PAAVAI ENGINEERING COLLEGE, NAMAKKAL – 637 018

M.E. - STRUCTURAL ENGINEERING

CURRICULUM

REGULATION 2015

SEMESTER III

Course Code	Course Title	L	T	P	C
PSEE5*	Elective - V	3	0	0	3
PSEE6*	Elective - VI	3	0	0	3
PSEE7*	Elective - VII	3	0	0	3
PSE15301	Project Work (Phase I)	0	0	12	6
PSE15302	Practical Training (4 weeks) *	0	0	0	1
PSE15303	Technical Seminar *	0	0	2	1

SEMESTER IV

Course Code	Course Title	L	T	P	C
PSE15401	Project work (Phase II)	0	0	24	12

LIST OF ELECTIVE FOR III SEMESTER

Course Code	Course Title	L	T	P	C
PSEE15301	Design of Prefabricated Structures	3	0	0	3
PSEE15302	Theory of Plates	3	0	0	3
PSEE15303	Design of Steel ConcreteComposite Structures	3	0	0	3
PSEE15304	Design of Industrial Structures	3	0	0	3
PSEE15305	Stability of Structures	3	0	0	3
PSEE15306	Cracks and Crack Control in Concrete Structures	3	0	0	3
PSEE15307	Design of Shell Structures	3	0	0	3
PSEE15308	Construction Safety andManagement	3	0	0	3
PSEE15309	Design of Power Plant Structures	3	0	0	3

PSE15301 PROJECT WORK (PHASE I) 0 0 12 6

COURSE OBJECTIVES

- To identify a specific problem for the current need of the society and collecting information related to the same through detailed review of literature.
- To develop the methodology to solve the identified problem.
- To train the students in preparing project reports and to face reviews and viva-voce examination.

SYLLABUS

The student individually works on a specific topic approved by faculty member who is familiar in this area of interest. The student can select any topic which is relevant to his/her specialization of the programme. The topic may be experimental or analytical or case studies. At the end of the semester, a detailed report on the work done should be submitted which contains clear definition of the identified problem, detailed literature review related to the area of work and methodology for carrying out the work. The students will be evaluated through a viva-voce examination by a panel of examiners including one external examiner.

TOTAL: 180 PERIODS

COURSE OUTCOME

At the end of the course the student will able to have a idea of his/her area of work and they are in a position to carry out the remaining phase ii work in a systematic way.

PSE15302 PRACTICAL TRAINING (4 Weeks) * 0 0 0 1

COURSE OBJECTIVES

- To train the students in the field work so as to have a firsthand knowledge of practical problems related to Structural Engineering in carrying out engineering tasks.
- To develop skills in facing and solving the field problems.

SYLLABUS

The students individually undertake training in reputed Structural Engineering Companies during the summer vacation for a specified period of four weeks. At the end of training, a detailed report on the work done should be submitted within ten days from the commencement of the semester. The students will be evaluated through a viva-voce examination by a team of internal staff.

COURSE OUTCOME

At the end of the course the student will able to tackle a practical field/industry orientated problem related to Structural Engineering.

PSE15303 TECHNICAL SEMINAR* 0 0 2 1

COURSE OBJECTIVES

- To work on a specific technical topic in Structural Engineering and acquire the skills in written and oral presentation.
- To acquire writing abilities for seminars and conferences.

SYLLABUS

The students will work for two hours per week guided by a group of staff members. They will be asked to give a presentation on any topic of their choice related to Structural Engineering and to engage in discussion with the audience. A brief copy of their presentation also should be submitted. Similarly, the students will have to present a seminar of not less than fifteen minutes and not more than thirty minutes on the technical topic. They will defend their presentation. Evaluation will be based on the technical presentation and the report and also on the interaction shown during the seminar.

TOTAL: 30 PERIODS

COURSE OUTCOME

At the end of the course the student will able to face the audience and tackle any problem during group discussion in interviews.

PSE15401 PROJECT WORK (PHASE II) 0 0 24 12

COURSE OBJECTIVE

- To solve the identified problem based on the formulated methodology.
- To analyze and discuss the test results, and make conclusions.

SYLLABUS

The student should continue the phase I work on the selected topic as per the formulated methodology. At the end of the semester, after completing the work to the satisfaction of the supervisor and review committee, a detailed report should be prepared and submitted to the head of the department. The students will be evaluated through based on the report and the viva-voce examination by a panel of examiners including one external examiner.

