# Shri Shamrao Patil (Yadravkar) Educational & Charitable Trust's
# Sharad Institute of Technology College of Engineering
# Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur
# (An Autonomous Institute)

---

**Department:** Department of Civil Engineering **Rev:** Course Structure/00/2021-22
**Class:** Final Year B. Tech **Semester:** VII

| Course Code | Type of Course | Course | Teaching Scheme | | | | Evaluation Scheme | | | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | Total Hrs | CA1 | CA2 | MSE | ESE | Total | |
| CE701 | PCC | Estimating & Costing | 3 | - | - | 3 | 10 | 10 | 30 | 50 | 100 | 3 |
| CE702 | PCC | Design of Concrete Structure – II | 3 | - | - | 3 | 10 | 10 | 30 | 50 | 100 | 3 |
| CE703 | PEC | Elective-IV | 2 | - | - | 2 | 10 | 10 | 30 | 50 | 100 | 2 |
| CE704 | PEC | Elective-V | 2 | - | - | 2 | 10 | 10 | 30 | 50 | 100 | 2 |
| CE705 | PCC | Estimating & Costing Laboratory | - | - | 2 | 2 | 15 | 15 | - | 20 | 50 | 1 |
| CE706 | PCC | Structural Design and Drawing – II Laboratory | - | - | 2 | 2 | 15 | 15 | - | 20 | 50 | 1 |
| PRJ06 | PROJ | Mega Project Phase -II | - | - | 8 | 8 | 25 | 25 | - | 50 | 100 | 4 |
| PRJ07 | PROJ | Seminar | - | - | 2 | 2 | - | - | - | 50 | 50 | 1 |
| HMS09 | HSMC | Values & Ethics | 2 | - | - | 2 | 25 | 25 | - | - | 50 | Audit |
| OEXXX | OEC | Open Elective-III | 3 | - | - | 3 | 10 | 10 | 30 | 50 | 100 | 3 |
| **TOTAL** | | | **15** | | **14** | **29** | **130** | **130** | **150** | **390** | **800** | **20** |

***Elective List :**

| **Elective-IV** | |
|---|---|
| CE 703 A | Advanced foundation engineering |
| CE 703 B | Infrastructure Development |
| CE 703 C | Safety in construction |
| CE 703 D | Earthquake Engineering |
| **Elective-V** | |
| CE 704 A | Design of Pre-stress Concrete structures |
| CE 704 B | Contracts accounts & tenders |
| CE 704 C | Airways, Docks & Harbour's |
| CE 704 D | Bridge Engineering |
| **Open Elective - III** | |
| OEXXX | Entrepreneurship Development |

---

## Estimating & Costing

| CE701 | PCC | Estimating & Costing | 3-0-0 | 3 Credits |
|---|---|---|---|---|

| Teaching Scheme: | Examination Scheme: |
|---|---|
| Lecture: 2 hrs./week | Continuous Assessment 1 : 10 Marks<br>Continuous Assessment 2 : 10 Marks<br>Mid Semester Exam : 30 Marks<br>End Semester Exam : 50 Marks |

**Pre-Requisites:** Building Construction & Materials

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

| | |
|---|---|
| **CO1** | Understand the importance of preparing the types of estimates under different conditions for various structures. |
| **CO2** | Importance of specifications for various items of work. |
| **CO3** | Prepare approximate estimates for various civil engineering works and calculate rates for |
| **CO4** | Prepare detailed estimate for various civil engineering works and tender documents.. |
| **CO5** | Organize the valid documents of contract. |
| **CO6** | Prepare valuation report for civil engineering structures |

### Course Content

| | |
|---|---|
| **Unit 1: Introduction**<br>Introduction to estimating, purpose, types, items of inclusion, modes of measurement for different works, administrative approval and technical sanction to estimates | **[04]** |
| **Unit 2: Quantity Surveying**<br>Purpose, General and detailed specifications for various items of work, prime cost, provisional sums and provisional quantities, taking out quantity, P.W.D. method, recording of measurements | **[06]** |
| **Unit 3: Costing**<br>Analysis of rates for various items of construction of civil engineering works, standard schedule of rate, price escalation, detailed and approximate estimates for buildings, R.C.C works, culverts, earthwork for canals, roads including hill roads and other civil engineering works | **[10]** |
| **Unit 4: Detailed Estimate Of Infrastructure Work**<br>Types, preparation of tender papers, detailed estimate of – Culvert, road & embankment introduction to B.O.T. | **[06]** |
| **Unit 5: Contracts**<br>Essentials of legally valid contract, types and forms of contract between various agencies, | **[08]** |

| | |
|---|---|
| organizational set up of P.W.D. , introduction to arbitration | |
| **Unit 6: Valuation**<br>Principles, types, price and cost, attributes of value, valuer and his duties, factors affecting the valuation of properties, methods of valuation, different types of lease Valuation from yield and from life, gross yield and net yield, sinking fund, depreciation, different methods of calculating depreciation, depreciated cost, obsolescence. | **[06]** |

**Text Books:**

1. Dutta B. N. (2012) "Estimating and Costing", UBS Publishers Distributors, New Delhi
2. Namavati R. H. (2016) "Professional Practice Estimating and Valuation", Lakhani book Depot, Mumbai
3. Patil B. S. (2015) "Civil Engineering Contracts and Estimates", Universities Press, Hyderabad
4. Bhasin P. L. (1987) "Quantity Surveying", S. Chand & Co. Ltd., Mumbai
5. Rangwala S. C. (1990), "Elements of Estimating and Costing", Charotar Publication, Anand
6. Birdi G. S. (2014) "Estimating and Costing", DhanpatRai& Sons, N. Delhi
7. Chakroborty M. (2010) "Estimating, Costing & Specification in Civil Engineering", M.Chakraborty Publication, Nepal
8. Rangwala S. C. (2011) "Valuation of real Properties", Charotar Publication, Anand

**Reference Books:**

1. Standard specifications volumes I and II ( PWD Maharashtra) Govt. of Maharashtra
2. CPWD Specifications
3. CPWD Schedules of Rates
4. PWD Hand Book and Red Book
5. PWD Schedule of Rates – Latest
6. National Building Code of India – Guidelines for regulating the building construction activities

