of automation, type and degree of automation, hard automation and flexible automation, working of stand alone semi-automatic machine tools- turret and capstan lathes, stand alone automatic machine tools, multi-spindle machine tools, transfer machines.

#### **UNIT-II**

Introduction to computer aided manufacturing (CAM) systems, basic building blocks of computer integrated manufacturing (CIM).

#### **UNIT-III**

Numerical Control Machines and Systems- CNC, DNC (Direct and Distributed), FMC, FMM, FMS, Machining Centres, CAPP, Part Programming on CNC machines for machining, EDMing, forming, etc. using G and M codes, APT, etc., toolings of CNC machines; Adaptive Control systems, tool and work handling systems involving robot, AGV, AS/RS, ATC, APC, etc.

#### **UNIT-IV**

Robotics; types, anatomy, drives, kinematics, controls, and applications of the robot.

#### **UNIT-V**

Computer aided production planning and control, CAD-CAM interface, Manufacturing from product design-concept of group technology (GT), Control systems, Process monitoring, Automatic inspection systems, use of CMM.

#### **Reference Books:**

1. "Automation, Production Systems, and Computer-Integrated Manufacturing" - M.P. Groover, Prentice Hall of India.
2. "CAD/CAM - Theory and Practice" - I. Zeid, Tata McGraw-Hill PublishingCo. Ltd., New Delhi.
3. "CAD/CAM" - M.P. Groover and E.W. Zimmers Jr., Prentice Hall of India
4. "CAD/CAM/CIM" - P. Radhakrishnan, S. Subramanyan and V. Raju, New Age International Publishers.
5. "Computer Aided Manufacturing" - P.N. Rao, N.K. Tewari and T.K. Kundra, Tata McGraw- Hill Publication.
6. "Robotics Technology and Flexible Automation" - S.R. Deb, Tata McGraw-Hill Publication.
7. "Industrial Robots and Computer Integrated Manufacturing" - S. Kumar, Oxford & IBH Publishing Co. Ltd.
8. "Computer-Aided Production Management" - P.B. Mahapatra, Prentice Hall of India.

**Course:-** M.Tech

**Subject:-** Modern Machining Processes

**Max. Marks: a) Internal/Practical- 30**  
**b) External- 70**

**Year/Semester:-** I/II

**Subject Code:-** MPR-202

Credit Hours		
L	T	P
3	0	0

**Syllabus Contents:**

**UNIT-I**

Modern Machining Processes; Non-traditional machining: Introduction, Specific Applications and Advantages over Traditional Machining Processes; Need of High production rate machining.

Mechanical Non-Traditional Machining Processes; Ultrasonic Machining, Abrasive Jet Machining, Water Jet Machining, and Abrasive Water Jet Machining; Process details, parametric effects, recent advancements and modelling.

**UNIT-II**

Thermal Non-Traditional Machining Processes; Electro discharge Machining, Plasma Arc Machining, Electron Beam Machining, and Laser Beam Machining; process, parameters, recent advances and modelling.

**UNIT-III**

Chemical and Electrochemical processes; Chemical Machining, Electro Chemical Machining and Electrochemical grinding.

Hybrid-type systems; Electro Chemical Discharge Machining, Ultrasonic-assisted Electro Discharge Machining, ELID during grinding and other types,

**UNIT-IV**

High Production Rate Machining and Grinding; Designing suitable tooling, cutting fluid application; alternative processes- hot machining, stretch machining, etc.; obstacles faced and possible remedies.

**UNIT-V**

Micro and Nano machining, Environment friendly machining.

Intelligent Manufacturing Systems: Fuzzy, Neural Networks, Genetic Algorithms to be applied in smart / digital manufacturing. Industry 4.0: Cyber Physical Manufacturing System.