TOTAL: 360 PERIODS

COURSE OUTCOME

At the end of the course the student will able to take up any challenging practical problem and find better solutions.

LIST OF ELECTIVES

PSEE15301 DESIGN OF PREFABRICATED STRUCTURES 3 0 0 3

COURSE OBJECTIVES

- To understand the concepts of prefabrication, types and its systems.
- To gain knowledge in the structural behaviour of prefabricated structures.
- To acquire knowledge in design of cross section and the joints in structures.
- To design and detail of various prefabricated units.
- To design the structures subjected to earthquake.

UNIT I INTRODUCTION 9

Types of prefabrication, prefabrication systems and structural schemes- Need for prefabrication - Principles - Materials - Disuniting of structures- Handling and erection - Elimination of erection stresses

UNIT II PREFABRICATED COMPONENTS 9

Production, Transportation & erection- Shuttering and mould design - Dimensional tolerances - Erection of R.C. Structures, Total prefabricated buildings - Structural behaviour of precast structures - Large panel constructions - Construction of roof and floor slabs - Wall panels - Columns - Shear walls.

UNIT III DESIGN PRINCIPLES 9

Design of cross section based on efficiency of material used - Problems in design - joint flexibility - Allowance for joint deformation - Design of construction and expansion joints.

UNIT IV STRUCTURAL MEMBERS 9

Designing and detailing of prefabricated units - industrial structures - Multi-storey buildings - Water tanks - Dimensioning and detailing of joints for different structural connections.

UNIT V DESIGN FOR ABNORMAL LOADS 9

Progressive collapse - Codal provisions - Equivalent design loads for considering abnormal effects such as earthquakes, cyclones - Importance of avoidance of progressive collapse.

TOTAL :45 PERIODS

COURSE OUTCOMES

At the end of the course the student will be able to

- understand the basic concepts of prefabrication and their needs in construction industry.
- know the behaviour of prefabricated structures.
- design the cross section and joints of prefabricated units
- exhibit their knowledge in designing and detailing of prefabrication units.

- design the structures for abnormal loads using the codal provisions.

REFERENCES

1. Gerostiza C.Z., Hendrikson C. and Rehat D.R., "Knowledge based process planning for construction and manufacturing", Academic Press Inc., 1994.
2. "Structural design manual, Precast concrete connection details, Society for the studies in the use of precast concrete", Netherland BetorVerlag, 1978.
3. Hass, A.M. "Precast Concrete Design and Applications", Applied Science Publishers, 1983.
4. Promislow, V "Design and Erection of Reinforced Concrete Structures", MIR Publishers, Moscow 1980.
5. Koncz T., "Manual of precast concrete construction", Vols. I, II and III, Bauverlag,GMBH,1971.

CODE BOOKS

1. IS 15916:2011 - Building Design And Erection Using prefabricated Concrete.
2. IS 11447: 1985 - Code of practice for construction with large panel prefabricates.
3. IS 1893: 2002 (Part - I)- Criteria for Earthquake Resistant Design of Structures - General.
4. IS 13920: 1993 - Ductile detailing of Reinforced Concrete Structures.

PSEE15302 THEORY OF PLATES 3 0 0 3

COURSE OBJECTIVES

- To introduce various plate theories, governing equations for bending of plates and various boundary conditions.
- To conceptualise the Navier's solution and Levy's solution and to analyse rectangular plates.
- To study the behaviour of bending of circular plates.
- To familiarise with the concepts of finite difference method.
- To apply energy methods to analyse the solution of rectangular plates for the given boundary conditions.

UNIT I INTRODUCTION TO PLATE THEORY 9

Thin and thick plates - Small and large - Deflection theory of thin plate - assumptions - Moment curvature relations - stress resultants, governing - Differential equation for bending of plates - various boundary conditions.

UNIT II RECTANGULAR PLATES 9

Navier's Solution - Simply supported rectangular plates subjected to UDL and varying loads on entire area - Parabolic loads, sinusoidal loads - partly loaded plates - concentrated loads and couples - Distributed Couples - Symmetric and Antisymmetric Loadings.

Levy's Solution - Plates subjected to UDl and varying loads, sinusoidal parabolic loads between the supported edges - Conditions for other two edges - Simply supported, fixed, free and Elastically restrained.

