

# Syllabus Book

4<sup>th</sup> Year B. Tech.  
Civil Engineering



**P P Savani University**  
School of Engineering  
Department of Civil Engineering

Effective From: 2020-21  
Authored by: P P Savani University

| P P SAVANI UNIVERSITY   |             |  |            |                 |           |          |       |        |                    |     |           |     |          |     |       |     |
|---|-------------|--|------------|-----------------|-----------|----------|-------|--------|--------------------|-----|-----------|-----|----------|-----|-------|-----|
| SCHOOL OF ENGINEERING   |             |  |            |                 |           |          |       |        |                    |     |           |     |          |     |       |     |
| TEACHING & EXAMINATION SCHEME FOR FOURTH YEAR B.TECH. CIVIL ENGINEERING PROGRAMME |             |  |            |                 |           |          |       |        |                    |     |           |     |          |     |       |     |
| Sem   | Course Code | Course Name                              | Offered By | Teaching Scheme |           |          |       |        | Examination Scheme |     |           |     |          |     |       |     |
|   |             |  |            | Contact Hours   |           |          |       | Credit | Theory             |     | Practical |     | Tutorial |     | Total |     |
|   |             |  |            | Theory          | Practical | Tutorial | Total |        | CE                 | ESE | CE        | ESE | CE       | ESE |       |     |
| 7   | SECV4011    | Structural Design-II                     | CV         | 4               | 0         | 1        | 5     | 5      | 40                 | 60  | 0         | 0   | 50       | 0   | 150   |     |
|   | SECV4021    | Professional Practice & Valuation        | CV         | 3               | 0         | 0        | 3     | 3      | 40                 | 60  | 0         | 0   | 0        | 0   | 100   |     |
|   | SECV4030    | Construction Management & Equipment      | CV         | 3               | 0         | 1        | 4     | 4      | 40                 | 60  | 0         | 0   | 20       | 30  | 150   |     |
|   | SECV4041    | Highway & Traffic Engineering            | CV         | 3               | 2         | 0        | 5     | 4      | 40                 | 60  | 20        | 30  | 0        | 0   | 150   |     |
|   | SEPD4010    | Creativity, Problem Solving & Innovation | SEPD       | 3               | 0         | 0        | 3     | 3      | 40                 | 60  | 0         | 0   | 0        | 0   | 100   |     |
|   | SECV4910    | Industrial Training                      | CV         | 5               |           |          |       | 0      | 5                  | 0   | 0         | 100 | 100      | 0   | 0     | 200 |
|   |             | <b>Elective-III</b>                      |            | 2               | 2         | 0        | 4     | 3      | 40                 | 60  | 20        | 30  | 0        | 0   | 150   |     |
| 8   | SECV4920    | Project                                  | CV         | 22              |           |          |       | 22     | 22                 | 0   | 0         | 100 | 100      | 0   | 0     | 200 |

| P P SAVANI UNIVERSITY  |             |  |            |                 |           |          |       |       |        |                    |     |           |     |          |     |       |
|--|-------------|--|------------|-----------------|-----------|----------|-------|-------|--------|--------------------|-----|-----------|-----|----------|-----|-------|
| SCHOOL OF ENGINEERING  |             |  |            |                 |           |          |       |       |        |                    |     |           |     |          |     |       |
| TEACHING & EXAMINATION SCHEME FOR FOURTH YEAR B.TECH. CIVIL ENGINEERING PROGRAMME (ELECTIVE COURSES) |             |  |            |                 |           |          |       |       |        |                    |     |           |     |          |     |       |
| Sem  | Course Code | Department Elective Course Name                                  | Offered By | Teaching Scheme |           |          |       |       | Credit | Examination Scheme |     |           |     |          |     |       |
|  |             |  |            | Contact Hours   |           |          |       | Total |        | Theory             |     | Practical |     | Tutorial |     | Total |
|  |             |  |            | Theory          | Practical | Tutorial | Total |       |        | CE                 | ESE | CE        | ESE | CE       | ESE |       |
| 7  | SECV4511    | Legal Aspects in Construction Practice                           | CV         | 2               | 0         | 1        | 3     | 3     | 40     | 60                 | 0   | 0         | 20  | 30       | 150 |       |
|  | SECV4521    | Project Control & Life Cycle Execution of Constructed Facilities | CV         | 2               | 0         | 1        | 3     | 3     | 40     | 60                 | 0   | 0         | 20  | 30       | 150 |       |
|  | SECV4531    | Road Safety Audit  | CV         | 2               | 0         | 1        | 3     | 3     | 40     | 60                 | 0   | 0         | 20  | 30       | 150 |       |
|  | SECV4552    | Solid Waste Management   | CV         | 2               | 0         | 1        | 3     | 3     | 40     | 60                 | 0   | 0         | 20  | 30       | 150 |       |
|  | SECV4561    | Traffic Engineering: Operation & Controls                        | CV         | 2               | 0         | 1        | 3     | 3     | 40     | 60                 | 0   | 0         | 20  | 30       | 150 |       |
|  | SECV4571    | Urban Infrastructure Engineering & Management                    | CV         | 2               | 0         | 1        | 3     | 3     | 40     | 60                 | 0   | 0         | 20  | 30       | 150 |       |
|  | SECV4582    | Advanced Waste Water Treatment                                   | CV         | 2               | 2         | 0        | 4     | 3     | 40     | 60                 | 0   | 0         | 20  | 30       | 150 |       |
|  | SECV4591    | Modern Transportation system                                     | CV         | 2               | 0         | 1        | 3     | 3     | 40     | 60                 | 0   | 0         | 20  | 30       | 150 |       |

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## Semester 7

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| 5              | SEPD4010           | Creativity, Problem Solving & Innovation | 13-15           |

## Electives

| <b>Sr. No.</b> | <b>Course Code</b> | <b>Course Name</b>   | <b>Page No.</b> |
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| 8              | SECV4591           | Modern Transportation system                                     | 37-39           |

**P P Savani University**  
**School of Engineering**

**Department of Civil Engineering**

Course Code: SECV4011

Course Name: Structural Design-II

Prerequisite Course(s): SECV3062 - Structural Design-I

**Teaching & Examination Scheme:**

| Teaching Scheme (Hours/Week) |           |          |        | Examination Scheme (Marks) |     |           |     |          |     |       |
|------------------------------|-----------|----------|--------|----------------------------|-----|-----------|-----|----------|-----|-------|
| Theory                       | Practical | Tutorial | Credit | Theory                     |     | Practical |     | Tutorial |     | Total |
|                              |           |          |        | CE                         | ESE | CE        | ESE | CE       | ESE |       |
| 04                           | 00        | 01       | 05     | 40                         | 60  | 00        | 00  | 50       | 00  | 150   |

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- understand Limit state design with code of practice for general construction.
- understand the design concept of various connections and structural members.
- apply plastic design of steel structures like water tank and roof truss.

**Course Content:**

| <b>Section I</b> |   |       |                |
|------------------|---|-------|----------------|
| Module No.       | Content   | Hours | Weightage in % |
| 1.               | <b>Introduction</b><br>Introduction to Engineering Structures - Principles of Design, Loads, Factor of Safety, Properties of Steel.   | 04    | 06             |
| 2.               | <b>Design of Connections in Steel Structures</b><br>Bolted and Welded Connections, Different Types of Joints, Design of Various Types of Riveted and Welded Connections Subjected to Direct Loads and Moments.<br><b>Design of Tension Members</b> Selection of Section, IS-Specifications, Design of Axially Loaded Tension Members, Design of Members for Axial Tension and Bending, End Connections, Design of Lug Angles and Tension Splices. | 13    | 22             |
| 3.               | <b>Design of Compression Members</b><br>Theory of Buckling, Design of Column, Cross Section (Single and Built Up Sections), Design of Angle Struts, Eccentrically Loaded Columns, Column Splices, Lacings and Battens<br>Design of Beams: Laterally Stability, Design of Single and Built Up Beams, Plated Beams and Curtailment of Flange Plates   | 13    | 22             |

| <b>Section II</b> |  |       |                |
|-------------------|--|-------|----------------|
| Module No.        | Content  | Hours | Weightage in % |
| 1.                | <b>Design of Column Bases and Column Footings</b><br>Slab Base-Gusseted Base Foundation and Column Bases, Subjected to Moment, Introduction to Plastic Design of Members and Load Resistance Factored Design (Lrfd) Method, Independent Column Footing, Combined Column Footing  | 09    | 15             |
| 2.                | <b>Water Tanks</b><br>Design of Rectangular Pressed Steel Tanks, Cylindrical Tanks with Hemispherical Bottom, Design of Staging; Plastic Design of Steel Structures: Review of Plastic Analysis as Covered in Earlier Courses, Effect of Normal and Shear Forces on Plastic Moments, Lateral Buckling and Local Buckling of Beam. Design of Beams and Frames, Design of Connections-Straight Corner, Beam Column and Plate Connections | 12    | 20             |
| 3.                | <b>Design of Roof Trusses &amp; Industrial Roof</b><br>Types of Trusses, Roofs and Side Coverage, Types of Loadings and Load Combinations, Design of Members and Connections. Analysis and Design of Typical Industrial Roof Trusses with Gantry Girder and Portal Frames  | 09    | 15             |

**List of Tutorials:**

| Sr. No | Name of Tutorial              | Hours |
|--------|-------------------------------|-------|
| 1.     | Bolted and welded connections | 02    |
| 2.     | Tension members               | 03    |
| 3.     | Compression members           | 03    |
| 4.     | Column base & slab base       | 03    |
| 5.     | water tank                    | 02    |
| 6.     | Roof truss                    | 02    |

**Text Book(s):**

| Title                                     | Author/s      | Publication                              |
|---|---------------|--|
| Design of Steel Structures                | K. S. Sai Ram | Pearson Education                        |
| Design of Steel Structures                | Arya & Ajmani | Nem Chand Bros, Roorkee                  |
| Design of Steel Structures". Vol – I & II | Ram Chandra   | Standard Book House, New Delhi           |
| Design of Steel Structure                 | Dugal S K     | Tata Mc Graw Hill Publication, New Delhi |

**Reference Book(s):**

| Title                      | Author/s      | Publication                         |
|----------------------------|---------------|-------------------------------------|
| Design of Steel Structures | P. Dayaratnam | S. Chand of Co.                     |
| Steel Structures           | B.C.Punamia   | Laxmi Publication                   |
| Design of Steel Structures | Negi K S      | Tata Mc Graw Hill Publisher Co. Ltd |

**Web Material Link(s):**

- <https://nptel.ac.in/courses/105105162/>

**Course Evaluation:****Theory:**

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

**Tutorial:**

- Continuous Evaluation consists of performance of tutorial which will be evaluated out of 10 marks for each tutorial and average of the same will be converted to 10 marks.
- Internal viva consists of 10 marks.
- Drawing sheet of tutorials consists of 15 marks during End Semester Exam.
- Viva/ Oral performance consists of 15 marks during End Semester Exam.