**Reference Books:**

1. "Modern Machining Processes" - P.C. Pandey and H.S. Shan, Tata McGraw-Hill Publication.
2. "Non-Conventional Machining" - P.K.Mishra, Narosa Publishers.
3. "Advanced Machining Processes – Nontraditional and Hybrid Machining Processes"- H.A.G. El-Hofy, McGraw-Hill.
4. "Manufacturing Science"- A. Ghosh and A.K. Mallik, East-West Publications.
5. "Manufacturing Engineering and Technology" - S. Kalpakjian, Addison Wesley.
6. "Materials and Processes in Manufacturing" - E.P. DeGarmo, J.T. Black and R.A. Kohser, Prentice Hall of India.
7. "A Text Book of Production Technology" - O.P. Khanna and M. Lal, Dhanpat Rai and Sons.
8. "Rapid Prototyping: A Brief Introduction"- A. Ghosh, East West Publication.
9. "Manufacturing Processes"- Amstead, Ostwald and Begeman, John Wiley and Sons.
10. "Micromachines", I. Fujimasa, Oxford University Press.
11. "Precision Engineering in Manufacturing", R.L. Murty, New Age International Publishers.
12. "Laser Machining and Welding" - N. Rykalin, A. Uglov and A. Kokora, Mir Publishers, Moscow.

**Course:-** M.Tech  
**Subject:-** Machine Tools Engineering  
**Max. Marks: a) Internal/Practical-** 30  
**b) External-** 70

**Year/Semester:-** I/II  
**Subject Code:-** MPR-031

Credit Hours		
L	T	P
3	0	0

### **Syllabus Contents:**

#### **UNIT-I**

Chronological developments of machine tools, design principles of metal cutting machine tools, machine kinematics, criterion for selection of operating capacity and design parameters, analysis of formative motions and preparation of layouts, concept of standardization, design of elements for strength, rigidity and life.

#### **UNIT-II**

Design of Speed and Feed box, stepless regulations of speed and feed, machine tool structure, design of bed, headstock, guide ways, slide ways, structure analysis, use of finite element method.

#### **UNIT-III**

Concepts of oil hydraulics and pneumatics, electro hydraulics servo mechanisms, basic configuration of hydraulic power supplies, bypass regulated and stroke regulated hydraulic power supplies, heat generation and dissipation in hydraulic systems, hydraulic control elements - DCV, PCV, FCV, valve configuration and analysis.

Mechatronic elements of a CNC machine, machine tool error analysis, sources of error, error compensation strategies, use of neural networks.

#### **UNIT-IV**

Machine tool dynamics, free and forced vibrations, review of multiple degree of freedom systems, response to excitations, models of vibrations, self excited vibrations, random vibrations and stability analysis.

#### **UNIT-V**

Acceptance tests of machine tools.

Agile manufacturing, Reconfigurable machining systems, Application of ergonomics in machine tool design.

#### **References:**

1. "Principles of Machine Tools" - G.C. Sen and A. Bhattacharya
2. "Machine Tool Design" - J.N. Acherkan, Vol. 1 to 4, MIR Publishers
3. "Machine Tool Design", N.K. Mehta, TMG Publications,
4. "Fluid Power Control" - J.F. Blackburn, G. Reetholf and J.L. Shearer, New York Technology Press of MIT and Wiley
5. "Oil Hydraulic Power and Its Industrial Applications" - W. Ernst, 2nd Ed. New York, McGraw Hill
6. "Hydraulic Control Systems" - H.E. Merrit
7. "Testing of Machine Tools" - G. Shleisinger, Pergamon Press
8. "Elements of Vibration Analysis" - L. Meirovitch, McGraw Hill Co.
9. "Mechatronics" - W. Bolton, Addition Wesley Longman, Singapore.

**Course:-** M.Tech  
**Subject:-** Quality Management  
**Max. Marks: a) Internal/Practical-** 30  
**b) External-** 70

**Year/Semester:-** I/II  
**Subject Code:-** MPR-041

Credit Hours		
L	T	P
3	0	0

**Syllabus Contents:**

**UNIT-I**

Basic concepts, definitions and history of quality control, Quality function and concept of quality cycle, Quality policy and objectives, Quality considerations in design, Economics of quality and measurement of the cost of quality, definitions, classifications, Quality Cost Matrix, Evaluation of Quality Costs. Taguchi's Quality Loss Function.

**UNIT-II**

Process control: Upper and Lower Specification Limits, Accuracy and Precision. Process Capability, Potential Capability and Actual Capability. Use of control charts and process engineering techniques for implementing the quality plan.

