SRINIVAS UNIVERSITY

# Mukka,Mangaluru–574146

Web:[www.srinivasuniversity.ac.in](http://www.srinivasuniversity.ac.in/)

**[In compliance of University Grants Commission (Minimum Standards and Procedures for Award ofPh.D. Degree) Regulations, 2016]**

**COURSEWORK SYLLABUS OF Ph.D. PROGRAMME IN CIVIL ENGINEERING**

**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

# MUKKA, Mangaluru–574 146.

## SRINIVASUNIVERSITY

**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**Ph.D. PROGRAMME**

## SYLLABUSOFCOURSEWORK

### COURSEWORKPATTERN 400 M

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Sl.****No.** | **Subjects** | **Exam(Hours)** | **Credits** | **InternalMarks** | **ExternalMarks** | **Marks** |
| 1 | Research Methodology  | 2 | 4 | 50 | 50 | 100 |
| 2 | Structural Engineering | 2 | 4 | 50 | 50 | 100 |
| 3 | Patent analysis and Presentation | 2 | 4 | 50 | 50 | 100 |
| 4 | Review of Literature leading to publish of review paper in journal | 2 | 4 | 50 | 50 | 100 |
| **Total** |  | **16** | **200** | **200** | **400** |

**COURSEWORKSYLLABUS**

**RESEARCH METHODOLOGY (22SPHDRM)**

**COMMON TO ALL ENGINEERING BRANCHES**

**Module-1:**

Meaning, Objectives and Characteristics of research - Research methods Vs Methodology - Types of research - Descriptive Vs. Analytical, Applied Vs. Fundamental, Quantitative Vs. Qualitative, Conceptual Vs. Empirical - Research process - Criteria of good research -Developing a research plan. Defining the research problem - Selecting the problem - Necessity of defining the problem -Techniques involved in defining the problem - Importance of literature review in defining a problem - Survey of literature - Primary and secondary sources – Development of working hypothesis.

**Module -2:**

Research design and methods – Research design – Basic Principles- Need of research design –– Features of good design – Important concepts relating to research design – Observation and Facts, Laws and Theories, Prediction and explanation, Induction, Deduction, Development of Models - Developing a research plan - Exploration, Description, Diagnosis, and Experimentation- Determining experimental and sample designs.

**Module -3:**

Sampling design - Steps in sampling design - Characteristics of a good sample design - Types of sample designs - Measurement and scaling techniques - Methods of data collection – Collection of primary data - Data collection instruments Testing of hypotheses - Basic concepts - Procedure for hypotheses testing flow diagram for hypotheses testing - Data analysis with Statistical Packages – Correlation and Regression - Important parametric test - Chi-square test - Analysis of variance and Covariance

**Module -4:**

IPRs- Invention and Creativity- Intellectual Property-Importance and Protection of Intellectual Property Rights (IPRs) - A brief summary of: Patents, Copyrights, Trademarks, Industrial Designs- Integrated Circuits-Geographical Indications-Establishment of WIPO-Application and Procedures.

**Module-5:**

 Interpretation and report writing - Techniques of interpretation - Structure and components of scientific reports - Different steps in the preparation - Layout, structure and language of the report - Illustrations and tables - Types of report - Technical reports and thesis

REFERENCES:

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2021. An introduction to Research Methodology, RBSA Publishers.

2. Kothari, C.R., 2015. Research Methodology: Methods and Techniques. New Age International. 418p. 3. Anderson, T. W., An Introduction to Multivariate Statistical Analysis, Wiley Eastern Pvt., Ltd., New Delhi

4. Sinha, S.C. and Dhiman, A.K., 2012. Research Methodology, EssEss Publications. 2 volumes. se knowledge base, Atomic Dog Publishing.

