



**Shirpur Education Society's**

**R. C. Patel Institute of Technology, Shirpur**  
**(An Autonomous Institute)**

**Course Structure and Syllabus**  
**Second Year B. Tech (Civil Engineering)**

**With effect from Year 2025-26**



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**R. C. PATEL**  
**INSTITUTE OF TECHNOLOGY**  
An Autonomous Institute

## **Department of Civil Engineering**

### **Vision of the Institute**

To become a leading Institute in Technical education fostering innovation, research, ethical values, and sustainable development for the betterment of society.

### **Mission of the Institute**

To impart high quality Technical Education through:

- M1.** Innovative and Interactive learning process and high quality, globally recognized instructional programs.
- M2.** Fostering a collaborative scientific temper among students with ethical responsibility towards the society.
- M3.** Preparing students from diverse backgrounds to have aptitude for employment, entrepreneurship and research with a spirit of Professionalism.
- M4.** To contribute to nation's sustainable development.

### **Vision of the Civil Engineering**

To provide quality Civil engineering education with socio-moral values catering to the need of nation and globe.

### **Mission of the Civil Engineering**

- M1:** Provide civil engineering education with technical and ethical excellence.
- M2:** Empower students through innovation, research, and sustainable engineering design.
- M3:** Prepare civil engineers with research skills and entrepreneurial career mindset.

### **Program Educational Objectives (PEOs) of the Department**

- PEO 1** Graduates will apply scientific, mathematical, and engineering principles to solve complex civil problems ethically and sustainably.
- PEO 2** Graduates will design and implement resilient civil solutions addressing societal needs through innovation, collaboration, and environmental responsibility.
- PEO 3** Graduates will exhibit professional competence, communication, teamwork, and lifelong learning for career advancement, entrepreneurship, and higher education.



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## **Department of Civil Engineering**

### **Program Specific Outcomes (PSOs)**

**PSO 1-** Graduates will apply core Civil Engineering principles to survey, plan, analyze, design, and manage infrastructure systems using innovative, sustainable, and efficient approaches for real-world challenges.

**PSO 2-** Graduates will uphold ethical professional practice, collaborate effectively in teams, and communicate clearly to enhance employability skills while fostering entrepreneurial ventures in diverse civil engineering contexts.

| Second Year B. Tech Civil Engineering - Semester-III (w. e. f. 2025-26) |                 |              |                                           |                 |   |    |                       |                   |                   |                        |       |         |       |     |
|-------------------------------------------------------------------------|-----------------|--------------|-------------------------------------------|-----------------|---|----|-----------------------|-------------------|-------------------|------------------------|-------|---------|-------|-----|
| S. No                                                                   | Course Category | Course Code  | Course Title                              | Teaching Scheme |   |    | Evaluation Scheme     |                   |                   |                        | Total | Credit  | Total |     |
|                                                                         |                 |              |                                           | L               | T | P  | Continuous Assessment |                   |                   |                        |       |         |       | ESE |
|                                                                         |                 |              |                                           |                 |   |    | TA                    | Term Test 1 (TT1) | Term Test 2 (TT2) | Average of (TT1 & TT2) |       |         |       |     |
|                                                                         |                 |              |                                           |                 |   |    | [A]                   |                   |                   | [B]                    | [C]   | [A+B+C] |       |     |
| 1                                                                       | PC              | RCP23VPC201  | Mathematics for Civil Engineering         | 3               | - | -  | 25                    | 15                | 15                | 15                     | 60    | 100     | 3     | 3   |
| 2                                                                       | PC              | RCP23VPC202  | Mechanics of Solids                       | 3               | - | -  | 25                    | 15                | 15                | 15                     | 60    | 100     | 3     | 4   |
| 3                                                                       | PC              | RCP23VPC202L | Mechanics of Solids Laboratory            | -               | - | 2  | 25                    | -                 | -                 | -                      | 25    | 50      | 1     |     |
| 4                                                                       | PC              | RCP23VPC203  | Concrete Technology                       | 3               | - | -  | 25                    | 15                | 15                | 15                     | 60    | 100     | 3     | 4   |
| 5                                                                       | PC              | RCP23VPC203L | Concrete Technology Laboratory            | -               | - | 2  | 25                    | -                 | -                 | -                      | 25    | 50      | 1     |     |
| 6                                                                       | PC              | RCP23VPC204L | Building Construction Material Laboratory | -               | - | 2  | 25                    | -                 | -                 | -                      | 25    | 50      | 1     | 1   |
| 7#                                                                      | OE              | RCP23XOE211  | Product Life Cycle Management             | 3               | - | -  | 25                    | 15                | 15                | 15                     | 60    | 100     | 3     | 3   |
|                                                                         |                 | RCP23XOE212  | Management Information System             |                 |   |    |                       |                   |                   |                        |       |         |       |     |
|                                                                         |                 | RCP23XOE213  | Operations Research                       |                 |   |    |                       |                   |                   |                        |       |         |       |     |
|                                                                         |                 | RCP23XOE214  | Personal Finance Management               |                 |   |    |                       |                   |                   |                        |       |         |       |     |
|                                                                         |                 | RCP23XOE215  | Public System and Policies                |                 |   |    |                       |                   |                   |                        |       |         |       |     |
|                                                                         |                 | RCP23XOE216  | Fundamentals of Biomedical                |                 |   |    |                       |                   |                   |                        |       |         |       |     |
|                                                                         |                 | RCP23XOE217  | IPR and Patenting                         |                 |   |    |                       |                   |                   |                        |       |         |       |     |
|                                                                         |                 | RCP23XOE218  | Entrepreneurship and Startup Ecosystem    |                 |   |    |                       |                   |                   |                        |       |         |       |     |
| 8                                                                       | MD              | RCP23VMD201  | Automation in Construction                | 2               | - | -  | 25                    | 15                | 15                | 15                     | 60    | 100     | 2     | 2   |
| 9                                                                       | HS              | RCP23XHS232  | Universal Human Values                    | 3               | - | -  | 25                    | 15                | 15                | 15                     | 60    | 100     | 3     | 3   |
| 10                                                                      | SC              | RCP23XSC201P | Semester Project-I                        | -               | - | 2  | 25                    | -                 | -                 | -                      | 25    | 50      | 1     | 1   |
| 11                                                                      | EL              | RCP23XEL201  | Community Engagement Service              | -               | - | 2  | 25                    | -                 | -                 | -                      | -     | 25      | 1     | 1   |
| Total                                                                   |                 |              |                                           | 17              | - | 10 | 275                   | 90                | 90                | 90                     | 460   | 825     | 22    | 22  |

TA-Teacher Assessment, ESE- End Semester Examination

Prepared by

Checked by

Dean Academic/Dy. Director

C.O.E



BOS Chairman

Director

## Second Year B. Tech Civil Engineering - Semester-IV (w. e. f. 2025-26) NEP

| S. No. | Course Category | Course Code  | Course Title                                 | Teaching Scheme |   |    | Evaluation Scheme          |                   |                   |                        |     | Total | Credit | Total |
|--------|-----------------|--------------|----------------------------------------------|-----------------|---|----|----------------------------|-------------------|-------------------|------------------------|-----|-------|--------|-------|
|        |                 |              |                                              | L               | T | P  | Continuous Assessment (CA) |                   |                   |                        | ESE |       |        |       |
|        |                 |              |                                              |                 |   |    | TA                         | Term Test 1 (TT1) | Term Test 2 (TT2) | Average of (TT1 & TT2) |     |       |        |       |
|        |                 |              |                                              |                 |   |    |                            |                   |                   |                        |     |       |        |       |
| 1      | PC              | RCP23VCPC401 | Fluid Mechanics                              | 3               | - |    | 25                         | 15                | 15                | 15                     | 60  | 100   | 3      | 4     |
| 2      | PC              | RCP23VLPC401 | Fluid Mechanics - Laboratory                 |                 |   | 2  | 25                         |                   |                   |                        | 25  | 50    | 1      |       |
| 3      | PC              | RCP23VCPC402 | Surveying                                    | 2               |   |    | 25                         | 15                | 15                | 15                     | 60  | 120   | 2      | 3     |
| 4      | PC              | RCP23VLPC402 | Surveying Laboratory                         |                 |   | 2  | 25                         |                   |                   |                        | 25  | 50    | 1      |       |
| 5      | PC              | RCP23VCPC403 | Structural Analysis                          | 3               | - |    | 25                         | 15                | 15                | 15                     | 60  | 100   | 3      | 3     |
| 6      | PC              | RCP23VCPC404 | Building Planning & Design                   | 2               |   |    | 25                         | 15                | 15                | 15                     | 60  | 100   | 2      | 3     |
| 7      | PC              | RCP23VLPC404 | Building Planning & Design Laboratory        |                 |   | 2  | 25                         |                   |                   |                        | 25  | 50    | 1      |       |
| 8      | MD              | RCP23VCMD401 | Remote Sensing & GIS                         | 2               |   |    | 25                         | 15                | 15                | 15                     | 60  | 100   | 2      | 2     |
| 8#     | OE              | RCP23OCOE401 | Project Management                           | 3               |   |    | 25                         | 15                | 15                | 15                     | 60  | 100   | 3      | 3     |
|        |                 | RCP23OCOE402 | Cyber Security & Laws                        |                 |   |    |                            |                   |                   |                        |     |       |        |       |
|        |                 | RCP23OCOE403 | Advanced Operations Research                 |                 |   |    |                            |                   |                   |                        |     |       |        |       |
|        |                 | RCP23OCOE404 | Corporate Finance Management                 |                 |   |    |                            |                   |                   |                        |     |       |        |       |
|        |                 | RCP23OCOE405 | Corporate Social Responsibility              |                 |   |    |                            |                   |                   |                        |     |       |        |       |
|        |                 | RCP23OCOE406 | Bio Informatics                              |                 |   |    |                            |                   |                   |                        |     |       |        |       |
|        |                 | RCP23OCOE407 | Human Resource Management                    |                 |   |    |                            |                   |                   |                        |     |       |        |       |
|        |                 | RCP23OCOE408 | Digital Marketing Management                 |                 |   |    |                            |                   |                   |                        |     |       |        |       |
|        |                 | RCP23OCOE409 | Logistics & Supply Chain Management          |                 |   |    |                            |                   |                   |                        |     |       |        |       |
| 10     | HS              | RCPXHS281T   | Professional Business communication Tutorial |                 | 2 |    | 50                         |                   |                   |                        |     | 50    | 1      | 1     |
| 11     | SC              | RCP23XSC202P | Semester Project-II                          |                 |   | 2  | 25                         |                   |                   |                        | 25  | 50    | 1      | 1     |
| 12     | HS              | RCP23XHS283L | Design Thinking Laboratory                   |                 |   | 2  | 50                         |                   |                   |                        |     | 50    | 2      | 2     |
|        |                 |              | TOTAL                                        | 15              | 2 | 10 | 350                        | 90                | 90                | 90                     | 460 | 900   | 22     | 22    |

TA-Teacher Assessment, ESE- End Semester Examination

Prepared by

Dean Academic/Dy. Director

Checked by

C.O.E



BOS Chairman

Director

SEM

III

|                                                        |                 |                      |
|--------------------------------------------------------|-----------------|----------------------|
| <b>Program : Civil Engineering</b>                     | <b>SY BTECH</b> | <b>Semester: III</b> |
| <b>Mathematics for Civil Engineering (RCP23VPC201)</b> |                 |                      |

**Pre-requisite**

- 1) Engineering Mathematics

**Course Objectives**

To inculcate an ability to relate engineering problems to mathematical context.

1. To provide a solid foundation in mathematical fundamentals required to solve engineering problems.
2. To inculcate an ability to use the fundamentals of linear algebra to solve Civil engineering problems.
3. To study the basic principles of linear algebra, vector calculus, and transforms like Laplace and Fourier.

| <b>COs</b> | <b>Course Outcomes</b>                                                                                                                         | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Evaluate functions of square matrices using eigenvalues and eigenvectors                                                                       | 5                   | Evaluate                  |
| <b>CO2</b> | Use Laplace and Inverse Laplace to solve Ordinary Differential Equations.                                                                      | 3                   | Apply                     |
| <b>CO3</b> | Apply Fourier series and Fourier integral methods to represent periodic functions and compute Fourier transform and inverse Fourier transform. | 3                   | Apply                     |
| <b>CO4</b> | Correlate statistical methods and probability distributions to solve civil engineering problems.                                               | 4                   | Analyze                   |

## Course Content

|                                                                                                                                                                                                                                                                                                                                                                                     |                                                 |               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|---------------|
| <b>Unit-I</b>                                                                                                                                                                                                                                                                                                                                                                       | <b>Linear Algebra</b>                           | <b>08 Hrs</b> |
| Linear Algebra Characteristic equation, Eigenvalues and Eigenvectors with properties. Cayley-Hamilton theorem. Diagonalizability of matrices. Functions of square matrix.                                                                                                                                                                                                           |                                                 |               |
| <b>Unit-II</b>                                                                                                                                                                                                                                                                                                                                                                      | <b>Laplace Transform (LT)</b>                   | <b>08 Hrs</b> |
| LT of standard functions such as $1, t^n, e^{at}, \sin at, \cos at, \sinh at, \cosh at$ . Linearity property of Laplace Transform, First Shifting property, Change of Scale property of L.T. (without proof).                                                                                                                                                                       |                                                 |               |
| $L\{t^n f(t)\}, L\left\{\frac{f(t)}{t}\right\}, L\left\{\int_0^t f(u)du\right\}, L\left\{\frac{d^n f(t)}{dt^n}\right\}$                                                                                                                                                                                                                                                             |                                                 |               |
| <b>Unit-III</b>                                                                                                                                                                                                                                                                                                                                                                     | <b>Inverse Laplace Transform</b>                | <b>08 Hrs</b> |
| Inverse Laplace Transform Linearity property, Partial fractions method and convolution theorem. Applications to solve ordinary differential equations with one dependent variable with given boundary conditions. Laplace Transform of special functions (Flip classroom - self-study) Heaviside Unit step function, Dirac Delta function, Periodic functions                       |                                                 |               |
| <b>Unit-IV</b>                                                                                                                                                                                                                                                                                                                                                                      | <b>Fourier Series and Fourier Transform</b>     | <b>10 Hrs</b> |
| Fourier series :<br>Definition, Dirichlet's conditions, Fourier series of periodic function with period $2\pi$ & $2l$ . Even and odd functions, Half range sine and cosine series, Parseval's identities (without proof)<br>Fourier Transform (FT) :<br>Fourier integral theorem (only statement), Fourier transform, Fourier sine & cosine transforms, Inverse Fourier Transforms. |                                                 |               |
| <b>Unit-V</b>                                                                                                                                                                                                                                                                                                                                                                       | <b>Statistic &amp; Probability Distribution</b> | <b>08 Hrs</b> |
| Coefficient of Correlation, Lines of Regression if Bivariate Data fitting of curve (Line and Parabola) by Least square, Random Variable, Discrete and Continuous Probability Distribution Binomial, Poisson and Normal Distribution, Application to Civil Engineering                                                                                                               |                                                 |               |

## **References / Text Books / List of experiments / Assignment**

### **Text Books**

1. Seymour Lipschutz and Marc Lipson, "Linear Algebra", 4th Edition, Schaum's outlines, 2008.
2. Gilbert Strang, "Linear Algebra and its Applications", 4th Edition, Cengage, 2005.
3. B. S. Grewal, 'Higher Engineering Mathematics', Khanna Publication.

### **Reference Books:**

1. Erwin Kreyszig, 'Advanced Engineering Mathematics', Wiley India
2. Deisenth, Faisal, Ong, 'Mathematics for machine learning', Cambridge University Press

|                                                      |                 |                      |
|------------------------------------------------------|-----------------|----------------------|
| <b>Program : Civil Engineering</b>                   | <b>SY BTECH</b> | <b>Semester: III</b> |
| <b>Mechanics of Solids (RCP23VPC202T)</b>            |                 |                      |
| <b>Mechanics of Solids Laboratory (RCP23VPC202L)</b> |                 |                      |

#### **Pre-requisite**

- 1) Engineering Mechanics
- 2) Engineering Physics
- 3) Engineering Mathematics

#### **Course Objectives:**

1. To gain knowledge of the effect of external action on elastic body.
2. To understand the different engineering properties of the materials.
3. To analyses the stress, strain and deformation of elastic bodies under external actions and to compute design forces.

| <b>COs</b> | <b>Course Outcomes</b>                                                                                                                                                                               | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Remember stress - strain behavior and other physical properties of material, Compute type of stresses in determinate, indeterminate, structures                                                      | 1                   | Remember                  |
| <b>CO2</b> | Develop bending and shear stress diagram for various cross sections of beam                                                                                                                          | 2                   | Understand                |
| <b>CO3</b> | Determine the torsional stresses and stresses due to strain energy for different loading conditions                                                                                                  | 5                   | Evaluate                  |
| <b>CO4</b> | Plot axial force diagram, Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) for determinate structural elements.                                                                            | 3                   | Apply                     |
| <b>CO5</b> | Analyze axially and eccentrically loaded column, Explain the concept of principal stresses due to combined loading and able to compare the values of analytical and graphical (Mohr's circle) method | 4                   | Analyse                   |

## Course Content

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|---------------|
| <b>Unit-I</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Simple Stresses and Strains</b>                            | <b>8 Hrs</b>  |
| Definitions of stress, strain, modulus of elasticity, modulus of rigidity, bulk modulus, and yield stress, ultimate stress, factor of safety and shear stress. Hooke's law, and stress – strain relationship, Poisson ratio, bars of varying sections, stress due to self-weight. Composite sections, volumetric strain, elastic constants and relations between them, temperature stresses.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                               |               |
| <b>Unit-II</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Bending and Shear Stresses</b>                             | <b>8 Hrs</b>  |
| Concept and determination of Moment of Inertia for various cross-section Stress due to bending: theory of simple or pure bending, Assumptions, derivation of flexure formula, bending stress distribution diagrams, Moment of Resistance of cross-section. b) Shear stresses in beams: concept of shear, complimentary shear, derivation of shear stress formula, shear stress distribution for various cross sections, maximum and average shear stress for circular and rectangular sections and shear connectors.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                               |               |
| <b>Unit-III</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>Torsion and Strain Energy</b>                              | <b>8 Hrs</b>  |
| a) Torsion of circular shafts: Theory of pure torsion, torsional moment of resistance, power transmitted by shafts, torsional rigidity, shear stresses in shafts due to torsion, stress & strain in determinate shafts of hollow or solid cross-sections. b) Strain energy and impact: concept of strain energy, expression of strain energy for axially loaded member under gradual, sudden and impact loads. Strain energy due to self-weight.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                               |               |
| <b>Unit-IV</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Shear Force and Bending Moment Diagram</b>                 | <b>10 Hrs</b> |
| a) Concept of shear force and bending moment Relation between shear force, bending moment and intensity of loading. Shear force and bending moment diagrams for cantilevers, simple and compound beams due to concentrated, uniformly distributed, uniformly varying loads and couples in determinate beams. b) Bending moment and loading diagram from given shear force diagram. Shear force and loading diagram from given bending moment diagram. vibrations of an elastic string its solution using Fourier series. Heat equation, steady-state configuration for heat flow (For Self-Study)                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                               |               |
| <b>Unit-V</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Axially Loaded Columns, Principal Stresses and Strains</b> | <b>8 Hrs</b>  |
| a) Axially loaded columns: concept of critical load and buckling, Euler's formula for buckling load with hinged ends, concept of equivalent length for various end conditions, Rankine's formula, safe load on column and limitations of Euler's formula. b) Direct and bending stresses for eccentrically loaded short column, the middle third rule. Resultant stress diagrams due to axial loads, uni-axial, and bi-axial bending concept of core of section for solid and hollow rectangular and circular sections. a) Axially loaded columns: concept of critical load and buckling, Euler's formula for buckling load with hinged ends, concept of equivalent length for various end conditions, Rankine's formula, safe load on column and limitations of Euler's formula. b) Direct and bending stresses for eccentrically loaded short column, the middle third rule. Resultant stress diagrams due to axial loads, uni-axial, and bi-axial bending concept of core of section for solid and hollow rectangular |                                                               |               |

## **References / Text Books / List of experiments / Assignment**

### **Reference Books**

- S. Timoshenko and Young, Engineering Mechanics, Tata McGraw Hill, 2013. (ISBN: 9781259062667/125906266X).
- W. A. Nash Strength of Material, Schaum's Outline Series, McGraw Hill, 4th edition, 1998. (ISBN-9780071830805/978-0071830805).
- S. Timoshenko and Gere, Mechanics of Materials, PWS Publication Co. Ltd., 3rd edition, 1997. (ISBN-0534921744/9780534921743).
- G.H. Ryder, Strength of Materials, Prentice Hall Publications, 3rd edition, 2002. (ISBN:9780333935361/0333935365).

### **Text Books**

- S.S. Bhavikatti, Strength of Material, Vikas Publishing House Pvt. Ltd., 3rd edition, 2013. (ISBN: 9789325971578/9325971577).
- R.K. Rajput, Strength of Materials, S. Chand Publications. 7th Edition, 2018, (ISBN)
- R.K. Bansal "Strength of Materials", Laxmi Publications. 6th Edition, 2018 (ISBN- 10: 9788131808146, ISBN-13: 978-8131808146)
- S Ramamrutham "Strength of Materials", Dhanpat Rai Publications. 2017, ISBN-10: 9352164385, ISBN-13: 978-9352164387

### **List of experiments**

Term work shall consist of performing experimental sets from the list below.