---

## Design of Concrete Structure – II

| CE702 | PCC | Design of Concrete Structure – II | 3-0-0 | 3 Credits |
|---|---|---|---|---|

| Teaching Scheme: | Examination Scheme: |
|---|---|
| Lecture: 3 hrs./week | Continuous Assessment 1 : 10 Marks<br>Continuous Assessment 2 : 10 Marks<br>Mid Semester Exam : 30 Marks<br>End Semester Exam : 50 Marks |

**Pre-Requisites:** Strength of material, Concrete technology.

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

| | |
|---|---|
| **CO1** | Design of water tank by using working stress method. |
| **CO2** | Design of continuous beam (Two spans and three spans). |
| **CO3** | Design the combined footing & raft foundation. |
| **CO4** | Explain the concept of pre stressing. |
| **CO5** | Analyze the losses of pre stress in pre and post tensioned system. |
| **CO6** | Design of pre stress concrete section-Limit state of collapse in flexure |

### Course Content

| | |
|---|---|
| **Unit : 1**<br>Water tank - Design of circular and rectangular water tank resting on ground using approximate and IS Code method. | **[07]** |
| **Unit : 2**<br>Limit state Design of two span continuous beams and three span continuous beams using IS coefficient, concept of moment redistribution | **[06]** |
| **Unit : 3**<br>Foundation - Design of combined footing (Slab type, slab beam type) and design concept of raft foundation. | **[06]** |
| **Unit : 4**<br>Basic concept of pre stressing. Historical development. Types and systems of prestressing. Analysis of rectangular and symmetrical I sections. Different cable profiles. | **[07]** |
| **Unit : 5**<br>Losses of pre stress in Pre & Post tensioned members. Flexural strength of pre stress concrete section | **[06]** |
| **Unit : 6**<br>Design of pre stress concrete - rectangular and Symmetrical I sections for following criteria: (i) Design of section for flexure (ii) Design of section for the limit state of collapse in flexure. | **[07]** |

**Text Books:**

1. R.C. Hibbeler (2012) "Design of Reinforced Concrete Structures", Pearson Education, New Delhi
2. S. N. Sinha (2010) "Reinforced Concrete Design", Tata McGraw-Hill Education, New Delhi
3. N. Subramanian (2014) "Design of Reinforced Concrete Structures", Oxford University Press, New Delhi
4. Varghese P.C. (2013) "Design of Reinforced Concrete Structures", Prentice-Hall of India, New Delhi
5. Devdas Menon, S. Unnikrishna Pillai (2010) "Reinforced Concrete Design", Tata McGraw-Hill Education, New Delhi

**Reference Books:**

1. S 456-2000, Relevant Special publications of BIS
2. Limit state theory and Design –Karve and Shah , Structures publications , Pune
3. Reinforced Concrete Design – Limit state - A.K. Jain Nem Chand brothers Roorkee
4. Fundamentals of Reinforced Concrete –Sinha and Roy, S. Chand and company Ltd. Ram Nagar, New Delhi
5. Limit State Design of reinforced concrete P.C.Varghese, Prentice Hall, New Delhi
6. Reinforced Concrete Design- B.C. PunmiaLaxmi publications New Delhi
7. Reinforced Concrete Design-M. L. Gambhir-Mcmillan India Ltd. New Delhi

---

## A) Advanced Foundation Engineering

| CE703A | PEC | A) Advanced Foundation Engineering | 2-0-0 | 2 Credits |
|---|---|---|---|---|

| Teaching Scheme: | Examination Scheme: |
|---|---|
| Lecture: 3 hrs./week | Continuous Assessment 1 : 10 Marks<br>Continuous Assessment 2 : 10 Marks<br>Mid Semester Exam : 30 Marks<br>End Semester Exam : 50 Marks |

**Pre-Requisites:** Soil Mechanics

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

| | |
|---|---|
| **CO1** | Understand the Planning of subsurface investigation as per project requirements. |
| **CO2** | Explain concepts of shallow foundation with different loading. |
| **CO3** | Design the pile foundation in all types of ground condition. |
| **CO4** | Explain the concepts of Retaining wall. |
| **CO5** | Explain ground improvement techniques for site specific requirements |
| **CO6** | Design the shallow foundation with different loading conditions. |

### Course Content

| | |
|---|---|
| **Unit 1: Subsurface Exploration:**<br>Introduction, Planning of Soil Exploration for Different Projects, Methods of Borings, Methods of Samplings, Observation of Water Tables, Introduction to Various Field Tests Like, Vane Shear Test, CPT, PMT, Dilatometer Test Etc, Coring of Rocks, Geophysical Exploration. | **[06]** |
| **Unit 2: Foundation Analysis:**<br>Shallow Foundations, Methods of Estimating Bearing Capacity of Footings, Foundations Under Eccentric Loading, Foundations Under Inclined Loading. | **[05]** |
| **Unit 3: Pile Foundation:**<br>Introduction, Types of Pile, Pile capacity In Sand and Clay, Pile capacity in Rock, Settlement of Pile, Group pile | **[05]** |
| **Unit 4: Retaining Walls:**<br>Gravity and Cantilever Walls, Stability of Retaining Walls, Introduction to Mechanically Stabilized Retaining Walls | **[05]** |
| **Unit 5: Ground Improvement:**<br>Introduction to Ground Improvement, Methods Like: Compaction, Blasting, Pre-Compression, Sand Drains, Prefabricated Vertical Drains, Chemical Stabilization, Stone Column with Design, Dynamic Compaction, Jet Grouting, Deep Mixing. | **[05]** |

| | |
|---|---|
| **Unit 6: Reinforced Concrete Design of Shallow Foundations:**<br>Fundamentals of Reinforced Concrete Design, Design Example of a Square and Rectangular Foundation for a Column. | **[04]** |

**Text Books:**

1. Braja M. Das, "Principles of Foundation Engineering." PWS Publishing, USA. 1999
2. Bowles, J.E., 1997. "Foundation Analysis and Design", Fifth ed. McGraw-Hill, Singapore.
3. Dr.K.R.Arora, "Soil Mechanics & foundation Engineering".Standard Publisher Distributers.
4. Murthy, V.N.S., 2001. "Geotechnical Engineering: Principles and Practices of Soil Mechanics and Foundation Engineering', Marcel Dekker, Inc. New York.
5. Ranjan, G. and Rao, A. S. R., 1991, 2000, 2007. "Basics and Applied Soil Mechanics", New Age International.