5. Trochim, W.M.K., 2015. Research Methods: the conci 270p.

6. Fink, A., 2019. Conducting Research Literature Reviews: From the Internet to Paper. Sage Publications

7. Intellectual Property Rights in the Global Economy: Keith Eugene Maskus, Institute for International Economics, Washington, DC, 2019

8. Subbarau NRHandbook on Intellectual Property Law and Practice Publishing Private Limited.2008S Viswanathan Printers

**STRUCTURAL ENGINEERING (22SPHDCV01)**

**Module -1:**

Concrete as construction material, mix design of light weight concrete construction, Ferro cement, cracking moment and design of Ferro cement elements under tension, Fibre reinforced concrete, polymers in concrete, RPC, SCC, FRSCC and whisper concrete. High density and high strength concrete.

**Module -2:**

Review of design philosophy, properties of structural concrete, behavior of members in flexure, axial load, shear and torsion, bond and anchorage, cracking, codal provisions, ductility, detailing procedure, Prestressed concrete, ultimate strength in flexure, shear, torsion and combined loading, deflection and crack widths. Continuous beams and portal frames.

**Module -3:**

Analysis of stresses, analysis of strain, stress-strain relations, extension, torsion and flexure of beams, Principal stresses and strains, two and three dimensional elasticity problems, theory of plasticity, yield criteria, Prandtl-Reuss Equation

**Module -4:**

Matrix formulation in structural dynamics, lumped and consistent mass matrices, condensation of stiffness matrices, Analysis of normal modes, Modal superposition and direct integration for dynamic response, Transfer matrices

**Module-5:**

Descrete and continuous structures, Force and displacement method of structural analysis, Different types of finite elements in elasticity, beams plates and shells. Application to dynamic and nonlinear problems. Discussion of matrix manipulations and accuracy

**REFERENCES:**

 1. M.S.Shetty, “Concrete Technology” – Theory and Practice, S.Chand and Company, New Delhi

 2. Neville A. M., “Properties of Concrete”, ELBS, London

3. Pallai and Menon., “Reinforced concrete Design”, TMH Education Private Limited

4. Dr. B. C. Punmia, Ashok Kr. Jain, Arun Kr. Jain, “Reinforced Concrete Structures”, Volume 1.

5. N. Krishna Raju , “Pre-stressed Concrete” : Thermodynamics, Tata Mc. Graw Publishers

 6. P. Dayarathnam, “Pre-stressed Concrete”, Oxford and IBH Publishing Co.

7. Chemical Kinetics and Dynamics; Jeffrey I Steinfeld, Joseph S. Francisco and William L. Hase. Prentice Hall, 2nd edition, 1998.

 8. T.Y. Lin and Ned H. Burns; “Design of pre-stressed concrete structures", John Wiley and Sons, New York.

9. Mario Paz, William E. Leigh., “Structural Dynamics: Theory and Computation”, Kluver Academic Publishers.

10. Clough & Penzen, “Structural Dynamics”, TMH.

11. Timoshenko. S.P. and Goodier. J.N. “Theory of Elasticity” – International students- Edition McGraw Hill Book Co. Inc., New Delhi.

12. Srinath.L.S. “Advanced Mechanics of Solids”, Tata McGraw Hill Publications Co.Ltd., New Delhi

13. Chadrupatla “Finite Element Analysis for Engineering and Technology” Tirupathi R., University Press, India

14. Zienkeiwicz. O.C. “The Finite Element Method”, Tata McGraw Hill Co. Ltd., New Delhi.

**Patent analysis and Presentation (22SPHDCV02)**

Student should submit the review of literature of granted patents in the form of report and presnt the report in front of the committee.Report carries 50 percent weightage and presentation carries 50 percentage weightage.

**Review ofLiterature leading to publish of review paper in journal (22SPHDCV03)**

Student should submit the review of literature of published papersand publish this work in peer reviewed journals. Present the paper in front of the committee.Published paper carries 50 percent weightage and presentation carries 50 percentage weightage.

**Examination patterns**

For Research methodology and Structural Engineering carries 50 percentage for assignments. Students are required to submit the hand written assignment given by the guide and it carries 50 percent weightage.

Examination will be conducted for remaining 50 percentage. Question paper pattern will be as follows

Two question from each module will be asked in the exam. Students are required write any one of the question. Each question will carry 10 marks.

NOTE: One research methodology online course should be completed and students are required to submit the certificate compulsorily.