1. Tensile test on Mild steel.
2. Shear test on Mild steel.
3. Torsion test on Mild steel.
4. Compression test on wood or concrete
5. Rockwell hardness test on different metals.
6. To determine impact strength of steel. (By Izod test)
7. To determine impact strength of steel. (By Charpy test)
8. Bending test on timber

|                                                      |                 |                      |
|------------------------------------------------------|-----------------|----------------------|
| <b>Program : Civil Engineering</b>                   | <b>SY BTECH</b> | <b>Semester: III</b> |
| <b>Concrete Technology (RCP23VPC203)</b>             |                 |                      |
| <b>Concrete Technology Laboratory (RCP23VPC203L)</b> |                 |                      |

### **Course Objectives**

1. To introduce the student's Basic ingredients of concrete and their properties.
2. The students should be able to illustrate and control method of manufacture of concrete.
3. Understand effect of admixtures on the behaviour of the fresh and hardened concrete.
4. The students should be able to design and recommend the mix of concrete for given materials.
5. Students will able to Learn various NDT methods used for inspection of concrete.

| <b>COs</b> | <b>Course Outcomes</b>                        | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|-----------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Learn The Different Properties of Ingredients | 1                   | Remembering               |
| <b>CO2</b> | Explain Manufacturing Process of Concrete     | 2                   | Understand                |
| <b>CO3</b> | Explain Effects of Admixture on Concrete      | 2                   | Understand                |
| <b>CO4</b> | Prepare Concrete Mix Design                   | 4                   | Analyzing                 |
| <b>CO5</b> | Learn Various NDT Methods                     | 5                   | Evaluating                |

## **Course Content**

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|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|---------------|
| <b>Unit-I</b>                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>Cement, Aggregate and water</b>                         | <b>8 Hrs</b>  |
| Cement: - Manufacture of cement, chemical composition, setting and hydration of cement. Types of cement, Properties and testing of cement. Aggregates – Classification, properties, grading, impurities in aggregates and testing of aggregates, its effect on strength of concrete. Quantity of water for concrete.                                                                                                                                |                                                            |               |
| <b>Unit-II</b>                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>Fresh and Hardened Concrete</b>                         | <b>8 Hrs</b>  |
| Fresh Concrete: - Definition and its ingredients, grades of concrete, concreting process, Significance of water cement ratio. Properties of fresh concrete. Hardened Concrete- Various properties of hardened concrete, factors affecting various properties, and stress - strain relation, Creep and Shrinkage testing of hardened concrete. Permeability and Durability of concrete                                                               |                                                            |               |
| <b>Unit-III</b>                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>Admixture and Special Concrete</b>                      | <b>10 Hrs</b> |
| Admixtures in Concrete: Types, Plasticizers and Super-plasticizers & their Effects on Workability. Types of Concrete: - Lightweight concrete, polymer concrete, fiber reinforced concrete, ready mixed concrete, self-compacting and high performance concrete, Ferro cement concrete. Special concrete- Transparent concrete, cellular light wt. concrete, pre-stressed concrete, under water concreting, concreting in extreme weather conditions |                                                            |               |
| <b>Unit-IV</b>                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>Concrete mix Design</b>                                 | <b>8 Hrs</b>  |
| Introduction, to concrete mix design object of mix design, factors to be considered, statistical quality control, different methods of mix design. Concrete mix design by I.S. (10262-456) method and IRC method                                                                                                                                                                                                                                    |                                                            |               |
| <b>Unit-V</b>                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>Introduction to NDT &amp; Deterioration of concrete</b> | <b>8 Hrs</b>  |
| Introduction to non-destructive testing of concrete, rebound hammer, ultrasonic pulse velocity, pull out test, impact echo test. Deterioration of concrete Sulphate Attack, Alkali Aggregate Reaction (AAR) factors affecting on AAR, Deteriorating effects of AAR, Chloride Attack, Corrosion of Steel.                                                                                                                                            |                                                            |               |

## **References / Text Books / List of experiments / Assignment**

### References / Text Books

#### Reference Books

- Concrete Technology by A.N. Neville, J.J. Brooks, Addison Wesley
- Concrete Technology by R.S. Varshney, Oxford & I B H.
- Concrete Technology by P Kumar Mehta, Gujarat Ambuja Text Books
- Concrete Technology by M. S. Shetty, S Chand Publication.
  
- Concrete Technology by M. L. Gambhir, TMH Publication.
- Concrete Technology by S.V. Deodhar, Central Techno Publication
- Concrete Technology by N.V. Nayak & A.K. Jain, Narosa Publishing House Pvt. Ltd.

#### List of experiments

Term work shall consist of performing experimental sets from the list below.

1. Testing of Cement: Consistency, Fineness, Setting Time, Specific Gravity,
2. Soundness and Strength Test for Cement
3. Testing of Aggregates: Specific Gravity, Sieve Analysis, Bulking of Fine Aggregate, Flakiness Index, Elongation Index and Percentage Elongation
4. Placement Tests on Concrete: Workability Tests: Slump, Compaction,
5. Strength Tests on Concrete: Compression, Flexure, Split & Tensile Test,
6. Effects of Admixture: Accelerator, Retarder, Super Plasticizer,
7. Exercise and verification of Concrete Mix Design,
8. Non-destructive Testing for Concrete.

|                                                                 |                 |                      |
|-----------------------------------------------------------------|-----------------|----------------------|
| <b>Program : Civil Engineering</b>                              | <b>SY BTECH</b> | <b>Semester: III</b> |
| <b>Building Construction Material Laboratory (RCP23VPC204L)</b> |                 |                      |

### Course Objectives

1. Identify the various Building Components in detail.
2. Select and deploy suitable construction technique and methods for various construction of masonry works.
3. To select materials for engineering purpose is very much crucial activity in civil engineering any material of construction, the first and for most necessity is to know its properties, suitability, strength and durability.
4. Check and ensure quality of construction materials and components as per standards and practices

| <b>COs</b> | <b>Course Outcomes</b>                                                                                                                                | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | List and describe the various components of a building along with their functions.                                                                    | 1                   | Remember                  |
| <b>CO2</b> | Explain construction procedure of different components and Ability to Explain types of masonry                                                        | 2                   | Understand                |
| <b>CO3</b> | Illustrate the use of different types of doors, windows, arches, and lintels in practical situations.                                                 | 3                   | Apply                     |
| <b>CO4</b> | Analyse various systems of vertical circulation and their protective coating requirements.                                                            | 4                   | Analyse                   |
| <b>CO5</b> | Evaluate the effectiveness and limitations of various construction materials by analysing their properties, practical uses, and performance outcomes. | 5                   | Evaluate                  |

### **References / Text Books / List of experiments / Assignment**

#### **List of Experiments**

1. Draw a cross section of building.
2. C.C.T.W. Panelled door: plan, elevation, section
  - To know the various types doors and draw the sketches.
  - To describe the various types windows and draw the sketches.
1. Flush door: plan, elevation and section
  - To know the various types doors and draw the sketches.
  - To describe the various types windows and draw the sketches.
1. Lintel/ Arches in stone and bricks.
  - To know various types lintel and arches and draw the sketches
1. Stone masonry: U.C.R., C.R. and Ashlars.
  - To study various types of bonds in brick masonry, reinforced brick masonry.
1. Report writing of (Latest Market survey of Construction Material Rate/Types of Material Available /New Material in Market etc.)

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|----------------------------------------------------|-----------------|----------------------|
| <b>Program : Civil Engineering</b>                 | <b>SY BTECH</b> | <b>Semester: III</b> |
| <b>Product Life Cycle Management (RCP23XOE211)</b> |                 |                      |

### Course Objectives

1. To familiarize the students with the need, benefits and components of PLM.
2. To acquaint students with Product Data Management & PLM strategies.
3. To give insights into new product development program and guidelines for designing and developing a product.
4. To familiarize the students with Virtual Product Development.
5. To acquaint students with the need of Environmental aspects in PLM & its implementation

| <b>COs</b> | <b>Course Outcomes</b>                                                                                       | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|--------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Describe the phases of PLM, PLM strategies and methodology for PLM feasibility study and PDM implementation. | 2                   | Understand                |
| <b>CO2</b> | Demonstrate various approaches and techniques for designing and developing products.                         | 3                   | Apply                     |
| <b>CO3</b> | Demonstrate knowledge in applying virtual product development tools.                                         | 3                   | Apply                     |
| <b>CO4</b> | Demonstrate knowledge in implementation of Environmental aspects in PLM.                                     | 3                   | Apply                     |
| <b>CO5</b> | Analyze the Waterfall and Agile Scrum methodologies for software development projects.                       | 4                   | Analyse                   |

## Course Content

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|---------------|-----------------------------------------------------|---------------|
| <b>Unit-I</b> | <b>Introduction to Product Lifecycle Management</b> | <b>08 Hrs</b> |
|---------------|-----------------------------------------------------|---------------|

Introduction to Product Lifecycle Management (PLM): Product Lifecycle management (PLM), Need for PLM, Product Lifecycle Phases, Opportunities of Globalization, Pre-PLM Environment, PLM Paradigm, Importance & Benefits of PLM, Widespread Impact of PLM, Focus and Application, A PLM Project, Starting the PLM Initiative, PLM Applications. PLM Strategies: Industrial strategies, Strategy elements, its identification, selection and implementation, Developing PLM Vision and PLM Strategy, Change management for PLM.

|                |                                       |               |
|----------------|---------------------------------------|---------------|
| <b>Unit-II</b> | <b>Product Design and Development</b> | <b>07 Hrs</b> |
|----------------|---------------------------------------|---------------|

Product Design and Development: Product Design and Development Process, Engineering Design, Organization and Decomposition in Product Design, Typologies of Design Process Models, Reference Model, Product Design in the Context of the Product Development Process, Relation with the Development Process Planning Phase, and Relation with the Post Design Planning Phase.

|                 |                                                   |               |
|-----------------|---------------------------------------------------|---------------|
| <b>Unit-III</b> | <b>Methodological Evolution of Product Design</b> | <b>06 Hrs</b> |
|-----------------|---------------------------------------------------|---------------|

Methodological Evolution of Product Design: Concurrent Engineering, Characteristic Features of Concurrent Engineering, Concurrent Engineering, Life Cycle Approach, Characteristic Features of Life Cycle Approach. The Design for X System, Objective Properties and Design for X Tools, Choice of Design for X Tools and Their Use in the Design Process. New Product Development (NPD) and Strategies, Product Configuration and Variant Management. Integration of Environmental Aspects in Product Design: Sustainable Development Design for Environment, Need for Life Cycle Environmental Strategies, Useful Life Extension Strategies, End-of-Life Strategies, Introduction of Environmental Strategies into the Design Process, Life Cycle Environmental Strategies and Considerations for Product Design, Tools and techniques for integrated design, Implementation of international standards.

|                |                                |               |
|----------------|--------------------------------|---------------|
| <b>Unit-IV</b> | <b>Product Data Management</b> | <b>06 Hrs</b> |
|----------------|--------------------------------|---------------|

Product Data Management (PDM): Product and Product Data, PDM systems and importance, Components of PDM, Reason for implementing a PDM system, financial justification of PDM, barriers to PDM implementation. Virtual Product Development Tools: For components, machines, and manufacturing plants, 3D CAD systems and realistic rendering techniques, Digital mock-up, Model building, Model analysis, Modelling and simulations in Product Design, Examples/Case studies

|               |                                                                         |  |
|---------------|-------------------------------------------------------------------------|--|
| <b>Unit-V</b> | <b>Engineering Methods for product Duration design &amp; Evaluation</b> |  |
|---------------|-------------------------------------------------------------------------|--|

Engineering Methods for product Duration design & evaluation: Durability of Products and Components, Design for Fatigue, Infinite Life Approach, Design for Finite Life. Product Recovery Planning & Analysis: Approach to the Recovery Problem, Method for Recovery Cycles Planning, Calculation Models for Recovery Cycles Planning, Basic procedure, Determinant Factors for Recovery, Effective Component Reusability, Recovery Fractions, Extension of Useful Life.

## **References / Text Books / List of experiments / Assignment**

### **Reference Books**

1. Saaksvuori Antti, Immonen Anselmie, —Product Life Cycle Management, Springer, Dreamtech, **ISBN: 3540257314**
2. Michael Grieve, —Product Lifecycle Management: Driving the next generation of lean thinking, Tata McGraw Hill, 2006, ISBN: 0070636265
3. Francois Villeneuve, Luc Mathieu, Max Giordano —Product Life-Cycle Management: Geometric Variations. (2010). United Kingdom: Wiley.

### **Text Books**

4. John Stark, — Product Lifecycle Management: Paradigm for 21(st) Century Product Realisationl, Springer-Verlag, 2004. ISBN: 1852338105.
5. Fabio Giudice, Guido La Rosa, Antonino Risitano, — Product Design for the environment-A life cycle approachl, Taylor & Francis 2006, ISBN: 0849327229

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|----------------------------------------------------|-----------------|----------------------|
| <b>Program : Civil Engineering</b>                 | <b>SY BTECH</b> | <b>Semester: III</b> |
| <b>Management Information System (RCP23XOE212)</b> |                 |                      |

**Pre-requisite:** Nil

**Course Objectives:**

1. The course is blend of management and technical field.
2. Discuss the roles played by information technology in today's business and define various technology Architectures on which information systems are built.
3. Define and analyse typical functional information systems and identify how they meet the needs of the firm to deliver efficiency and competitive advantage.
4. Identify the basic steps in systems development.

| <b>COs</b> | <b>Course Outcomes</b>                                                                                                                                               | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Explain the fundamental concepts of the management information systems used in business.                                                                             | 2                   | Understand                |
| <b>CO2</b> | Describe IT infrastructure and its components and its current trends.                                                                                                | 2                   | Understand                |
| <b>CO3</b> | Use the tools and technologies for accessing information from databases to improve business performance and decision making.                                         | 3                   | Apply                     |
| <b>CO4</b> | Identify and explain the security and ethical challenges in MIS along with the measures to be taken.                                                                 | 2                   | Understand                |
| <b>CO5</b> | Select a suitable social computing platform for the given requirements that integrates AI and IoT.                                                                   | 3                   | Apply                     |
| <b>CO6</b> | Explain the processes involved in the information system within the organization includes information acquisition and enterprise and global management technologies. | 2                   | Understand                |

## Course Content

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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|----------------|
| <b>Unit-I</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Foundation Concepts</b>                            | <b>04 Hrs</b>  |
| Foundation Concepts Definition and scope of Management Information Systems (MIS) in business, Functional area information system, The components of information systems, Impact of IT on organizations and society, Business Process and BPI. Business Pressure, Organizational responses. Competitive Advantage and Strategic IS's                                                                                                                                                                                                                                             |                                                       |                |
| <b>Unit-II</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Information Technology Infrastructure</b>          | <b>05 Hrs</b>  |
| Information Technology Infrastructure Overview of IT infrastructure, Hardware and software, Computer systems: End user and enterprise, Computing computer peripherals: Input, output, and storage technologies, Application software: End user applications, System software: Computer system management, Data resource management: Technical foundations of database management, Managing data resources, Big data, Data warehouse and data marts, Knowledge management, Networks: The networked enterprise (wired and wireless), Pervasive computing, Cloud computing models, |                                                       |                |
| <b>Unit-III</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>MIS Tools and applications for Decision making</b> | <b>010 Hrs</b> |
| MIS Tools and applications for Decision making • ERP and ERP support of business • Business intelligence (BI): Managers and Decision Making. •Decision Support System (DSS): types, components, Data mining. • Executive information system. • Role of AI in decision making. • Role of predictive analytics and data visualization in business                                                                                                                                                                                                                                 |                                                       |                |
| <b>Unit-IV</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Security and Ethical Challenges</b>                | <b>08 Hrs</b>  |
| Security and Ethical Challenges • Information security fundamentals, • Key principles of information security, • Common threats and vulnerabilities in MIS, • Security measures and controls, • Access control mechanisms: authentication, authorization, and accounting (AAA), • Encryption techniques and cryptographic protocols • Ethical, and societal challenges of IT, • Legal and regulatory framework, • Privacy Policies                                                                                                                                              |                                                       |                |
| <b>Unit-V</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Social Computing (SC)</b>                          | <b>08 Hrs</b>  |
| Social Computing (SC) Web 2.0 and 3.0: static and dynamic platform, integration with AI and IoT, • SC in business shopping: leveraging social media platforms, Social listening and sentiment analysis, • Social computing in Customer Relationship Management (CRM) , • Marketing, operational and analytic CRM, • E-business and E-commerce – B2B B2C, E-commerce platforms and payment gateways , • Mobile commerce: growth trends, mobile wallets, contactless payments, shopping apps and platforms .                                                                      |                                                       |                |

## **References / Text Books / List of experiments / Assignment**

### **Text Books**

1. A. K. Gupta, “Management Information System”, S. Chand Limited, 2010.
2. K. K. Ghosh, Saini Das, and S. Mukherjee, “Management Information System”, Management, IIT, Kharagpur, 2021

### **Reference Books**

1. J. A. O’Brien, G. Marakas, “Management Information Systems”, McGraw-Hill Companies, Incorporated, 2006.
2. K. Rainer, B. Prince, “Management Information Systems”, Wiley, 2016.

### **Web References**

- Management Information System: <https://nptel.ac.in/courses/110105148>
- Management Information System (Archive):

<https://archive.nptel.ac.in/courses/110/105/110105148/>

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|------------------------------------------|-----------------|----------------------|
| <b>Program : Civil Engineering</b>       | <b>SY BTECH</b> | <b>Semester: III</b> |
| <b>Operations Research (RCP23XOE213)</b> |                 |                      |

**Pre-requisite: Nil**

**Course Objectives:**

1. Formulate a real-world problem as a linear programming problem and able to solve.
2. Understand the optimisation tools that are needed to solve linear programming problems.

| <b>COs</b> | <b>Course Outcomes</b>                                                                                                                                                                      | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Analyze real-world optimization problems by formulating them as Linear Programming Problems (LPP) and interpreting optimal solutions using the Simplex Method or other suitable algorithms. | 1                   | Analyze                   |
| <b>CO2</b> | Solve Linear Programming Problems using transportation and assignment models.                                                                                                               | 3                   | Apply                     |
| <b>CO3</b> | Apply Decision Theory to determine the optimal course of action among available alternatives under conditions of certainty, risk, and uncertainty.                                          | 3                   | Apply                     |
| <b>CO4</b> | Apply Game Theory for decision-making in conflicting situations involving one or more opponents (players).                                                                                  | 3                   | Apply                     |
| <b>CO5</b> | Analyze and solve complex problems by breaking them into smaller subproblems using Dynamic Programming models through recursive or iterative approaches                                     | 1                   | Analyze                   |

## **Course Content**

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|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|---------------|
| <b>Unit-I</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Introduction to Operations Research</b> | <b>12 Hrs</b> |
| Introduction to Operations Research: Introduction, Structure of the Mathematical Model, Limitations of Operations Research. Linear Programming: Introduction, Linear Programming Problem, Requirements of LPP, Mathematical Formulation of LPP, Graphical method, Simplex Method, Penalty Cost Method or Big M-method, Two Phase Method.                                                                                                                       |                                            |               |
| <b>Unit-II</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>Transportation Problem</b>              | <b>08 Hrs</b> |
| Transportation Problem: Formulation, solution, unbalanced Transportation problem. Finding basic feasible solutions – Northwest corner rule, least cost method and Vogel's approximation method. Optimality test: MODI method. Assignment Problem: Introduction, Mathematical Formulation of the Problem, Hungarian Method Algorithm, Processing of n Jobs through Two Machines and m Machines, Graphical Method of Two Jobs m Machines Problem Routing Problem |                                            |               |
| <b>Unit-III</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>Decision Theory</b>                     | <b>06 Hrs</b> |
| Decision Theory: Steps in Decision Theory approach, Decision-making Environment, Decision making under condition of certainty, Decision making under condition of uncertainty, Decision making under condition of risk, Maximum likelihood criterion.                                                                                                                                                                                                          |                                            |               |
| <b>Unit-IV</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>Game Theory</b>                         | <b>6 Hrs</b>  |
| Game Theory: Competitive games, rectangular game, saddle point, minimax/maximin method of optimal strategies, value of the game. Solution of games with saddle points, dominance principle. Rectangular games without saddle point – mixed strategy for 2 X 2 games.                                                                                                                                                                                           |                                            |               |
| <b>Unit-V</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Dynamic programming</b>                 | <b>07 Hrs</b> |
| Dynamic programming: Characteristics of dynamic programming. Dynamic programming approach for Priority Management Employment smoothening, capital budgeting, Stagecoach/Shortest Path, cargo loading and Reliability problems.                                                                                                                                                                                                                                 |                                            |               |

### **References / Text Books / List of experiments / Assignment**

#### **Text Books**

1. Operations Research - An Introduction: Taha, H. A., Pearson Education, 2022.
2. Operations Research, Gupta, P. K. and Hira, D. S., S. Chand Publications, 2014.