**Course Outcome(s):**

After completion of the course, the student will be able to

- understand steel structure characteristics under application of loads.
- design bolt connection of angle section to gusset plate & welded connection of angle section to gusset plate, lacing system ( single or double ) for built up column , batten system for built up column, laterally restrained simply supported beam, purlin made up angle section, slab base foundation under axially loaded column made up of single h section.
- analyze and design axially loaded tension member made up of angle section, strut made up of angle section, axially loaded column.
- calculate dead load, live load and wind load on panel points of a roof truss as per IS-875-1984 and design of water tank.

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Course Code: SECV4021

Course Name: Professional Practice & Valuation

Prerequisite Course(s): SECV3090 - Estimating and Costing

**Teaching & Examination Scheme:**

| Teaching Scheme (Hours/Week) |           |          |        | Examination Scheme (Marks) |     |           |     |          |     |       |
|------------------------------|-----------|----------|--------|----------------------------|-----|-----------|-----|----------|-----|-------|
| Theory                       | Practical | Tutorial | Credit | Theory                     |     | Practical |     | Tutorial |     | Total |
|                              |           |          |        | CE                         | ESE | CE        | ESE | CE       | ESE |       |
| 03                           | 00        | 00       | 03     | 40                         | 60  | 00        | 00  | 00       | 00  | 100   |

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- develop a basic understanding of the scope of professional practice.
- gain knowledge on types of contracts.
- understand about tendering system.
- evaluate valuation for building and land.
- understand the building procurement process.

**Course Content:**

| <b>Section I</b> |  |       |                |
|------------------|--|-------|----------------|
| Module No.       | Content  | Hours | Weightage in % |
| 1                | <p><b>Office Practice</b><br/>Organizational Set-up, Working of Professional Firms, Office Procedure, Construction Contracts, Legal Aspects, Professional Charges, Role of Builder and Contractor.</p> <p><b>Entrepreneurship Development</b><br/>Concept Need and Scope of Entrepreneurship, Characteristic of Entrepreneurship, Forms of Business Organization</p> | 09    | 20             |
| 2                | <p><b>Arbitration &amp; Easement</b><br/>The Purpose of Arbitration, the Powers and Duties of Arbitrator, Arbitration and Building Contract, Types of Arbitration, Fire Insurance, Easement Characteristics and its types.</p> <p><b>IPR and Patent Act</b><br/>Importance and Scope, Forms of IPR, Patents, Copyrights, Trademarks, Relevant Acts.</p>              | 07    | 16             |
| 3                | <p><b>P.W.D. Accounts and Procedure of Works</b><br/>Organizational Set up, Classification of work, Execution of work, Book Keeping, Measurement Book, Store Procedure, Mode of Payments, Public works Accounting System.</p>  | 06    | 14             |



| <b>Section II</b> |   |       |                |
|-------------------|---|-------|----------------|
| Module No.        | Content   | Hours | Weightage in % |
| 1.                | <b>Contracts</b><br>Introduction, Types of contracts, Formation of contract, Contract conditions, Contract for labour, material, design, construction, drafting of contract documents based on IBRD / MORTH Standard bidding documents, Construction contracts, Contract problems, Arbitration and legal requirements.  | 08    | 18             |
| 2.                | <b>Tenders</b><br>Tender Notices, Types, Tender Procedures, Drafting Model Tenders, E-Tendering - Digital Signature Certificates, Encrypting, Decrypting, Reverse Auctions.   | 05    | 10             |
| 3.                | <b>Valuation</b><br>Definitions, Classification of Valuations, Valuation Methods, Purpose of Valuation, Types of Property, Depreciation, Sinking Fund, Lease Hold and Free Hold Property, Obsolescence, Gross Income, Outgoing and Net Income, Capitalized Value and Year's Purchase; Rental Method of Valuations, and Typical Problems, Escalation, Valuation of Land, Buildings, Calculation of Standard Rent, Mortgage, Lease. | 10    | 22             |

**Text Book(s):**

| Title   | Author/s         | Publication                  |
|---|------------------|------------------------------|
| Construction Project Management, Theory and Practices | Kumar Neeraj Jha | Pearson                      |
| Principles and Practices of Valuation                 | D. N. Banerjee   | V Edition, Eastern Law House |
| Estimating, Coasting & Valuation                      | S.C.Rangwala     | Charotar Publication         |

**Reference Book(s):**

| Title                           | Author/s        | Publication                |
|---------------------------------|-----------------|----------------------------|
| Professional Practice           | Rashan Nanavati | Lakhani book Depot, Mumbai |
| PWD Handbook & Survey           | Govt. of India  |                            |
| Indian Standard Code-1200       | Govt. of India  |                            |
| Construction Project Management | K K Chitkara    | Tata Mac Grow Hill         |

**Web Material Link(s):**

- <https://en.wikipedia.org/wiki/Contract>
- <https://eprocure.gov.in/eprocure/app>
- <http://www.civilprojectsonline.com/civil-projects/methods-of-valuation-of-a-building/>
- <https://en.wikipedia.org/wiki/Easement>
- <https://en.wikipedia.org/wiki/Arbitration>

**Course Evaluation:****Theory:**

- Continuous Evaluation consists of two tests each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by course coordinator.
- End semester Examination consists of 60 marks.

**Course Outcome(s):**

After completion of the course, the student will be able to

- learn the purpose and importance of valuation.
- understand and work on tenders.
- analyze and apply industry professional knowledge.
- analyze and synthesize property data to undertake an evidenced based market analysis.
- analyze and synthesize property data and trends to determine property value for a commercial or specialized property.

**P P Savani University**  
**School of Engineering**

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**Department of Civil Engineering**

Course Code: SECV4030

Course Name: Construction Management & Equipment

Prerequisite Course(s): --

**Teaching & Examination Scheme:**

| Teaching Scheme (Hours/Week) |           |          |        | Examination Scheme (Marks) |     |           |     |          |     |       |
|------------------------------|-----------|----------|--------|----------------------------|-----|-----------|-----|----------|-----|-------|
| Theory                       | Practical | Tutorial | Credit | Theory                     |     | Practical |     | Tutorial |     | Total |
|                              |           |          |        | CE                         | ESE | CE        | ESE | CE       | ESE |       |
| 03                           | 00        | 01       | 04     | 40                         | 60  | 00        | 00  | 50       | 00  | 150   |

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- define and describe construction processes and various engineering roles involved.
- describe, interpret, and differentiate between project delivery systems in construction projects.
- explain and develop work breakdown structures.
- develop construction plans and schedules.
- categorize construction operations, equipment.

**Course Content:**

| <b>Section I</b> |   |       |                |
|------------------|---|-------|----------------|
| Module No.       | Content   | Hours | Weightage in % |
| 1.               | <b>Construction Management</b><br>Introduction of Construction Management, Objectives and Scope of Construction Management. A Construction Project, Phases of Construction Project, Importance of Construction and Construction Industry, Indian Construction Industry Need of Construction Management, Stakeholders of Construction Management | 06    | 14             |
| 2.               | <b>Construction Planning</b><br>Types of Project Plans, Work Break Down Structure, Planning Techniques, Bar Charts, CPM and PERT Network Analysis, Line of Balance Method, Project Scheduling and Resource Leveling, Resource Allocation, Importance of Project Scheduling  | 06    | 14             |
| 3.               | <b>Construction Quality Management</b><br>Construction Quality, Inspection, Quality Control and Quality Assurance in Projects, Total Quality Management.  | 11    | 22             |

| <b>Section II</b> |  |              |                       |
|-------------------|--|--------------|-----------------------|
| <b>Module No.</b> | <b>Content</b>   | <b>Hours</b> | <b>Weightage in %</b> |
| 1.                | <b>Construction Equipment</b><br>Introduction to Construction Equipment and their Contribution and Importance in Construction Industry. Classification of Equipment, Financial Aspects related to Construction Equipment: Discounted Present Worth Analysis, Depreciation, Cost of Owning and Operating Construction Equipment, Basics of Equipment Replacement Policy | 08           | 18                    |
| 2.                | <b>Excavating Equipment</b><br>Power Shovels, Draglines, Hoes, Clam Shells and Trenching Machines, their Basic Parts, Operation, Output Estimation, Factors Influencing output and Methods to Enhance it, Tractors and Related Equipment: Bulldozers, Rippers, Scrapers & Overview of Other Equipment  | 08           | 18                    |
| 3.                | <b>Belt Conveyor System</b><br>Terminology, Classification, Components, Power Requirement Estimation and Design.<br><b>Hauling Equipment</b><br>Trucks and Wagons, Operation and Guideline for Selection and Deployment.   | 06           | 14                    |

**List of Tutorials:**

| <b>Sr. No</b> | <b>Name of Tutorial</b>  | <b>Hours</b> |
|---------------|--|--------------|
| 1             | Write a scope and objectives of construction management.   | 01           |
| 2             | Draw a work break down structure for a given job and draw a job layout for given construction project.                                   | 01           |
| 3             | Example based on Bar charts.   | 02           |
| 4             | Example based on Milestone charts.   | 02           |
| 5             | Example based on line of balance technique.  | 02           |
| 6             | Tutorial based on CPM & PERT.  | 02           |
| 7             | Tutorial based on resource allocation and resource scheduling.   | 02           |
| 8             | Tutorial based on construction equipment like classification of equipment, financial aspect, depreciation, cost of owning and operating. | 02           |
| 9             | Write in brief about hauling equipment, excavating equipment and belt conveyor system with neat sketches.                                | 01           |