**UNIT-III**

Total Quality Control and Management, definition, vision and philosophy, Concepts of TQM, Concepts of customer centered environment, Golden Rules of TQM, the PDCA Cycle, Tools and Techniques, Implementation of TQM, Waste Elimination, the 5S campaign

**UNIT-IV**

Flow Chart, Pareto analysis, Cause and Effect Diagram, Force Field Analysis, Brain Storming, Quality Circle, Quality Function Deployment, Just-In- Time Approach, Quality Standards, ISO 9000 Standard, Implementation and Registration.

**References:**

1. "Quality Control Handbook" - J. Juran, McGraw-Hill Book Company.
2. "Quality Planning and Analysis" - M. Juran, F. M. Gryana, Tata McGraw Hill (3rd Ed.).
3. "Statistical Quality Control" - M. Mahajan, Dhanpat Rai Publication.
4. "Handbook of Total Quality Management" - R.P. Mohanty and R.R. Lakhe, Jaico Publishing House.
5. "Total Quality Management" - D. H. Besterfield, et al., Pearson Education, Asia.
6. "Quality Control and Industrial Statistics" - A.J. Duncan, Richard D. Irwin Inc., USA.

**Course:-** M.Tech

**Subject:-** Manufacturing Process And Systems Lab

**Max. Marks: a) Internal/Practical- 25**

**b) External- 25**

**Year/Semester:-** I/II

**Subject Code:-** MPR-211

Credit Hours		
L	T	P
0	0	4

**Syllabus Content:**

1. Part programming on a CNC lathe
2. Part programming on a CNC milling / machining centre
3. Using MasterCAM, etc. for making a job from AutoCAD drafting
4. Computer Aided Process Planning
5. Robotic Programming
6. Electric Discharge Machining
7. Testing for alignment/ error in machine tools
8. Finding out speed ratios and constructing ray diagrams of machine tools.
9. Machine Tool Vibration
10. Mechatronic elements in automated machine tools

**Course:-** M.Tech

**Subject:-** Design Lab

**Max. Marks:** a) **Internal/Practical-** 25  
b) **External-** 25

**Year/Semester:-** I/II

**Subject Code:-** MPR-212

Credit Hours		
L	T	P
0	0	4

**Syllabus Contents:**

1. Design of components of machine tools, cutting tool, other toolings, metal working processes, etc.
2. Stress analysis of components of machine tools, cutting tool, other toolings, metal working processes, etc. under different types of loading conditions using standard software such as ANSYS, etc.
3. Designing for New Product Development.



**Course:-** M.Tech

**Subject:-** Mini Project

**Max. Marks: a) Internal/Practical- 50**

**b) External- 50**

**Year/Semester:-** I/II

**Subject Code:-** MPR-221

Credit Hours		
L	T	P
0	0	4

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

1. Identify structural engineering problems reviewing available literature.
2. Study different techniques used to analyze complex structural systems.
3. work on the solutions given and present solution by using his/her technique applying engineering principles.

### **Syllabus Contents:**

Mini Project will have mid semester presentation and end semester presentation. Mid semester presentation will include identification of the problem based on the literature review on the topic referring to latest literature available.

End semester presentation should be done along with the report on identification of topic for the work and the methodology adopted involving scientific research, collection and analysis of data, determining solutions highlighting individuals' contribution.

Continuous assessment of Mini Project at Mid Sem and End Sem will be monitored by the departmental committee.

**Course:-** M.Tech

**Subject:-** Disaster Management

**Max. Marks: a) Internal/Practical- 30**

**b) External- 70**

**Year/Semester:-** I/II

**Subject Code:-** AUD-102

Credit Hours		
L	T	P
3	0	0

**Course Outcomes:** Students will be able to:

1. Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
2. Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
3. Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
4. Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in

### **Syllabus Contents:**

#### **Unit 1: Introduction**

Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.

#### **Unit 2: Repercussions Of Disasters And Hazards:**

Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem.

Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

#### **Unit 3: Disaster Prone Areas In India**

Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics

#### **Unit 4: Disaster Preparedness And Management**

Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.

#### **Unit 5: Risk Assessment**

Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival.

#### **Unit 6: Disaster Mitigation**

Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.

### **SUGGESTED READINGS:**

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "New Royal book Company.
2. Sahni, Pardeep Et. Al. (Eds.), "Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.
3. Goel S. L. , "Disaster Administration And Management Text And Case Studies" ,Deep & Deep Publication Pvt. Ltd., New Delhi.