UNIT III CIRCULAR PLATES 9

Bending of circular plates with clamped and simply supported edges - plate with central hole - uniformly distributed and varying loads - conical loads, Distributed couples - Ring loads - Semi circular plates - Asymmetrically loaded plates.

UNIT IV FINITE DIFFERENCE METHOD 9

Solution of plate problems - Deviation of Delta / Pattern / Stencil for biharmonic form for a rectangular mesh - Two stage solutions - Solutions for various loadings and boundary conditions - Use of Symmetry and Anti - symmetry - extrapolation formula - Introduction to improved finite difference technique.

UNIT V ENERGY METHODS 9

Use of potential energy principle - solution of rectangular plates with various boundary conditions and loadings.

TOTAL :45 PERIODS

COURSE OUTCOMES

At the end of the course the students will be able to

- explain about various plate theories
- gain knowledge of navier's solution, levy's solution and solve for the rectangular plates.
- analyse circular plates for any boundary conditions.
- apply finite difference method for solving plate problems.
- understand the potential energy principle and find the solution of rectangular plates for various loadings.

REFERENCES

1. Timoshenko S. and Krieger S.W. "Theory of Plates and Shells", McGraw Hill Book Company, New York, 2003.
2. Bairagi, "Plate Analysis", Khanna Publishers, 1996.
3. Reddy J N, "Theory and Analysis of Elastic Plates and Shells", McGraw Hill Book Company, 2006.
4. Szilard R., "Theory and Analysis of Plates", Prentice Hall Inc., 2004.
5. Chandrashekahara, K., "Theory of Plates", University Press (India) Ltd., Hyderabad, 2001.

PSEE15303 DESIGN OF STEEL CONCRETE COMPOSITE STRUCTURES 3 0 0 3

COURSE OBJECTIVES

- To introduce the composite construction and composite behaviour of steel concrete composite structures.
- To obtain knowledge in conceptualise and design the composite beams, columns, floors, slabs and concrete filled steel tubes.
- To know various connections and connection design of composite structures.
- To have a knowledge in the behaviour of composite box girder bridges.
- To possess practical knowledge on the skills of composite construction and seismic behaviour of composite structures through case studies.

UNIT I INTRODUCTION 9

Introduction to steel – Concrete composite construction – Behaviour of composite structures – Composite construction

UNIT II DESIGN OF COMPOSITE MEMBERS 9

Design of composite beams - slabs and composite floors - composite columns – Design of composite trusses

UNIT III DESIGN OF CONNECTIONS 9

Types of connections - Design of connections in the composite structures – Shear connections – Degree of shear connection – Partial shear interaction

UNIT IV COMPOSITE BOX GIRDER BRIDGES 9

Introduction – Behaviour of box girder bridges – Design concepts

UNIT V CASE STUDIES 9

Case Studies on steel – Concrete composite construction in buildings – Seismic behaviour of composite structures.

TOTAL :45 PERIODS

COURSE OUTCOMES

At the end of the course the students will be able to

- possess knowledge in the composite behaviour of structures.
- design various composite structural elements such as beams,columns, floors, slabs and concrete filled steel tubes.
- analyse the connection behaviour and design.
- enumerate the behaviour of box girder bridges and the design concepts of the same.

- gain practical knowledge of construction and design of various structural elements and design concepts through case studies.

REFERENCES

1. Johnson R.P., “Composite Structures of Steel and Concrete”, Blackwell Scientific Publications , UK 2008.
2. Oehers D.J. and Bradford M.A., “Composite Steel and Concrete Structural Members, Fundamental Behaviour”, Permagon Press, Oxford, 1999.
3. Proceedings of Workshop on “Steel Concrete Composite Structures”, Anna University, 2007.
4. INSDAG Materials , Volume I and II. 2000.

CODE BOOKS

1. BS 5950-1 : 2000 Structural use of steel work in building. Code of practice for design - Rolled and welded sections.
2. EN 1994 Euro code 4 : Design of composite steel and concrete structures, composite slabs.
3. IS11384 - 1985 code of practice for composite construction in structural steel and concrete.

PSEE15304 DESIGN OF INDUSTRIAL STRUCTURES 3 0 0 3

COURSE OBJECTIVES

- To impart broad knowledge in the area of Planning and functional requirements for industrial structures.
- To understand the basic idea about the materials and design of industry structural elements.
- To know the design concepts of power plant structures,
- To analyse the design concepts of power transmission structures,
- To understand the basic design concepts of chimneys, bunkers and silos and the construction techniques

UNIT I PLANNING AND FUNCTIONAL REQUIREMENTS 9

Classification of Industries and industrial structures - Planning for Layout requirements regarding lighting, ventilation and fire safety - Protection against noise and vibration - Guidelines of Factories Act.

