

SHRI VENKATESHWARA UNIVERSITY



Syllabus

**M.TECH - PART TIME
Production Engineering
IIIrd SEMESTER
(Three Years Post Graduation Programme)**

(w.e.f. 2019-20)

**SCHOOL OF ENGINEERING &
TECHNOLOGY**

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

Year/Semester:- II/III
Subject Code:- WPR-301

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:- Machine Tools Engineering
Max. Marks: a) Internal/Practical- 30
b) External- 70

Year/Semester:- II/III
Subject Code:- WPR-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:- Research Methodology and IPR
Max. Marks: a) Internal/Practical- 30
b) External- 70

Year/Semester:- II/III
Subject Code:- MLC-301

Credit Hours		
L	T	P
2	0	0

Course Outcomes:

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

- Understand research problem formulation.
- Analyze research related information
- Follow research ethics
- Understand that today's world is controlled by Computer, Information Technology, buttomorrow world will be ruled by ideas, concept, and creativity.
- Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
- Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

Syllabus Contents:

Unit 1: Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem.

Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

Unit 2: Effective literature studies approaches, analysis Plagiarism, Research ethics,

Unit 3: Effective technical writing, how to write report, Paper

Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

Unit 4: Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

Unit 5: Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

Unit 6: New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

References:

- Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students"
- Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
- Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners"
- Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.

- Mayall , “Industrial Design”, McGraw Hill, 1992.
- Niebel , “Product Design”, McGraw Hill, 1974.
- Asimov , “Introduction to Design”, Prentice Hall, 1962.
- Robert P. Merges, Peter S. Menell, Mark A. Lemley, “ Intellectual Property in New Technological Age”, 2016.
- T. Ramappa, “Intellectual Property Rights Under WTO”, S. Chand, 2008

Course:- M.Tech

Subject:- Manufacturing Process And Systems Lab

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

b) **External-** 25

Year/Semester:- II/III

Subject Code:- MPR-311

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 too