#### **Reference Books**

1 Operations Research: Introduction to Models and Methods, Boucherie, R. J., Tijms, H. and Braaksma, A., 2021.

1. Introduction to Operations Research: Hiller, F. S. and Lieberman, G. J., McGrawHill Higher Education, 2010.
2. Operations Research: Principles and Practice: Ravindran, A., Phillips, D. T. and Solberg, J. J., Wiley India Pvt. Limited, 2009

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|--------------------------------------------------|-----------------|----------------------|
| <b>Program : Civil Engineering</b>               | <b>SY BTECH</b> | <b>Semester: III</b> |
| <b>Personal Finance Management (RCP23XOE214)</b> |                 |                      |

**Pre-requisite: Nil**

**Course Objectives:**

1. To create awareness and educate consumers on access to financial services.
2. To make the students understand the basic concepts, definitions and terms related to Direct taxation.
3. To help the students compute the Goods and Service Tax (GST) payable by a supplier after Considering the eligible input tax credit.
4. To familiarize the students with micro finance for accelerating the expansion of local microbusinesses

| <b>COs</b> | <b>Course Outcomes</b>                                                                                                                                                                | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Formulate the real-world optimization problem into a Linear Programming Problem (LPP) and analyses the solution obtained using LPP optimization models                                | 1                   | Remember                  |
| <b>CO2</b> | Solve Linear Programming Problems using transportation and assignment models.                                                                                                         | 4                   | Analyze                   |
| <b>CO3</b> | Apply Decision Theory to determine the optimal course of action when a number of alternatives are available, and their consequences cannot be forecast with certainty and uncertainty | 3                   | Apply                     |
| <b>CO4</b> | Apply Game Theory for decision making under conflicting situations where there are one or more opponents (players).                                                                   | 3                   | Apply                     |
| <b>CO5</b> | To breaking down a large problem into smaller sub problems                                                                                                                            | 1                   | Remember                  |

## Course Content

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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|---------------|
| <b>Unit-I</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Overview of Indian Financial System</b>         | <b>07 Hrs</b> |
| Overview of Indian Financial System: Characteristics, Components and Functions of Financial System. Financial Instruments and Financial Markets, Financial inclusion. Introduction to Personal Finance Personal Financial Planning in Action, Money Management Skills, Taxes in Your Financial Plan, Savings and Payment Services. Consumer Credit: Advantages, Disadvantages, Sources and Costs.                                                                                                                                                                                                                                                                                                                                           |                                                    |               |
| <b>Unit-II</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>Personal Financial Management</b>               | <b>07 Hrs</b> |
| Personal Financial Management Loans: Home, Car, Education, Personal, Loan against property and Jewel loan. Insurance: Types of Insurance – ULIP and Term; Health and Disability Income Insurance, Life Insurance. Investment: Investing Basics and Evaluating Bonds, investing in Stocks and Investing in Mutual Funds, Planning.                                                                                                                                                                                                                                                                                                                                                                                                           |                                                    |               |
| <b>Unit-III</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>Income Tax &amp; Dynamics</b>                   | <b>09 Hrs</b> |
| Income Tax Income Tax Act Basics Introduction to Income Tax Act, 1961 Heads of Income and Computation of Total Income and Tax Liability- Heads of Income and Computation of Total Income under various heads, Clubbing Provisions, Set off and carry forward of Losses, Deductions, Assessment of Income and tax liability of different persons. Tax Management, Administrative Procedures and ICDS - TDS, TCS and Advance Tax Administrative Procedures, ICDS.                                                                                                                                                                                                                                                                             |                                                    |               |
| <b>Unit-IV</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>Goods and Services Tax</b>                      | <b>08 Hrs</b> |
| Goods and Services Tax GST Constitutional framework of Indirect Taxes before GST (Taxation Powers of Union & State Government); Concept of VAT: Meaning, Variants and Methods; Major Defects in the structure of Indirect Taxes prior to GST; Rationale for GST; Structure of GST (SGST, CGST, UTGST & IGST); GST Council, GST Network, State Compensation Mechanism, Registration. Levy and Collection of GST Taxable event “Supply” of Goods and Services; Place of Supply: Within state, Interstate, Import and Export; Time of supply: Valuation for GST- Valuation rules, taxability of reimbursement of expenses; Exemption from GST: Small supplies and Composition Scheme: Classification of Goods and Services                     |                                                    |               |
| <b>Unit-V</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Introduction to Micro-finance Micro-Finance</b> | <b>08 Hrs</b> |
| Introduction to Micro-finance Micro-Finance: Definitions, Scope & Assumptions, Types of Microfinances, Customers of Microfinance, Credit Delivery Methodologies, SHG concept, origin, Formation & Operation of Self-Help Groups (SHGs). Models in Microfinance - Joint Liability Groups (JLG), SHG Bank Linkage Model and GRAMEEN Model: Achievements & Challenges. Institutional Mechanism Current Challenges for Microfinance, Microfinance Institutions (MFIs): Constraints & Governance Issues, Institutional Structure of Microfinance in India: NGO MFIs, NBFC MFIs, Co-operatives, Banks, Microfinance Networks and Associations; Demand & Supply of Microfinance Services in India, Impact assessment and social assessments of MFI |                                                    |               |

### **References / Text Books / List of experiments / Assignment**

#### **Text Books**

1. Banking and Financial Sector Reforms in India, by Asha Singh, M.S. Gupta, Serials Publication.
2. Indian Banking Sector: Essays and Issues (1st), by M.S. Gupta & J.B. Singh, Serials Publication.
3. Basics of Banking & Finance, by K.M. Bhattacharya O.P. Agarwal, Himalaya Publishing House. Agricultural Finance and Management, by S. Subba Reddy, P. Raghu Ram.
4. The Indian Financial System and Development, by Dr.Vasant Desai, Himalaya Publishing House; Fourth Edition.
5. Income Tax Management, Simple Way of Tax Management, Tax Planning and Tax Saving, By Sanjay Kumar Satapathy.
6. Direct Tax System Income Tax by Dr. R. K. Jain, SBPD Publications.
7. Simplified Approach to GST Goods and Services Tax, By S K Mishra, Educreation Publishing.
8. Introduction to Microfinance, By Todd A Watkins, World Scientific Publishing company

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|-------------------------------------------------|-----------------|----------------------|
| <b>Program : Civil Engineering</b>              | <b>SY BTECH</b> | <b>Semester: III</b> |
| <b>Public System and Policies (RCP23XOE215)</b> |                 |                      |

**Pre-requisite: Nil**

**Course Objectives:**

1. To explain public policy and its operations with special focus on policy relating to Government finance.
2. To analyze and evaluate the impact of public policy on firms and the economy at large.

| <b>COs</b> | <b>Course Outcomes</b>                                                                                                           | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|----------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Understand the importance of public systems in a fast-changing environment in the global context.                                | 2                   | Understand                |
| <b>CO2</b> | Analyze the transformations in public systems with emphasis on current initiatives and emerging challenges in the field.         | 4                   | Analyze                   |
| <b>CO3</b> | Explain public policy and its operations with special focus on policy relating to Government finance.                            | 1                   | Knowledge                 |
| <b>CO4</b> | Make policies and know about the happenings in the world, in the nation and those in their locality                              | 4                   | Analyze                   |
| <b>CO5</b> | Analyze and evaluate the impact of public policy on firms and the economy at large and work under various fields as policymakers | 4                   | Analyze                   |

## **Course Content**

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|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|---------------|
| <b>Unit-I</b>                                                                                                                                                                                                                                                                                                                                             | <b>Introduction and Overview of Public Systems</b> | <b>10 Hrs</b> |
| Introduction and Overview of Public Systems: Ideology of Public Systems; Mechanistic and Organic view of Society and Individuals, The Legal Framework; Federal Government; State and Local Governments, Government growth; the size of Government.                                                                                                        |                                                    |               |
| <b>Unit-II</b>                                                                                                                                                                                                                                                                                                                                            | <b>Public Sector in the Economics Accounts</b>     | <b>06 Hrs</b> |
| Public Sector in the Economics Accounts: Public Sector in the circular flow; Public Sector in the National Income Accounts.                                                                                                                                                                                                                               |                                                    |               |
| <b>Unit-III</b>                                                                                                                                                                                                                                                                                                                                           | <b>Public Choice and Fiscal Politics</b>           | <b>08 Hrs</b> |
| Public Choice and Fiscal Politics: Direct Democracy; Representative Democracy; The Allocation Function; The Distribution Function; The Stabilization Function; Coordination of Budget Functions; The Leviathan Hypothesis.                                                                                                                                |                                                    |               |
| <b>Unit-IV</b>                                                                                                                                                                                                                                                                                                                                            | <b>Introduction and Overview of Public Policy</b>  | <b>10 Hrs</b> |
| Introduction and Overview of Public Policy: Markets and Government; Social goods and Market failure, public expenditure and its evaluation; Cost Benefit Analysis, Public policy and Externalities, Taxation Policy and its impact, Income distribution, redistribution and social security issues Fiscal & Budgetary Policy, Fiscal Federalism in India. |                                                    |               |
| <b>Unit-V</b>                                                                                                                                                                                                                                                                                                                                             | <b>Case Studies in Expenditure Policy</b>          | <b>05 Hrs</b> |
| Case Studies in Expenditure Policy: Public Services A) National Defense B) Highways C) Outdoor Recreation D) Education                                                                                                                                                                                                                                    |                                                    |               |

## **References / Text Books / List of experiments / Assignment**

### **Text Books**

1. Charles J, Wheelan, “Introduction to Public Policy”, W.W. Norton & Company, New York, 2011.
2. Thomas R, Dye, “Understanding Public Policy”, Prentice Hall, 2008.
3. Anderson, James E, “Public Policy-Making: An Introduction”, Boston, 2011.
4. Avasthi & Maheshwari, “Public Administration”, Lakshmi Narain Agarwal, 2008.
5. Mohit Bhattacharya, “New Horizons of Public Administration”, Jawahar Publishers, New Delhi, 2011
6. Nicholas Henry, “Public Administration and Public Affairs”, Prentice Hall of India, New Delhi, 2017.
7. Harvey S Rosen and Ted Gayer, “Public Finance” 10th Edition, McGraw-Hill Education, 2013.
8. Richard A Musgrave and Peggy B Musgrave, “Public Finance in Theory and Practice”, 5<sup>th</sup> Edition, McGraw Hill Book, 2017.

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|------------------------------------------------------------|-----------------|----------------------|
| <b>Program : Civil Engineering</b>                         | <b>SY BTECH</b> | <b>Semester: III</b> |
| <b>Fundamentals of Biomedical Instrument (RCP23XOE216)</b> |                 |                      |

**Pre-requisite: Nil**

**Course Objectives:**

1. To understand the basic principles and working of various medical instruments.
2. To familiarize the learners with the various medical imaging modalities, their operating principles, instrumentation and clinical applications

| <b>COs</b> | <b>Course Outcomes</b>                                                                           | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|--------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Describe and associate the different physiological processes taking place within the human body. | 2                   | Understand                |
| <b>CO2</b> | Identify the use of biomaterials and apply principles of various transducers & sensors.          | 3                   | Apply                     |
| <b>CO3</b> | Demonstrate the working principle of various medical instruments.                                | 3                   | Apply                     |
| <b>CO4</b> | Demonstrate principles used in imaging modalities and analysis.                                  | 3                   | Apply                     |
| <b>CO5</b> | Describe different processes used in telemetry and telemedicine.                                 | 2                   | Understand                |

## Course Content

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|---------------|
| <b>Unit-I</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>Basic Human Physiology</b>               | <b>04 Hrs</b> |
| Basic Human Physiology • Cell: Electrical activity of excitable cells (Structure and functions of cell. Polarization and depolarization of cell) • Cardiovascular System: Heart, Conductive tissues of heart, Cardiac cycle, Heart Valves, System and Pulmonary Circulation, Transmission of Cardiac Impulse, Blood Pressure, ECG (Einthoven's Triangle, Various leads and Waveforms). • Muscle Physiology: Muscle physiology and aspects of skin resistance. Generation of EMG • Nervous System: Different parts, their functions. Reflex actions and reflex arc, Function of Sympathetic and Parasympathetic nervous system. Generation of EEG |                                             |               |
| <b>Unit-II</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Biomaterial, Transducers and Sensors</b> | <b>10 Hrs</b> |
| Biomaterial, Transducers and Sensors: • Biomaterials used in fabrication of biodevices and implants: Polymeric, Composite biomaterials, Metallic biomaterials, and Ceramic biomaterials. • Biopotential electrodes: Electrode tissue interface, Electrode electrolyte interface Electrodes used for ECG, EEG & EMG. • Transducers & sensors: temperature transducer, pulse sensor, glucose sensor, respiration sensor, • Introduction of biomaterials, Classification of biomaterials                                                                                                                                                            |                                             |               |
| <b>Unit-III</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Overview of Medical Instruments</b>      | <b>08 Hrs</b> |
| Overview of Medical Instruments • Classification, application and specifications of diagnostic, therapeutic and clinical laboratory equipment, • Method of operation of these Bio Medical Instruments, • ECG, EEG, EMG                                                                                                                                                                                                                                                                                                                                                                                                                           |                                             |               |
| <b>Unit-IV</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Imaging Modalities and Analysis</b>      | <b>09 Hrs</b> |
| Imaging Modalities and Analysis: • Radio graphic techniques, Computer Tomography, • MRI, PET, SPECT, • Ultrasonography, • Endoscopy, • Thermography, Retinal Imaging, • Imaging application in Biometric systems, • Analysis of digital images                                                                                                                                                                                                                                                                                                                                                                                                   |                                             |               |
| <b>Unit-V</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>Telemetry &amp; Telemedicine</b>         | <b>08 Hrs</b> |
| Telemetry & Telemedicine: • Introduction to Biotelemetry, • Physiological parameters compliant to biotelemetry, • Components of Biotelemetry system, • Applications of telemetry in medical field (ECG, EEG & EMG)                                                                                                                                                                                                                                                                                                                                                                                                                               |                                             |               |

## **References / Text Books / List of experiments / Assignment**

### **Text Books:**

1. Leslie Cromwell, "Biomedical Instrumentation and Measurement", Prentice hall of India, New Delhi, 2007.
2. M.Arumugam, "Bio-Medical Instrumentation", Anuradha Agencies, 2003.
3. Khandpur R.S, "Handbook of Biomedical Instrumentation", Tata McGraw-Hill, New Delhi, 2nd Edition, 2003.
4. John G. Webster, "Medical Instrumentation Application and Design", John Wiley and sons, New York, 1998.
5. "Biomaterials Science - An Introduction to Materials in Medicine", B.D. Ratner, A.S. Hoffmann, F. J. Schoen, J. E. Lemons, Academic Press, 1997.

### **Reference Books:**

1. Electronic Measurement and Instrumentation by Dr Rajendra Prasad
2. Ed. Joseph D. Bronzino, The Biomedical Engineering Hand Book, 3rd Edition, Boca Raton, CRC Press LLC, 2006.
3. Curry, T. S., Dowdey, J. E., & Murry, R. C. (1990). Christensen's physics of diagnostic radiology. Lippincott Williams & Wilkins.
4. Biomaterials: An Introduction, Joon Park, R. S. Lakes, Springer Science & Business Media

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|----------------------------------------|-----------------|----------------------|
| <b>Program : Civil Engineering</b>     | <b>SY BTECH</b> | <b>Semester: III</b> |
| <b>IPR and Patenting (RCP23XOE217)</b> |                 |                      |

**Pre-requisite: Nil**

**Course Objectives:**

1. To promote the knowledge of intellectual property laws of India and international treaties.
2. To encourage innovation.

| <b>COs</b> | <b>Course Outcomes</b>                                                                                    | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|-----------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Classify the appropriate Intellectual Property Right (IPR) category for a given project or innovation.    | 2                   | Understand                |
| <b>CO2</b> | Differentiate the fundamentals of the patents, copyrights, and design registrations.                      | 4                   | Analyze                   |
| <b>CO3</b> | Prepare applications for protecting various forms of intellectual property rights.                        | 3                   | Apply                     |
| <b>CO4</b> | Examine effective communication with national and international IP organizations to pursue IP protection. | 4                   | Analyze                   |

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## Course Content

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|---------------|-----------------------------------------------------------|--------------|
| <b>Unit-I</b> | <b>Introduction to Intellectual Property Rights (IPR)</b> | <b>3 Hrs</b> |
|---------------|-----------------------------------------------------------|--------------|

Introduction to Intellectual Property Rights (IPR): Concept meaning of IP and IPR. • General principles of intellectual property rights, • Need for intellectual property, • Categories of IPR instruments - Patents, Trademarks, Copyrights, Industrial Designs, Plant variety protection, Trade secrets, Geographical Indications etc. Ownership, assignment, licenses, infringement, validity period. • International treaties on IPR.

|                |                             |               |
|----------------|-----------------------------|---------------|
| <b>Unit-II</b> | <b>Copyright and Design</b> | <b>09 Hrs</b> |
|----------------|-----------------------------|---------------|

1. The Indian Copyright Act, 1957, 2. Meaning of copyrights and rights of copyrighted works, 3. Types of copyright, 4. Process of filing a copyright application, 5. Introduction to Designs Law – Definitions, 6. Registration of designs and procedure.

|                 |                          |               |
|-----------------|--------------------------|---------------|
| <b>Unit-III</b> | <b>Basics of Patents</b> | <b>09 Hrs</b> |
|-----------------|--------------------------|---------------|

Basics of Patents • The Indian Patent Act and The Indian Patent Rules, • Conditions of patentability, • Patentable and non-patentable inventions, • Types of patent applications and patent specification, • Inventors and Applicants, • Category of applicants - natural person, small entity, start up and others, • Patent databases and patent search, • International Patent Classification code.

|                |                                    |               |
|----------------|------------------------------------|---------------|
| <b>Unit-IV</b> | <b>Patent Application Drafting</b> | <b>09 Hrs</b> |
|----------------|------------------------------------|---------------|

Patent Application Drafting • Patent application drafting: Application, Specification, Claims drafting: Independent and dependent claims drafting, Process patent and product patent claims, Abstract, Drawings, Declaration as to inventors hip, Statement and undertaking. Drafting response to communications from patent office. Reading and understanding examination reports, Drafting response.

|               |                                                                      |               |
|---------------|----------------------------------------------------------------------|---------------|
| <b>Unit-V</b> | <b>Procedure for Filing a Patent Application, Timelines and Fees</b> | <b>09 Hrs</b> |
|---------------|----------------------------------------------------------------------|---------------|

Procedure for Filing a Patent Application, Timelines and Fees • Application for grant of patent, • Forms and Fees, • Request for (early) publication and / or (early) examination, • Patent examination and hearing, • Pre-grant and post-grant opposition.

## **References / Text Books / List of experiments / Assignment**

### **Text Books:**

1. A Durafe and D Toradmalle, "Intellectual Property Rights", Wiley, 2020.
2. H Rockman, "Intellectual property law for engineers, scientists, and entrepreneurs", Wiley-IEEE Press, 2020.