UNIT II INDUSTRIAL BUILDINGS 9

Roofs for industrial buildings - Steel and RCC - Gantry girders - Design of corbels and nibs - Machine foundations.

UNIT III POWER PLANT STRUCTURES 9

Types of power plants - Design of turbo generator foundation - Containment structures.

UNIT IV POWER TRANSMISSION STRUCTURES 9

Principles of analysis and design of lattice towers - Transmission towers - Tower foundations - Testing Towers.

UNIT V AUXILIARY STRUCTURES 9

Design of steel and RCC Chimneys - Bunkers and silos.

TOTAL :45 PERIODS

COURSE OUTCOMES

At the end of the course, the students will be able to

- know the planning and functional requirements of various industries.
- get an idea about the materials used and design of industry structural elements.
- Gain knowledge in the basic concepts and design of power plant structures.
- design power transmission structures.
- possess the ability to understand the design concepts of chimneys, bunkers and silos

REFERENCES

1. Manohar S.N, “Tall Chimneys - Design and Construction”, Tata McGraw Hill, 1985.
2. Santhakumar A.R. and Murthy S.S., “Transmission Line Structures”, Tata McGrawHill, 1992.
3. Srinivasulu P and Vaidyanathan.C, “Handbook of Machine Foundations”, Tata McGraw Hill, 1976.
4. Jurgen Axel Adam, KatharriaHausmann, Frank Juttner, Klauss Daniel, “Industrial Buildings: A Design Manual”, Birkhauser Publishers, 2004.
5. Procs. of Advanced course on “Industrial Structures”, Structural Engineering Research Centre, Chennai, 1982.

CODE BOOKS

1. IS 4995 (Part I) -1974 - Criteria for design of reinforced concrete bins for the storage of granular and powder materials.
2. IS 4995 (Part II) -1974 - General Requirements and assessment of bin Loads.
3. IS 6060 -1971 - Code of practice for Day lighting of factory buildings.
4. IS 3103 -1975- Code of practice for industrial ventilation.
5. IS 3483 -1965 - Code of practice for Noise reduction in industrial buildings.
6. IS:456-2000 - Code of Practice for Plain and Reinforced Concrete.
7. IS 6533 (Part 2) -1989 - Code of practice for design and construction of steel chimneys.
8. IS:875 (Part 1 to 5) - Code of Practice for Design loads.
9. IS:802-1977(Part 2) - Code of practice for use of structural steel in Over Head transmission line towers.
10. IS:3370-1967 - Part 2 to 4 - Code of Practice for Concrete Structures for the storage of liquids - Reinforced Concrete Structures.
11. IS:4091-1979 - Code of Practice for Design and Construction of Foundations for Transmission Line Towers and Poles.
12. IS:9178-1980 - Criteria for Design of Steel Bins for Storage of Bulk Materials.

PSEE15305 STABILITY OF STRUCTURES 3 0 0 3

COURSE OBJECTIVES

The main objective of this course is

- To study the stability of columns using theoretical and numerical methods.
- To understand the approximate methods and numerical methods of inelastic buckling.
- To get accustomed to beam column behaviour and that of frames.
- To enumerate the lateral buckling, lateral torsional buckling and flexural torsional buckling of beams.
- To study various numerical techniques and energy methods for buckling of thin plates.

UNIT I STABILITY OF COLUMNS 9

Fundamental concepts - Elastic structural stability - Structural instability - Analytical methods for the stability analysis, equilibrium, imperfections and energy methods - Non-prismatic columns- Built up columns- Buckling modes Effect of shear on buckling load - Large deflection theory.

UNIT II METHODS OF ANALYSIS AND INELASTIC BUCKLING 9

Approximate methods - Rayleigh and Galerkin methods - Numerical methods - Finite difference and finite Element - Analysis of columns - Experimental study of column behaviour - South well plot - Column curves - Derivation of column design formula - Effective length of Columns - Inelastic behaviour- Tangent modulus and Double modulus theory

UNIT III BEAM COLUMNS AND FRAMES 9

Beam column behaviour- standard cases- Continuous columns and beam columns - Columns on elastic foundation - Buckling of frames - Single storey portal frames with and without side sway - Classical and stiffness methods - Use of Wood's charts.