**Reference Books:**

1. Winterkorn and Fang, "Foundation engineering Handbook".
2. Tomlinson M.J, "Foundation Design & Construction." ELBS Publication.
3. Muni Budhu, "Soil mechanics & foundations", John Wiley & Sons Inc.
4. Chapman & Hall Poulos, H.G. and Davis, E.H. 1980, "Pile Foundation Analysis and Design" Wiley and Sons.
5. Woodward, J. and Tomlinson, M. 1994, "Pile Design and Construction Practice"

---

## B) Infrastructure Engineering

| CE 703 B | PEC | B) Infrastructure Engineering | 2-0-0 | 2 Credits |
|---|---|---|---|---|

| Teaching Scheme: | Examination Scheme: |
|---|---|
| Lecture: 2 hrs./week | Continuous Assessment 1 : 10 Marks<br>Continuous Assessment 2 : 10 Marks<br>Mid Semester Exam : 30 Marks<br>End Semester Exam : 50 Marks |

**Pre-Requisites:** Basic Civil Engineering, Transportation Engineering

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

| | |
|---|---|
| **CO1** | Explain different sectors in infrastructure. |
| **CO2** | Summarize the components used in railways. |
| **CO3** | Illustrate Geometric Design of Railway Track. |
| **CO4** | Explain importance of Points Crossings and Signaling. |
| **CO5** | Outline different types of tunnel. |
| **CO6** | Explain tunneling methods used in different soils. |

### Course Content

| | |
|---|---|
| **Unit 1: Basic Concepts Related to Infrastructure**<br>Introduction to Infrastructure, Role of Infrastructure in Economic Development, Types of Infrastructure, Infrastructure scenario in India. | **[05]** |
| **Unit 2: Railway Engineering**<br>Components of Railway Engineering: Permanent way components – Railway Track Gauge - Cross Section of Permanent Way - Functions of various Components like Rails, Sleepers and Ballast –Rail Fastenings – Creep of Rails- Theories related to creep – Adzing of Sleepers- Sleeper density – Rail joints. | **[05]** |
| **Unit 3: Geometric Design of Railway Track**<br>Geometric Design of Railway Track: Alignment – Engineering Surveys - Gradients- Grade Compensation- Cant and Negative Super elevation- Cant Deficiency – Degree of Curve – safe speed on curves – Transition curve – Compound curves – Reverse curves – Extra clearance on curves – widening of gauge on curves – vertical curves – cheek rails on curves. | **[05]** |
| **Unit 4: Points, Crossings and Signaling**<br>Track layouts – Switches – Design of Tongue Rails – Crossings – Turnouts – Layout of Turnout – Double Turnout – Diamond crossing – Scissors crossing. Signal Objectives – Classification – Fixed signals – Stop signals – Signaling systems – Mechanical signaling system – Electrical signaling system – System for Controlling Train Movement – Interlocking – Modern signaling Installations. | **[05]** |

| | |
|---|---|
| **Unit 5: Tunnel Engineering**<br>Definition, Advantages and disadvantages of tunnels and open cuts, Selection of route of tunnel, Classification of tunnels, tunnel approaches, stages in tunnel construction. | **[05]** |
| **Unit 5: Soil classification and tunneling methods**<br>Soil classification, Choice of method, Methods of tunneling:<br>Fore poling method, Needle beam method, Army method or case method, Timbering in soft soil tunneling | **[05]** |

**Text Books:**

1. Railway Engineering, 2/E by Chandra—Oxford University Press
2. Railway Track Engineering: J.S.Mundrey,Tata McGraw Hill
3. Saxena and Arora, " A Course in Railway Engineering," DhanpatRai& Sons Delhi
4. Arora N. L., " Transportation Engineering", IPH New Delhi

**Reference Books:**

1. Grigg, Neil, Infrastructure engineering and management, Wiley, (1988).
2. Hudson, Haas, Uddin, Infrastructure management: integrating design, construction, maintenance, rehabilitation, and renovation, McGraw Hill, (1997).
3. World Development Report 1994: Infrastructure for Development (1994).
4. Hariharan K. V., " Multimodal Transport & Infrastructure Development in India", Shroff Publishers, Mumbai
5. Publications of Bureau of Indian Standards, New Delhi, Relevant To the Syl Laboratory us

---

## C) Safety in construction

| CE703 C | PEC | C) Safety in construction | 2-0-0 | 2 Credits |
|---|---|---|---|---|

| Teaching Scheme: | Examination Scheme: |
|---|---|
| Lecture: 2 hrs./week | Continuous Assessment 1 : 10 Marks<br>Continuous Assessment 2 : 10 Marks<br>Mid Semester Exam : 30 Marks<br>End Semester Exam : 50 Marks |

**Pre-Requisites:** Basic Civil Engineering

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

| | |
|---|---|
| **CO1** | Explain the theoretical foundation for the different factors used in safety. |
| **CO2** | Assess risk for different tasks and systems in construction. |
| **CO3** | Review risk for different equipment in construction industry. |
| **CO4** | Develop and study efficient systems for safety management. |
| **CO5** | Choose appropriate policies for a systematic and efficient organization in safety. |
| **CO6** | Learning of different acts used in construction safety. |

### Course Content

| | |
|---|---|
| **Unit 1: Introduction to Safety**<br><br>Introduction to Safety Management, Need for Safety in Indian Construction Sites, Safety issues in construction- Human factors in construction safety management, Roles of various groups in ensuring safety in construction industry. Introduction to Industrial Safety. | **[05]** |
| **Unit 2: Safety in various construction operations**<br><br>Physical injury hazards in Excavation, under water works, under pinning & shoring Ladders & Scaffolds, Tunneling, Blasting, Demolition, Pneumatic caissons, confined Space Temporary Structures, Highways, crane and heavy Lifting, transport and mobile plants etc. Indian Standards on construction safety, National Building Code Provisions on construction safety. | **[05]** |
| **Unit 3: Safety in construction equipment**<br><br>Vehicles, Cranes, Tower Cranes, Lifting gears, Hoists & Lifts, Wire Ropes, Pulley blocks, Mixers, Conveyors, Pneumatic and hydraulic tools in construction. Temporary power supply. | **[05]** |
| **Unit 4: Material and accident management**<br><br>Safety Organization, Safety in storage & stacking of construction materials, Health Hazards, Chemical Hazards, Physical Hazards, Biological Hazards, Site Arrangements for Health, Safety and Welfare, First-aid Facilities, Reporting Injuries, Accident Investigation, Costs of | **[05]** |