**Text Book(s):**

| <b>Title</b>                                  | <b>Author/s</b>                  | <b>Publication</b>                     |
|---|----------------------------------|--|
| Construction Planning, Equipments and Methods | R.L. Peurifoy and W.B. Ledbetter | McGraw-Hill Publishers. New Delhi.     |
| Project Planning and control with PERT & CPM  | B.C. Punmia and K.K Khandelwal   | Laxmi Publication Pvt. Ltd. New Delhi. |

**Reference Book(s):**

| Title   | Author/s                  | Publication                                 |
|---|---------------------------|---|
| A Management Guide to PERT/ CPM                     | J. D. Weist and F.K. Levy | Prentice Hall of India Pvt. Ltd.            |
| Construction Project Management (Theory & Practice) | Kumar Neeraj Jha          | Pearson                                     |
| Construction Planning and Management                | P.S. Gahlot and B.M. Dhir | New Age International Pvt. Ltd., New Delhi. |

**Web Material Link(s):**

- [https://en.wikipedia.org/wiki/Construction\\_management](https://en.wikipedia.org/wiki/Construction_management)
- <http://www.interventions.org/pertcpm/>
- <https://www.smartsheet.com/blog/5-strategies-of-construction-pm>
- <https://www.thebalancesmb.com/construction-schedule-techniques-844480>
- [https://www.designingbuildings.co.uk/wiki/Line\\_of\\_balance\\_\(LOB\)](https://www.designingbuildings.co.uk/wiki/Line_of_balance_(LOB))

**Course Evaluation:****Theory:**

- Continuous Evaluation consists of two tests each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by course coordinator.
- End semester Examination consists of 60 marks.

**Tutorial:**

- Continuous Evaluation consists of tutorial which will be evaluated out of 10 for each tutorial and average of the same will be converted to 10 marks.
- Internal viva consists of 10 marks.
- Viva/Oral performance of 30 marks during End Semester Exam.

**Course Outcome(s):**

After completion of the course, the student will be able to

- understand the different construction management techniques and application of different construction equipment.
- learn concept of construction management and different job layout.
- develop concepts related with construction management & equipment management.

**P P Savani University**  
**School of Engineering**

**Department of Civil Engineering**

Course Code: SECV4041

Course Name: Highway & Traffic Engineering

Prerequisite Course(s): Basics of Transportation Engineering (SECV3070)

**Teaching & Examination Scheme:**

| Teaching Scheme (Hours/Week) |           |          |        | Examination Scheme (Marks) |     |           |     |          |     |       |
|------------------------------|-----------|----------|--------|----------------------------|-----|-----------|-----|----------|-----|-------|
| Theory                       | Practical | Tutorial | Credit | Theory                     |     | Practical |     | Tutorial |     | Total |
|                              |           |          |        | CE                         | ESE | CE        | ESE | CE       | ESE |       |
| 03                           | 02        | 00       | 04     | 40                         | 60  | 20        | 30  | 00       | 00  | 150   |

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- gain knowledge about highly efficient traffic flow through ample research and innovative design efforts.
- use research for designing roadways and highways that increase traffic safety (strategic implementation of stop signs, traffic signs, and traffic lights).
- understand geometric and structural design of highway.
- understand traffic parameters and traffic control.
- understand accident causes and remedies.

**Course Content:**

| <b>Section I</b> |   |       |                |
|------------------|---|-------|----------------|
| Module No.       | Content   | Hours | Weightage in % |
| 1.               | <b>Introduction</b><br>Scope of Highway Engineering, Highway Planning and Development in India, Classification of Rural and Urban Roads, Road Patterns, Planning and Alignment Surveys.   | 03    | 07             |
| 2.               | <b>Traffic Characteristics</b><br>Road user's characteristics - general human characteristics, physical, mental and emotional factors, factors affecting reaction time, PIEV theory, Vehicular characteristics: (static and dynamic), Characteristics affecting road design-width, height, length and other dimensions. Weight, power, speed and braking capacity of a vehicle. | 08    | 18             |
| 3.               | <b>Highway Geometric Design</b><br>Introduction; highway cross section elements, sight distance, design of horizontal alignment, design of vertical alignment, super-elevation, widening, gradients.  | 11    | 25             |

| <b>Section II</b> |  |       |                |
|-------------------|--|-------|----------------|
| Module No.        | Content  | Hours | Weightage in % |
| 1.                | <b>Highway material and construction</b><br>Pavement materials- Materials used in Highway Construction- Soils, Stone aggregates, bituminous binders, bituminous paving mixes; Portland cement and cement concrete: desirable properties, tests, requirements for different types of pavements. Problems.   | 05    | 11             |
| 2.                | <b>Pavement Design</b><br>Types and component parts of pavements, Factors affecting design and performance of pavements. Stresses and Deflections in Flexible Pavements: Stresses and deflections in homogeneous masses. Burmister's two layer theory, three layer and multi-layer theories; wheel load stresses, various factors in traffic wheel loads; ESWL of multiple wheels. Repeated loads and EWL factors; sustained loads. Pavement behaviour under transient traffic loads. Flexible Pavement Design Methods For Highways and design of flexible pavements as per IRC. | 10    | 22             |
| 3.                | <b>Traffic engineering</b><br>Basic parameters, Traffic studies, Different traffic control devices, Signs, markings, signals, Traffic management and regulation, Concepts of at-grade & grade separated intersections, highway capacity, level of service.   | 08    | 17             |

**Text Book(s):**

| Title                                      | Author/s                              | Publication                |
|--|---------------------------------------|----------------------------|
| Highway Engineering                        | Dr. S.K. Khanna and Dr. C.E. G. Justo | Nem Chand & Bros., Roorkee |
| Traffic Engineering and Transport Planning | L.R. Kadiyali                         | Khanna Publishers, Delhi   |

**Reference Book(s):**

| Title  | Author/s      | Publication                  |
|--|---------------|------------------------------|
| Highway Engineering  | L.R. Kadiyali | Khanna Publishers, New Delhi |
| Principles, Practice & Design of Highway Engineering   | S.K. Sharma   | S. Chand & Co., New Delhi.   |
| IRC – 37 Guidelines for Design of flexible Pavements, IRC, New Delhi – 2001.   |               |                              |
| IRC – 67 Code of Practice for Road Signs, IRC, New Delhi – 2001.   |               |                              |
| IRC: 58, 2002: "Guidelines for the Design of Plain Jointed Rigid Pavements for Highways", IRC, N. Delhi, December, 2002. |               |                              |

**Web Material Link(s):**

- <https://nptel.ac.in/courses/105103097/>
- <https://nptel.ac.in/courses/105103097/25>

**List of Practical:**

| Sr. No | Name of Practical   | Hours |
|--------|---|-------|
| 1.     | California Bearing Ratio (CBR) Test                       | 04    |
| 2.     | Aggregate crushing Test                                   | 02    |
| 3.     | Aggregate Impact Test                                     | 02    |
| 4.     | Flakiness Index and Elongation Index Test for Aggregate   | 02    |
| 5.     | Los Angeles Abrasion Test / Deval Abrasion Test           | 02    |
| 6.     | Marshall stability test on Bitumen mix.                   | 02    |
| 7.     | Specific gravity and Water Absorption test for Aggregate. | 02    |
| 8.     | Penetration test for Bitumen.                             | 02    |
| 9.     | Softening point test for Bitumen.                         | 02    |
| 10.    | Ductility test for Bitumen.                               | 02    |
| 11.    | Flash and Fire Point test for Bitumen.                    | 04    |
| 12.    | Specific gravity test for Bitumen                         | 02    |
| 13.    | Viscosity Test for Bitumen.                               | 02    |

**Course Evaluation:****Theory:**

- Continuous Evaluation consists of two tests each of 30 marks and of 1 Hour duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

**Practical:**

- Continuous Evaluation consists of performance of practical which will be evaluated out of 10 marks for each practical and average of the same will be converted to 10 marks.
- Internal viva consists of 10 marks.
- Practical performance/quiz/drawing/test consists of 15 marks during End Semester Exam.
- Viva/ Oral performance of 15 marks during End Semester Exam.

**Course Outcome(s):**

After completion of the course, the student will be able to

- understand about highway planning and its classification.
- know about importance and working of different traffic control devices.
- conduct different types of Traffic Surveys.
- explain the reasons of accidents and their preventive measures.
- design of traffic signals at intersections and rotary intersection.
- aware of various traffic regulation and control devices.



**Center for Skill Enhancement and Professional Development**

Course Code: SEPD4010

Course Name: Creativity, Problem Solving & Innovation

Prerequisite Course(s): --

**Teaching & Examination Scheme:**

| Teaching Scheme (Hours/Week) |           |          |        | Examination Scheme (Marks) |     |           |     |          |     |       |
|------------------------------|-----------|----------|--------|----------------------------|-----|-----------|-----|----------|-----|-------|
| Theory                       | Practical | Tutorial | Credit | Theory                     |     | Practical |     | Tutorial |     | Total |
|                              |           |          |        | CE                         | ESE | CE        | ESE | CE       | ESE |       |
| 03                           | 00        | 00       | 03     | 100                        | 00  | 00        | 00  | 00       | 00  | 100   |

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- achieve expertise with the technicalities of creativity and problem solving.
- advance an assertiveness for innovation.
- advance creative thinking skills using shaft of learning components leading to understanding of plans of creativity, problem solving and innovation
- discuss uses of the concepts of creativity and problem-solving skills in personal, social, academic, and profession life.