UNIT IV BUCKLING OF BEAMS 9

Lateral buckling of beams - Energy method- Application to symmetric and single symmetric I beams - Simply supported and cantilever beams - Narrow rectangular cross sections- -Numerical solutions - Torsional buckling - Uniform and non-uniform torsion on open cross section - Flexural torsional buckling - Equilibrium and energy approach.

UNIT V BUCKLING OF THIN PLATES 9

Isotropic rectangular plates - Governing Differential equations - Simply supported on all edges - Use of energy methods -Numerical techniques.

TOTAL :45 PERIODS

COURSE OUTCOMES

At the end of the course, the students will be able to

- analyze both static and dynamic instabilities, by both theoretical and numerical methods.

- execute and work out the inelastic buckling using various methodologies.
- examine the behaviour of beam columns and frames with and without side sway using classical and stiffness methods.
- gain knowledge in the lateral buckling, torsional buckling, flexural torsional buckling of various beams and non-circular sections.
- evaluate buckling of thin plates using energy methods and various numerical techniques.

REFERENCES

1. Timoshenko, S., and Gere., "Theory of Elastic Stability", McGraw Hill Book Company, 2012.
2. Chajes, A. "Principles of Structural Stability Theory", Prentice Hall, 1974.
3. Ashwini Kumar, "Stability of Structures", Allied Publishers LTD, New Delhi, 2003.
4. Iyenger.N.G.R., "Structural Stability of Columns and Plates", Affiliated East West Press,1988.
5. Gambhir, "Stability Analysis and Design of Structures", springer, New York , 2004.
6. Horns M.R., and Merchang W, "The stability of frames", Porgamon press, 1965.
7. Gregory M, "Elastic Instability", Spon's Civil Engineering series,1967.
8. Bleich F, "Buckling strength of Metal Structures", McGraw Hill Book Co.,1952.
9. Galambos T.V, "Structural members and frames", Prentice Hall INC, 1968.

PSEE15306 CRACKS AND CRACK CONTROLIN CONCRETE STRUCTURES 3 0 0 3

COURSE OBJECTIVES

The main objective of this course is

- To equip the students with a knowledge of properties and microstructure of concrete.
- To impose a knowledge of various durability and corrosion behavior of concrete.
- To classify the different types of cracks due to any type of force including earthquake force and other factors.
- To understand the long term effects of cracking.
- To gain knowledge in crack detection and crack measuring techniques

UNIT I PROPERTIES OF CONCRETE 9

Historical note on Portland Cement Concrete - Basic properties of plain concrete - Microstructure - Shrinkage, creep and strength of concrete - Temperature effect on concrete- Transport properties of concrete - Tensile, shear, bend and torsional strength of plain and reinforced concrete.

UNIT II DURABILITY OF CONCRETE 9

Durability of concrete causes for inadequate durability of concrete chloride diffusion - Carbonation of concrete - Sulphate attack - Acid attack on concrete - Alkali - Silica reaction - Abrasion resistance - Fire resistance - Erosion resistance - Cavitations - Flame resistance - corrosion resistance - Chemical resistance of concrete and other durability tests methods on concrete.

UNIT III THEORY OF CONCRETE 9

Classifications of cracks in plain and reinforced concrete - Theories of cracking and fundamental mechanics of cracking - Shear cracking- Moment cracking - Torsional cracking - Settlement cracks - Cracks due to force transfer - Cracking due to earthquake forces and cracking due to other factors.

UNIT IV PROPERTIES OF CRACKS 9

Long term effects of cracking - Material and loading effects- Creep effect Bond - Slip theory - Straight line theory - Flexural stiffness - Effective moment of inertia - Computation of deflection due to short term and long term - Computation of crack width and crack spacings.

UNIT V CRACK DETECTION AND CONTROL 9

Crack detection - Crack measuring techniques - Control of cracking in plain and reinforced concrete beams and columns - Crack control by material selection - Crack reduction designs and construction practices - Advanced crack control and repair techniques.

TOTAL :45 PERIODS

COURSE OUTCOMES

At the end of the course the students will be able to

- gain knowledge in properties and microstructure of concrete.
- get exposed to durability of concrete and corrosion behavior.
- familiarize with advanced knowledge of causes and propagation of cracks.
- understand the long term effects of cracking
- detect various cracks and measuring techniques for the same.