| | |
|---|---|
| Safety, Design and Specification, Design Aids for Safe Construction, Important of site management and layout in safety. | |
| **Unit 5: Safety policies**<br><br>Legislation, Safety Organization, Health and Safety Policy Statements, Safety Organization, Safety Management Contracting, Subcontracting, Safety Groups and Group Safety Schemes, The Need for Information on Safety, Information prepared in-house, Posters, Publications, Films and Videos, Tool box meeting | **[05]** |
| **Unit6: Acts**<br><br>Contract Labor (R&A) Act and Central Rules: Definitions, Registration of Establishments, Licensing of Contractors, Welfare and Health provisions in the Act and the Rules, Penalties, Rules regarding wages. Building & Other Construction Workers (RE&CS) Act,1996 and Central Rules, 1998: Applicability, Administration, Registration, Welfare Board & Welfare Fund, Training of Building workers, General Safety, Health & Well fare provisions, Penalties. | **[05]** |
| **Text Books:**<br>1. K.N. Vaid, Construction Safety Management.<br>2. James B.Fullman, Construction Safety, Security & Loss Prevention<br>3. Linger L, Modern Methods of Material Handling | |
| **Reference Books:**<br>1. National Building Code of India.<br>2. V.J. Davies and K.Tomasin, Construction Safety Handbook.<br>3. R.T. Ratay, Hand book of Temporary Structures in Construction.<br>4. FactoriesAct,1948 with amendments of1976 & 1987.<br>5. Code of Practice for Hazardous goods by NFPA. | |

---

## D) Earthquake Engineering

| CE703D | PEC | D) Earthquake Engineering | 2-0-0 | 2 Credits |
|---|---|---|---|---|

| Teaching Scheme: | Examination Scheme: |
|---|---|
| Lecture: 3 hrs./week | Continuous Assessment 1 : 10 Marks<br>Continuous Assessment 2 : 10 Marks<br>Mid Semester Exam : 30 Marks<br>End Semester Exam : 50 Marks |

**Pre-Requisites:** Structural Analysis- 1, Design of Structure

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

| | |
|---|---|
| **CO1** | Understand all facts of earthquake hazards. |
| **CO2** | To understand the fundamentals of structural dynamics. |
| **CO3** | Understand the concept of structural dynamics and methods for earthquake load analysis. |
| **CO4** | Apply the concept of ductile detailing in RC structures. |
| **CO5** | Learn behavior of structure during earthquake. |
| **CO6** | Analyse earthquake resistant design of RC structure. |

### Course Content

| | |
|---|---|
| **Unit 1: Elements of Seismology**<br>Terminology, structure of earth, causes of an earthquake, plate tectonic theory, continental drift theory, seismic waves, magnitude and intensity, energy released, seismograph, prominent earthquake in India. | **[05]** |
| **Unit 2: Theory of vibrations**<br>Equation of motion, Dynamic equation of equilibrium, Free and forced vibration (with and without damping) of SDOF, Duhamel integral | **[05]** |
| **Unit 3: Response Spectrum Theory**<br>Earthquake response spectrum, construction of design response spectrum, Design criteria, design lateral force. | **[05]** |
| **Unit 4: Design Philosophy**<br>Philosophy of earthquake resistance design, Behavior of RC building, Ductile detailing of beam and column using IS 13920. | **[05]** |
| **Unit 5: Behavior of structure during earthquake**<br>Behavior of brick masonry structure, Behavior of RC masonry structure, RC bands, vertical reinforcement, importance of seismic IS codes, Retrofitting | **[05]** |
| **Unit 6: Special topics**<br>Introduction to Earthquake Resistant Features – Base isolation, seismic dampers, Soil | **[05]** |

| | |
|---|---|
| liquefaction | |

**Reference Books:**

1. Manish Shrikhande & Pankaj Agrawal; Earthquake resistant design of structures, PHI Publication, New Delhi
2. S.K.Duggal; Earthquake resistance design of structures; Oxford University Press, New Delhi.
3. A.K.Chopra; Dynamics of structures , Pearson, New Delhi
4. Clough & Penzin; Dynamics of structures

**IS Codes:**

1. Criteria for earthquake resistant design General provision & Building - IS: 1893 (Part I)- 2016
2. Code of Practice for Ductile Detailing of RC Structures - IS: 13920 (2016).
3. Code of Practice for earthquake resistant design & Construction of buildings – IS 4326 (2013).
4. Improving Earthquake Resistance of Earthen Buildings - IS 13827(1993) (R 2006)
5. Guide lines for Improving Earthquake Resistance low strength masonry buildings - IS 13828 (1993) (R2008)

---

## A) Design of Pre-stress Concrete structures

| CE 704 A | PEC | A) Design of Pre-stress Concrete structures | 2-0-0 | 2 Credits |
|---|---|---|---|---|

| Teaching Scheme: | Examination Scheme: |
|---|---|
| Lecture: 2 hrs./week | Continuous Assessment 1 : 10 Marks<br>Continuous Assessment 2 : 10 Marks<br>Mid Semester Exam : 30 Marks<br>End Semester Exam : 50 Marks |

**Pre-Requisites:** Strength of materials, Structural analysis-I

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

| | |
|---|---|
| **CO1** | Explain basic principles of prestressing. |
| **CO2** | Design rectangular and I sections prestressed beam. |
| **CO3** | Analyze and design end block in post tensional members. |
| **CO4** | Analyze and design prestress concrete pipes and sleepers. |
| **CO5** | Analyze and design single bay portal fame for single story. |
| **CO6** | Design prestress concrete one way and two way slab. |