### **Reference Books:**

1. Bare Act, "The Patents Act, 1970 with The Patents Rules, 2003", Universal, 2023.
2. Bare Act, "The Copyright Act, 1957", Universal and LexisNexis, 2021.
3. Bare Act, "The Designs ACT, 2000", Commercial Law Publishers (India) Pvt. Ltd. 2021

### **Online Resources:**

1. W. Fisher, "Maps of Intellectual Property"  
<https://cyber.harvard.edu/people/tfisher/IP/IPMaps.htm>
1. World Intellectual Property Organisation courses  
<https://www.wipo.int/academy/en/>
1. Prof. Feroz Ali, "Patent Drafting for Beginners"  
<https://onlinecourses.nptel.ac.in/noc24hs59/preview>

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|-------------------------------------------------------------|-----------------|----------------------|
| <b>Program : Civil Engineering</b>                          | <b>SY BTECH</b> | <b>Semester: III</b> |
| <b>Entrepreneurship and Startup Ecosystem (RCP23XOE218)</b> |                 |                      |

**Pre-requisite: Nil**

**Course Objectives:**

1. To foster an entrepreneurial mind-set
2. To guide participants in building effective Business Models.
3. To educate participants regarding Intellectual property and Fundraising for Innovative Ventures.

| <b>COs</b> | <b>Course Outcomes</b>                                                                                         | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|----------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Apply strategies to effectively navigate the global startup landscape.                                         | 3                   | Apply                     |
| <b>CO2</b> | Analyze situations to develop an entrepreneurial mindset.                                                      | 4                   | Analyse                   |
| <b>CO3</b> | Apply strategies to navigate the global startup landscape.                                                     | 3                   | Apply                     |
| <b>CO4</b> | Explain the significance of Intellectual Property rights.                                                      | 2                   | Understand                |
| <b>CO5</b> | Apply appropriate fundraising strategies to match startup stages and investor profiles in practical scenarios. | 3                   | Apply                     |

## **Course Content**

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|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|---------------|
| <b>Unit-I</b>                                                                                                                                                                                                                                                                                                                                                          | <b>Understanding the Entrepreneurial Ecosystem</b>        | <b>06 Hrs</b> |
| • Introduction to Entrepreneurship and Start-ups, • Role of Entrepreneurship in economy, • Global and Local Entrepreneurial Landscapes, • Role of Incubators and Accelerators, • Case Studies of Successful Start-ups                                                                                                                                                  |                                                           |               |
| <b>Unit-II</b>                                                                                                                                                                                                                                                                                                                                                         | <b>Developing a Startup Mindset</b>                       | <b>08 Hrs</b> |
| • Cultivating an Entrepreneurial Mindset, • Market Analysis and Segmentation, • Opportunity Recognition, • Innovation and Idea Generation, • Feasibility Analysis of Business Ideas, • Role of innovation in Entrepreneurship, • Fostering creativity, • Practical Exercises and Workshops on Creative Problem Solving                                                 |                                                           |               |
| <b>Unit-III</b>                                                                                                                                                                                                                                                                                                                                                        | <b>Business Model Development</b>                         | <b>10 Hrs</b> |
| • Introduction to Business Models, • Lean Startup Methodology, • Prototyping and Minimum Viable Product (MVP), • Financial Projections and Budgeting, • various forms of Business Ownership • Compliance and Legal Regulations, • Operations and Supply Chain Management, • Human Resource Management, • Developing a marketing Strategy, • Managing Growth Challenges |                                                           |               |
| <b>Unit-IV</b>                                                                                                                                                                                                                                                                                                                                                         | <b>Technological Innovation and Intellectual Property</b> | <b>08 Hrs</b> |
| • Technology and Entrepreneurship, • Intellectual Property Basics (Patents, Trademarks, Copyrights) • Patent Search and Analysis, • Strategies for Protecting Intellectual Property, • Ethical Considerations in Technology and Innovation                                                                                                                             |                                                           |               |
| <b>Unit-V</b>                                                                                                                                                                                                                                                                                                                                                          | <b>Fundraising and Investment Strategies</b>              | <b>07 Hrs</b> |
| • Fundraising Options for Start-ups, • Angel Investors and Venture Capital, • Crowdfunding Platforms • Financial Modelling for Start-ups, • Crafting an Effective Pitch                                                                                                                                                                                                |                                                           |               |

## **References / Text Books / List of experiments / Assignment**

### **Text Books:**

1. Alexander Osterwalder and Yves Pigneur, Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers, John Wiley & Sons, Jul2010.
2. Peter Thiel and Blake Masters, Zero to One: Notes on Startups, or How to Build the Future, Virgin Books, 2015.
3. Alejandro Cremades, The Art of Startup Fundraising: Pitching Investors, Negotiating the Deal, and Everything Else Entrepreneurs Need to Know” by, John Wiley & Sons, Inc., Hoboken, New Jersey, 2016.
4. Christensen, Clayton M. The Innovator’s Dilemma: When New Technologies Cause Great Firms to Fail. Boston, MA: Harvard Business School Press, 1997.
5. Brad Feld and Jason Mendelson, Venture Deals: Be Smarter than Your Lawyer and Venture Capitalist, Wiley; 4th edition, 1 October 2019

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|-------------------------------------------------|-----------------|----------------------|
| <b>Program : Civil Engineering</b>              | <b>SY BTECH</b> | <b>Semester: III</b> |
| <b>Automation in Construction (RCP23VMD201)</b> |                 |                      |

**Pre-requisite**    Element of Civil Engineering

**Course Objectives:**

1. To understand the fundamentals of automation in the construction industry.
2. To explore various automated systems and technologies used in construction.
3. To analyze the impact of automation on construction productivity, safety, and quality.
4. To evaluate the future trends and challenges in construction automation.

| <b>COs</b> | <b>Course Outcomes</b>                                                                               | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Comprehend the basic concepts and significance of automation in construction.                        | 1                   | Remember                  |
| <b>CO2</b> | Identify and describe various automated technologies used in construction.                           | 2                   | Understand                |
| <b>CO3</b> | Assess the benefits and challenges associated with implementing automation in construction projects. | 4                   | Analyse                   |
| <b>CO4</b> | Anticipate future trends in construction automation and adapt to emerging technologies.              | 2                   | Understand                |

## **Course Content**

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|---------------|---------------------------------------------------|---------------|
| <b>Unit-I</b> | <b>Introduction to Automation in Construction</b> | <b>06 Hrs</b> |
|---------------|---------------------------------------------------|---------------|

Prerequisite: NA Definition and importance of automation in construction. History and evolution of construction automation. Types of automation: Mechanization, robotic automation, and information automation. Benefits and challenges of automation in construction. Case studies on successful automation implementation in construction projects.

|                |                                                |               |
|----------------|------------------------------------------------|---------------|
| <b>Unit-II</b> | <b>Automated Construction Equipment System</b> | <b>06 Hrs</b> |
|----------------|------------------------------------------------|---------------|

Automated earth-moving and excavation equipment. Robotics in construction: Types, applications, and limitations. 3D printing in construction: Technology, materials, and applications. Automated bricklaying and masonry systems. Drones and UAVs in construction: Applications and regulations.

|                 |                                                |               |
|-----------------|------------------------------------------------|---------------|
| <b>Unit-III</b> | <b>Application of Robotics in Construction</b> | <b>06 Hrs</b> |
|-----------------|------------------------------------------------|---------------|

Robotic Systems for Specific Tasks: Bricklaying robots, Concrete dispensing and finishing robots, Welding and cutting robots, Inspection and maintenance robots Automation in Construction Processes: Earthmoving and excavation, Material handling and transportation, Prefabrication and modular construction

|                |                                                          |               |
|----------------|----------------------------------------------------------|---------------|
| <b>Unit-IV</b> | <b>Safety, Quality, and Productivity in Construction</b> | <b>06 Hrs</b> |
|----------------|----------------------------------------------------------|---------------|

Impact of automation on construction safety. Quality control and assurance in automated construction. Enhancing productivity through automation. Human-robot collaboration in construction. Regulatory and ethical considerations in construction automation.

|               |                                                                |               |
|---------------|----------------------------------------------------------------|---------------|
| <b>Unit-V</b> | <b>Future Trends and Challenges in Construction Automation</b> | <b>06 Hrs</b> |
|---------------|----------------------------------------------------------------|---------------|

Emerging technologies in construction automation. The role of artificial intelligence and machine learning in construction. Internet of Things (IoT) and smart construction sites. Challenges and barriers to adopting automation in construction. The future of the construction workforce in an automated environment.

## **References / Text Books / List of experiments / Assignment**

### **Textbooks:**

1. Benny Raphael, Construction and Building Automation: From Concepts to Implementation, Routledge/Taylor & Francis, 1st Edition, 2021
2. Kenji Itoh & Shigeo Kitahara, Automation in Construction Engineering: Digital Transformation and Smart Construction, Wiley-IEEE Press, 1st Edition, 2022,
3. Reza Akhavian & Amir H. Behzadan, Construction Automation and Robotics: Principles and Applications, CRC Press, 1st Edition, 2023, (ISBN-9781032156781/978-1-032-15678-1).

### **Reference Books:**

1. Thomas Bock, Thomas Linner & Willi Viktor Mörrth, Automation and Robotics in the Architecture, Engineering, and Construction Industry, Springer Nature, 1st Edition, 2022, (ISBN-9783030771621/978-3-030-77162-1).
2. Carlos Balaguer & Mohamed Abderrahim (Editors), Robotics and Automation in Construction: Advanced Technologies and Applications, IntechOpen, 2nd Edition, 2019
3. Javad Majrouhi Sardroud, Automation in Construction Management: RFID and IoT Technologies, LAP Lambert Academic Publishing, 1st Edition, 2018,
4. Robotics and Automation in Construction by Behzad Sodagar
5. 3D Printing in Construction: Applications, Performance, and Challenges by Munir M. Hamad
6. Construction Technology: Analysis and Choice by Tony Bryan and Andrew E. Powell
7. Automation and Robotics in Construction XI by Alan Chamberlain

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|---------------------------------------------|-----------------|----------------------|
| <b>Program : Civil Engineering</b>          | <b>SY BTECH</b> | <b>Semester: III</b> |
| <b>Universal Human Values (RCP23XHS232)</b> |                 |                      |

**Pre-requisite: Nil**

**Course Objectives:**

1. To help students distinguish between values and skills, and understand the need, basic guidelines, Content and process of value education.
2. To help students initiate a process of dialog within themselves to know what they ‘really want to be’ in their life and profession.
3. To help students understand the meaning of happiness and prosperity for a human being.
4. To facilitate the students to understand harmony at all the levels of human living and live accordingly.
5. To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life.

| <b>COs</b> | <b>Course Outcomes</b>                                                                                                    | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|---------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Identify the need, relevance, and role of universal human values in personal, academic, and professional life.            | 2                   | Understand                |
| <b>CO2</b> | Demonstrate understanding of self-exploration, harmony in human relationships, and ethical conduct in daily interactions. | 3                   | Apply                     |
| <b>CO3</b> | Apply principles of trust, respect, and responsibility to foster sustainable and compassionate social environments.       | 3                   | Apply                     |
| <b>CO4</b> | Analyze the interdependence between individual values, societal well-being, and ecological balance.                       | 4                   | Analyse                   |
| <b>CO5</b> | Use human values into decision-making processes for holistic development and responsible engineering practice.            | 3                   | Apply                     |

## Course Content

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|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|---------------|
| <b>Unit-I</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>Introduction:</b>                                                                      | <b>04 Hrs</b> |
| Need, Basic Guidelines, Content and Process for Value Education Purpose and motivation for the course. Self-Exploration–what is it? - Its content and process; ‘Natural Acceptance’ and Experiential Validation- as the process for self-exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.                                                                                                                                                                                                                                                                                     |                                                                                           |               |
| <b>Unit-II</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>Understanding Harmony in the Human Being</b>                                           | <b>05 Hrs</b> |
| Understanding Harmony in the Human Being – Harmony in Myself! Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’. Understanding the needs of Self (‘I’) and ‘Body’ - happiness and physical facility. Understanding the Body as an instrument of ‘I’ (I am being the doer, seer and enjoyer). Understanding the characteristics and activities of ‘I’ and harmony in ‘I’. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Health.                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                           |               |
| <b>Unit-III</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Understanding Harmony in the Family and Society:</b>                                   | <b>09 Hrs</b> |
| Understanding Harmony in the Family and Society: Harmony in Human-Human Relationship. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship. Understanding the meaning of Trust Difference between intention and competence. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.                                                                                                                                                                                                                          |                                                                                           |               |
| <b>Unit-IV</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>Understanding Harmony in Nature and Existence:</b>                                     | <b>04 Hrs</b> |
| Understanding Harmony in Nature and Existence: Whole existence as Coexistence Understanding the harmony in the Nature. Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self-regulation in nature. Understanding Existence as Co-existence of mutually interacting units in all pervasive space. Holistic perception of harmony at all levels of existence.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                           |               |
| <b>Unit-V</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>Implications of the above Holistic Understanding of Harmony on Professional Ethics</b> | <b>04 Hrs</b> |
| Implications of the above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order, b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists, and managers, b. At the level of society: as mutually enriching institutions and organizations. |                                                                                           |               |

## **References / Text Books / List of experiments / Assignment**

### **Text books:**

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010.

### **Reference Books:**

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi.
5. Small is Beautiful - E. F Schumacher. 6. Slow is Beautiful - Cecile Andrews.
6. Economy of Permanence - J C Kumarappa.
7. Bharat Mein Angreji Raj – PanditSunderlal.
8. Rediscovering India - by Dharampal.
9. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi.
11. India Wins Freedom - Maulana Abdul Kalam Azad.
12. Vivekananda - Romain Rolland. (English)
13. Gandhi - Romain Rolland. (English)

### **Tutorial (Term work):**

1. Practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony, and co-existence) rather than as arbitrariness in choice based on liking-disliking.
2. Practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.
3. Practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.
4. Practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.
5. Practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions e.g. To discuss the conduct as an engineer or scientist etc.

(Term work shall consist of minimum 5 activities based on above activities conducted. The final certification and acceptance of term work will be subject to satisfactory performance of activities and upon fulfilling minimum passing criteria in the term work)

The final certification and acceptance of term work will be subject to satisfactory performance of activities and upon fulfilling minimum passing criteria in the term work.

|                                          |                 |                      |
|------------------------------------------|-----------------|----------------------|
| <b>Program : Civil Engineering</b>       | <b>SY BTECH</b> | <b>Semester: III</b> |
| <b>Semester Project-I (RCP23XSC201P)</b> |                 |                      |

**Pre-requisite:** Nil

**Course Objectives:**

1. Students are expected to design, simulate/implement a project based on the knowledge acquired from Current semester subjects.

| <b>COs</b> | <b>Course Outcomes</b>                                                                                 | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|--------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Analyze a survey of several available literatures in the preferred field of study.                     | 1                   | Analyze                   |
| <b>CO2</b> | Describe various/alternate approaches to complete a project.                                           | 2                   | Understand                |
| <b>CO3</b> | Apply a collaborative project environment by interacting and dividing project work among team members. | 3                   | Apply                     |
| <b>CO4</b> | Use technical communication skills to present project work in the form of a technical report/paper.    | 3                   | Apply                     |
| <b>CO5</b> | Apply teamwork and project management skills to plan, execute, and manage the research study.          | 3                   | Apply                     |

## Course Content / Guidelines

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### Semester Project:

The purpose of introducing semester project at second year level is to provide exposure to students With a variety of projects based on the knowledge acquired from the semester subjects. This activity Is supposed to enrich their academic experience and bring enough maturity in student while selecting The project. Students should take this as an opportunity to develop skills in implementation, Presentation and discussion of technical ideas/topics. Therefore, proper attention shall be paid to the Content of semester project report which is being submitted in partial fulfillment of the requirements Of the Second Year and it is imperative that a standard format be prescribed for the report.

Each student shall work on project approved by departmental committee approved by the Head Of Department, a group of 03 to 05 students (max allowed: 5 students in extraordinary cases, subject To the approval of the department committee and the Head of the department) shall be allotted for Each Semester Project. Each group shall submit at least 3 topics for the Semester Project. The Departmental committee shall finalize one topic for every group. Semester Project Title or Theme Should be based on knowledge acquired during semester. The project work shall involve sufficient work

So that students get acquainted with deferent aspects of knowledge acquired from semester subjects. Student is expected to:

- \_ Select appropriate project title based on acquired knowledge from current semester subjects.
- \_ Maintain Log Book of weekly work done (please see attached log book format).
- \_ Report weekly to the project guide along with log book.

### Assessment Criteria:

\_ at the end of the semester, after conformation by the project guide, each project group will Submit project completion report in prescribed format for assessment to the departmental committee (including project guide).

\_ Assessment of the project (at the end of the semester) will be done by the departmental committee (including project guide).

### Prescribed project report guidelines:

Size of report shall be of minimum 25 pages. Project Report should include appropriate content for:

- \_ Introduction
- \_ Literature Survey
- \_ Related Theory
- \_ Implementation detail
- \_ Project Outcomes
- \_ Conclusion
- \_ References

Assessment criteria for the departmental committee (including project guide) for Continuous Assessment: Guide will monitor weekly progress and marks allocation will be as per Table 2.

Assessment criteria for the departmental committee (including project guide) for End Semester Exam: Departmental committee (including project guide) will evaluate project as per Table 3. Each group shall present/publish a paper based on the semester project in reputed/peer Reviewed Conference/Journal/Tech Fest/Magazine/ before the end of the semester.

Table 1 Log Book format

| S.NO. | Week (Start date / End date) | Work done | Sign of Guide | Sign of Coordinator |
|-------|------------------------------|-----------|---------------|---------------------|
| 1     |                              |           |               |                     |
| 2     |                              |           |               |                     |

Table 2 Continuous Assessment sheet

| S.NO. | Exam Seat No | Name of Student | Student Attendance | Log Book Maintain | Literature review | Depth of Understanding | Report | Total |
|-------|--------------|-----------------|--------------------|-------------------|-------------------|------------------------|--------|-------|
|       |              |                 | 5                  | 5                 | 5                 | 5                      | 5      | 25    |
|       |              |                 |                    |                   |                   |                        |        |       |

Table 3 Evaluation sheet

| S.NO. | Exam Seat No | Name of Student | Project Selection | Design Simulation logic | PCB hardware programing | Result Verification | Presentation | Total |
|-------|--------------|-----------------|-------------------|-------------------------|-------------------------|---------------------|--------------|-------|
|       |              |                 | 5                 | 5                       | 5                       | 5                   | 5            | 25    |
|       |              |                 |                   |                         |                         |                     |              |       |

|                                                   |                 |                      |
|---------------------------------------------------|-----------------|----------------------|
| <b>Program : Civil Engineering</b>                | <b>SY BTECH</b> | <b>Semester: III</b> |
| <b>Community Engagement Service (RCP23XEL201)</b> |                 |                      |

**Pre-requisite: Nil**

**Course Objectives:**

1. To sensitize the student / learner into recognizing community level problems & challenges and give them an opportunity to engage in activities for solving the same.

| <b>COs</b> | <b>Course Outcomes</b>                                                                                                                                                                                            | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Implement knowledge understandings acquired from one's academic study/ field/ discipline for community level education, information dissemination by participation and engagement in community welfare activities | 3                   | Apply                     |
| <b>CO2</b> | Appraise commitment to community engagement activities that reinforce a sense of belongingness and gratitude towards societal causes.                                                                             | 5                   | Evaluate                  |
| <b>CO3</b> | Demonstrate diversity in communities and cultures by adopting a change in approach and attitude as evidence of unconditional acceptance.                                                                          | 3                   | Apply                     |
| <b>CO4</b> | Assess the effectiveness of working in a team by demonstrating the co-existence of the roles of a sincere worker and an effective leader.                                                                         | 5                   | Evaluate                  |

### Course Content / Guidelines

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|               |                        |                |
|---------------|------------------------|----------------|
| <b>Unit-I</b> | <b>Open Activities</b> | <b>04 Hrs.</b> |
|---------------|------------------------|----------------|

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Participation in: blood donation camps organizer / donor, day-long tree plantation or Afforestation / seed dispersal / cleanliness (water bodies, surrounding etc.) drives. Literacy Drives for children / youth / adults. One day hand holding activities in work-shop conduct for Under privilege kids in the areas of basic science, math, technical skill demonstration.

|                |                                         |               |
|----------------|-----------------------------------------|---------------|
| <b>Unit-II</b> | <b>Technical (Program core related)</b> | <b>05 Hrs</b> |
|----------------|-----------------------------------------|---------------|

Cyber-crime, security awareness and vulnerabilities – sensitization, information dissemination and awareness sessions in indicated focus areas. Promotion and Sensitization for Sustainable living – focusing on solar power, water recycling, e-waste responsible disposal, waste recycling etc. in indicated focus areas.

Focus areas: residential societies, schools, under-privileged areas, governments /private offices, and similar other establishments.

#### Field Survey:

Reporting on proactively conducted survey in the areas of resource management for – water, vegeta- bles, electricity, crops etc

#### Activities to be performed:

Among the listed activities students are expected to complete one open activity mandatorily, and one technical (program core) OR field survey activity. The activities mentioned are exemplary in nature and any other additional activity of similar nature too can be undertaken by the learners, provided it is approved and endorsed by the faculty mentor / head of the department.

#### Suggested Activities

1. Undertaking cyber safety / security awareness sensitization drive / program especially for un- initiated students / individuals in schools / colleges / residential complex / offices etc. Typical suggested tabulation.

| Participant No. | Na me | Ag e | School/ College/ Residence / Office | Ema il | Contact Numbe r | Awarenes s Level | Remark s |
|-----------------|-------|------|-------------------------------------|--------|-----------------|------------------|----------|
|                 |       |      |                                     |        |                 |                  |          |

2. Energy / Power assessment for establishments (societies, schools, colleges, residential complex, shops etc.) involving computing power devices ratings, power consumption over operating period, calculating energy cost from tariff card / rates for every group of appliances / devices or equipment. Typical suggested tabulation pattern.

| Device/Appliance Group | Number of appliances /devices | Power Rating (kW) | Operating Hours (h/day) | Energy Consumption (kWh/day) | Tariff Rate (Rs./ kWh) | Energy Cost (Rs.) |
|------------------------|-------------------------------|-------------------|-------------------------|------------------------------|------------------------|-------------------|
| Lighting Fixtures      |                               |                   |                         |                              |                        |                   |
| Ceiling Fans           |                               |                   |                         |                              |                        |                   |
| Air Conditioner (AC)   |                               |                   |                         |                              |                        |                   |
| Security Systems       |                               |                   |                         |                              |                        |                   |
| Water Pump             |                               |                   |                         |                              |                        |                   |

3.

| Sr. No. | Timestamp | Traffic Density | Traffic Light Status | Road Repair Status | Remarks |
|---------|-----------|-----------------|----------------------|--------------------|---------|
|         |           |                 |                      |                    |         |
|         |           |                 |                      |                    |         |
|         |           |                 |                      |                    |         |

Traffic light monitoring viz-e-viz average traffic density on road. Analyzing the data and commenting on results. Evaluating and comparing impact on road repairs related lane blockage and proportional recommendation for lights timing variations. Typical suggested tabulation pattern.

