

SHRI VENKATESHWARA UNIVERSITY



EVALUATION SCHEME M.TECH (Structural Engineering) PART-TIME

(Two Years Post Graduation Programme)

(w.e.f. 2019-20)

SCHOOL OF ENGINEERING & TECHNOLOGY

M.TECH SE (Semester III)

Research Methodology and IPR MLC 101 3 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, but tomorrow 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 emphasize 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.

<p>Unit 1: INTRODUCTION 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</p>	Reference s:
<p>Unit 2:Effective literature studies approaches, analysis Plagiarism, and Research ethics</p>	
<p>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</p>	S tuar t
<p>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.</p>	Mel ville e
<p>Unit 5:Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.</p>	Wa yne
<p>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.</p>	Go dda

rd, “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,

WSE-301 - Finite Element Method in Structural Engineering(Credits- 3:0:0 = 3)

Teaching Scheme Lectures: 3 hrs/week

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

1. Use Finite Element Method for structural analysis.
2. Execute the Finite Element Program/ Software.
3. Solve continuum problems using finite element analysis.

Syllabus Contents:

- ☐ **Introduction:** History and Applications. Spring and Bar Elements, Minimum Potential Energy Principle, Direct Stiffness Method, Nodal Equilibrium equations, Assembly of Global Stiffness Matrix, Element Strain and Stress.
- ☐ **Beam Elements:** Flexure Element, Element Stiffness Matrix, Element Load Vector.
- ☐ **Method of Weighted Residuals:** Galerkin Finite Element Method, Application to Structural Elements, Interpolation Functions, Compatibility and Completeness Requirements, Polynomial Forms, Applications.
- ☐ **Types:** Triangular Elements, Rectangular Elements, Three-Dimensional Elements, Isoparametric Formulation, Axi-Symmetric Elements, Numerical Integration, Gaussian Quadrature.
- ☐ **Application to Solid Mechanics:** Plane Stress, CST Element, Plane Strain Rectangular Element, Isoparametric Formulation of the Plane Quadrilateral Element, Axi- Symmetric Stress Analysis, Strain and Stress Computations.
- ☐ **Computer Implementation** of FEM procedure, Pre-Processing, Solution, Post-Processing, Use of Commercial FEA Software.

Reference Books:

- ☐ Finite Element Analysis, Seshu P., Prentice-Hall of India,2005.
- ☐ Concepts and Applications of Finite Element Analysis, Cook R. D., Wiley J., New York, 1995.
- ☐ Fundamentals of Finite Element Analysis, Hutton David, Mc-Graw Hill, 2004.
- ☐ Finite Element Analysis, Buchanan G.R., McGraw Hill Publications, New York, 1995.
- ☐ Finite Element Method, Zienkiewicz O.C. & Taylor R.L. Vol. I, II & III, Elsevier, 2000.
- ☐ Finite Element Methods in Engineering, Belegundu A.D., Chandrupatla, T.R., Prentice Hall India, 1991.

WSE-031– Advanced Steel Design (Credits - 3:0:0 = 3)

Teaching Scheme Lectures: 3 hrs/week

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

1. Design steel structures/ components by different design processes.
2. Analyze and design beams and columns for stability and strength, and drift.
3. Design welded and bolted connections.

Syllabus Contents:

☐ **Properties of Steel:** Mechanical Properties, Hysteresis, Ductility.

Hot Rolled Sections: compactness and non-compactness, slenderness, residual stresses.

☐ **Design of Steel Structures:** Inelastic Bending Curvature, Plastic Moments, Design Criteria Stability, Strength, Drift.

☐ **Stability of Beams:** Local Buckling of Compression Flange & Web, Lateral Torsional Buckling.

☐ **Stability of Columns:** Slenderness Ratio, Local Buckling of Flanges and Web, Bracing of Column about Weak Axis.

☐ **Method of Designs:** Allowable Stress Design, Plastic Design, Load and Resistance Factor Design;

☐ **Strength Criteria:** Beams - Flexure, Shear, Torsion, Columns - Moment Magnification Factor, Effective Length, PM Interaction, Biaxial Bending, Joint Panel Zones.

Drift Criteria: P Effect, Deformation Based Design;

Connections: Welded, Bolted, Location Beam Column, Column Foundation, Splices.

Reference Books:

☐ Design of Steel Structures - Vol. II, Ramchandra. Standard Book House, Delhi.

☐ Design of Steel Structures - Arya A. S., Ajmani J. L., Nemchand and Bros., Roorkee.

☐ The Steel Skeleton- Vol. II, Plastic Behaviour and Design - Baker J. F., Horne M. R., Heyman J., ELBS.

☐ Plastic Methods of Structural Analysis, Neal B. G., Chapman and Hall London.

☐ IS 800: 2007 – General Construction in Steel - Code of Practice, BIS, 2007.

☐ SP – 6 - Handbook of Structural Steel Detailing, BIS, 1987

WSE-311 Model Testing Lab (Credits- 0:0:4 = 2)

Teaching Scheme Lectures: 2 hrs/week,

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

1. Understand the response of structures.
2. Prepare the models.
3. Conduct model testing for static loading
4. Conduct model testing for free and forced vibrations

Syllabus Content:

☐ Response of structures and its elements against extreme loading events.

☐ Model Testing: Static - testing of plates, shells, and frames models.

☐ Model Testing: Free and forced vibrations, Evaluation of dynamic modulus.

☐ Beam vibrations, Vibration isolation, Shear wall building model, Time and frequency-domain study, Vibration Characteristics of RC Beams using Piezoelectric Sensors etc.