### Course Content

| | |
|---|---|
| **Unit 1:**<br>Introduction to prestressed concrete ,Materials, Basic principles of Prestressing, Load balancing concept, stress concept, center of thrust, Various losses encountered in pre-tensioning and post-tensioning methods | **[05]** |
| **Unit 2:**<br>Design of beams : Rectangular and I sections for Limit State of flexure, ultimate flexural strength, recommendations of I.S. codes | **[05]** |
| **Unit 3:**<br>Analysis and design of end blocks in post tensional members, primary and secondary distribution zones, Bursting and spalling tensions | **[05]** |
| **Unit 4:**<br>Analysis and design of prestressed concrete structures such as concrete pipes and Sleepers. | **[05]** |
| **Unit 5**<br>Analysis and design of portal frames, single storey and limited to one bay.(Fixed and Hinged). | **[05]** |
| **Unit 6**<br>Design of prestressed concrete Floor slab, one way and two way slab. | **[05]** |

---

**Text Books:**

1. N. Krishna Raju ,Prestressed Concrete Design, McGraw Hill Publications, 6th edition,2018.
2. P. Dayaratnam , Prestressed Concrete Design, Medtech publishers, 7th edition, 2017.
3. N. Rajgopalan, Prestressed Concrete Design, Narosa Publishers 2nd edition, 2010.
4. E.G. Nawy , Prestressed Concrete Design, Pearson publication, 2nd edition, 1995.
5. T.Y. Lin ―Prestressed Concrete‖, John Wiley & sons Inc. New York, 3rd Edition, 1981.

**Reference Books:**

1. "Design of Prestressed Concrete Structures" by T Y Lin and N H Burns
2. "Prestressed Concrete Analysis and Design: Fundamentals" by A E Naaman
3. "Prestressed Concrete Bridges" by N Krishnaraju
4. "Limit State Design of Prestressed Concrete" by Y Guyan
5. "Prestressed Concrete Design" by Nagarajan

---

## B) Contracts accounts & Tenders

| CE704B | PEC | B) Contracts accounts & Tenders | 2-0-0 | 2 Credits |
|---|---|---|---|---|

| Teaching Scheme: | Examination Scheme: |
|---|---|
| Lecture: 3 hrs./week | Continuous Assessment 1 : 10 Marks<br>Continuous Assessment 2 : 10 Marks<br>Mid Semester Exam : 30 Marks<br>End Semester Exam : 50 Marks |

**Pre-Requisites:** Building Construction and material

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

| | |
|---|---|
| **CO1** | Execute the method of PWD for initiating work. |
| **CO2** | Prepare the specification for various items in construction. |
| **CO3** | Execute the contract for civil engineering works. |
| **CO4** | Understand contract system for civil engineering work |
| **CO5** | Prepare the tender for civil engineering works. |
| **CO6** | Understand arbitration act for civil engineering work. |

### Course Content

| | |
|---|---|
| **Unit 1: Public work Account**<br>Introduction, organizational structure of PWD, functions of PWD, administrative approval, methods used in PWD for carrying out work | **[04]** |
| **Unit 2: Specification**<br>Specification, necessity and importance of specification, Points to be observed in framing specification, types of specification, , Preparing detailed specification of items in civil engineering works such as Building Construction, Irrigation Engineering, Public Health Engineering. | **[06]** |
| **Unit 3: Contracts**<br>Contract, Objects of contract, requirements of valid contract, Overview of Indian contract Act 1872, types of engineering contract, dispute in contract, international contract | **[05]** |
| **Unit 4: Contract System**<br>Classification of contractor on basis of financial limits, Requirement of documents for registration of contractor in PWD, condition of contract, rights of contractor | **[04]** |
| **Unit 5: Tender and tender Document**<br>Tender, types of tender, tender form, tender document, tender notice, time limits for tender notice, acceptance and rejection of tender, engineering tender documents, concept of e-tendering | **[05]** |
| **Unit 6: Arbitration** | |

| | |
|---|---|
| Arbitration, need for arbitration, arbitrator, qualification of arbitrator, different kind of arbitration according to arbitration act, procedure of settlement of dispute in contract, action taken by departmental officer in charge, arbitration award | **[06]** |

**Text Books:**

1. Gupta, R.P. (2015) "Contracts, Accounts and Tenders in Construction Industry," Nem Chand & Bros, Roorkee
2. Raghunath, S. (2013) "Construction Contracts and Accounts: An Indian Perspective," Charotar Publishing House Pvt. Ltd., Anand
3. Bandyopadhyay, K.K. (2017) "Contracts, Accounts and Tenders in Construction Management," New Central Book Agency, Kolkata
4. Mukhopadhyay, A.K. (2019) "Construction Contracts and Tenders: Theory and Practice," Oxford University Press, New Delhi
5. Ghosh, S.K. (2014) "Contracts, Accounts and Tenders in Civil Engineering," PHI Learning Pvt. Ltd., New Delhi

**Reference Books:**

1. P N datta; Estimating and costing in civil engineering, USB Publication, New Delhi
2. Chakraborti M; Estimating costing specification and valuation; ISBN, Kolkata.
3. Raina V K ; Construction management and contact practices , Shroff publisher, New Delhi
4. Patil B S ; civil engineering contracts and estimates; Orient longman, Mumbai.

---

## C) Airways, Docks & Harbors

| CE 704 C | PEC | C) Airways, Docks & Harbors | 2-0-0 | 2 Credits |
|---|---|---|---|---|

| Teaching Scheme: | Examination Scheme: |
|---|---|
| Lecture: 2 hrs./week | Continuous Assessment 1 : 10 Marks<br>Continuous Assessment 2 : 10 Marks<br>Mid Semester Exam : 30 Marks<br>End Semester Exam : 50 Marks |

**Pre-Requisites:** Transportation Engineering

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

| | |
|---|---|
| **CO1** | Understand term used in airport, parts of airplane, survey conducted for site selection |
| **CO2** | Understand classification of airport and design of runway |
| **CO3** | Understand harbour planning and its layout |
| **CO4** | Understand the functions of harbour structure |
| **CO5** | Understand requirement of port and shore protection works such as sand dunes, groynes |
| **CO6** | Understand facilities such as dry docks, aprons, transit shed, and ware house |