**Course Content:**

| <b>Section I</b> |   |       |                |
|------------------|---|-------|----------------|
| Module No.       | Content   | Hours | Weightage in % |
| 1.               | <b>Introduction to Creativity, Problem Solving and Innovation</b> <ul style="list-style-type: none"> <li>• Definitions of Problem Solving, Creativity and Innovation</li> <li>• Need for Problem Solving and Innovation &amp; Scope of Creativity</li> <li>• Types and Styles of Thinking</li> <li>• Strategies to Develop Creativity, Problem Solving and Innovation Skills</li> </ul> | 08    | 17             |
| 2.               | <b>Questioning and Learning</b> <ul style="list-style-type: none"> <li>• Introduction to Questioning, Learning and Visualization and its Strategies</li> <li>• Sources and Methods of Questioning and Learning</li> <li>• Finding Perspective, Visualizing thinking</li> <li>• Mind Mapping</li> </ul>  | 07    | 16             |
| 3.               | <b>Creative Thinking and Problem Solving</b> <ul style="list-style-type: none"> <li>• Need of Creative Thinking</li> <li>• Cracking Creativity - Reversals, Reversing Perspective, seeing all sides, Looking in other world,</li> </ul>   | 08    | 17             |

|                   | <ul style="list-style-type: none"> <li>Finding what you are not looking for and following up</li> <li>Fishbone Diagram</li> <li>SCAMPER Technique</li> </ul>  |       |                |
|-------------------|---|-------|----------------|
| <b>Section II</b> |   |       |                |
| Module No.        | Content   | Hours | Weightage in % |
| 1.                | <b>Logic and Reasoning</b> <ul style="list-style-type: none"> <li>Basic Concept of Logic</li> <li>Divergent Vs Convergent Thinking, Inductive Vs Deductive Thinking</li> <li>Fusion of Ideas for Problem Solving</li> <li>Moral Reasoning</li> <li>Improvisation</li> </ul>   | 08    | 17             |
| 2.                | <b>Practices of Playing</b> <ul style="list-style-type: none"> <li>Collaboration and Brainstorming</li> <li>The Spirit of Koinonia</li> <li>QFT Model</li> <li>Connecting the Unconnected</li> <li>Making Novel Combinations</li> </ul>   | 07    | 16             |
| 3.                | <b>Review Strategies for Creative problem-solving methods</b> <ul style="list-style-type: none"> <li>A Heuristic Technique</li> <li>Problem-Solving Strategies: Why Bother?</li> <li>Five Building Blocks as per Fogler &amp; LeBlanc</li> <li>Strategy for Critical Thinking for Choosing</li> <li>Lateral Thinking</li> <li>Six Thinking Hats by Edward De Bono</li> <li>Design Thinking</li> </ul> | 07    | 17             |

**Text Book(s):**

| Title   | Author/s         | Publication                   |
|---|------------------|-------------------------------|
| Thinker Toys  | Michael Michalko | Random House Publication 2006 |
| Crackling Creativity, The Secrets of Creative Genus | Michael Michalko | Ten Speed Press 2001          |

**Reference Book(s):**

| Title  | Author/s                  | Publication                      |
|--|---------------------------|----------------------------------|
| Zig Zag, The Surprising Path to Greater Creativity                   | R Keith Sawyer            | Jossy-Bass Publication 2013      |
| De Bono's Thinking Course  | Edward De Bono            | Penguin Publication 1994         |
| Six Thinking Hats  | Edward De Bono            | Penguin Publication 1999         |
| How to Mind Map  | Tony Buzan                | Thorsons Publication 2002        |
| The Myths of Innovation  | Scott Berkun              | Berkun Publication 2010          |
| Creative confidence: Unleashing the creative Potential within Us all | Tom Kelly and David Kelly | William Collins Publication 2013 |
| The all Laughed  | Ira Flatow                | Harper Publication 1992          |

|  |  |                           |
|--|--|---------------------------|
| The Ultimate Lateral & Critical Thinking Puzzle book | Paul Sloane, Des MacHale & M.A. DiSpezio | Sterling Publication 2002 |
|--|--|---------------------------|

**Course Evaluation:**

| Section            | Module No. | Evaluation Criteria   | Marks      |
|--------------------|------------|---|------------|
| 1                  | 1          | Group Activity on Brainstorming   | 15         |
|                    | 2          | Mind Mapping Activity   | 10         |
|                    | 3          | Chart Preparation on 'Practicality of Fishbone Diagram'   | 15         |
|                    |            | Group presentation on 'SCAMPER Technique & its applications'  | 10         |
| 2                  | 1          | Group Presentation on Critical Analysis of a Govt. scheme/ policy/ budget (merit/ demerit, pros/cons etc) | 15         |
|                    | 2          | Group Discussion/ Debate/ Elocution   | 10         |
|                    | 3          | Problem Solving Activity (Individual)   | 10         |
|                    |            | Presentation (Learning Outcomes)  | 15         |
| <b>Grand Total</b> |            |   | <b>100</b> |

**Course Outcome(s):**

After completion of the course, the student will be able to

- establish creativity in their day to day actions and educational output.
- solve all types of problems with an optimistic and an impartial attitude.
- reflect innovatively and work towards problem solving in a tactical way.
- initiate different and advanced practices in their selected field of profession.

**P P Savani University**  
**School of Engineering**

**Department of Civil Engineering**

Course Code: SECV4511

Course Name: Legal Aspects in Construction Practice

Prerequisite Course(s): Estimation & Costing (SECV3090)

**Teaching & Examination Scheme:**

| Teaching Scheme (Hours/Week) |           |          |        | Examination Scheme (Marks) |     |           |     |          |     |       |
|------------------------------|-----------|----------|--------|----------------------------|-----|-----------|-----|----------|-----|-------|
| Theory                       | Practical | Tutorial | Credit | Theory                     |     | Practical |     | Tutorial |     | Total |
|                              |           |          |        | CE                         | ESE | CE        | ESE | CE       | ESE |       |
| 02                           | 00        | 01       | 03     | 40                         | 60  | 00        | 00  | 20       | 30  | 150   |

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- study the various types of construction contracts and their legal aspects and provisions.
- study the tenders, arbitration, legal requirements, labor and human rights regulations.

**Course Content:**

| <b>Section I</b>  |   |       |                |
|-------------------|---|-------|----------------|
| Module No.        | Content   | Hours | Weightage in % |
| 1.                | <b>Introduction to Construction Law</b><br>Need for Legal Issues in Construction in the Indian Judicial System – Context of Construction Industry, Principles of a Contract, Indian Contract Act 1872 – Provisions for Construction Industry, Essentials of a Valid Contract, Types of Contracts, Alternate Contract Methods, Concept of Completion of a Contract, IT Law 2000 and its Influence on Construction Contract.  | 07    | 23             |
| 2.                | <b>Construction Tendering Process</b><br>Introduction to Construction Process, Need for Tendering, Process of Tendering in Construction, Importance of Specifications and Estimates in Construction, Concept of Completion of the contract, Sub-Contracts and requirements, Tendering Models and Strategies, Prequalification of Bidders, Documents Forming a BID and a Contract, Agreements and Bonds in Tendering Process | 08    | 27             |
| <b>Section II</b> |   |       |                |
| Module No.        | Content   | Hours | Weightage in % |
| 1.                | <b>Construction Administration</b><br>Duties and Responsibilities – Project Manager, Owner,   | 04    | 13             |

|    |   |    |    |
|----|---|----|----|
|    | Engineers and Contractors, Important Site Documents, Process of Building Permissions, Provision for Scheduling delays and accelerations, Environmental Provisions for Construction Contracts  |    |    |
| 2. | <b>Disputes and Liabilities in Construction</b><br>Major Sources of disputes in Construction, Delays – Types, Claims and Solutions, Labor Laws in India, Worker Compensation and Insurance Laws, Construction Liabilities and Litigations, Disputes in Land Development                               | 05 | 17 |
| 3. | <b>Dispute Resolution in Construction</b><br>Dispute Resolution in Construction, Judicial Process in Dispute Resolution, Alternate Dispute Resolution Methods, Arbitration and Conciliation Act 1996, Importance of Arbitration in Construction, Arbitration Process, Arbitration Clause in Contracts | 06 | 20 |

#### List of Tutorials:

| Sr. No | Name of Tutorial                         | Hours |
|--------|--|-------|
| 1.     | Contract Methods                         | 03    |
| 2.     | Tendering Process                        | 03    |
| 3.     | Construction Administration              | 03    |
| 4.     | Disputes and Liabilities in Construction | 03    |
| 5.     | Dispute Resolution in Construction       | 03    |

#### Text Book(s):

| Title  | Author/s    | Publication   |
|--|-------------|---|
| Indian Contract Act 1872                                     | -           | Universal Law Publishing, New Delhi, India                      |
| Indian Arbitration and Conciliation Act,1996                 | -           | Ministry of Law and Justice , Law literature Publication, India |
| Laws Relating to Building and Engineering Contracts in India | Gajaria G T | M.M.Tripathi Private Ltd., Bombay                               |

#### Reference Book(s):

| Title  | Author/s                 | Publication           |
|--|--------------------------|-----------------------|
| Gujrat B & C Code , 1986   | Gopal Ranjan, Rao A.S. R | New age int. (p) ltd. |
| Contracts and the Legal Environment for Engineers and Architects | Joseph T. Bockrath       | McGraw Hill, 2000     |
| Construction Contracts   | Jimmie Hinze             | McGraw Hill           |

#### Web Material Link(s):

- <https://nptel.ac.in/courses/105103097/>

**Course Evaluation:****Theory:**

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

**Tutorial:**

- Continuous Evaluation consists of tutorial submission which will be evaluated out of 10 marks for each practical and average of the same will be converted to 20 marks.
- Report Submission/case studies consists of 15 marks during End Semester Exam.
- Viva/ Oral performance consists of 15 marks during End Semester Exam.

**Course Outcome(s):**

After completion of the course, the student will be able to

- analyze legal aspect of construction project.
- understand about the various types of construction contracts and their legal aspects and provisions.
- understand the details and different types of contracts in construction, arbitration and legal aspects and its provision.