REFERENCES

1. SandorPopovics, " Concrete Materials: Properties, Specifications, and Testing", Noyes Publications, 1992.
2. Prashanthkumar, "Elements of Fracture Mechanics", by Wheeler Publishing Company, New Delhi, 2009
3. Srinath L.S., "Advanced mechanics of Solids", TataMcgraw-hill Publishing Company Ltd, New Delhi, 2009.
4. Parton V.N, Movozov E.M., "Elastic-plastic Fracture Mechanics", Mir publishers Moscow, 1984.
5. Kong F.K. and Evans R.H, "Reinforced and Prestressed Concrete", 3rd Ed- ELBS- Van no strand Reinhold (International), 1998.

CODE BOOKS

1. IS 456 - 2000 Plain and Reinforced Concrete - Code of Practice.
2. SP:16 -1980 Design Aids for Reinforced Concrete to IS:456-1978.

PSEE15307 DESIGN OF SHELL STRUCTURES 3 0 0 3

COURSE OBJECTIVES

The main objective of this course is

- To classify and analyse the different type of shell structures.
- To design circular domes, conical roofs and circular cylindrical shells.
- To study the behaviour of pyramidal roof
- To be familiar with design philosophy of space frames.
- To study the finite element analysis shell structures.

UNIT I SHELL CLASSIFICATION AND ANALYSIS 9

Classification of shells – Structural action – Membrane theory – Analysis of spherical dome – Cylindrical Shells – Folded plates

UNIT II DESIGN OF SHELLSS 9

Design of circular domes – Conical roofs – Circular cylindrical shells.

UNIT III FLODED PLATES 9

Folded plate structures – Structural behavior – Types – Design – Pyramindal roof.

UNIT IV INTRODUCTION TO SPACE FRAME 9

Space frame – Configuration – Types of nodes – General principles of design Philosophy – Behaviour.

UNIT V FINITE ELEMENT ANALYSIS 9

Finite element application on cylindrical shells - Introduction to shell elements- Flat elements - Axisymmetric elements- Degenerated elements - General shell element.

TOTAL :45 PERIODS

COURSE OUTCOMES

At the end of the course, the students will be able to

- analyse and design various shell and spatial structures
- design all types of domes.
- understand the behaviour of folded plates.
- know the structural behaviour and philosophy of space frames.
- analyse finite element analysis of shell structures

REFERENCES

1. Billington.D.P, “Thin Shell Concrete Structures”, McGraw Hill Book Co., New York,2008.
2. Santhakumar.A.R and Senthil.R, “Proceedings of International Conference on Space Structures”, Anna University, Chennai, 1997.
3. Subramanian.N /’Principles of Space Structures”, Wheeler Publishing Co. 1999.
4. Ramasamy, G.S., “Design and Construction of Concrete Shells Roofs”, CBS Publishers, 1986.

PSEE15308 CONSTRUCTION SAFETY AND MANAGEMENT 3 0 0 3

COURSE OBJECTIVES

The main objective of this course is

- To gain knowledge in the cause of accident and construction industry related laws.
- To know in detail about the safety aspects in various construction methods.
- To gain knowledge about the preparation of accident report by analysing the key factors.
- To gain knowledge in construction management.
- To practice the safety implementation by case studies**.**

UNIT I INTRODUCTION 9

Importance - Causes of accident, safety measures- Environmental issues in construction- Construction industry related laws - Occupation Safety and Health Act (OSHA), National Safety Council (NSC) - British Safety Council (BSC) - Council of industrial safety (CIS) - Loss Prevention Association (India)-Construction safety- Elements of an effective safety programmes job-Site assessment

UNIT II PLANNING 9

Safety aspects of building and plant-layout-Introduction to treatment and disposal on Industrial wastes & effluents-Planning and safe operations- Planning and site operations- Safe systems of storing in construction materials-Excavation-Demolition work-Blasting-Timbering- Scaffolding- Hoisting apparatus and conveyors-Manual handling- Safe use of Ladder- Safety in hand tools-Safety in use of mobile cranes-Trusses, girders and beams.

UNIT III ACCIDENT CAUSATION, REPORTING AND INVESTIGATION 9

Accidents and Hazards control-Cost of accidents- Accident reports- Accident reporting, investigations and statistics-Identification of the key factors-Safety organization-Types-Functions-Safety committees.