4. Help compute green footprint of select number of household (per member) - say 10 houses of 3+ members. This is for evaluating dependence upon non green energy sources and habits and changes in lifestyle for attempts at their reductions. Learners are encouraged to use typically available online carbon-footprint calculators. The table herewith maybe used for reference calculations.

| House No. | Household Name | Number of Members | Energy Usage (kWh) | Water Usage (liters) | Waste Production (kg) | Transportation Habits | Green Footprint |
|-----------|----------------|-------------------|--------------------|----------------------|-----------------------|-----------------------|-----------------|
|           |                |                   |                    |                      |                       |                       |                 |
|           |                |                   |                    |                      |                       |                       |                 |

5. Compulsion of having a borewell for non-potable water supply in city residential complexes is a modern-day rule. Increased pace of re-development, as well as number of occupants in given area, has resulted in increased number of borewells being dug within and outside city limits. Reduced yield, quality and quantity of water adds to the recurring maintenance cost of borewells, especially in the city areas. Poor water recharge systems along-with depleting open soil cover area in wake of wall-to-wall of concrete carpet aggravate the problem. Study, analyse and report a residential society's – capacity of water requirement, present day borewells in action, approximate yield, maintenance cost and frequency, borewell flushing iterations in wake of redevelopment in neighborhood. A typical tabulation mechanism for inferences can be as below:

| Borewell No. | Location | Depth (ft) | Yield (Liters/Day) | Water Quality | Maintenance Cost (Rs.) | Remarks |
|--------------|----------|------------|--------------------|---------------|------------------------|---------|
|              |          |            |                    |               |                        |         |

6. Detection of Adulteration in food / fruits / vegetables / milk / mava /saffron etc. or contamination of potable drinking water. Ex. Adulteration in fruits could be apple waxing, injecting chemicals in watermelon, pomegranate etc. to give it a bright red color, artificial ripening of mangos etc. For a given activity, samples from more than one area, specifically from mofussil /interiors / 'gaothans' etc, may be obtained, to evaluate sample purity or extent of adulteration. Learners are encouraged to use online resources provided by 'Food Safety and Standards Authority of India' (fssai), for handholding in requisite procedures.

**YouTube link:**

Food Safety and Standards Authority of India: <https://goo.gl/Y8Lzbu>

| Product | Adulterant | Testing Method | Result | Remarks |
|---------|------------|----------------|--------|---------|
|         |            |                |        |         |
|         |            |                |        |         |

Ex. 1 Milk Adulteration:

<https://www.youtube.com/watch?v=pbnmeRUBxKk> Ex. 2 Watermelon

Adulteration: <https://www.youtube.com/watch?v=yrLAj7oJies>

## Certificates and Formats:

### Activity Endorsement Certificate

Date:

Community engagement service is a mandatory course, of two credits, introduced at second year of engineering under the autonomous structure of the institute. Course objective: To sensitize the student / learner into recognizing social problems & challenges and give them an opportunity to engage in activities for solving the same.

Course outcomes:

1. Knowledge application: Applies knowledge understandings acquired from one's academic study/ field/ discipline for community level education, information dissemination by participation and engagement in community welfare activities.
2. Commitment for cause: Identify and experience commitment for community engagement activities that reinforce sense of belongingness and gratitude towards societal cause.
3. Diversity: Witness diversity in communities and cultures and demonstrate change in approach / attitude as an evidence of unconditional acceptance.
4. Team: Recognize, experience and value effectiveness of working in a team, demonstrating coexistence of the roles - sincere worker and effective leader.

This is to certify that Mr./Ms. Bearing PRN is a student of S.Y. B. Tech.,----- branch of engineering. He / She is a bonafide student of SES's R. C. Patel Institute of Technology, Shirpur. He / She is reliable, sincere, hardworking and capable of conducting activity in your premises. We request you to kindly allow for the conduction of the activity and we also solicit your earnest co-operation in the same.

Signature

Department Head:

### Disclaimer

(This form must be read, signed, and submitted prior to the beginning of the community service activity.)

| Student Details | Activity Details |
|-----------------|------------------|
| Name            |                  |
| SAPID           | Date             |
| Program         | Time             |
| Class/Div       | Address          |

I, the undersigned \_\_\_\_\_ accept the following terms and conditions unconditionally:

1. I accept and understand that the community activity identification and selection has been done willingly by me.
2. I undertake to convey that, I am apparently in good health and well-being, and suffer no physical impairment that would or should prevent my participation in the activity.
3. I undertake to bear all related expenses and risk of travel related to the activity and shall not hold any personnel from the institute responsible with regards to claims and / or loss in the process of conduct of activity.
4. I undertake that my parents or legal/local guardians are aware of said activity and agree to above mentioned terms and conditions.

**Student's name & signature:** \_\_\_\_\_

**Parent or Guardian's name & signature:** \_\_\_\_\_

### **Guidelines for Assessment of the work**

- The review/progress monitoring committee shall be constituted by the Head of the Department. The progress of selected/assigned activities is to be evaluated on a continuous basis, holding at least one review in the semester.
- In the continuous assessment, focus shall also be on each individual student's contribution to the team activity, their understanding and involvement as well as responses to the questions being raised at all points in time.
- Each group needs to submit the following forms to the respective supervisor after conducting both the activities:
  - Activity Conduction Report
  - Participant Feedback (online / offline)
  - Participant Attendance (online / offline)
  - Survey Report
  - Participation certification

#### **Forms for Technical Activity:**

##### **1. Activity Conduction Report**

| <b>Sr. No.</b> | <b>Name of the Activity</b>      |  |
|----------------|----------------------------------|--|
| 1              | Date of Activity                 |  |
| 2              | Activity type (Open / Technical) |  |
| 3              | Activity objectives              |  |
| 4              | Place of Activity                |  |
| 5              | SAP id and Names of students     |  |
| 6              | Name of the Association          |  |
| 7              | Activity description             |  |
| 8              | No. of participants              |  |
| 9              | Photos (Geo tagged)              |  |

2. **Participant feedback (online / offline):**

| <b>Sr. No.</b> | <b>Indicators</b>                                        | <b>Scale: 1<br/>(Lowest) to 5<br/>(Highest)</b> |
|----------------|----------------------------------------------------------|-------------------------------------------------|
| 1              | The objectives of the training were clearly defined.     |                                                 |
| 2              | The content was organized and easy to follow.            |                                                 |
| 3              | This training experience will be useful to me.           |                                                 |
| 4              | The trainer was knowledgeable about the training topics. |                                                 |
| 5              | The training objectives were met                         |                                                 |

**Evaluation Scheme:**

**Continuous Assessment (A):**

Term Work: - 25 marks, distribution as herewith:

1. **Rubric for Open Ended Activity (10 marks)**

- Activity Conduction Report

2. **Rubric for Technical Activity (15 marks)**

| <b>Sr. No.</b> | <b>Performance Indicators</b> (Maximum marks per indicator are given in bracket) | <b>Marks</b> |
|----------------|----------------------------------------------------------------------------------|--------------|
|----------------|----------------------------------------------------------------------------------|--------------|

1. **Rubric for Field Survey Activity**

| <b>Sr. No.</b> | <b>Performance Indicators</b> (Maximum 03 marks per indicator) | <b>Marks</b> |
|----------------|----------------------------------------------------------------|--------------|
| 1              | Topic selection                                                |              |
| 2              | Survey preparation                                             |              |
| 3              | Field work                                                     |              |
| 4              | Analysis                                                       |              |
| 5              | Report writing                                                 |              |
|                | <b>TOTAL</b>                                                   |              |

# SEM IV

|                                                    |                 |                     |
|----------------------------------------------------|-----------------|---------------------|
| <b>Program : Civil Engineering</b>                 | <b>SY BTECH</b> | <b>Semester: IV</b> |
| <b>Fluid Mechanics (RCP23VCPC401)</b>              |                 |                     |
| <b>Fluid Mechanics - Laboratory (RCP23VLPC401)</b> |                 |                     |

**Course Objectives:**

After successful completion of course, students should able to:

1. Understand basic properties of fluids.
2. Study of Fluid statics conditions.
3. Measurement of flow with orifice, mouth piece, notches, weirs.

| <b>COs</b> | <b>Course Outcomes</b>                                                                               | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Define the basic concept of fluid and fluid properties. Including concept of buoyancy and flotation. | 2                   | Understand                |
| <b>CO2</b> | Measure the fluid pressure in various conditions                                                     | 3                   | Apply                     |
| <b>CO3</b> | Apply continuity equations to solve problems in fluid mechanics.                                     | 3                   | Apply                     |
| <b>CO4</b> | Apply the Bernoulli equation to solve problems in fluid mechanics.                                   | 3                   | Apply                     |
| <b>CO5</b> | Measure fluid flow with help of orifice, notches.                                                    | 2                   | Understand                |

## Course Content

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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                         |               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------|
| <b>Unit-I</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Introduction</b>     | <b>06 Hrs</b> |
| Definition of fluid, distinction between solid, fluid and gases Fluid Properties: Mass density, specific volume, specific weight, specific gravity - Definitions, units and dimensions, Viscosity, Newton's law of viscosity, Newtonian and non-Newtonian fluids, ideal and real fluids, Compressibility, Vapor Pressure, Surface tension, and Capillary. Buoyant force and center of buoyancy, Archimedes principle, meta-center, Stability of floating bodies |                         |               |
| <b>Unit-II</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Fluid Statics</b>    | <b>07 Hrs</b> |
| Fluid pressure at a point, Variation of fluid pressure with depth, pressure head, atmospheric, gauges, vacuum pressure, relationship with diagram, pressure measurement using simple and differential manometer with formation of gage equation. Hydrostatics pressure on various surface, Center of pressure and total pressure for fluid masses subjected to horizontal, vertical and inclined plane surface.                                                 |                         |               |
| <b>Unit-III</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>Fluid Kinematics</b> | <b>06 Hrs</b> |
| Types of fluid flows, rate of flow of discharge, continuity equation for one, two and three dimensional flows, Velocity and acceleration, Velocity potential function and stream function, vortex flow, flow nets concept.                                                                                                                                                                                                                                      |                         |               |
| <b>Unit-IV</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Fluid Dynamics</b>   | <b>07 Hrs</b> |
| Equation of motion, Euler's equation of motion, Bernoulli's equation, and practical Applications of Bernoulli's equation: Venturi meter, orifice meter, Pitot tube, Momentum Equation. Free liquid jet.                                                                                                                                                                                                                                                         |                         |               |
| <b>Unit-V</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Flow Measurement</b> | <b>06 Hrs</b> |
| Classification of Orifices, Mouthpieces, Determination of hydraulic co-efficient ( $C_v$ , $C_c$ , $C_d$ ), Classification of Notches and weirs, Discharge over rectangular notch, triangular notch, trapezoidal notch and weirs. Time required to empty a reservoir or a tank with triangular/rectangular notch. Ventilation of weir, Types of weirs.                                                                                                          |                         |               |

**Text Books**

1. Hydraulics and fluid mechanics including Hydraulic machines by Dr. P. N. Modi and
2. M. Seth, Latest edition, Standard book house.
3. Theory and application of fluid mechanics by K Subramanya, Tata McGraw Hill Publishing Company Ltd New Delhi.
1. A textbook of Fluid Mechanics and Hydraulic Machines by R. K. Bansal.
2. Fluid Mechanics- by D. S.Kumar, S.K.Katariya and Sons, Delhi.

**Reference Books:**

1. Fluid Mechanics and Hydraulic Machines by S. C. Gupta, Darling Kindersley (I) pvt. Ltd. Pearson licensee, Nodia, UP.
1. Fluid Mechanics – Fundamentals and applications by Yunus cengel, Jhon M Cimbala, Tata McGraw Hill Publishing Company Ltd New Delhi, latest edition/ reprint.
1. Fluid mechanics through problems, 2nd ed.: R. J. Garde, Wiley Eastern Ltd

**List of Experiments:**

1. Study variation of viscosity of oil with temperature.
2. Determination of metacentric height
3. Study of pressure measuring devices (simple and differential manometers).
4. Verification of Bernoulli's equation.
5. Laminar flow by Reynolds Experiment.
6. Study the concept of flow net with electrical analogy test.
7. Calibration of Venturimeter.
8. Calibration of rectangular / Triangular notch.
9. Determination of Hydraulic Coefficients for an orifice.

|                                              |                 |                     |
|----------------------------------------------|-----------------|---------------------|
| <b>Program : Civil Engineering</b>           | <b>SY BTECH</b> | <b>Semester: IV</b> |
| <b>Surveying (RCP23VCPC402)</b>              |                 |                     |
| <b>Surveying - Laboratory (RCP23VLPC402)</b> |                 |                     |

### Course Objectives

1. To understand the need and significance of vertical measurements, also basic concepts and methods, instruments used for levelling with computational skills.
2. To understand necessity, methods and instruments used for horizontal and vertical control.
3. To understand the operation of measurement of horizontal distance and vertical elevation by transit theodolite.
4. To analyse the elements and setting out of horizontal and vertical curves by different methods. Use of aerial photogrammetry for large scale survey project operations.

| <b>COs</b> | <b>Course Outcomes</b>                                                                                                         | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|--------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Determine the Reduced Levels (RLs) of various points using different levelling methods.                                        | <b>L3</b>           | Apply                     |
| <b>CO2</b> | Analyse and perform theodolite surveying operations for measuring horizontal and vertical angles in elevation and positioning. | <b>L4</b>           | Analyze                   |
| <b>CO3</b> | Apply tachometric surveying techniques to calculate horizontal distances and elevations.                                       | <b>L3</b>           | Apply                     |
| <b>CO4</b> | Set out and evaluate horizontal curves using various field methods.                                                            | <b>L5</b>           | Evaluate                  |

## Course Content

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|                                                                                                                                                                                                                                                                                                                                                                                                                  |                               |              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|--------------|
| <b>Unit-I</b>                                                                                                                                                                                                                                                                                                                                                                                                    | <b>Levelling</b>              | <b>8 Hrs</b> |
| Principle of surveying, Definitions of some common terms in leveling, Instruments for leveling, Types of levels, leveling staff, Temporary adjustments of level, Types of bench mark, Computation of reduced level by height of instrument and rise and fall method, Curvature and refraction correction, Reciprocal leveling method, Profile leveling L section and cross section.                              |                               |              |
| <b>Unit-II</b>                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Theodolite Traversing</b>  | <b>8 Hrs</b> |
| Uses of theodolite, Measurement of horizontal and vertical angles, Measurement of Magnetic bearing and deflection angle, Theodolite traverse, Computation of consecutive and independent coordinates, Adjustment and balancing of closed traverse, Gales traverse by coordinate method.                                                                                                                          |                               |              |
| <b>Unit-III</b>                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Tachometry</b>             | <b>8 Hrs</b> |
| Principle of stadia system, Methods of tachometry- Fixed hair and Movable hair, Determination of Horizontal distance and Vertical elevation, If line of sight is inclined and staff is held vertical, Uses of tachometry in surveying, Characteristics and Uses of Contour lines, Plotting of contour by interpolation method, Radial contouring.                                                                |                               |              |
| <b>Unit-IV</b>                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Curve</b>                  | <b>8 Hrs</b> |
| Horizontal curves, Simple Curves, setting with Chain and Tapes, Tangential Angles by Theodolite, Double Theodolite, Compound and Reverse Curves, Transition Curves, Functions and requirements, setting out by offsets and angles, Vertical Curves, Sight Distance requirements. (Only Theory)                                                                                                                   |                               |              |
| <b>Unit-V</b>                                                                                                                                                                                                                                                                                                                                                                                                    | <b>Photogrammetry and EDM</b> | <b>8 Hrs</b> |
| Objects of photogrammetry, Terrestrial photogrammetry and aerial photogrammetry, Aerial camera, Comparison of map and vertical photograph, Vertical tilted and oblique Photographs, terms related with photogrammetry, Scale of vertical photograph, Computation of length and height from the photograph, Relief displacement, Flight planning.<br>Types of EDM, Total station- features, observation, working. |                               |              |

## **References / Text Books / List of experiments / Assignment**

### **Text Books:**

1. Surveying- Fundamentals and Advanced practices by Dr. N R Chandak, Dr. H R Kumavat, S K Katariya Publication New Delhi.
2. Surveying Vol.1 by Dr. B. C. Punmia, Laxmi Publication.
3. Surveying and Levelling by N.N.Basak, Tata Mac Graw Hill Publication.

### **Reference Books:**

1. Surveying and Levelling by S. K. Duggal, Tata Mac Graw Hill Publication.
2. Surveying and Levelling by T. P. Kanetkar, Laxmi publication.
3. Higher Sureveying by A.M.Chandra
4. Principles of remote sensing by A.N. Patel, Surendra Singh
5. Advanced Surveying (Total Station, GIS and Remote Sensing) First edition 2007, Sathessh Gopi, Sathikumar, N Madhu.

### **List of the Experiment**

- 1 Calculation of RL by Height of instrument and Rise and fall method
- 2 Measurement of Horizontal Angle of triangle (Repetition method) by 20" Theodolite
- 3 Measurement of Horizontal Angle (Reiteration method) by 20" Theodolite
- 4 Measurement of Vertical Angle by 20" Theodolite OR 1" Theodolite
- 5 Determination of gradient by Tachometric Surveying
- 6 Measurement of Horizontal Angle of triangle by 1" Theodolite
- 7 Setting out of circular curve by Rankine method of deflection angle.
- 8 Study of Total Station for measurement of angles and distances.
- 9 Road project for minimum length of 200m, including fixing of alignment, profile leveling, cross sectioning.
- 10 Tachometric contouring project

|                                           |                 |                     |
|-------------------------------------------|-----------------|---------------------|
| <b>Program : Civil Engineering</b>        | <b>SY BTECH</b> | <b>Semester: IV</b> |
| <b>Structural Analysis (RCP23VCPC403)</b> |                 |                     |

### Course Objectives

1. To understand the concept of determinate and indeterminate structures, analyses of determinate and indeterminate structures.
2. The student should be able to categories the different types of actions, quantify their corresponding deformations and appreciate the final displaced shape of structures.
3. The course runs through a number of techniques which are used for the analysis of civil engineering structures.

| <b>COs</b> | <b>Course Outcomes</b>                                                                                                               | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|--------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Students will able to understand the basic concept of static and kinematic indeterminacy, slope and deflection of determinate beams. | 3                   | Apply                     |
| <b>CO2</b> | Students will able to understand and analyze indeterminate beams.                                                                    | 2                   | Understand                |
| <b>CO3</b> | Students will be able to apply fundamental concepts of slope-deflection method for analysis of indeterminate structures.             | 3                   | Apply                     |
| <b>CO4</b> | Students will be proficient in analyzing determinate and indeterminate trusses.                                                      | 4                   | Analyze                   |

## Course Content

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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                 |              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|--------------|
| <b>Unit-I</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>Introduction to Structural Analysis and Deflections in Determinate Beams</b> | <b>8 Hrs</b> |
| a) Introduction, types of structure, equilibrium and compatibility conditions, stress-strain relations, force-displacement relations, Static and kinematic indeterminacy of structures: concept, theories, and numerical. b) Approaches to compute deflections in determinate beams – Calculations of deflection for determinate beams by Moment area method, Conjugate beam method and Macaulay's method of double integration.                                                             |                                                                                 |              |
| <b>Unit-II</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Analysis of Indeterminate Beams</b>                                          | <b>8 Hrs</b> |
| a) Fixed Beams- Fundamentals, advantages and disadvantages, fixed end moment and reactions for standard cases of loading, numerical examples considering effect of sinking of support, SFD and BMD. b) Continuous Beams - Analysis of continuous beam by Clapyeron's theorem of three moments.                                                                                                                                                                                               |                                                                                 |              |
| <b>Unit-III</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>Slope Deflection Method</b>                                                  | <b>8 Hrs</b> |
| Analysis of continuous beams, analysis of rigid frames, frames without sway and with sway, effects of settlement.                                                                                                                                                                                                                                                                                                                                                                            |                                                                                 |              |
| <b>Unit-IV</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Analysis of Trusses</b>                                                      | <b>8 Hrs</b> |
| a) Analysis of truss using method of joints and method of section b) Deflection of trusses- Analysis of determinate plane trusses by Castigliano's first theorem                                                                                                                                                                                                                                                                                                                             |                                                                                 |              |
| <b>Unit-V</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>Analysis of Arches</b>                                                       | <b>7 Hrs</b> |
| a) Three hinged arches- Theory of arches, Eddy's theorem, Concept of three hinged arch, calculations for support reactions, horizontal thrust, normal thrust and radial shear. Calculations for maximum positive and negative bending moment. BMD for circular and parabolic three hinged arches. b) Two hinged arches- Theory, calculations for horizontal thrust. Calculations for maximum positive and negative bending moment. BMD for parabolic arch due to various loading conditions. |                                                                                 |              |

## **References / Text Books / List of experiments / Assignment**

### **Reference Books:**

- Ramamrutham S., “Theory of structures”, Dhanpatrai Publishing Company.
- Reddy C. S., “Basic Structural Analysis”, Tata McGraw Hill, 3rd edition 2010
- Wang C.K., “Statically Indeterminate Structures”, McGraw Hill
- Vazirani V.N., Ratwani M.M and Duggal S.K., “Analysis of Structures - Vol. I”, ISBN NO: 978-81-7409-140-8
- Punmia B.C., “Structural Analysis”, Laxmi Publications
- Bhavikatti S.S., “Structural analysis” Vol –I, II , Vikas Publishing House Pvt. Ltd.
- Junnarkar S. B. and Dr. Shah H.J., “Mechanics of structures” Vol – II by, Charotar Publishing House.