**P P Savani University**  
**School of Engineering**

**Department of Civil Engineering**

Course Code: SECV4521

Course Name: Project Control and Life Cycle Execution of Constructed Facilities

Prerequisite Course(s): Construction Management & Equipment (SECV4030)

**Teaching & Examination Scheme:**

| Teaching Scheme (Hours/Week) |           |          |        | Examination Scheme (Marks) |     |           |     |          |     |       |
|------------------------------|-----------|----------|--------|----------------------------|-----|-----------|-----|----------|-----|-------|
| Theory                       | Practical | Tutorial | Credit | Theory                     |     | Practical |     | Tutorial |     | Total |
|                              |           |          |        | CE                         | ESE | CE        | ESE | CE       | ESE |       |
| 02                           | 00        | 01       | 03     | 40                         | 60  | 00        | 00  | 20       | 30  | 150   |

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- to gain different viewpoints on project management for construction.
- understand the framework by which project managers are able to measure their progress.
- utilize technology tools for communication, collaboration, information management, and decision support.

**Course Content:**

| <b>Section I</b> |  |       |                |
|------------------|--|-------|----------------|
| Module No.       | Content  | Hours | Weightage in % |
| 1.               | <p><b>Application of Statistical Methods in Construction</b></p> <p><b>Probability:</b> Probability Theory and its Importance: Definition of Probability, Rules of Probability, Random Variable. Probability Distribution. Mean or Expectation of Random Variable. Properties of Mean of Expectation</p> <p><b>Sampling:</b> Sampling and Sampling Distribution: Probability Samples, Non-probability Samples, Sample Random Sampling, other Sampling Schemes, Sampling Distribution and Standard Error, some Sampling and Quality control. Use of Concepts of Standard Deviation, Coefficient of Variance, Range in Quality Control of Concreting and Similar such Activities</p> | 08    | 26             |
| 2.               | <p><b>Work Study</b></p> <p>Definition, Objectives, Basic Procedure, Method Study and Work Measurement, Work Study Applications in Civil Engineering, Method Study, Definition, Objective, Procedure for Selecting the Work, Recording Facts, Symbols, Flow Process Charts, Multiple Activity Charts, String Diagrams, Work Measurement, Time and Motion Studies, Concept of Standard Time and Various Allowances, Time Study, Equipment</p>   | 07    | 24             |

|                   | Performance Rating, Activity Sampling, Time-Lapse, Photography Technique, Analytical Production Studies   |       |                |
|-------------------|---|-------|----------------|
| <b>Section II</b> |   |       |                |
| Module No.        | Content   | Hours | Weightage in % |
| 1.                | <b>Safety Engineering</b><br>Causes of Accidents on Various Sites, Safety Measures and Safety Policies to be Adopted, Determination of Safety Parameters, Personal Protective Equipment. Workmen Compensation Act, Minimum Wages Act, Type of Industrial Hazards-Nature, Causes and Control Measures, Hazard Identifications and Control Techniques, HAZOP, FMEA, FMECA, Cost of Construction Injuries-Legal Implications, Safety Organization –Safety Policy, Safety Record Keeping, Safety Culture, Safety and First Line Supervisors, Middle Managers, Top Management Practices, Sub contractual obligation, Project Coordination and Safety Procedure | 08    | 26             |
| 2.                | <b>Work Study</b><br>Definition, Objectives, Basic Procedure, Method Study and Work Measurement, Work Study Applications in Civil Engineering, Method Study, Definition, Objective, Procedure for Selecting the Work, Recording Facts, Symbols, Flow Process Charts, Multiple Activity Charts, String Diagrams. C) Work Measurement – Time and Motion Studies, Concept of Standard Time and Various Allowances, Time Study, Equipment Performance Rating. Activity Sampling, Time-Lapse, Photography Technique, Analytical Production Studies   | 07    | 24             |

**List of Tutorials:**

| Sr. No. | Tutorial                           | Hours |
|---------|------------------------------------|-------|
| 1.      | Introduction                       | 02    |
| 2.      | Planning of railway                | 02    |
| 3.      | Airport Planning                   | 02    |
| 4.      | Intelligent transportation systems | 02    |
| 5.      | ITS functional areas               | 02    |
| 6.      | ITS User Needs and Services        | 02    |
| 7.      | Automated Highway Systems          | 03    |

**Text Book(s):**

| Title  | Author/s              | Publication   |
|--|-----------------------|---------------|
| Applied Statistics and Probability for Engineers | Montgomery and Runger | Wiley, India  |
| Construction Project planning & Scheduling       | Charles Patrick       | Pearson, 2012 |



**Reference Books(s):**

| Title  | Author/s   | Publication                  |
|--|------------|------------------------------|
| Construction Planning, Equipment and methods | Peurifoy   | Tata McGraw Hill Publication |
| Quality Control and Total Quality Management | P. L. Jain | Tata McGraw Hill Publ        |

**Web Material Link(s):**

- <https://frame-online.eu/wp-content/uploads/2014/10/PlanningGuide.pdf>
- <https://www.transport.gov.scot/media/36472/a21-modern-transport-system.pdf>
- <https://jalopnik.com/the-ten-most-advanced-transportation-systems-in-the-wor-1729614271>
- <https://www.kontron.com/blog/mobility/modern-transport-system>

**Course Evaluation:****Theory:**

- Continuous Evaluation consists of two tests each of 30 Marks and 1 Hour of duration and average of the same will be converted to 30 Marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

**Practical/Tutorial:**

- Continuous Evaluation consists of performance of Film Appreciation, Literature Review, Area Appreciation which will be evaluated out of 10 for each and average of the same will be converted to 10 marks.
- Internal viva component of 10 marks.
- Practical performance/quiz/drawing/test of 15 marks during End Semester Exam.
- Viva/Oral performance of 15 marks during End Semester Exam.

**Course Outcome(s):**

After completion of the course, the student will be able to

- utilize technology tools for communication, collaboration, information management, and decision support.
- implement general business concepts, practices, and tools to facilitate project success.
- apply appropriate legal and ethical standards.
- appraise the role of project management in organization change.

**P P Savani University**  
**School of Engineering**

**Department of Civil Engineering**

Course Code: SECV4531

Course Name: Road Safety Audit

Prerequisite Course(s): Basics of Transportation Engineering (SECV3070)

**Teaching & Examination Scheme:**

| Teaching Scheme (Hours/Week) |           |          |        | Examination Scheme (Marks) |     |           |     |          |     |       |
|------------------------------|-----------|----------|--------|----------------------------|-----|-----------|-----|----------|-----|-------|
| Theory                       | Practical | Tutorial | Credit | Theory                     |     | Practical |     | Tutorial |     | Total |
|                              |           |          |        | CE                         | ESE | CE        | ESE | CE       | ESE |       |
| 02                           | 00        | 01       | 03     | 40                         | 60  | 00        | 00  | 20       | 30  | 150   |

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- understand the role of road safety in planning the urban infrastructures design is discussed.
- be aware of importance of road safety aspects and environmental impacts for commissioning the highway project.
- give the idea for mitigation measures for improving traffic safety and environment.

**Course Content:**

| <b>Section I</b>  |   |       |                |
|-------------------|---|-------|----------------|
| Module No.        | Content   | Hours | Weightage in % |
| 1.                | <b>Overview of road safety audit</b><br>Road Safety Audit, Road Defects as a Cause of Accidents, Road Safety Engineering, Limitations of Design Standards and International Consultants, Audit Team, Cost Implications, Problems & Issues   | 05    | 17             |
| 2.                | <b>Conducting road safety audits</b><br>The Audit Process, Initiating the Audit, Providing the Background Information, Studying the Plans and Inspecting the Site, holding a Commencement Meeting with the Designer and Client, Undertake the Audit, Writing the Audit Report, holding a Completion Meeting, Writing the Responses Report, Follow-up. | 06    | 20             |
| 3.                | <b>The audit of road designs</b><br>Introduction, Feasibility Studies, Preliminary Design, Detailed Design, Pre-Opening Stage   | 04    | 13             |
| <b>Section II</b> |   |       |                |
| Module No.        | Content   | Hours | Weightage in % |
| 1                 | <b>Road Signs and Traffic Signals</b><br>Classification, Location of Signs, Measures of Sign Effectiveness,   | 05    | 17             |

|   |   |    |    |
|---|---|----|----|
|   | Types of Visual Perception, Sign Regulations, Sign Visibility, Sign Variables, Text Versus Symbols  |    |    |
| 2 | <b>Road Marking</b><br>Role of Road Markings, Classification, Visibility. Traffic Signals: Need, Signal Face. Illumination and Location of Signals, Factors Affecting Signal Design, Pedestrians' Safety, Fixed and Vehicle Actuated Signals. Design of Signals, Area Traffic Control. Delineators, Traffic Impact Attenuators, Road Side Rest Areas, Safety Barriers, Traffic Aid Posts. | 06 | 20 |
| 3 | <b>Engineering Measures</b><br>Speed Humps, Speed Bumps, Speed Tables, Speed Cushions; Community Awareness and Education (Speed Limits); Enforcement- Non-Physical Measures - Physical Measures   | 04 | 13 |

**List of tutorials:**

| Sr. No | Name of Tutorial  | Hours |
|--------|---|-------|
| 1      | Collection of road accident data & analysis of collected data.  | 03    |
| 2      | Collection of data regarding black spots on major highways including geometric details & Analysis of black spots data and suggest mitigation measures.                | 03    |
| 3      | Collection of air quality data (emission level) and noise level data on problematic spots of highway and Analysis of collected data and suggest improvement measures. | 03    |
| 4      | Audit of Roadworks & Audit of Building Development,   | 02    |
| 5      | Safety Review of Existing Roads.  | 02    |
| 6      | Audit of Traffic Management Schemes   | 02    |

**Text Book(s):**

| Title   | Author/s         | Publication         |
|---|------------------|---------------------|
| Traffic Engineering and Transportation Planning | L. R. Kadiyali   | Khanna Publishers   |
| Fundamentals of Transportation Engineering      | C. S. Papacostas | Prentice Hall India |

**Reference Book(s):**

| Title                    | Author/s              | Publication     |
|--------------------------|-----------------------|-----------------|
| Highway Safety code      | Indian Roads Congress | IRC: SP-44:1996 |
| Road Safety Audit Manual | Indian Roads Congress | IRC: SP-88-2010 |

**Web Material Link(s):**

- <http://morth-roadsafety.nic.in/index1.aspx?lsid=504&lev=2&lid=456&langid=1>
- [https://en.wikipedia.org/wiki/Road\\_safety\\_audit](https://en.wikipedia.org/wiki/Road_safety_audit)
- [https://en.wikipedia.org/wiki/Road\\_signs\\_in\\_India](https://en.wikipedia.org/wiki/Road_signs_in_India)
- [https://en.wikipedia.org/wiki/Road\\_surface\\_marking](https://en.wikipedia.org/wiki/Road_surface_marking)

**Course Evaluation:****Theory:**

- Continuous Evaluation consists of two tests each of 30 marks and 1 hour of duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by course coordinator.
- End semester Examination consists of 60 marks.