### Course Content

| | |
|---|---|
| **Unit 1: Introduction to Airport**<br>Role of Air Transportation, Terms in airport terminology, open sky policy, component parts of airplanes, airport survey objectives and types. | **[05]** |
| **Unit 2: Airport Planning**<br>Classifications of Airport as per ICAO, Classification of Airport in India, Site selection, Component of airport, orientation of runways, Runway design, length, correction to basic length of runway, zones of airport, aircraft parking system and drainage | **[05]** |
| **Unit 3: Harbour planning**<br>Harbour planning and layout, channel, harbor entrance ,width, dimensions of harbor basin, turning basin, anchorage and offline moorings, berths etc. | **[06]** |
| **Unit 4: Harbour Structure**<br>Breakwaters and it types- sketches, breakwater height, Wharves, masonry, sheet pile wall, jetties, dolphins and moorings, Environmental issues | **[06]** |
| **Unit 5: Introduction to Port**<br>Requirement of port and terms used, shore protection works, such as sand dunes, groynes | **[05]** |
| **Unit 6: Facilities at Dock**<br>Dry Docks ,cargo handling equipments-container, aprons, transit shed, ware house, | **[05]** |

| | |
|---|---|
| Navigational aids | |

**Text Books:**

1. Antia K. F., "Railway Engineering", New Book Company Pvt. Ltd.
2. Saxena and Arora,"A Course in Railway Engineering," Dhanpat Rai& Sons Delhi
3. K. P. Subramanian, "Highway Railways Airport and Harbour Engineering," SCITECH Publications (India) Pvt. Ltd, Chennai.
4. Rangwala,"Airport Engineering",Charotar Publishing House Pvt. Ltd.,Anand, Gujarat.
5. H.P.Oza, G.H.Oza . "Dock and Harbour Engineering",Sixth edition, Charotar Pub House, Anand
6. Bindra and Arora, "Highway Engineering", Standard Publishers.
7. Vazirani V.N. and Chandola S.P.," Transportation Engineering", VolI and II , Khanna Publishers, N. Delhi

**Reference Books:**

1. Alonzo Def. Quinn, Design and Construction of Ports and Marine Structure, McGraw - Hill Book Company, New York
2. Ashford N. and Wright P.H., Airport Engineering, John Wiley and Sons, Inc., New York
3. Horonjeff R and Mackelvey F.X., Planning and Design of Airports fourth Intl.edition, McGraw Hill Book Co., New Delhi
4. Dr. S. K. Khanna, M.G.Arora and S.S. Jain, Airport Planning & Design, Nem Chand & Bros., Roorkee
5. S. P. Bindra, A Course in Docks and Harbour Engineering, 1992, DhanpatRai& Sons, New Delhi
6. R. Srinivasan and S. C. Rangwala, Harbour, Dock and Tunnel Engineering, 1995, Charotar Pub House, Anand
7. G.V. Rao Airport Engineering, Tata McGraw Hill Pub. Co., New Delhi

---

## D)Bridge Engineering

| CE704D | PEC | D)Bridge Engineering | 2-0-0 | 2 Credits |
|---|---|---|---|---|

| Teaching Scheme: | Examination Scheme: |
|---|---|
| Lecture: 2 hrs./week | Continuous Assessment 1 : 10 Marks<br>Continuous Assessment 2 : 10 Marks<br>Mid Semester Exam : 30 Marks<br>End Semester Exam : 50 Marks |

**Pre-Requisites:** Water Resource Engineering

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

| | |
|---|---|
| **CO1** | Explain concepts of IRC standards and Types of bridges. |
| **CO2** | Design the basic components of Bridges like Deck slab. |
| **CO3** | Design the T beam Bridges. |
| **CO4** | Design the different elements of Plate Girder Bridges. |
| **CO5** | Design the Box culvert. |
| **CO6** | Explain substructure of Bridge. |

### Course Content

| | |
|---|---|
| **Unit 1: Introduction of Bridge:**<br>Introduction to bridges, classification of Bridges, selection of bridge site and Initial decision process , detailed survey work and alignment, Geotechnical Investigation, liner waterway, economic span, afflux, scours depth. Design ads for bridges, introduction to I.R.C. loading standards, Load Distribution Theory, Bridge slabs, Effective width, Introduction to methods as per I.R.C Bearings: General features, types of bearings,Design principles of steel rocker, roller bearings and elastomeric pad bearing | **[06]** |
| **Unit 2: Deck Slab Bridge:**<br>Introduction, straight and skew slab bridge, Design of Deck Slab Bridge (simply supported) subjected to class AA tracked vehicle only. | **[05]** |
| **Unit 3: T Beam Bridge:**<br>General features, Design of Inerior panel of slab,Pigeauds method, Design of T-Beam Bridge subjected to class AA tracked vehicle only. | **[05]** |
| **Unit 4: Plate Girder Bridge:**<br>Introduction, elements of plate girder and their design, Design of deck type welded Plate girder, Bridge of Single line B.G | **[05]** |
| **Unit 5: Culverts:**<br>Design of Box culverts (single vent only).Design of pipe culverts. | **[04]** |

| | |
|---|---|
| **Unit6: Piers & Abutments:**<br>General features, Bed block, Types of Piers, forces acting on Piers, stability analysis of Piers, General features of Abutment ,forces acting on Abutments, stability analysis of Abutments, Types of wing wall ,Types of Bridge Foundations(Excluding design) | **[05]** |

**Text Books:**

1. Victor D.J- Essentials of Bridge Engineering, Oxford& IBH publishers.
2. Arya &Azmani-Design of steel structure Nemchand Publishers.
3. Design of Bridge by Krishnan Raju, Oxford & IBH, publishing company Pvt.ltd, Delhi.
4. Relevant-IRC & Railway bridge codes.

**Reference Books:**

1. Design of concrete Bridges by Aswini,Vazirani,Ratwani.
2. Bridge Engineering by Ponnuswamy,TATAMacgraw Hill company,New Delhi.
3. Design of RC structure by B.C .Punmia,Jain& Jain ,Lakshmi Publications.
4. Design of Steel structure by B.C.Punmia, Ashok Kumar jain,Arun Kumar Jain, Lakshmi Publication, New Delhi.
5. Design of R.C.C structure by B.C.Punmia, Ashok Kumar Jain, Arun Kumar Jain, Lakshmi Publication, New Delhi.