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|---------------------------------------------------------------|-----------------|---------------------|
| <b>Program : Civil Engineering</b>                            | <b>SY BTECH</b> | <b>Semester: IV</b> |
| <b>Building Planning and Design (RCP23VCPC404)</b>            |                 |                     |
| <b>Building Planning and Design Laboratory (RCP23VLPC404)</b> |                 |                     |

Course Objectives

1. To identify the basic drawing principles of building.
2. To understand the principle of planning for residential and Public building.
3. To develop plans of Residential/Public building using byelaws and buildings services as per National Building Code.
4. To understand the sketches and working drawings.
5. To draw elevation, section and aesthetics of proposed building by perspective view.

| <b>COs</b> | <b>Course Outcomes</b>                                                                                            | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|-------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Discuss concepts of scale, symbols of materials, types of buildings, and use of building materials.               | 2                   | Understand                |
| <b>CO2</b> | Explain various building byelaws relating to planning of building and different building services.                | 3                   | Apply                     |
| <b>CO3</b> | Use different building services to make building comfortable.                                                     | 3                   | Apply                     |
| <b>CO4</b> | Prepare working and submission drawings of load bearing and framed structure.                                     | 6                   | Creating                  |
| <b>CO5</b> | Draw one- and two-point perspective view of an object and building and to plan public and administrative building | 3                   | Apply                     |

## Course Content

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|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|---------------|
| <b>Unit-I</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>Principles and Codes of Practices for Planning and Designing of Buildings</b> | <b>04 Hrs</b> |
| a) <b>Study of IS 962-1989- Code of practice for architectural and building drawings</b> – sizes of drawings, layout of drawings. Importance and types of scales in architecture, criteria for proper selection of scale for various types of drawing.<br>Line work – Types thickness, spacing of lines, lettering and dimensioning,<br>Graphical symbols of door windows, Abbreviations, symbols for sanitary and electric installation.                             |                                                                                  |               |
| b) <b>Principles of planning for Residential buildings</b> – Aspect, prospect, grouping, circulation, roominess, flexibility, privacy, sanitation, ventilation, Elegance, Economy, Practical Consideration.                                                                                                                                                                                                                                                           |                                                                                  |               |
| c) <b>Types of Building as per occupancy</b>                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                  |               |
| <b>Unit-II</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Study of Building byelaws</b>                                                 | <b>04 Hrs</b> |
| a) Building byelaws - Importance/Necessity of Building Codes and byelaws, plot sizes, road width, open spaces, floor area ratio (F.A.R.), marginal distances, building line, control line, height regulation, Minimum size and width of different components of residential premises, types of area calculations – built-up area, floor area, and carpet area, Primary introduction about Real Estate (Regulation and Development) Act, 2016.                         |                                                                                  |               |
| <b>Unit-III</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>Building Services and Building components</b>                                 | <b>04 Hrs</b> |
| a) Ventilation- Necessity of Ventilation, Natural ventilation and Mechanical ventilation. b) Air Conditioning Systems- Classification, object and necessity of air conditioning.                                                                                                                                                                                                                                                                                      |                                                                                  |               |
| <b>Unit-IV</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Planning of Residential Building - Load bearing and frame structure</b>       | <b>07 Hrs</b> |
| a) Planning of residential building - Bubble diagrams of detached house, semi- detached house, and row houses. Data drawing (load bearing or frame structure) – Developed floor plans, elevation, section, site plan schedule of opening, construction note with specification, area statement, foundation plan. b) Planning of staircase- Rise and trade calculation of dog-legged staircase, open well staircase, Spiral Staircase, Curved (Geometrical) staircase. |                                                                                  |               |
| <b>Unit-V</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>Perspective drawing and Planning of Public Building</b>                       | <b>06 Hrs</b> |
| a) Perspective Drawings – One point and Two-point perspective of an object and simple Residential building.<br>b) Line plan of public building – Functional requirements and planning of Educational Building (School, Colleges), Hostel, Library building, Restaurant/ Hotel building, Primary Health Center/ Hospital, Shopping complex, Community/marriage halls, Post offices, Bank building. Two dimensioned line plans of above public buildings.               |                                                                                  |               |

## References / Text Books / List of experiments / Assignment

### Text Books:

1. Shah M.G., Kale C.M. and Patki S.Y., “Building drawing an Integrated approach to Built environment”, Tata McGraw Hill (Fifth edition )
1. Building Planning and Drawing by Dr. N. KumaraSwamy, A. Kameswara Rao, 7th edition, Charotar Publishing House.
1. Y.S.Sane, “Planning and Designing Buildings”, Engineering Book Publishing Co., Pune – 16, Edition 1996
1. S.P.Arora and S.P. Bindra, “A Text Book of Building Construction”, Dhanpat Rai and Sons, Delhi, Edition 1996

### Reference Books:

1. National Building Code of India 2005, Bureau of Indian Standard, New Delhi.
2. Dr. B.C. Punmia, “Building Construction” Laxmi Publications Pvt. Ltd., New Delhi, Edition, 1998
1. I.S. 962 – 1989 Code for Practice for Architectural and Building Drawings.
2. Building science and planning by Dr. S. V. Deodhar, Khanna Publishers.
3. National Building Code of India – 2005 (NBC 2005)
4. A Course in Civil Engineering Drawing”, by V. B. Sikka, S. K.Kataria and Sons.

### List of Experiments

#### A) Group A- Planning of Residential Building -

a) Planning of a small residential buildings/bungalow/duplex from given data (load bearing or framed structure).

1. Draw different floor detailed plans with furniture arrangement.
2. Draw front elevation, sections (preferably through staircase).
3. Site plan, built up area calculations.
4. Schedules of area and openings.

b) Perspective views of different objects and small residential building plan with suitable scale.

#### B) Group B- Planning of Public Building (From Unit V)-

1. Typical floor plans- Draw all details units of each floor. / Front or Road side elevations.
2. Sections- Draw section through staircase and toilet with all constructional details.
3. Foundation Plan- Draw all foundation details.
4. Layout plan and site plan project building including water supply and drainage arrangements
5. Site Visit – Visit of any advanced on-going building construction site, (visit report should contain- Details of the location of site visit, stage of construction, sketches of components with cross section and dimensions, materials used and site plan, and photographs etc.)

### Laboratory:

Oral examination will be based on the entire syllabus including, the experiments performed during Filed and laboratory sessions.

The final certification and acceptance of term work will be subject to satisfactory performance of laboratory

work and upon fulfilling minimum passing criteria in the term work.

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|----------------------------------------------|-----------------|---------------------|
| <b>Program : Civil Engineering</b>           | <b>SY BTECH</b> | <b>Semester: IV</b> |
| <b>Remote Sensing and GIS (RCP23VCMD401)</b> |                 |                     |

### Course Objectives

This course introduces undergraduate civil engineering students to the fundamental principles and applications of remote sensing and Geographic Information Systems (GIS). The objectives are:

1. To introduce the fundamental principles and concepts of remote sensing and GIS.
2. To explore the different types of remote sensing and GIS technologies and their functionalities.
3. To familiarize students with the software tools used in remote sensing and GIS.
4. To develop skills for interpreting remote sensing data and integrating it with GIS for civil engineering applications.
5. To apply remote sensing and GIS techniques to solve real-world problems in civil engineering.

| <b>COs</b> | <b>Course Outcomes</b>                                                                                      | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|-------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Explain the basic concepts of remote sensing and GIS.                                                       | 2                   | Understand                |
| <b>CO2</b> | Identify and describe various types of remote sensing techniques and GIS tools.                             | 1                   | Learn                     |
| <b>CO3</b> | Utilize appropriate software for processing and analysing remote sensing data.                              | 3                   | Apply                     |
| <b>CO4</b> | Integrate remote sensing and GIS for planning, analysis, and decision-making in civil engineering projects. | 1                   | Analyze                   |

## Course Content

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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|---------------|
| <b>Unit-I</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>Basic of Remote Sensing</b>                         | <b>08 Hrs</b> |
| Basic principles of remote sensing, Importance, scope, Sensors used in remote sensing, classification of sensors, Remote sensing platforms, Applications of remote sensing to Civil Engineering.                                                                                                                                                                                                                                                                                                  |                                                        |               |
| <b>Unit-II</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>Sensors and Platforms:</b>                          | <b>07 Hrs</b> |
| Sensors- Remote Sensing sensors and their characteristics, Across track (Whiskbroom) and Along track (Push broom) scanning, Optical mechanical scanners- MSS, TM, LISS, WIFS, PAN; Active and Passive sensors. Platforms- Remote Sensing platforms types and characteristics, Satellite and their characteristics- Geostationary and Sun-synchronous, Satellite mission: IRS satellite series, LANDSAT series, SPOT series, QUICK BIRD, IKONOS, Metrological satellite- INSAT, NOAA, GOES, NIMBUS |                                                        |               |
| <b>Unit-III</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Fundamentals of Geographic Information Systems</b>  | <b>06 Hrs</b> |
| Introduction to GIS, Understand the difference between GIS and information system in general, GIS components and function of GIS: hardware software requirement of GIS, data types and spatial data models, idea of conceptual, logical and physical models, Basics of spatial analysis: overlay, buffer, and interpolation. Civil engineering applications of GIS.                                                                                                                               |                                                        |               |
| <b>Unit-IV</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                        | <b>06 Hrs</b> |
| Image interpretation of different geological landforms, rock types and structures. Remote Sensing Integration with GIS and GPS Geo-referencing Technique Basic Image Enhancement Techniques Spatial Filtering, Band ratio and Principal Component Analysis techniques                                                                                                                                                                                                                             |                                                        |               |
| <b>Unit-V</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>Applications of RS and GIS in Civil Engineering</b> | <b>06 Hrs</b> |
| Urban and Regional Planning: Land use and land cover analysis, zoning, Environmental Management: Watershed management, erosion studies, and environmental impact assessment. Disaster Management: Flood, earthquake, and landslide risk mapping. Transportation Engineering: Route optimization, traffic analysis, and asset management. Case Studies: Detailed examples demonstrating the integration of remote sensing and GIS in civil projects.                                               |                                                        |               |

## **References / Text Books / List of experiments / Assignment**

### **Textbooks:**

1. "Remote Sensing and GIS" by Basudeb Bhatta.
2. "Introduction to Geographic Information Systems" by Kang-Tsung Chang.
3. "Remote Sensing and Image Interpretation" by Thomas Lillesand, Ralph W. Kiefer, and Jonathan Chipman.
4. Online resources and tutorials for ArcGIS, QGIS, and ERDAS Imagine.

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|------------------------------------------------------------|-----------------|---------------------|
| <b>Program : Civil Engineering</b>                         | <b>SY BTECH</b> | <b>Semester: IV</b> |
| <b>Open Elective –II Project Management (RCP23OCOE401)</b> |                 |                     |

### Course Objectives

1. To familiarize the students with the use of a structured methodology/approach for every unique project undertaken, utilizing project management concepts, tools and techniques.
2. To appraise the students with the project management life cycle and make them knowledgeable about the various phases from project initiation through closure.

| <b>COs</b> | <b>Course Outcomes</b>                                                                                                                                            | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Explain project management life cycle and the various project phases as well as the role of project manager.                                                      | 2                   | Understand                |
| <b>CO2</b> | Apply selection criteria and select an appropriate project from different options.                                                                                | 3                   | Apply                     |
| <b>CO3</b> | Create a work break down structure for a project and develop a schedule based on it. Manage project risk strategically.                                           | 6                   | Create                    |
| <b>CO4</b> | Use Earned value technique and determine and predict status of the project. Capture lessons learned during project phases and document them for future reference. | 6                   | Create                    |
| <b>CO5</b> | Differentiate between traditional waterfall approach and agile scrum methodology for software development projects                                                | 1                   | Analyze                   |

## Course Content

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### Unit-I

07 Hrs

Project Management Foundation: Definition of a project, Project Vs Operations, Necessity of project management, Triple constraints, Project life cycles (typical and atypical). Project phases and stage gate process. Role of project manager, Negotiations and resolving conflicts, Introduction to project leadership, ethics in projects, Multicultural and virtual projects, Project management in various organization structures, PM knowledge areas as per Project Management Institute (PMI).

### Unit-II

08 Hrs

Initiating Projects: How to get a project started, selecting project strategically, Project selection models (Numeric /Scoring Models and Non-numeric models), Project portfolio process, Project sponsor and creating charter, Effective project team, Stages of team development and growth (forming, storming, norming and performing), team dynamics.

### Unit-III

08 Hrs

Project Planning: Work Breakdown structure (WBS) and linear responsibility chart, Project cost estimation and budgeting, Top down and bottoms up budgeting, Networking and Scheduling techniques, PERT, CPM. Crashing project time and Resource loading and levelling (Only Theory), Project Stakeholders and Communication plan. Risk Management in projects: Risk management planning, Risk identification and risk register, Qualitative and quantitative risk assessment, Probability, and impact matrix. Risk response strategies for positive and negative risks.

### Unit-IV

08 Hrs

Monitoring and Controlling Projects: Planning monitoring and controlling cycle, Information needs and reporting, engaging with all stakeholders of the projects, communication and project meetings. Earned Value Management techniques for measuring value of work completed, using milestones for measurement, change requests and scope creep, Project audit, Project Contracting: Project procurement management, contracting and outsourcing. Closing the Project: Customer acceptance, Reasons of project termination, Various types of project terminations (Extinction, Addition, Integration, Starvation), Process of project termination, completing a final report, doing a lessons learned analysis, acknowledging successes and failures.

### Unit-V

08 Hrs

Agile project management: Agile principle, Agile Manifesto, Agile process framework, Characteristics of Agile Approaches and Scrum, Benefits of Agile project management, Implementing Agile project management. Agile Project Planning: Comparison of Agile Project Management with Traditional Waterfall Approach, Project Planning with Scrum, Scrum Artifacts Supporting Project Planning, Scrum Events for Project Planning. Scheduling with scrum, Techniques for scrum scheduling- Poker estimation. Agile Tools for Tracking Project Progress: Task Boards, Burnup and Burndown Charts.

## **References / Text Books / List of experiments / Assignment**

### **Text Books:**

1. Jack Meredith and Samuel Mantel, “Project Management: A managerial approach”, 11th Edition, Wiley India.
2. Erik Larson, Clifford Gray, “Project Management: The Managerial Process”, 8th Edition, Mc- Graw Hill Education.
3. Jim Highsmith, Pearson Education, “Agile Project Management”, Low Price Edition, India.

### **Reference Books:**

1. A Guide to the Project Management Body of Knowledge (PMBOK® Guide), 7th Edition, Project Management Institute PA, USA.
2. Gido Clements, “Project Management”, Cengage Learning.
3. Gopalan, “Project Management”, Wiley India.
4. Dennis Lock, “Project Management”, 9th Edition, Gower Publishing England.
5. Kalpesh Ashar, “Agile Essentials You Always Wanted to Know”, Vibrant Publishers U.S.A.

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|-----------------------------------------------------------------|-----------------|---------------------|
| <b>Program : Civil Engineering</b>                              | <b>SY BTECH</b> | <b>Semester: IV</b> |
| <b>Open Elective II- Cyber Security and Laws (RCP23OCOE402)</b> |                 |                     |

**Prerequisite:** Fundamentals of Computers.

**Course Objectives:**

1. Familiarize with the provisions and implications of the Digital Personal and Data Protection Act, the obligations of data fiduciaries, the rights and duties of data principals, and mechanisms for resolving breaches.
2. Equip individuals and organizations with the knowledge and tools to create secure cyber ecosystem- tems, strengthen regulatory frameworks, and develop incident response plans.

| <b>COs</b> | <b>Course Outcomes</b>                                                                                                                               | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Understand and describe the major types of cybercrime and navigate legal frameworks and regulations concerning digital personal and data protection. | 2                   | Understand                |
| <b>CO2</b> | Implement strategies for cybersecurity outlined in the National Cyber Security Policy.                                                               | 3                   | Apply                     |
| <b>CO3</b> | Apply appropriate law enforcement strategies to both, prevent and control cybercrime.                                                                | 3                   | Apply                     |
| <b>CO4</b> | Comprehend regulations and strategies pertaining to AI (Artificial Intelligence) and large language models.                                          | 2                   | Understand                |

## Course Content

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### **Unit-I**

**08 Hrs**

Cyber Crime: Definition and Origin of the Word, Cyber Crime and Information Security, who are Cyber Criminals, Classification of Cybercrimes, E-mail Spoofing, Spamming, Cyber Defamation, Internet Time Theft, Salami Attack, Salami technique Data Diddling, Forgery, Newsgroup Spam, Online Frauds, Pornographic Offenders, Email Bombing, Password Sniffing, Credit Card Frauds.

### **Unit-II**

**08 Hrs**

Cyber Offenses: How Criminals plan them, Categories of Cyber Crimes, How Criminal Plans the Attack: Active Attacks, Passive Attacks, Social Engineering, Classification of Social Engineering, Cyber Stalking: types of Stalkers, Cyber Cafe and Cyber Crimes, Botnets, Attack Vectors, Cyber Crime and Cloud Computing.

### **Unit-III**

**08 Hrs**

Indian IT Act: Cyber Crime and Criminal Justice, Penalties, Adjudication and Appeals Under the IT Act, 2000, IT Act. 2008 and its Amendments Security aspect in Cyber-Law, The Contract Aspects in Cyber Law, The Security Aspect of Cyber Law, Security Standards: SOX, GLBA, HIPAA, NIST Cyber Security Framework (CSF).

### **Unit-IV**

**07 Hrs**

India's Digital Personal and Data Protection Act (2023): Preliminary, Obligations of Data Fiduciary, Rights and Duties of Data Principal, Special Provisions, Data Protection Board of India, Powers, Functions and Procedure to Be Followed by Board, Appeal and Alternate Dispute Resolution, Penalties and Adjudication.

### **Unit-V**

**08 Hrs**

India's AI Regulation and Strategy: Privacy, Security and Artificial Intelligence, Differential Privacy, Security in AI. National Artificial Intelligence Strategy, Principles for Responsible AI, Information Technology (Intermediary Guidelines and Digital Media Ethics Code-2021), Draft National Data Governance Framework Policy (NDGFP), Rules against Deep fakes, Due diligence advisory for AI, AI regulations framework (June 2024).

## **References / Text Books / List of experiments / Assignment**

### **Text Books:**

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole, Sunit Belapur, Wiley-2011.
2. Understanding Cybersecurity Management in Decentralized Finance: Challenges, Strategies, and Trends by Gurdip Kaur, Springer-2023.

### **Reference Books:**

1. The Information Technology Act, 2000; Bare Act- Professional Book Publishers, New Delhi.
2. Izzat Alsmadi , The NICE Cyber Security Framework: Cyber Security Intelligence and Analytics, Springer-2023.

### **References (Web Resources):**

1. Digital Personal Data Protection Act 2023.pdf (meity.gov.in)
2. National Cyber Security Policy (draft v1 (meity.gov.in)
3. CISO Roles Responsibilities.pdf
4. Standards(bis.gov.in)
5. AI, Machine Learning and Big Data Laws and Regulations — India (globallegalinsights.com)

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|----------------------------------------------------------------------|-----------------|---------------------|
| <b>Program : Civil Engineering</b>                                   | <b>SY BTECH</b> | <b>Semester: IV</b> |
| <b>Open Elective II- Advanced Operations Research (RCP23OCOE403)</b> |                 |                     |

**Prerequisite:** 1. Operation Research 2. Mathematics (Calculus)

**Course Objectives:**

1. To develop an ability to analyses the structure and mathematical model of various complex system occurring in manufacturing system, service system, and business applications.
2. To develop knowledge of the mathematical structure of linear and nonlinear optimization models.
3. To develop an understanding of the techniques used to solve linear and nonlinear optimization models using their mathematical structure.
4. To develop an understanding of the use of modelling languages for expressing and solving optimization models.

| <b>COs</b> | <b>Course Outcomes</b>                                                                                                                    | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Apply Duality theory to solve linear programming problem and analyses optimum solution.                                                   | 3                   | Apply                     |
| <b>CO2</b> | Construct linear integer programming models and apply the O.R. algorithms and techniques to solve linear integer programming problems. L3 | 1                   | Remember                  |
| <b>CO3</b> | Determine best satisfying solution under a varying quantity of resources and priorities of the goals.                                     | 5                   | Evaluate                  |
| <b>CO4</b> | Set up decision models and solve nonlinear programming-uncon- strained optimization problems.                                             | 3                   | Apply                     |
| <b>CO5</b> | Set up decision models and solve nonlinear programming-con- strained optimization problems.                                               | 3                   | Apply                     |

## Course Content

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### **Unit-I**

**06 Hrs**

Dual Linear Programs: Primal, dual, and duality theory - The dual simplex method -The primal- dual Algorithm-Duality applications. Post optimization problems: Sensitivity analysis.

### **Unit-II**

**06 Hrs**

Integer Programming: Pure and mixed integer programming problems, Solution of Integer programming problems Gomory's all integer cutting plane method and mixed integer method, branch and bound method, Zero-one programming.

### **Unit-III**

**05 Hrs**

Goal Programming: Concept of Goal Programming, GP model formulations, Graphical method of GP, The simplex method of GP, Application areas of GP.

### **Unit-IV**

**11 Hrs**

Nonlinear Programming- Unconstrained optimization: Minimization and maximization of convex functions- Local Global optimum- Convergence-Speed of convergence. one-dimensional unconstrained optimization – Newton's method – Golden-section search method, multidimensional unconstrained optimization –Gradient method — steepest ascent (descent) method – Newton's method.

### **Unit-V**

**11 Hrs**

Nonlinear Programming- Constrained optimization: Constrained optimization with equality and inequality constraints. Constrained optimization: Lagrangian method - Sufficiency conditions - Kuhn-Tucker optimality conditions Rate of convergence - Engineering Applications Quadratic programming problems-convex programming problems.