**Practical/Tutorial:**

- Continuous Evaluation consists of performance of Film Appreciation, Literature Review, Area Appreciation which will be evaluated out of 10 for each and average of the same will be converted to 10 marks.
- Internal viva component of 10 marks.
- Practical performance/quiz/drawing/test of 15 marks during End Semester Exam.
- Viva/Oral performance of 15 marks during End Semester Exam.

**Course Outcome(s):**

After completion of the course, the student will be able to

- give the idea for mitigation measures for improving traffic safety and environment.
- be aware of importance of road safety aspects.
- design & planning various road geometrics.
- environmental impacts for commissioning the highway project.

**P P Savani University**  
**School of Engineering**

**Department of Civil Engineering**

Course Code: SECV4552

Course Name: Solid Waste Management

Prerequisite Course(s): Environmental Engineering (SECV3040),  
Water & Waste Water Engineering (SECV3101)

**Teaching & Examination Scheme:**

| Teaching Scheme (Hours/Week) |           |          |        | Examination Scheme (Marks) |     |           |     |          |     |       |
|------------------------------|-----------|----------|--------|----------------------------|-----|-----------|-----|----------|-----|-------|
| Theory                       | Practical | Tutorial | Credit | Theory                     |     | Practical |     | Tutorial |     | Total |
|                              |           |          |        | CE                         | ESE | CE        | ESE | CE       | ESE |       |
| 02                           | 00        | 01       | 03     | 40                         | 60  | 00        | 00  | 20       | 30  | 150   |

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- assess the activities involved for the proposed and determine the type, nature and estimated volumes of waste to be generated.
- identify any potential environmental impacts from the generation of waste at the site.
- recommend appropriate waste handling and disposal measures / routings in accordance with the current legislative and administrative requirements.
- categories waste material where practicable (inert material / waste fractions) for disposal considerations i.e. public filling areas / landfill.

**Course Content:**

| <b>Section I</b> |  |       |                |
|------------------|--|-------|----------------|
| Module No.       | Content  | Hours | Weightage in % |
| 1.               | <b>Sources and Composition of Municipal Solid Waste</b><br>Introduction, Sources of Solid Waste, Types of Solid Waste, Composition of Solid Waste and its Determination, Types of Materials Recovered from MSW   | 03    | 10             |
| 2.               | <b>Properties of Municipal Solid Waste</b><br>Physical Properties of Municipal Solid Waste, Chemical Properties of Municipal Solid Waste, Biological Properties of Municipal Solid Waste, Transformation of Municipal Solid Waste  | 04    | 13             |
| 3.               | <b>Solid Waste Generation and Collection</b><br>Quantities of Solid Waste, Measurements and Methods to Measure Solid Waste Quantities, Solid Waste Generation and Collection, Factors affecting Solid Waste Generation Rate, Quantities of Materials Recovered from MSW. | 04    | 13             |

| 4.                | <b>Handling, Separation and Storage of Solid Waste</b><br>Handling and Separation of Solid Waste at Site, Material Separation by Pick in, Screens, Float and Separator Magnets and Electromechanical Separator and other Latest Devices for Material Separation. Waste Handling and Separation at Commercial and Industrial Facilities, Storage of Solid Waste at the Sources.   | 04    | 14             |
|-------------------|--|-------|----------------|
| <b>Section II</b> |  |       |                |
| Module No.        | Content  | Hours | Weightage in % |
| 1.                | <b>Processing of Solid Waste</b><br>Processing of Solid Waste at Residence e.g. Storage, Conveying, Compacting, Shredding, Pulping, Granulating etc., Processing of Solid Waste at Commercial and Industrial Site.   | 04    | 13             |
| 2.                | <b>Disposal of Municipal Solid Waste</b><br>Combustion and Energy Recovery of Municipal Solid Waste, Effects of Combustion, Undesirable Effects of Combustion, Landfill: Classification, Planning, Siting, Permitting, Landfill Processes, Landfill Design, Landfill Operation, Use of Old Landfill, Differentiate Sanitary Land Fill and Incineration as Final Disposal System for Solid Waste, Biochemical Processes: Methane Generation by Anaerobic Digestion, Composting. | 06    | 20             |
| 3.                | <b>Hazardous Solid Waste</b><br>Definition, Identification and Classification of Hazardous Solid Waste, Characteristics Hazardous Waste Toxicity, Reactivity, Infectiousness, Flammability, Radioactivity, Corrosiveness, Irritation, Bio-Concentration, Genetic Activity, Explosiveness, Bio-Medical Waste.   | 05    | 17             |

**List of Tutorial:**

| Sr. No. | Name of Tutorial  | Hours |
|---------|---|-------|
| 1.      | Survey the MSW of your locality and Identify its sources and write composition of MSW.                            | 02    |
| 2.      | Carryout sample survey of different localities in groups listing properties of municipal solid waste              | 02    |
| 3.      | Survey your locality and based on it suggest methods of solid waste collection                                    | 02    |
| 4.      | Survey your locality and based on it suggest suitable methods of handling, separation and storage of solid waste. | 02    |
| 5.      | Identify& discuss the methods of processing different types of solid waste (search internet for latest methods).  | 02    |
| 6.      | Compare different methods of disposal of MSW. (search internet for latest methods)                                | 02    |
| 7.      | Identify methods of hazardous waste disposal during a site visit and follow safety precautions.                   | 03    |

**Text Book(s):**

| Title                             | Author/s   | Publication |
|-----------------------------------|--|-------------|
| Integrated solid waste management | George Tchobanoglous and Hillary theisen, Samuel Vigil | McGraw Hill |

**Reference Books(s):**

| Title   | Author/s   | Publication                   |
|---|--|-------------------------------|
| Disposal and Recovery of Municipal Solid Waste  | Arthur B. Gallion (2003)                           | CBS Publishers & Distributors |
| Solid Waste Management  | Michael E Henstock Butterworths, Ann Arbor Science |                               |
| Manual on Municipal Solid waste management by Central Public Health and Environmental Engineering Organization, Government of India, New Delhi, 2000. |  |                               |

**Web Material Link(s):**

- <http://www.moef.nic.in/legis/hsm/mswmhr.html>
- <http://www.cyen.org/innovaeditor/assets/Solid%20waste%20management.pdf>
- <http://www.ilo.org/oshenc/part-vii/environmental-pollution-control/item/514>
- [www.houstontx.gov/solidwaste](http://www.houstontx.gov/solidwaste)
- [www.epa.gov/tribalmsw/](http://www.epa.gov/tribalmsw/)
- [www.unc.edu/courses/2009spring/.../SolidWasteIndiaReview2008.pdf](http://www.unc.edu/courses/2009spring/.../SolidWasteIndiaReview2008.pdf)

**Course Evaluation:****Theory:**

- Continuous Evaluation consists of two tests each of 30 Marks and 1 Hour of duration and average of the same will be converted to 30 Marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

**Practical/Tutorial:**

- Continuous Evaluation consists of performance of Film Appreciation, Literature Review, Area Appreciation which will be evaluated out of 10 for each and average of the same will be converted to 10 marks.
- Internal viva component of 10 marks.
- Practical performance/quiz/drawing/test of 15 marks during end semester exam.
- Viva/Oral performance of 15 marks during end semester exam.

**Course Outcome(s):**

After completion of the course, the student will be able to

- understand the municipal solid waste management systems with respect to its physical properties, and associated critical considerations in view of emerging technologies.
- understand the method for solid waste collection, transportation, redistribution and disposal.

**P P Savani University**  
**School of Engineering**

**Department of Civil Engineering**

Course Code: SECV4561

Course Name: Traffic Engineering: Operation & Controls

Prerequisite Course(s): SECV3070 - Basics of Transportation Engineering

**Teaching & Examination Scheme:**

| Teaching Scheme (Hours/Week) |           |          |        | Examination Scheme (Marks) |     |           |     |          |     |       |
|------------------------------|-----------|----------|--------|----------------------------|-----|-----------|-----|----------|-----|-------|
| Theory                       | Practical | Tutorial | Credit | Theory                     |     | Practical |     | Tutorial |     | Total |
|                              |           |          |        | CE                         | ESE | CE        | ESE | CE       | ESE |       |
| 02                           | 00        | 01       | 03     | 40                         | 60  | 20        | 30  | 00       | 00  | 150   |

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- design field traffic surveys and generate the data of interpretation and analysis.
- apply capacity and level of service analysis for highways.
- design signalized and rotary intersection.
- plan provision of various signs and design regulations for traffic facilities.
- gain knowledge about highly efficient traffic flow through ample research and innovative design efforts.