UNIT IV SAFETY MANAGEMENT IN CONSTRUCTION 9

Safety policy-safety meeting-Planning for safety and productivity-safety management techniques-Safety sampling-Safety Audit-Job safety analysis-Incident recall techniques- Safety and Health provision in the factories act.

UNIT V CASE STUDIES 9

Involvement in safety-Role of Government and voluntary agencies- Safety officers-Fire hazards and preventing methods- case studies - fire accidents.

TOTAL :45 PERIODS

COURSE OUTCOMES

At the end of the course, the students will be able to

- understand the basic mandatory procedures to be followed in the construction industry.

- know the fundamental planning and safety practices commonly implemented on construction sites.
- know the key factor for causing accidents.
- understand the requirements for compliance and inspection imposed for the safety in construction site
- understand the importance of agencies involved in rescue operation by various case studies.

REFERENCES

1. Jimmie Hinze, "Construction safety", Prentice-Hall, 2013.
2. Herbert William Heinrich, "Industrial Accident Prevention", McGraw-Hill, 1959.
3. Richard J. Coble, Jimmie Hinze and Theo C. Haupt, "Construction Safety and Health Management", Prentice Hall Inc., 2001.

CODE BOOKS

1. IS 3696 : 1987 (Part I) 1991 (PART II) -code of safety for Scaffolds and ladder.
2. IS 3764 : 1992 - Code of Safety for Excavation work.
3. IS 4081 : 1986 - Code of Safety for blasting and related drilling operations.
4. IS 7293 : 1974 - Safety Code for Working with Construction Machinery.
5. IS 13416 : 1992 (Part I to V)- Preventive measures against Hazards at work places.
6. IS 15883 : 2009 (Part I) - Construction Project Management.
7. SP 70 : 2001, Hand Book of Construction Safety Practices, Bureau of Indian Standards, New Delhi.

PSEE15309 DESIGN OF POWER PLANT STRUCTURES 3 0 0 3

COURSE OBJECTIVES

- To acquire the knowledge in various planning and lay out of power plants.
- To analyse and design of steel and concrete chimneys.
- To design cooling towers.
- To design machine foundations and turbo generator foundations.
- To familiarise with different material handling system

UNIT I POWER PLANTS 9

Planning and Layout of different types of power plants.

UNIT II CHIMNEYS 9

Analysis and Design of Chimneys – IS codal provisions.

UNIT III COOLING TOWERS 9

Induced drayght and natural draught cooling towers.

UNIT IV FOUNDATION 9

Machine foundation and Turbo generator foundation. Silos and Bunkers

UNIT V MATERIAL HANDLING STRUCTURES 9

Silos and Bunkers

TOTAL :45 PERIODS

COURSE OUTCOMES

At the end of the course the students will be able to

- formulate the planning and layout of different power plants
- analyse and design chimneys as per codal provisions.
- be efficient in design of cooling towers.
- be familiar with all types of machine foundations.
- design all types of material handling systems.

REFERENCES

1. Krishna Raju N. "Advanced Reinforced Concrete Design", CBS Publishers and Distributors, 2nd Edition, 2008.
2. Srinivasulu, P and Vaidyanathan, G.V., "Handbook of Machine Foundations", Tata McGraw Hill, 2nd Edition, 1999.
3. Vijay K. Puri and ShamsherPrakash, "Foundations for Machines: Analysis and Design (Series in Geotechnical Engineering)", John Wiley & Sons, 2nd Edition, 2000.

4. Eldey Mc. K., Naxey Brooke K.K. “The Industrial Cooling Tower with special reference to design, construction, operation and maintenance of water cooling tower”, Elsevier Publishing company, 1st Ed., 1990.

CODE BOOKS

1. IS:9178-1980 - Criteria for Design of Steel Bins for Storage of Bulk Materials.
2. IS:2974 (Part I to V) - Code of practice for design and construction of machine foundations.
3. IS 4995 (Part II) -1974 - General Requirements and assessment of bin Loads.
4. IS 6060 -1971 - Code of practice for Day lighting of factory buildings.
5. IS:456-2000 - Code of Practice for Plain and Reinforced Concrete.
6. IS 6533 (Part 2) -1989 - Code of practice for design and construction of steel chimneys.
7. IS:875 (Part 1 to 5) - Code of Practice for Design loads.