## **References / Text Books / List of experiments / Assignment**

### **Text Books:**

1. Gupta, P. K. and Hira, D. S., Operations Research, S. Chand Publications, 2014.
1. Srinivasan, G., Operations research: Principles and applications, Prentice Hall of India, 2007.
1. Nita H. Shah, Poonam Prakash Mishra, Non-Linear Programming-A Basic Introduction, CRC Press, 2020.

### **Reference Books:**

1. Frederick S. Hillier and Gerald J. Lieberman, Introduction to Operations Research, McGraw-Hill: Boston MA; 8th(International) Edition, 2005.
2. Ravindran, Philips and Soleberg, Operations Research – Principle and Practice, Second Edition, John Wiley and Sons, 2007.
3. Taha, H. A., Operations Research - An Introduction, Pearson Education, 2022.
1. Paul A. Jensen, Jonathan F. Bard, Operations Research: models and methods, Wiley Publications, 2003.
2. C. B Gupta, I.K., Optimization Techniques in Operation Research, International Publishing House Pvt. Limited, 2008.

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|----------------------------------------------------------------------|-----------------|---------------------|
| <b>Program : Civil Engineering</b>                                   | <b>SY BTECH</b> | <b>Semester: IV</b> |
| <b>Open Elective II- Corporate Finance Management (RCP23OCOE404)</b> |                 |                     |

**Prerequisite:** Nil.

**Course Objectives:**

1. Overview of Indian financial system, instruments and market.
2. Basic concepts of value of money, returns and risks, corporate finance, working capital and its management.
3. Knowledge about sources of finance, capital structure, dividend policy.

| <b>COs</b> | <b>Course Outcomes</b>                                                                 | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|----------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Understand Indian finance system                                                       | 2                   | Understand                |
| <b>CO2</b> | Apply concepts of time value money and risk returns to product, services and business. | 3                   | Apply                     |
| <b>CO3</b> | Understand corporate finance and working capital management.                           | 2                   | Understand                |
| <b>CO4</b> | Take Investment and finance decisions.                                                 | 3                   | Apply                     |
| <b>CO5</b> | Take dividend decisions.                                                               | 3                   | Apply                     |

## Course Content

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### Unit-I

08 Hrs

Overview of Indian Financial System: Characteristics, Components and Functions of Financial System. Financial Instruments: Meaning, Characteristics and Classification of Basic Financial Instruments — Equity Shares, Preference Shares, Bonds-Debentures, Certificates of Deposit, and Treasury Bills. Financial Markets: Meaning, Characteristics and Classification of Financial Markets — Capital Market, Money Market and Foreign Currency Market. Financial Institutions: Meaning, Characteristics and Classification of Financial Institutions — Commercial Banks, Investment-Merchant Banks and Stock Exchanges.

### Unit-II

08 Hrs

Concepts of Returns and Risks: Measurement of Historical Returns and Expected Returns of a Single Security and a Two-security Portfolio; Measurement of Historical Risk and Expected Risk of a Single Security and a Two-security Portfolio. Time Value of Money: Future Value of a Lump Sum, Ordinary Annuity, and Annuity Due; Present Value of a Lump Sum, Ordinary Annuity, and Annuity Due; Continuous Compounding and Continuous Discounting.

### Unit-III

07 Hrs

Overview of Corporate Finance: Objectives of Corporate Finance; Functions of Corporate Finance—investment Decision, Financing Decision, and Dividend Decision. Working Capital Management: Concepts of Meaning Working Capital; Importance of Working Capital Management; Factors Affecting an Entity's Working Capital Needs; Estimation of Working Capital Requirements; Management of Inventories; Management of Receivables; and Management of Cash and Marketable Securities.

### Unit-IV

08 Hrs

Capital Budgeting: Meaning and Importance of Capital Budgeting; Inputs for Capital Budgeting Decisions; Investment Appraisal Criterion—Accounting Rate of Return, Payback Period, Discounted Payback Period, Net Present Value (NPV), Profitability Index, Internal Rate of Return (IRR), and Modified Internal Rate of Return (MIRR)

### Unit-V

08 Hrs

Capital Structure: Factors Affecting an Entity's Capital Structure; Overview of Capital Structure Theories and Approaches — Net Income Approach, Net Operating Income Approach; Traditional Approach, and Modigliani-Miller Approach. Relation between Capital Structure and Corporate Value Concept of Optimal Capital Structure. Dividend Policy: Meaning and Importance of Dividend Policy; Factors Affecting an Entity's Dividend Decision; Overview of Dividend Policy Theories and Approaches — Gordon's Approach, Walter's Approach, and Modigliani-Miller Approach

## **References / Text Books / List of experiments / Assignment**

### **Text Books:**

1. Financial Management, Theory Practice 8th Edition (2011), by Prasanna Chandra: Tata McGraw Hill Education Private Limited, New Delhi.
2. Indian Financial System, 9th Edition (2015) by M. Y. Khan; Publisher: McGraw Hill Education, New Delhi.
3. Financial Management, 11th Edition (2015) by I. M. Pandey; Publisher: S. Chand (G/L) and Company Limited, New Delhi.

### **Reference Books:**

1. Fundamentals of Financial Management, 13th Edition (2015) by Eugene F. Brigham and Joel Houston; Publisher: Cengage Publications, New Delhi.
1. Analysis for Financial Management, 10th Edition (2013) by Robert C. Higgins; Publishers: McGraw Hill Education, New Delhi.

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|-------------------------------------------------------------------------|-----------------|---------------------|
| <b>Program : Civil Engineering</b>                                      | <b>SY BTECH</b> | <b>Semester: IV</b> |
| <b>Open Elective II- Corporate Social Responsibility (RCP23OCOE405)</b> |                 |                     |

**Prerequisite:** Nil.

**Course Objectives:**

To make students understand the concept, theories and application of CSR for the Development of the Society

| <b>COs</b> | <b>Course Outcomes</b>                                                                                                                                                                                | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | To analyses and critique the ethical dimensions of Corporate Social Responsibility initiatives, demonstrating a comprehensive understanding of CSR principles and their ethical underpinnings         | 1                   | Analyze                   |
| <b>CO2</b> | To understand the legislative frameworks shaping Corporate Social Responsibility both in India and globally, alongside recognizing the key drivers fostering CSR practices within the Indian context. | 2                   | Understand                |
| <b>CO3</b> | To identify and discuss the significance of social responsibility and community engagement initiatives, demonstrating an understanding of their impact on both businesses and society.                | 2                   | Understand                |

## Course Content

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### **Unit-I**

**07 Hrs**

Introduction to Corporate Social Responsibility (CSR): Understanding the concept of CSR ,Historical evolution and development of CSR, Importance and benefits of CSR for businesses and society ,Stakeholder theory and its relevance to CSR .

### **Unit-II**

**08 Hrs**

Ethical Foundations of CSR: Ethical theories relevant to CSR (Utilitarianism, Deontology, Virtue Ethics), Ethical decision-making frameworks in business, Corporate governance and ethics, Ethical issues in supply chain management.

### **Unit-III**

**08 Hrs**

CSR-Legislation in India and the World: Section 135 of Companies Act 2013.Scope for CSR Activities under Schedule VII, Appointment of Independent Directors on the Board, and Computation of Net Profit's Implementing Process in India.

### **Unit-IV**

**08 Hrs**

The Drivers of CSR in India: Market based pressure and incentives, civil society pressure, the regulatory environment in India Counter trends, Review of current trends and opportunities in CSR, Review of successful corporate initiatives and challenges of CSR. Case Studies of Major CSR Initiatives Corporate Social Responsibility and Public-Private Partnership (PPP).

### **Unit-V**

**08 Hrs**

Social Responsibility and Community Engagement: Social issues and challenges in contemporary society, Corporate philanthropy and community development initiatives, Stakeholder engagement strategies, Corporate volunteering and employee engagement programs, CSR as a strategic business tool vital for sustainable development.

## **References / Text Books / List of experiments / Assignment**

### **Text Books:**

1. Andrew Crane, Dirk Matten, "Corporate Social Responsibility: Definition, Core Issues, and Recent Developments" Oxford University Press.
2. O. C. Ferrell, John Fraedrich, Linda Ferrell," Business Ethics: Ethical Decision Making Cases", Cengage Learning.
3. Corporate Social Responsibility in India, Sanjay K Agarwal, Sage Publications, 2008.
1. Corporate Social Responsibility in India, Bidyut Chakrabarty, Routledge, New Delhi, 2015.

### **Reference Books:**

1. Corporate Social Responsibility: An Ethical Approach, Mark S. Schwartz, Broadview Press, 2011.
2. Attaining Sustainable Growth through Corporate Social Responsibility, George Pohle and Jeff Hittner, IBA Global Business Services, 2008.
3. Strategic Corporate Social Responsibility: Stakeholders in a Global Environment, William B. Werther Jr. and David Chandler, 2nd Edition, Sage Publications, 2011.

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|---------------------------------------|-----------------|---------------------|
| <b>Program : Civil Engineering</b>    | <b>SY BTECH</b> | <b>Semester: IV</b> |
| <b>Bio Informatics (RCP23OCOE406)</b> |                 |                     |

**Prerequisite:** Nil

**Course Objectives:**

1. To provide an overview of bioinformatics and its significance in modern biological research.
2. To enable students to apply bioinformatics methods in practical scenarios for biological data analysis and interpretation.

| <b>COs</b> | <b>Course Outcomes</b>                                                                                      | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|-------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Understand the structure and function of cells, organelles, and biomolecules                                | 2                   | Understand                |
| <b>CO2</b> | Understand the types of data stored in bioinformatics databases and their relevance to biological research. | 2                   | Understand                |
| <b>CO3</b> | Explore genomic databases and understand the structure and content of protein databases.                    | 2                   | Understand                |
| <b>CO4</b> | Understand system biology concepts and molecular evolution                                                  | 2                   | Understand                |
| <b>CO5</b> | Apply knowledge of cellular and molecular biology concepts to analyze a biological problem.                 | 3                   | Apply                     |

## Course Content

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### Unit-I

**08 Hrs**

Foundations of Molecular and Cellular Biology: Introduction to molecular biology: DNA, RNA, proteins, and their roles in cellular processes Cell structure and function: Organelles, membrane structure, and cellular transport Cell cycle regulation: phases of the cell cycle, checkpoints, and cell cycle control mechanisms

### Unit-II

#### **Genetics and Genomics:**

**08 Hrs**

Mendelian genetics: Inheritance patterns, Punnett squares, and genetic crosses Chromosome structure and organization: karyotyping, gene mapping, and genetic linkage Introduction to genomics: genome structure, organization, and variation Techniques in molecular genetics: PCR, DNA sequencing, and gene cloning

### Unit-III

#### **Genomic and Protein Databases:**

**5 Hrs**

Types of genomic databases such as GenBank, Ensemble, and UCSC Genome Browser, Understand the structure and content of protein databases such as UniProt and Protein Data Bank (PDB), Searching, Retrieving, and Analysing Genomic and Protein data from online databases.

### Unit-IV

#### **Systems Biology: 08 Hrs.**

**08 Hrs**

Introduction to Systems Biology: Modeling biological systems and network analysis, Bioinformatics tools for systems biology and modeling complex biological processes. Principles of molecular evolution: Mutation, Selection, and genetic drift. Phylogenetic analysis: Tree construction, sequence alignment, and molecular clock.

### Unit-V

**07 Hrs**

Applications and Case Studies: Applications of Bioinformatics in Medicine, Agriculture, and Biotechnology, Case Studies (Integrating Cellular and Molecular Biology with Bioinformatics) and Research Examples, Ethical and Legal Issues in Bioinformatics, Future Trends and Emerging Technologies in Bioinformatics.

## **References / Text Books / List of experiments / Assignment**

### **Text Books:**

1. Bioinformatics For Dummies, Jean-Michel Claverie and Cedric Notredame, For Dummies, 2019.
1. Bioinformatics Algorithms: An Active Learning Approach by Phillip Compeau and Pavel Pevzner, Active Learning Publishers, 2019.

### **Reference Books:**

1. Introduction to Bioinformatics, Arthur Lesk, Biologist Bioinformatics Expert, 2019.
1. Introduction to Biomedical Data Science, Robert Hoyt, Informatics Education, 2019.
1. Python for Biologists: A Complete Programming Course for Beginners, Martin Jones, Oxford University Press, 2013.
2. An Introduction to Bioinformatics Algorithms, Neil C. Jones, and Pavel A. Pevzner, MIT Press, 2004.
3. Exploring Bioinformatics: A Project-Based Approach, Caroline St. Clair, and Jonathan E. Visick, Jones Bartlett Learning, 2014.

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|-------------------------------------------------|-----------------|---------------------|
| <b>Program : Civil Engineering</b>              | <b>SY BTECH</b> | <b>Semester: IV</b> |
| <b>Human Resource Management (RCP23OCOE407)</b> |                 |                     |

**Prerequisite:** Nil.

**Course Objectives:**

1. To introduce the students with basic concepts, techniques and practices of the human resource managements.
2. To provide opportunity of learning Human resource management (HRM) processes, related with the functions, and challenges in the emerging perspective of today 's organizations.
3. To familiarize the students about the importance of the labour relations in the organization.

| <b>COs</b> | <b>Course Outcomes</b>                                                                                         | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|----------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Understand and distinguish the changing environment of the HRM and the role of the HR managers.                | 2                   | Understand                |
| <b>CO2</b> | Understand and analyse the recruitment process and the application of the IT.                                  | 3                   | Apply                     |
| <b>CO3</b> | Understand and examine the importance of the training and development.                                         | 1                   | Analyze                   |
| <b>CO4</b> | Understand and determine the pay plans, performance appraisal and compensation.                                | 1                   | Analyze                   |
| <b>CO5</b> | Understand and explain the importance of the labour relation, the employee security and collective bargaining. | 2                   | Understand                |

## Course Content

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### Unit-I

07 Hrs

Human Resource Function: Human Resource Philosophy – Changing environments of HRM – Strategic human resource management – Using HRM to attain competitive advantage – Trends in HRM – Organisation of HR departments – Line and staff functions – Role of HR Managers.

### Unit-II

10 Hrs

Recruitment and Placement: Job analysis: Methods - IT and computerised skill inventory - Writing job specification - HR and the responsive organisation. Recruitment and selection process: Employment planning and forecasting - Building employee commitment: Promotion from within - Sources, Developing and Using application forms - IT and recruiting on the internet. Employee Testing and selection: Selection process, basic testing concepts, types of test, work samples and simulation, selection techniques, interview, common interviewing mistakes, Designing and conducting the effective interview, small business applications, computer aided interview.

### Unit-III

08 Hrs

Training and Development: Orientation and Training: Orienting the employees, the training process, need analysis, Training techniques, special purpose training, Training via the internet. Developing Managers: Management Development - The responsive managers - On-the-job and off the-job Development techniques using HR to build a responsive organisation. Performance appraisal: Methods - Problem and solutions - MBO approach - The appraisal interviews- Performance appraisal in practice. Managing careers: Career planning and development - Managing promotions and transfers.

### Unit-IV

08 Hrs

Compensation and Managing Quality: Establishing Pay plans: Basics of compensation - factors determining pay rate - Current trends in compensation - Job evaluation - pricing managerial and professional jobs - Computerised job evaluation. Pay for performance and Financial incentives: Money and motivation - incentives for operations employees and executives - Organisation wide incentive plans - Practices in Indian organisations. Benefits and services : Statutory benefits - non-statutory (voluntary) benefits - Insurance benefits retirement benefits and other welfare measures to build employee commitment.

### Unit-V

06 Hrs

Labour relations and employee security: Industrial relation and collective bargaining: Trade unions - Collective bargaining - future of trade unionism. Discipline administration - grievances handling - managing dismissals and separation. Labour Welfare: Importance and Implications of labour legislations - Employee health - Auditing HR functions, Future of HRM function.

## **References / Text Books / List of experiments / Assignment**

### **Text Books:**

1. Pattanayak, Biswajeet, Human Resource Management, 6th Edition, PHI Learning Pvt. Ltd., 1 Jul 2020.
2. Gary Dessler, Human Resource Management, 16th Edition, Pearson Publications, 2020.

### **Reference Books:**

1. Stephen Robbins, Organizational Behavior, 16th Edition, 2013.
2. Aswathapa, Human resource management: Text and cases, 6th Edition, 2011.
3. C. B. Mamoria and S V Gankar, Dynamics of Industrial Relations in India, 2015, Himalaya Publishing, 15th Edition, 2015.
4. P. Subba Rao, Essentials of Human Resource management and Industrial relations, 5th Edition, 2013, Himalaya Publishing.
5. Laurie Mullins, Management and Organizational Behavior, Latest Ed, 2016, Pearson
6. Raymond J. Stone, Anne Cox, Mihajla Gavin, Human Resource Management, 10th Edition, John Wiley and Sons, 14 Dec 2020.
7. V S P Rao, Human Resource Management, 3rd Edition, 2010, Excel publishing.

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|----------------------------------------------------|-----------------|---------------------|
| <b>Program : Civil Engineering</b>                 | <b>SY BTECH</b> | <b>Semester: IV</b> |
| <b>Digital Marketing Management (RCP23OCOE408)</b> |                 |                     |

**Prerequisite:** Nil.

**Course Objectives:**

1. Explain the evolution and technology of digital marketing, including underlying frameworks.
2. Understand digital business strategy and emerging business structures.
3. Cover digital marketing planning, operations setup, and implementation of search campaigns, alongside emerging concepts like Big Data, IoT, SMB, B2B marketing, and SoLoMo.

| <b>COs</b> | <b>Course Outcomes</b>                                                                    | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|-------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Understand the digital marketing framework and model and consumer behavior.               | 2                   | Understand                |
| <b>CO2</b> | Develop digital marketing strategy roadmap.                                               | 6                   | Create                    |
| <b>CO3</b> | Explain the terminology and concepts for developing web- specific media plans.            | 2                   | Understand                |
| <b>CO4</b> | Understand concepts related to digital campaign management and revenue generation models. | 2                   | Understand                |
| <b>CO5</b> | Get a perspective on global digital marketing technology/tools and future trends          | 3                   | Apply                     |

## Course Content

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### Unit-I

06 Hrs

Introduction to Digital Marketing: Emergence of Digital Marketing as a tool, media consumption drivers for new marketing environment, applications and benefits of digital marketing. Digital Marketing Framework: Delivering enhanced customer value, market opportunity analysis and digital services development, ASCOR framework. Digital Marketing Models Creation: Factors impacting digital marketplace, value chain digitization, business models. The Consumer for Digital Marketing: Consumer behavior on the internet, evolution of consumer behavior models, managing consumer demand, integrated marketing communications (IMC).

### Unit-II

12 Hrs

Digital marketing Strategy Development: Elements of assessment phase, macro-micro environmental analysis, marketing situation analysis. Digital Marketing Internal Assessment and Objectives Planning: Analyzing present offerings mix, marketing mix, core competencies analysis and internal resource mapping. Digital presence analysis, digital marketing objectives development and review. Digital Marketing Strategy Definition: Understanding digital business strategy and structures, consumer development strategy, offering mix for Digital, digital pricing models, managing promotional channels and developing the extended Ps- People, process, programs and performance. Digital marketing Strategy Roadmap: Developing digital marketing strategy roadmap, the 6s digital marketing implementation strategy, marketing across the product life cycle.

### Unit-III

08 Hrs

Digital Marketing Planning and Setup: Understanding digital media planning terminology and stages, steps to creating marketing communications strategy, introduction to search marketing, display marketing, social media marketing. Digital Marketing Operations Setup: Basics of lead generation and conversion marketing, web-site content development and management, elements of user experience, web usability and evaluation.

### Unit-IV

08 Hrs

Digital marketing Execution: Basic elements of digital campaign management, search execution, display execution, social media execution, content marketing. Digital marketing Execution Elements: Digital revenue generation models, managing service delivery and payments, managing digital implementation challenges like ecommerce, internal and external and consumer specific challenges.

### Unit-V

05 Hrs

Digital Business – Present and Future: Digital Marketing – Global Landscape, digital marketing overview – global spend, advertising spend, and technology/tools landscape. Data technologies (Big data and IOT) impacting marketing, segment based digital marketing and SoLoMo – the next level of hyperlocal marketing.

## **References / Text Books / List of experiments / Assignment**

### **Text Books:**

1. Fundamentals of Digital Marketing by Puneet Singh Bhatia, Pearson Education Limited, 2017.
1. Digital Marketing by Seema Gupta- McGraw Hill Education, 2022.

### **Reference Books:**

1. Digital Marketing Excellence: Planning, Optimizing and Integrating Online Marketing by Dave Chaffey and P. R. Smith, 5th Edition, Taylor and Francis, 2017.
2. Digital Marketing: Strategy, Implementation and Practice- 6th Edition by Dave Chaffey Fiona Ellis-Chadwick, Pearson Education Limited, 2019.
3. Digital marketing by Vandana Ahuja, Oxford University Press, 2015.
4. The Art of Digital Marketing by Ian Dodson, John Wiley and Sons, 2016.