**Course Content:**

| <b>Section I</b> |   |       |                |
|------------------|---|-------|----------------|
| Module No.       | Content   | Hours | Weightage in % |
| 1.               | <b>Introduction</b><br>Scope Functions and Administration, Traffic Issues in Indian Cities.   | 02    | 06             |
| 2.               | <b>Traffic Studies and Analysis</b><br>Road-user Characteristics, Vehicle Characteristics, Traffic Flow Characteristics, Different Traffic Studies and Analysis for Volume, Speed and Delays, Origin and Destination, Parking and Accident, Presentation & Interpretation, Traffic Forecasting. | 07    | 24             |
| 3.               | <b>Traffic Geometrics</b><br>Basic Geometric Elements, Design of Intersections, Rotary Intersections, Grade Separated Intersections, Design of Parking and Terminal Facilities.   | 06    | 20             |
|                  |   |       |                |



| <b>Section II</b> |   |              |                       |
|-------------------|---|--------------|-----------------------|
| <b>Module No.</b> | <b>Content</b>  | <b>Hours</b> | <b>Weightage in %</b> |
| 1.                | <b>Traffic Flow Study</b><br>Vehicular Stream Models, Car Following Model, Q- K -V Models, Highway Capacity, Level of Service, Shock Wave Phenomenon, Queuing.  | 08           | 27                    |
| 2.                | <b>Traffic Control, Regulation &amp; Management</b><br>Traffic Control, Regulations & Management for Vehicles, Drivers and Flow, Traffic Control Devices, Markings, Signage, Signals, Channelization, Design of Traffic Signal System, Urban Traffic Management Techniques, Street Lighting, Introduction to Intelligent Transportation System. | 07           | 23                    |

**Text Book(s):**

| <b>Title</b>   | <b>Author/s</b>                       | <b>Publication</b>         |
|--|---------------------------------------|----------------------------|
| Highway Engineering                                    | Dr. S.K. Khanna and Dr. C.E. G. Justo | Nem Chand & Bros., Roorkee |
| Traffic Engineering and Transport Planning             | L.R. Kadiyali                         | Khanna Publishers, Delhi   |
| Metropolitan Transportation Planning                   | John W Dickey                         | Tata McGraw-Hill           |
| Principles of Highway Engineering and Traffic Analysis | Fred L                                | John Wiley                 |

**Reference Book(s):**

| <b>Title</b>   | <b>Author/s</b> | <b>Publication</b>           |
|--|-----------------|------------------------------|
| Highway Engineering                                  | L.R. Kadiyali   | Khanna Publishers, New Delhi |
| Principles, Practice & Design of Highway Engineering | S.K. Sharma     | S. Chand & Co., New Delhi.   |

**Web Material Link(s):**

- <https://nptel.ac.in/courses/105103097/>
- <https://nptel.ac.in/courses/105103097/25>

**List of Practical/tutorial:**

| <b>Sr. No.</b> | <b>Name Practical/tutorial</b>   | <b>Hours</b> |
|----------------|--|--------------|
| 1.             | General aspects of traffic engineering   | 01           |
| 2.             | Design of rotary intersection  | 04           |
| 3.             | Design of traffic signals  | 02           |
| 4.             | Traffic Volume studies, Mixed traffic problem study, speed studies & case study to traffic problem solution. | 06           |
| 5.             | General aspects of traffic signals and boards  | 02           |

**Course Evaluation:****Theory:**

- Continuous Evaluation consists of two tests each of 30 marks and of 1 Hour duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

**Tutorial:**

- Continuous Evaluation consists of performance of tutorial which will be evaluated out of 10 marks for each practical and average of the same will be converted to 10 marks.
- Internal viva consists of 10 marks.
- Practical performance/quiz/drawing/test consists of 15 marks during End Semester Exam.
- Viva/ Oral performance of 15 marks during End Semester Exam.

**Course Outcome(s):**

After completion of the course, the student will be able to

- understand about highway planning and its classification.
- know about importance and working of different traffic control devices.
- conduct different types of Traffic Surveys.
- explain the reasons of accidents and their preventive measures.
- design of traffic signals at intersections and rotary intersection.
- aware of various traffic regulation and control devices.

**P P Savani University**  
**School of Engineering**

**Department of Civil Engineering**

Course Code: SECV4571

Course Name: Urban Infrastructure Engineering & Management

Prerequisite Course(s): SECV2090 - Building & Town Planning

**Teaching & Examination Scheme:**

| Teaching Scheme (Hours/Week) |           |          |        | Examination Scheme (Marks) |     |           |     |          |     |       |
|------------------------------|-----------|----------|--------|----------------------------|-----|-----------|-----|----------|-----|-------|
| Theory                       | Practical | Tutorial | Credit | Theory                     |     | Practical |     | Tutorial |     | Total |
|                              |           |          |        | CE                         | ESE | CE        | ESE | CE       | ESE |       |
| 02                           | 00        | 01       | 03     | 40                         | 60  | 00        | 00  | 20       | 30  | 150   |

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- understand infrastructure organizations.
- prepare infrastructure master plan.
- schedule infrastructure project activities.
- prepare project development plan.
- prepare tender documents for infrastructure project contract.

**Course Content:**

| <b>Section I</b>  |   |       |                |
|-------------------|---|-------|----------------|
| Module No.        | Content   | Hours | Weightage in % |
| 1.                | <b>Infrastructure</b><br>Definitions of Infrastructure, Governing Features, Historical Overview of Infrastructure Development in India, Infrastructure Organizations & Systems.   | 05    | 17             |
| 2.                | <b>Infrastructure Planning</b><br>Typical Infrastructure Planning Steps, Planning and Appraisal of Major Infrastructure Projects, Screening of Project Ideas, Life Cycle Analysis, Multi-criteria Analysis for Comparison of Infrastructure Alternatives, Procurement Strategies, Scheduling and Management of Planning Activities, Infrastructure Project Budgeting and Funding, Regulatory Framework, Sources of Funding. | 10    | 33             |
| <b>Section II</b> |   |       |                |
| Module No.        | Content   | Hours | Weightage in % |
| 1.                | <b>Project Management in Construction</b><br>Introduction to Project Management Processes - Initiating, Planning, Executing, Controlling, and Closing Processes; Project  | 08    | 27             |

|    |  |    |    |
|----|--|----|----|
|    | Integration Management - Project Plan Development, Project Plan Execution, and Overall Change Control; Project Scope Management - Initiation, Scope Planning, Scope Definition, Scope Verification, and Scope Change Control.  |    |    |
| 2. | <b>Contracts and Management of Contracts</b><br>Engineering Contracts and its Formulation, Definition and Essentials of a Contract, Indian Contract Act 1872, Types of Contracts and Clauses for Contracts, Preparation of Tender Documents, Issues Related to Tendering Process, Awarding Contract. | 07 | 23 |

**Text Book(s):**

| Title  | Author/s                    | Publication                  |
|--|-----------------------------|------------------------------|
| Infrastructure Planning Handbook: Planning, Engineering, and Economics | A. S. Goodman and M. Hastak | McGraw-Hill, New York, 2006. |
| Infrastructure planning  | J. Parkin and D. Sharma     | Thomas Telford, London, 1999 |

**Reference Book(s):**

| Title  | Author/s   | Publication                       |
|--|------------|-----------------------------------|
| Projects: Planning, Analysis, Selection, Financing, Implementation, and Review | P. Chandra | Tata McGraw-Hill, New Delhi, 2009 |
| Computer-based Construction Project Management                                 | T. Hegazy  | Prentice Hall, New Jersey, 2002   |

**List of Tutorial:**

| Sr. No | Name of Tutorial   | Hours |
|--------|--|-------|
| 1.     | Prepare infrastructure master plan                           | 03    |
| 2.     | Schedule infrastructure project activities                   | 04    |
| 3.     | Prepare project development plan                             | 04    |
| 4.     | Prepare tender documents for infrastructure project contract | 04    |

**Course Evaluation:**

**Theory:**

- Continuous Evaluation consists of two tests each of 30 marks and of 1 Hour duration and average of the same will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

**Tutorial:**

- Continuous Evaluation consists of performance of tutorial which will be evaluated out of 10 marks for each practical and average of the same will be converted to 10 marks.
- Internal viva consists of 10 marks.
- Practical performance/quiz/drawing/test consists of 15 marks during End Semester Exam.
- Viva/ Oral performance of 15 marks during End Semester Exam.

**Course Outcome(s):**

After completion of the course, the student will be able to

- understand infrastructure organizations.
- prepare infrastructure master plan.
- schedule infrastructure project activities.
- prepare project development plan.
- prepare tender documents for infrastructure project contract.

**P P Savani University**  
**School of Engineering**

**Department of Civil Engineering**

Course Code: SECV4582

Course Name: Advanced Waste Water Treatment

Prerequisite Course(s): SECV3040 - Environmental Engineering,  
SECV3101 - Water & Waste Water Engineering

**Teaching & Examination Scheme:**

| Teaching Scheme (Hours/Week) |           |          |        | Examination Scheme (Marks) |     |           |     |          |     |       |
|------------------------------|-----------|----------|--------|----------------------------|-----|-----------|-----|----------|-----|-------|
| Theory                       | Practical | Tutorial | Credit | Theory                     |     | Practical |     | Tutorial |     | Total |
|                              |           |          |        | CE                         | ESE | CE        | ESE | CE       | ESE |       |
| 02                           | 00        | 01       | 03     | 40                         | 60  | 00        | 00  | 20       | 30  | 150   |

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- understand about the different water treatment process.
- get knowledge about disposal of treated effluents and advanced methods.
- understand reusing and recycling of treated effluents.