---

## Estimating & Costing Laboratory

| CE705 | PCC | Estimating & Costing Laboratory | 0-0-2 | 1 Credit |
|---|---|---|---|---|

| Teaching Scheme: | Examination Scheme: |
|---|---|
| Practical: 2 hr/week | Continuous Assessment 1 : 15 Marks<br>Continuous Assessment 2 : 15 Marks<br>End Semester Exam : 20 Marks |

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

| | |
|---|---|
| **CO1** | Estimate for various civil engineering related works |
| **CO2** | Estimate the valuation of residential & public properties |
| **CO3** | Examine the estimated components on the site |

Term work include detailed study and working of following set of assignments

**Experiments**

| |
|---|
| 1. Preparing detailed specifications for items of work from various civil engineering works. (such as Building, Roads, Irrigation works, Water supply and sanitation and sewer from buildings) |
| 2. Preparing rate analysis for items of work from various civil engineering works. (at least 05 items) |
| 3. Schedule of reinforcement for the following: Beams, Slab, Staircase, Column and Footing |
| 4. Preparing detailed estimate for G + 1 building with RCC framed structure |
| 5. Preparing detailed valuation report for residential/commercial/ industrial building using standard format |

**Projects**

| |
|---|
| 1. 1 Site Visit after every 3 week |

---

**Structural Design and Drawing – II Laboratory**

| CE706 | PCC | Structural Design and Drawing – II Laboratory | 0-0-2 | 1 Credit |
|---|---|---|---|---|

| Teaching Scheme: | Examination Scheme: |
|---|---|
| Practical: 2 hr/week | Continuous Assessment 1 : 15 Marks<br>Continuous Assessment 2 : 15 Marks<br>End Semester Exam : 20 Marks |

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

| | |
|---|---|
| CO1 | Analysis and design of RCC building. |
| CO2 | Analysis and design water tank/retaing wall/Foundation. |
| CO3 | To develop the detailed drawing for different RCC structures |

**Projects**

The lab work shall consist of detailed design &drawing of the following R. C. structures by Limit State method unless specified.

1. Residential G+1 storey building

**2. Any ONE from following**

a) Circular water tank resting on ground with rigid base. (by working stress method)

b) Retaining wall (cantilever or counter fort type)

c) Combined footing/ raft foundation/ pile foundation.

**Note:**

- Computer analysis of any one frame for project No.1 shall be performed for Dead Load, Live Load & Earthquake Loads using relevant application software.
- Drawings prepared shall indicate ductility details as per the provision in IS: 13920.

---

## Mega Project Phase -II

| PRJ06 | PROJ | Mega Project Phase -II | 0-0-8 | 4 Credits |
|---|---|---|---|---|

| Teaching Scheme: | Examination Scheme: |
|---|---|
| Practical: 8hrs/week | CA1 :25 Marks<br>CA2 :25 Marks<br>End Semester Exam: 50 Marks |

### Course Content

Since Mega Project Phase-II is in continuation to Mega Project Phase-I, the students are expected to complete the total project by the end of semester VII. After completion of project work, they are expected to submit the project report including the work done in Phase-I and Phase-II.

The report shall be comprehensive and presented typed on A4 size sheets and **hard bound.** The number of copies to be submitted is number of students plus two. The assessment would be carried out by the panel of examiners (Guide and Project Evaluation Members) for both, term work and oral examinations.

The project work should be published in any one of the national/international quality

conference or reputed journal.

Report shall summarize the literature survey; spell out the scope of work, methodology and results. Viva-voce Examination shall be based on work carried out by the student

---

**Seminar**

| PRJ07 | PROJ | Seminar | 0-0-2 | 1 Credit |
|---|---|---|---|---|

| Teaching Scheme: | Examination Scheme: |
|---|---|
| Practical: 2hr/week | End Semester Examination - 50 |

**Pre-Requisites:**

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

| | |
|---|---|
| **CO1** | Identify technical and practical issues related to the area of course specialization. |
| **CO2** | Plan a well-organized case studies report employing elements of technical writing and critical thinking. |
| **CO3** | Demonstrate the ability to describe, interpret and analyze technical issues and develop competence in presenting. |

**Course Contents**

The civil Engineering Cases group believes that through industrial case studies, students will improve their ability to learn and retain concepts in their courses, on work terms and in their professional lives. One of the best means to create case studies is by converting them from student-generated work reports. As a result, it is in our best interest to ensure that work reports submitted to our group contain an adequate design process and topics that align with topics that professors have suggested would benefit from case studies. We also believe that students will benefit by having suggestions for work term report topics.

The student has to select a Seminar topic/Case Studies work based on topic of interest. Periodically the implementation will be evaluated by the project guide. The work starts after sixth semester and evaluated in the seventh semester. The end of each semester student will be evaluated by departmental committee/faculty assigned by HOD.

Students are suggested to choose seminar/ case study areas in following areas

**1. Structural Engineering:**

1. Structural failures due to design errors, construction defects, or inadequate materials.
2. Aging infrastructure and the need for maintenance, repair, and rehabilitation of existing structures.
3. Seismic vulnerability in earthquake-prone regions.

**2. Geo technical Engineering:**

1. Soil instability and settlement leading to foundation failures.
2. Slope stability issues, which can result in landslides and soil erosion.
3. Soil liquefaction during earthquakes, which can cause significant damage to structures.

**3. Transportation Engineering:**

1. Traffic congestion and the need for efficient traffic management systems.
2. Aging transportation infrastructure, including roads, bridges, and public transit systems.

3. Integrating sustainable transportation solutions to reduce environmental impact.

**4. Water Resources Engineering:**

1. Water scarcity and the need for efficient water management and distribution systems.
2. Flood management and protection against water-related disasters.
3. Pollution and water quality issues, including water treatment and wastewater management.

**5. Environmental Engineering:**

1. Air pollution and the need for effective air quality control measures.
2. Solid waste management and recycling to reduce environmental impact.
3. Contamination of soil and groundwater, requiring remediation and cleanup strategies.

**6. Construction Engineering and Management:**

1. Project delays and cost overruns due to poor planning and execution.
2. Safety issues and accidents at construction sites.
3. Managing complex construction projects with multiple stakeholders and interests.

**7. Materials Engineering:**

1. Research and development of innovative materials for sustainable and resilient construction.
2. Ensuring the quality and durability of materials used in construction projects.
3. Recycling and reusing construction materials to reduce waste.