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|-------------------------------------------------------------|-----------------|---------------------|
| <b>Program : Civil Engineering</b>                          | <b>SY BTECH</b> | <b>Semester: IV</b> |
| <b>Logistics and Supply Chain Management (RCP23OCOE409)</b> |                 |                     |

**Prerequisite:** Latest trend of information technology in retail industry and logistic applications.

**Course Objectives:**

1. To develop advanced strategic thinking skills in supply chain management and logistics to effectively analyses and optimize supply networks.
2. To attain proficiency in leveraging cutting-edge tools and technologies to enhance supply chain efficiency and supply chain transformation.
3. Design and implement collaborative supply chain and sourcing strategies to promote information sharing and optimize coordination.

| <b>COs</b> | <b>Course Outcomes</b>                                                                                                                                                  | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Develop a sound understanding of the important role of supply chain management in today's business environment.                                                         | 2                   | Understand                |
| <b>CO2</b> | Develop criteria and standards to achieve improved business performance by integrating and optimizing the total logistics and supply-chain process. L6                  | 1                   | Remember                  |
| <b>CO3</b> | Summarize the value of focusing on information business logistics systems which drives improved accuracy and decision-making at all levels of management. L2 Understand | 1                   | Remember                  |
| <b>CO4</b> | Become familiar with current supply chain information technology management trends.                                                                                     | 2                   | Understand                |
| <b>CO5</b> | Use available technologies to enhance work performance and support supply chain functions, processes, transactions, and communications.                                 | 1                   | Remember                  |

## Course Content

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### **Unit-I**

**05 Hrs**

Introduction: What Is Supply Chain Management? The Development Chain, Global Optimization, Managing Uncertainty and Risk, The Complexity in Supply Chain Management, Key Issues in Supply Chain Management.

### **Unit-II**

**06 Hrs**

Network Planning: Introduction, Network Design- Data Collection, Data Aggregation, Transportation Rates, Mileage Estimation, Warehouse Costs, Warehouse Capacities, Potential Warehouse Locations, Service Level Requirements, Future Demand, Model and Data Validation, Solution Techniques, Key Features of a Network Configuration Supply Chain Planning; Inventory Positioning and Logistics Coordination -Strategic Safety Stock.

### **Unit-III**

**08 Hrs**

The Value of Information: Introduction, The Bullwhip Effect-Quantifying the Bullwhip Effect, The Impact of Centralized Information on the Bullwhip Effect, Methods for Coping with the Bullwhip Effect, Information Sharing and Incentives, Effective Forecasts, Information for the Coordination of Systems, Locating Desired Products, Lead-Time Reduction, Information and Supply Chain Trade-offs-Conflicting Objectives in the Supply Chain, Designing the Supply Chain for Conflicting Goals ,Decreasing Marginal Value of Information.

### **Unit-IV**

**08 Hrs**

Supply Chain Integration : Introduction, Push, Pull, and Push-Pull Systems-Push-Based Supply Chain, Pull-Based Supply Chain, Push-Pull Supply Chain ,Identifying the Appropriate Supply Chain Strategy, Implementing a Push-Pull Strategy The Impact of Lead Time Demand-Driven Strategies The Impact of the Internet on Supply Chain Strategies-what is E-Business, the Grocery Industry , the Book Industry , the Retail Industry and Impact on Transportation and Fulfillment.

### **Unit-V**

**06 Hrs**

Information Technology and Business Process : Introduction, The Importance of Business Processes, Goals of Supply Chain IT, Supply Chain Management System Components, Decision-Support Systems, IT for Supply Chain Excellence, Sales and Operations Planning Integrating Supply Chain Information Technology. Implementation of ERP and Decision Support System. Unit-VI 06 Hrs. Technology Standards: Introduction, IT Standards, Information Technology Infrastructure-Interface

## **References / Text Books / List of experiments / Assignment**

### **Text Books:**

1. Sunil Chopra, Peter Meindl “Supply Chain Management-Strategy, Planning, and Operation”, Pearson Publications 2016.
2. David Simchi-Levi, Philip Kaminsky, Edith Simchi-Levi, “Designing and Managing the Supply Chain-Concepts, Strategies, and Case Studies”, McGraw-Hill/Irwin 2008.

### **Reference Books:**

1. Ian Sadler, “Logistics and Supply Chain Integration”, SAGE Publications, 2007.
1. Donald Waters, “Supply Chain Management - An Introduction to Logistics”, Bloomsbury Publishing, 2019.
2. Dimitris Folinas, “E-Logistics and E-Supply Chain Management-Applications for Evolving Business”, IGI Global publications, 2013.
3. Martin Christopher, “Logistics and Supply Chain Management”, Pearson Education publications, 2016.

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|------------------------------------------------------------------|-----------------|---------------------|
| <b>Program : Civil Engineering</b>                               | <b>SY BTECH</b> | <b>Semester: IV</b> |
| <b>Processional Business communication Tutorial (RCPXHS281T)</b> |                 |                     |

**Prerequisite: Nil**

**Course Objectives:**

1. To inculcate professional and ethical attitude at the workplace.
2. To enhance communication and interpersonal skills.
3. To develop effective employability skills.
4. To hone written skills for technical documentation.

| <b>COs</b> | <b>Course Outcomes</b>                                                      | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|-----------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Apply group discussion techniques in professional situations                | 3                   | Apply                     |
| <b>CO2</b> | Use employability skills to optimize career opportunities                   | 3                   | Apply                     |
| <b>CO3</b> | Employ storytelling techniques for effective presentation                   | 3                   | Apply                     |
| <b>CO4</b> | Prepare technical documents using appropriate style, for- mat, and language | 6                   | Create                    |
| <b>CO5</b> | Analyze the concept of professional ethics.                                 | 1                   | Analyze                   |
| <b>CO6</b> | Demonstrate interpersonal skills in professional and personal situations    | 3                   | Apply                     |

## Course Content / Guidelines

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The course is designed to equip students with essential skills, crucial for navigating the contemporary job market successfully and fostering a positive work environment through effective communication and collaboration. The assignments comprise of a combination of interactive activities, discussions, case studies and real-world simulations, to help students, not only to ace job interviews and professional interactions, but also to contribute positively to the ethical and productive functioning of any organization. For the project work, students must prepare and present a well-researched and persuasive business proposal, in groups, integrating the skills and knowledge acquired throughout the course.

Description of Tutorial Activities

### **Unit-I No of Assignment -01**

Group Discussion

- Purpose of a GD, types of GD, criteria for evaluating GD, Dos and Don'ts of GD.
- Activity: Students will be divided into groups of 8-12 and each group will be given a topic/case to discuss within a given time frame. Each student will submit a write-up on their observations of the GD.
- 

### **Unit-II No of Assignments -02**

Employment Skills

- Resume Writing: Types of resumes, structure, content, and formatting of resume.
- Activity: Students will prepare and submit their individual resume according to professional requirements.
- Interview Skills: Types and modes of interview, preparation for interview, Dos and Don'ts of interview, frequently asked questions during interview.
- Activity: Students will submit a write-up on the FAQs and participate in mock interviews.

### **Unit-III No of Assignment -01**

Corporate Storytelling

- Elevator pitch, product stories, event stories, stories in presentations, storytelling in SOPs and interviews, storytelling to manage conflict or to motivate
- Activity: Students will be divided into groups of 8-12 and asked to give a team presentation using storytelling techniques and submit the hardcopy of the PPT.

### **Unit-IV No of Assignment -01**

Technical Writing and Documentation

- Business Proposal Writing: Types of business proposals, format of proposal, language and style, presentation of proposal.
- Meeting Documentation: Planning layout of meetings, observing meeting decorum, drafting notice, agenda, and minutes of meeting.
- Activity: Students will be divided into groups of 8-12 and each group will conduct a mock meeting based on an agenda and submit a write-up of the meeting documentation.

### **Unit-V No of Assignment -01**

Professional Ethics

- Effective work habits, accountability, integrity, and excellence.
- Activity: Students will be divided into groups of 8-12 and each group will analyze a case involving an ethical issue and submit the write-up.

### **Unit-VI No of Assignment -02**

Interpersonal Skills

- Team Building: Difference between group and team, importance of teamwork, strategies to be a good team player
  - Activity: The students will be divided into groups of 8-12 and each group will be assigned a task to be accomplished as a team, for which they will submit the write-up.
  - Leadership: Types of leadership, leadership styles, case studies.
  - Activity: Each student will submit a write-up involving a leader they admire, analyzing various aspects of his leadership style.
  - Time Management: Importance of time management, cultural views of time, 80/20 rule, time wasters, setting priorities and goal.
  - Activity: Each student will submit a write-up about a case involving time management.
- Batch wise tutorial work of minimum eight assignments from the above suggested list or any other

assignments based on the syllabus will be included, which would help the learner to apply the concepts Learn.

### **References / Text Books / List of experiments / Assignment**

#### **Books Recommended:**

1. Fred Luthans, "Organizational Behavior", 12th Edition, McGraw Hill, 2010.
2. Lesika and Pettit, "Report Writing for Business", 9th Edition, McGraw Hill, 1994.
3. Huckin and Olsen, "Technical Writing and Professional Communication", 2nd Edition, McGraw Hill, 1991.
4. Wallace and Masters, "Personal Development for Life and Work", 12th Edition, Thomson Learning, 2010.
5. Herta Murphy, "Effective Business Communication", 7th Edition, McGraw Hill, 2017.
6. Sharma R. C. and Krishna Mohan, "Business Correspondence and Report Writing", 5th Edition, Tata McGraw-Hill Education, 2017.
7. Ghosh, B. N., "Managing Soft Skills for Personality Development", Tata McGraw Hill, 2017.
8. Bell, Smith, "Management Communication", 3rd Edition, Wiley India Edition, 2014.
9. Dr. Alex, K., "Soft Skills", 3rd Edition, S. Chand and Company, 2009.
10. Subramanian R., "Professional Ethics", 2nd Edition, Oxford University Press, 2017.
11. Sandeep Das, "How Business Story Telling Works: Increase Your Influence and Impact", Penguin Random House India Pvt. Ltd., 2023

|                                           |                 |                     |
|-------------------------------------------|-----------------|---------------------|
| <b>Program : Civil Engineering</b>        | <b>SY BTECH</b> | <b>Semester: IV</b> |
| <b>Semester Project-II (RCP23XSC202P)</b> |                 |                     |

**Course Objectives:**

Students are expected to design, simulate/implement a project based on the knowledge acquired from Current semester subjects.

| <b>COs</b> | <b>Course Outcomes</b>                                                                                                      | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|-----------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Conduct a survey of several available literatures in the preferred field of study.                                          | 1                   | Remember                  |
| <b>CO2</b> | Demonstrate various/alternate approaches to complete a Project.                                                             | 2                   | Understand                |
| <b>CO3</b> | Ensure a collaborative project environment by interacting and dividing project work among team members.                     | 3                   | Apply                     |
| <b>CO4</b> | Present their project work in the form of a technical report / paper and thereby improve the technical communication skill. | 3                   | Apply                     |
| <b>CO5</b> | Demonstrate the ability to work in teams and manage the conduct of the research study.                                      | 2                   | Understand                |

## Course Content / Guidelines

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### Semester Project:

The purpose of introducing semester project at second year level is to provide exposure to students with a variety of projects based on the knowledge acquired from the semester subjects. This activity is supposed to enrich their academic experience and bring enough maturity in student while selecting the project. Students should take this as an opportunity to develop skills in implementation, Presentation and discussion of technical ideas/topics. Therefore, proper attention shall be paid to the Content of semester project report which is being submitted in partial fulfillment of the requirements Of the Second Year and it is imperative that a standard format be prescribed for the report. Each student shall work on project approved by departmental committee approved by the Head of Department, a group of 03 to 05 students (max allowed: 5 students in extraordinary cases, subject To the approval of the department committee and the Head of the department) shall be allotted for Each Semester Project. Each group shall submit at least 3 topics for the Semester Project. The Departmental committee shall finalize one topic for every group. Semester Project Title or Theme Should be based on knowledge acquired during semester. The project work shall involve sufficient work So that students get acquainted with deferent aspects of knowledge acquired from semester subjects. Student is expected to:

- \_ Select appropriate project title based on acquired knowledge from current semester subjects.
- \_ Maintain Log Book of weekly work done (please see attached log book format).
- \_ Report weekly to the project guide along with log book.

### Assessment Criteria:

\_ at the end of the semester, after conformation by the project guide, each project group will Submit project completion report in prescribed format for assessment to the departmental committee (including project guide).

\_ Assessment of the project (at the end of the semester) will be done by the departmental committee (including project guide).

### Prescribed project report guidelines:

Size of report shall be of minimum 25 pages. Project Report should include appropriate content for:

- \_ Introduction
- \_ Literature Survey
- \_ Related Theory
- \_ Implementation details
- \_ Project Outcomes
- \_ Conclusion
- \_ References

Assessment criteria for the departmental committee (including project guide) for Continuous

Assessment: Guide will monitor weekly progress and marks allocation will be as per Table 2.

Assessment criteria for the departmental committee (including project guide) for End

Semester Exam: Departmental committee (including project guide) will evaluate project as per Table 3. Each group shall present/publish a paper based on the semester project in reputed/peer Reviewed Conference/Journal/Tech Fest/Magazine/ before the end of the semester.

Table 1 Log Book format

| S.NO. | Week (Start date / End date) | Work done | Sign of Guide | Sign of Coordinator |
|-------|------------------------------|-----------|---------------|---------------------|
| 1     |                              |           |               |                     |
| 2     |                              |           |               |                     |

Table 2 Continuous Assessment sheet

| S.NO. | Exam Seat No | Name of Student | Student Attendance | Log Book Maintain | Literature review | Depth of Understanding | Report | Total |
|-------|--------------|-----------------|--------------------|-------------------|-------------------|------------------------|--------|-------|
|       |              |                 | 5                  | 5                 | 5                 | 5                      | 5      | 25    |
|       |              |                 |                    |                   |                   |                        |        |       |

Table 3 Evaluation sheet

| S.NO. | Exam Seat No | Name of Student | Project Selection | Design Simulation logic | PCB hardware programing | Result Verification | Presentation | Total |
|-------|--------------|-----------------|-------------------|-------------------------|-------------------------|---------------------|--------------|-------|
|       |              |                 | 5                 | 5                       | 5                       | 5                   | 5            | 25    |
|       |              |                 |                   |                         |                         |                     |              |       |

|                                                  |                 |                     |
|--------------------------------------------------|-----------------|---------------------|
| <b>Program : Civil Engineering</b>               | <b>SY BTECH</b> | <b>Semester: IV</b> |
| <b>Design Thinking Laboratory (RCP23XHS283L)</b> |                 |                     |

**Prerequisite:**

1. Understanding of product / process / software / service development life cycle.
2. Knowledge of agile frameworks (or any similar iterative framework) would be added advantage but will not be mandatory.

**Course Objectives:**

1. To instil an innovative mindset in students to solve the digital-age business, societal and wicked type of problems using design thinking methods and tools, and its application.
2. To equip students with techniques to empathize with users, and ideate innovative and sustainable solutions for real-world problems through an iterative approach to design.

| <b>COs</b> | <b>Course Outcomes</b>                                                                  | <b>Blooms Level</b> | <b>Blooms Description</b> |
|------------|-----------------------------------------------------------------------------------------|---------------------|---------------------------|
| <b>CO1</b> | Understand the importance of a Human-Centric design approach for developing a solution. | 2                   | Understand                |
| <b>CO2</b> | Generate innovative ideas to design sustainable solutions for real world problems.      | 3                   | Apply                     |
| <b>CO3</b> | Apply design thinking principles to solve the real-world problems.                      | 3                   | Apply                     |

## Course Content

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### Unit-I

06 Hrs

Introduction to Design Thinking: • Understanding the fundamentals of design thinking. • Exploring the history and evolution of design thinking. • The importance of empathy in the design thinking process. • Conduct market and industry research by observing and contextualizing various macro and micro trends. • Case Study - conduct their research on how Design Thinking helped solve some of the biggest and most critical problems of our time.

### Unit-II

04 Hrs

Empathize Phase: • Techniques for conducting user research and gathering insights. • Creating user personas and empathy maps. • Practicing active listening and observation skills. • To apply various empathizing techniques to the problem statement selected. • Use walk-a-mile immersion and heuristic reviews to first empathize with end users and then to build an empathy map and customer journey map.

### Unit-III

04 Hrs

Define Phase: • Defining problem statements and reframing challenges. • Tools for synthesizing research findings. • Developing a clear and actionable problem statement. • Start building from Persona map and conduct interviews/ Gemba walk to plot user's journeys from start to end. • Define the problem space using the HMW statement. Now highlight areas of opportunities in the journey map and enlist potential channels/touchpoints as well as stakeholders for proposed solution interventions.

### Unit-IV

04 Hrs

Ideate Phase: • Generating creative ideas through brainstorming sessions. • Techniques for divergent and convergent thinking. • Prototyping and experimenting with ideas. • Apply suitable ideation technique to quickly generate diverse ideas that could be applied to target problem space – either partially or in full. • Brain Writing – Build on each other's ideas and constructively and creatively develop better ideas using SCAMPER technique.

### Unit-V

06 Hrs

Prototype and Validation: • Introduction to prototyping tools and techniques. • Rapid prototyping methods. • Testing prototypes with users and gathering feedback. • Refining solutions based on user insights. • Develop user storyboard to layout solution proposition in visual and easily explainable form. Run a quick peer validation. • peer-validated the storyboard. • Build an interactive digital prototype using any digital rapid prototyping platform and seek user validation.

## References / Text Books / List of experiments / Assignment

### Suggested List of Laboratory Experiments:

- Below is a list of assignments/ activities/ experiments that would be carried out by students as a mini project in groups consisting of 3-4 students.
- Problem statement for these assignments/ activities/ experiments will be provided by facilitator/ instructor/ faculty to the groups/ teams/ batches within each class.

This list of experiments will help students learn various design thinking methods and practice the corresponding tools available.

1. To conduct market and industry research and analyze case studies demonstrating the application of design thinking. (Increased understanding of how design thinking has been applied to solve critical problems in various contexts.)
2. To exercise empathizing techniques to understand the needs and pain points of a target audience.
3. Developing empathy maps and customer journey maps based on collected insights.
4. To exercise different tools and techniques (such as affinity diagrams, journey mapping, and user story mapping) for synthesizing research findings.
5. Develop user personas to represent different user archetypes and their needs concerning the problem at hand.
6. To practice SCAMPRE technique, Brainstorming and brain writing as a collaborative ideation technique to create multiple creative ideas / solution for the problem at hand.
7. Create a mind map to generate a wide range of solutions to a problem at hand.
8. To explore different prototyping tools and platforms, such as Adobe XD, Figma, Sketch, and In Vision.
9. To Conduct rapid prototyping sessions to build low fidelity / High fidelity prototype based on the ideas generated in Ideation phase and iterate based on feedback received.
10. Develop a plan for implementing the final solution, considering factors like scalability and feasibility.
11. Conduct usability testing to gather feedback on prototypes.

Use A/B testing to compare different versions of a solution and determine which performs better.

A minimum of five experiments from the above-suggested list or any other assignment based on the syllabus will be included, which would help the learner to apply the concept. The mini-project is mandatory.

### Text Books:

1. I. Mootee, “Design Thinking for Strategic Innovation: What They Can’t Teach You at Business or Design School”, Wiley, 2013.
2. M. Lewrick, P. Link, and L. Leifer, “The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystems”, Wiley, 2018.
3. T. Lockwood, “Design Thinking: Integrating Innovation, Customer Experience, and Brand Value”, Allworth Press, 2010.
4. K. T. Ulrich and S. D. Eppinger, “Product Design and Development”, McGraw-Hill Hill Education, 6th Edition, 2016.
5. C. J. Meadows and C. Parikh, “The Design Thinking Workbook: Essential Skills for Creativity and Business Growth”, Emerald Publishing, 2022.

### Reference Books:

1. T. Kelley and D. Kelley, “Creative Confidence: Unleashing the Creative Potential Within Us All”, HarperCollins Publisher, 2013.
2. T. Brown, “Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation”, HarperCollins, 2013.

3. J. Knapp, J. Zeratsky, and B. Kowitz, "Sprint: How to Solve Big Problems and Test New Ideas in Just Five Days", Simon and Schuster, 2016.
4. Chakrabarti, "Engineering Design Synthesis: Understanding, Approaches and Tools", Springer, 2002.
5. K. Otto, and K. Wood, "Product Design", Prentice Hall, 2000.

#### Online Reference:

- Design and Innovation
- <https://openstax.org/books/entrepreneurship/pages/4-suggested-resources>
- Overview of Design Thinking
- <https://www.interaction-design.org/literature/topics/design-thinking>
- 10 Models for Design Thinking. In 2004, business consultants Hasso. . . — by Libby Hoffman — Medium
- [https://www.tcgen.com/design-thinking/What is Design Thinking and How Does it Relate to Product Development](https://www.tcgen.com/design-thinking/What%20is%20Design%20Thinking%20and%20How%20Does%20it%20Relate%20to%20Product%20Development)
- Understand, observe and define the problem
- <https://www.nngroup.com/articles/empathy-mapping/>
- <https://uxdesign.cc/the-purpose-of-a-journey-map-and-how-can-it-galvanize-action-9a628b7ae6e>
- Ideation and prototyping
- <https://www.interaction-design.org/literature/topics/prototyping>
- <https://www.uxmatters.com/mt/archives/2019/01/prototyping-user-experience.php>
- Testing and implementation
- <https://www.nngroup.com/articles/usability-testing-101/>
- <https://www.interaction-design.org/literature/article/test-your-prototypes-how-to-gather-feedback-and-maximize-learning>