**Course Content:**

| <b>Section I</b> |  |       |                |
|------------------|--|-------|----------------|
| Module No.       | Content  | Hours | Weightage in % |
| 1.               | <b>Introduction</b><br>Objectives and need of Advanced Waste-Water Treatment -<br>Classification of Treatments.  | 05    | 17             |
| 2.               | <b>Nutrient Removal</b><br>Nitrogen Removal: Nitrification, Denitrification Simultaneous nitrification and denitrification<br>Phosphorus Removal: Introduction, Phosphorus removal by Chemical Precipitation, Principles of process, Chemicals applied, Chemistry of phosphorus precipitation, Process configuration, Phosphorus removal by Biological Precipitation: Principles of the process, Microorganisms involved in the process, Process configurations                          | 04    | 13             |
| 3.               | <b>Membrane Filtration</b><br>Membrane Process Terminology, Membrane Process Classification and operation- Microfiltration, Ultrafiltration, Nano filtration, Reverse Osmosis, Electrodialysis Membrane Configurations: Plate-and-frame module, Spiral-wound module, Tubular module, Hollow-fiber module Membrane Fouling: Modes of membrane fouling, Control of membrane fouling Application of membrane processes: Microfiltration, Ultrafiltration, Nano filtration, Reverse Osmosis. | 06    | 20             |

| <b>Section II</b> |   |       |                |
|-------------------|---|-------|----------------|
| Module No.        | Content   | Hours | Weightage in % |
| 1.                | <p><b>Adsorption &amp; Ion-exchange</b></p> <p>Adsorption: Type of adsorbents Development of adsorption isotherms-Freundlich, Langmuir, BET Activated carbon adsorption, Granular carbon adsorption.</p> <p>Ion Exchange: Fundamentals and types of Ion Exchange Resins, Theory of Ion Exchange Applications: Removal and recovery of heavy metals, Removal of nitrogen, Removal of phosphorus, Organic chemical removal.</p> | 04    | 13             |
| 2.                | <p><b>Membrane Bio Reactor</b></p> <p>Introduction MBR Process Description: Membrane Bioreactor with Membrane Module Submerged in the Bioreactor, Membrane Bioreactor with Membrane Module Situated Outside the Bioreactor, MBR System Features, Membrane Module Design Considerations, Applications in Industrial Wastewater Treatment and Municipal Wastewater.</p>   | 05    | 17             |
| 3.                | <p><b>Electrochemical Wastewater Treatment Processes</b></p> <p>Introduction,</p> <p>Electro-coagulation: Factors affecting Electrocoagulation, Electrode materials, Reactor configurations.</p> <p>Electro-floatation: Factors affecting electro floatation Comparison with other technology, Reactor configurations.</p> <p>Electro-oxidation: Electro oxidation process, Reactor configurations.</p>                       | 06    | 20             |

**List of Practical:**

| Sr. No | Name of Tutorial/Practical   | Hours |
|--------|--|-------|
| 1.     | Performance of at least 5 Practical based on selected sample and submission of report. | 15    |

**Text Book(s):**

| Title  | Author/s                                   | Publication                   |
|--|--|-------------------------------|
| Wastewater Engineering: Treatment and Disposal | Metcalf and Eddy                           | T.M.H. Edition, New Delhi     |
| Manual on Water Supply & Treatment             | -  | CPH & Env. Engg. Organization |
| Environmental Engineering                      | H. S. Peavy, D. R. Rowe & G. Tchobanoglous | Mc Graw Hill Int., New Delhi  |

**Reference Book(s):**

| Title                                    | Author/s                      | Publication                 |
|--|-------------------------------|-----------------------------|
| Water supply and sanitary engineering    | G. S. Birdie and J. S. Birdie | Dhanpatrai Publication      |
| Water supply and wastewater engineering  | B. S. N Raju                  | Tata McGraw hill, New Delhi |
| Environmental engineering volume 1 and 2 | S. K. Garg                    | Khanna publisher            |

**Web Material Link(s):**

- <https://nptel.ac.in/courses/105105178/>
- <https://nptel.ac.in/courses/105106119/>
- <https://nptel.ac.in/courses/105105048/>

**Course Evaluation:****Theory:**

- Continuous Evaluation consists of two tests each of 30 marks and 1 Hour of duration, which will be converted to 30 marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

**Practical:**

- Continuous Evaluation consists of performance of 5 suitable practical/tutorial based on selected sample which will be evaluated out of 10 marks for each practical and average of the same will be converted to 20 marks.
- Practical performance/quiz/drawing/test consists of 15 marks during End Semester Exam.
- Viva/ Oral performance consists of 15 marks during End Semester Exam.

**Course Outcome(s):**

After completion of the course, the student will be able to

- design the water supply and wastewater treatment systems.
- determine the treatment efficiency of treatment units.
- understand the treatment required for waste water.



**P P Savani University**  
**School of Engineering**

**Department of Civil Engineering**

Course Code: SECV4591

Course Name: Modern Transportation System

Prerequisite Course(s): Basics of Transportation Engineering (SECV3070)

**Teaching & Examination Scheme:**

| Teaching Scheme (Hours/Week) |           |          |        | Examination Scheme (Marks) |     |           |     |          |     |       |
|------------------------------|-----------|----------|--------|----------------------------|-----|-----------|-----|----------|-----|-------|
| Theory                       | Practical | Tutorial | Credit | Theory                     |     | Practical |     | Tutorial |     | Total |
|                              |           |          |        | CE                         | ESE | CE        | ESE | CE       | ESE |       |
| 02                           | 00        | 01       | 03     | 40                         | 60  | 00        | 00  | 20       | 30  | 150   |

CE: Continuous Evaluation, ESE: End Semester Exam

**Objective(s) of the Course:**

To help learners to

- reduce the impact of peripherality by improving external links to the north east by rail, road, sea and air.
- enhance the efficiency of the transport networks.
- ensure whole-life, long-term value of transport networks, in capital and running.

**Course Content:**

| <b>Section I</b>  |  |       |                |
|-------------------|--|-------|----------------|
| Module No.        | Content  | Hours | Weightage in % |
| 1.                | <b>Introduction</b><br>Historical Development of Transport in India, 20-year Road Plans, National Transport Policy Recommendations, IRC, CRR, Vision 2021, NHDP, PMGSY. Characteristics of Different Modes of Transport and their Integration and Interactions, Impact on Environment. | 05    | 16             |
| 2.                | <b>Planning of railway</b><br>Passenger and Goods Terminals, Layout, Passenger Facilities, Traffic Control.  | 04    | 14             |
| 3.                | <b>Airport Planning</b><br>Requirements and components. Design of Runway and Taxiway, Apron, Parking Configuration, Terminal Requirements, Airport Marking and Lighting, Air Traffic Control.  | 06    | 20             |
| <b>Section II</b> |  |       |                |
| Module No.        | Content  | Hours | Weightage in % |
| 1.                | <b>Intelligent Transportation Systems</b><br>Introduction to Intelligent Transportation Systems (ITS) -  | 05    | 17             |

|    |   |    |    |
|----|---|----|----|
|    | Definition of ITS and Identification of ITS Objectives, Historical Background, Benefits of ITS - ITS Data collection techniques – Detectors, Automatic Vehicle Location (AVL), Automatic Vehicle Identification (AVI), Geographic Information Systems (GIS), Video Data Collection.                 |    |    |
| 2. | <b>ITS functional areas</b><br>Advanced Traffic Management Systems (ATMS), Advanced Traveler Information Systems (ATIS), Commercial Vehicle Operations (CVO), Advanced Vehicle Control Systems (AVCS), Advanced Public Transportation Systems (APTS), Advanced Rural Transportation Systems (ARTS). | 03 | 10 |
| 3. | <b>ITS User Needs and Services</b><br>Travel and Traffic Management, Public Transportation Management, Electronic Payment, Commercial Vehicle Operations, Emergency Management, Advanced Vehicle Safety Systems, Information Management.  | 04 | 13 |
| 4. | <b>Automated Highway Systems</b><br>Vehicles in Platoons, Integration of Automated Highway Systems, ITS Programs in the World, Overview of ITS Implementations in Developed Countries, ITS in Developing Countries.   | 03 | 10 |

**List of Tutorial:**

| Sr. No. | Tutorial                           | Hours |
|---------|------------------------------------|-------|
| 1.      | Introduction                       | 02    |
| 2.      | Planning of railway                | 02    |
| 3.      | Airport Planning                   | 02    |
| 4.      | Intelligent transportation systems | 02    |
| 5.      | ITS functional areas               | 02    |
| 6.      | ITS User Needs and Services        | 02    |
| 7.      | Automated Highway Systems          | 03    |

**Text Book(s):**

| Title                                      | Author/s   | Publication          |
|--|--|----------------------|
| Traffic Engineering and Transport Planning | L. R Kadiyali                                    | Khanna Publisher     |
| Smart Transportation Systems               | Qu, X., Zhen, L., Howlett, R., Jain, L.C. (Eds.) | Springer             |
| Railway Engineering                        | Satish Chandra, M. M. Agarwal                    | Oxford               |
| Airport Planning                           | S.R.Rangwala                                     | Charotar Publication |
| Intelligent transportation system          | Pradipkumar Sarkar, Amitkumar Jain               | PHI Publication      |

**Reference Books(s):**

| Title                          | Author/s                  | Publication |
|--------------------------------|---------------------------|-------------|
| Advanced Transportation System | Milan Janić Butterworths, | Springer    |

**Web Material Link(s):**

- <https://frame-online.eu/wp-content/uploads/2014/10/PlanningGuide.pdf>
- <https://www.transport.gov.scot/media/36472/a21-modern-transport-system.pdf>
- <https://jalopnik.com/the-ten-most-advanced-transportation-systems-in-the-world-1729614271>
- <https://www.kontron.com/blog/mobility/modern-transport-system>

**Course Evaluation:****Theory:**

- Continuous Evaluation consists of two tests each of 30 Marks and 1 Hour of duration and average of the same will be converted to 30 Marks.
- Faculty evaluation consists of 10 marks as per the guidelines provided by the course coordinator.
- End Semester Examination consists of 60 marks.

**Tutorial:**

- Continuous Evaluation consists of performance of Film Appreciation, Literature Review, Area Appreciation which will be evaluated out of 10 for each and average of the same will be converted to 10 marks.
- Internal viva component of 10 marks.
- Practical performance/quiz/drawing/test of 15 marks during End Semester Exam.
- Viva/Oral performance of 15 marks during End Semester Exam.

**Course Outcome(s):**

After completion of the course, the student will be able to

- outline the energy and environmental impacts of transport activities, and their importance.
- identify the key points of relevant legislation and targets relating to vehicle emissions.
- understand that both technical and behavioral changes have a role in achieving transport sustainability.