**Apart from this students can choose any topic which is relevant to industry.**

---

## Values and Ethics

| HMS09 | HSMC | Values and Ethics | 1-0-0 | Audit |
|---|---|---|---|---|

| Teaching Scheme: | Examination Scheme: |
|---|---|
| Lecture: -1 hrs./week | Continuous Assessment 1: 25 Marks<br>Continuous Assessment 2: 25 Marks |

**Pre-Requisites:**

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

| | |
|---|---|
| **CO1** | Understand the Ethics & Human interface |
| **CO2** | Understand Attitude, Morals, Aptitude, Integrity towards Society |
| **CO3** | Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc. |
| **CO4** | Understand the significance of value inputs in a classroom and start applying them in their life and profession |
| **CO5** | Understand Publication ethics |
| **CO6** | Understand Business ethics in professional careers |

### Course Contents

| | |
|---|---|
| **Unit 1 Ethics and Human Interface**<br>Ethics and Human Interface; Dimensions of ethics; ethics in private and public relationships Human Values – lessons from the lives and teachings of great leaders, reformers and administrators, Role of family, society in inculcating values, role of educational institutions in inculcating values | **[4]** |
| **Unit 2: Attitude, Morals, Aptitude, Integrity towards Society**<br>Attitude: content, structure, function, Attitude and its influence and relation with thought and behavior, Aptitude and foundational values towards society , integrity, impartiality and non-partisanship, objectivity, dedication towards society, empathy, tolerance and compassion intelligence-concepts, and their utilities and application | **[5]** |
| **Unit 3:Understanding Harmony in the Human Being - Harmony in Myself**<br>Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha, Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya, Understanding harmony in the Family- the basic unit of human interaction | **[5]** |
| **Unit 4: Value Education**<br>Understanding the need, basic guidelines, content and process for Value Education, Self Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self-exploration, Continuous Happiness and Prosperity- A | **[4]** |

| | |
|---|---|
| look at basic Human Aspirations, Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfill the above human aspirations: understanding and living in harmony at various levels | |
| **Unit 5: Publication Ethics**<br>Publication Ethics: Introduction, Scope & importance, Best practices/standards initiatives & Guidelines: COPE, WAME,etc., Conflict of Interest, Publication Misconduct: definition, concept, problems that lead to unethical behavior & Vice versa, Violation of Publication Ethics, Authorship &Contributor ship, Identification of Publication misconduct, complaints & appeals, Predatory publishers & Journals | **[5]** |
| **Unit 6: Business Ethics**<br>Ethics - Meaning, Importance, & Types of Ethics, Nature and Relevance to Business ethics, Values and Attitudes of Professional Engineers, Seven Principles of Public Life, Ethics in Business: Features, Principles, Need & Importance, Issues in Business ethics, Improving ethical behavior in Business. | **[4]** |

**Text Books:**

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
3. Neeraj Kumar, "Lexicon for Ethics, Integrity & Aptitude", Chronicle Publication, 2016.
4. Santosh Ajmera, Nand Kishor Reddi, "Ethics - Integrity and Aptitude", Tata Mc Graw Hill Publication, 2014.
5. M. Karthikeyan"Ethics, Integrity and Aptitude", Tata Mc Graw Hill Publication, 2015.

**Reference Books:**

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA.
2. A N Tripathy, 2003, Human Values, New Age International Publishers.
3. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists &Engineers, Oxford University Press.
4. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
5. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow Reprinted 2008.
6. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.

---

## Entrepreneurship Development

| OE XXX | OEC | Entrepreneurship Development | 3-0-0 | 3 Credits |
|---|---|---|---|---|

| Teaching Scheme: | Examination Scheme: |
|---|---|
| Lecture: 3 hrs./week | Continuous Assessment 1 : 10 Marks<br>Continuous Assessment 2 : 10 Marks<br>Mid Semester Exam : 30 Marks<br>End Semester Exam : 50 Marks |

**Pre-Requisites:**

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

| | |
|---|---|
| **CO1** | Understand the Concept Entrepreneurship. |
| **CO2** | Plan Entrepreneurial components. |
| **CO3** | Apply Marketing Strategies & Growth Strategies. |
| **CO4** | Apply for fund raising by preparing project report to grow their business. |

### Course Content

| | |
|---|---|
| **Unit 1: Introduction**<br>Definitions of Entrepreneurship, Characteristics of an Entrepreneur, Role of an Entrepreneur, Types of Entrepreneur, Qualities of an Entrepreneur.<br>Introduction to Micro, Small and Medium Enterprises. | **[06]** |
| **Unit 2: Opportunities & Planning**<br>A) Opportunities - Sensing Entrepreneurial Opportunities, Problem Identification, Selecting the Right Opportunity.<br>B) Planning - Concept, Components - Organizational plan, Operational plan, Production plan, Financial plan, Marketing plan, Human Resource plan. | **[08]** |
| **Unit 3: Enterprise Marketing &** Marketing and Sales Strategy, Branding, Logo, Tagline, Promotion Strategy. | **[04]** |
| **Unit 4: Growth Strategies**<br>Franchising - Concept, types, Pros & Cons.<br>Mergers and Acquisition - Concept, reasons and type | **[04]** |
| **Unit 5: Project Report**<br>Introduction, Scope, Project Identification, Steps in project identification, Decision – making process , Contents of a project report, Formulation of a Project Report. | **[06]** |
| **Unit 6: Institutional arrangement for Entrepreneurship Development**<br>Governmental Agencies at State Level, Governmental Agencies at National Level, Non-Government Organizations (NGOs), Commercial Banks. | **[08]** |

| | |
|---|---|
| Angel Investor – Features. Venture Capital - Features, funding. | |

**Text Books:**

1. Hisrich, R.D., Peters, M.P., & Shepherd, D.A. (2017) "Entrepreneurship: Starting, Developing, and Managing a New Enterprise," McGraw-Hill Education, New Delhi
2. Vasant Desai (2018) "Entrepreneurship Development," Himalaya Publishing House, Mumbai
3. Rajeev Roy (2016) "Entrepreneurship Development: Concepts, Cases, and Skills," Oxford University Press, New Delhi
4. Bhupesh Kumar Shah (2019) "Entrepreneurship Development," Pearson India Education Services, New Delhi
5. P.C. Shejwalkar (2014) "Entrepreneurship Development," Nirali Prakashan, Pune