## PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR
### SCHOOL OF TECHNOLOGY
### COURSE STRUCTURE FOR B TECH IN CIVIL ENGINEERING

<table>
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<tr>
<th>Sr No</th>
<th>Course code</th>
<th>Course name</th>
<th>Teaching Scheme</th>
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<td>Civil Engineering Project</td>
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<td>CE 412T</td>
<td>Professional Practice and Valuation</td>
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<td>CE 413T</td>
<td>Department Elective-III*</td>
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<td>Department Elective-IV*</td>
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<td>Management Concepts and Practices</td>
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MS- Mid semester; ES- End semester; IA-Internal assessment; LW-Laboratory work; LE-Laboratory exam

### CE 413T Department Elective-III*
1. Application of FEM in Civil Engineering
2. Urban and Rural Planning
3. Retrofitting and Rehabilitation of Structures
4. Advanced concrete design
5. Reinforced earth and geo-synthetics
6. Tall Buildings

### CE 414T Department Elective-IV*
1. Environmental impact assessment and management
2. Ground Improvement Techniques
3. Air Quality Monitoring
4. Land Management
5. Bridge Engineering
PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR

SCHOOL OF TECHNOLOGY

CE411P CIVIL ENGINEERING PROJECT

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The research topic on the basis of compatibility of department will be assigned to the students/Group. Also the supervisor will be allotted to the students/Group and periodically review will be made by the panel of examiner as per university guidelines.
UNIT I


UNIT II

Tenders: Prequalification-Bidding-Accepting-Evaluation of Tender from Technical, Contractual and commercial points of view-contract formation and interpretation-Potential contractual problems-World Bank Procedures and Guidelines

UNIT III

Arbitration: Comparison of Actions and Laws-Agreements ,subject matter-Violations-Appointment of Arbitrators-Conditions of Arbitrations-Powers and duties of Arbitrator-Rules of Evidence-Enforcement of Award-costs

UNIT IV

VALUATION- Definitions of various terms, method of valuation, Freehold & Leasehold properties, Sinking fund, depreciation and method of estimating depreciation, Outgoings.

APPROXIMATE TOTAL 39 Hours

References:

5. B. N. Dutta, Estimating & Costing, Chand Publisher
Unit I


One Dimensional Finite Elements: Stiffness Matrix for the basic Bar & Beam Element Representation of Distributed Loading, The Assembly Process within the PMPE Approach, Element Stresses

Unit II

Finite Elements for Two Dimensional Planar Bodies: Triangular Elements for Plane Stress or Strain Conditions, Higher Order Triangular Elements, Rectangular Elements for Plane Stress or Strain Conditions

Unit III

Isoparametric element: Quadrilateral element, Shape functions, Numerical Integration, Subparametric and super parametric elements, 3D problems, Tetrahedral elements, Jacobian matrix, Stiffness matrix

Unit IV

Dynamic considerations: Dynamic equations, Consistent mass matrix, Eigen Values, Eigen Vectors, natural frequencies, Mode shapes, Modal Analysis

Introduction to Non linearity: Non-linear problems, Geometric Non-linearity, Material Non-linearity, Non-linear dynamic problems, analytical problems

Approximate Total 39 Hours

References:

UNIT I
Town Planning; Evolution of towns, rural and urban pattern of growth, factors promoting growth and development of rural-urban areas, History and trends in town planning, origin and growth, Historical development of town planning in ancient valley civilizations; Objects and necessary of town planning; Surveys and analysis of a town

UNIT II
New Concepts in town planning: Garden city movement, Linear city and Satellite city concepts, Neighborhood Planning; Planning Principles

UNIT III
Master Plan; Concepts of urban planning in India, case studies new town Gandhinagar, Jaipur, Chandigarh, design and landscaping for urban and rural areas, rural planning, concept of regional plans, physical planning of villages, standards and infrastructure requirements and planning

UNIT IV
Laws and practices on 73rd and 74th constitutional amendment act

References:
1. GK Hiraskar, Town Planning in India, Dhanpat Rai and Sons New Delhi
2. N K Gandhi, Town Planning in India

Approximate Total 39 Hours
## CE 413T Department Elective-III (Advanced Concrete Design)*

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<tr>
<th>Unit</th>
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<tr>
<td><strong>UNIT II</strong></td>
<td>DESIGN OF SPECIAL RC ELEMENTS: Design of Slender Columns, Grid Floors, Curved Beams, Deep Beams, Plain &amp; Reinforced Concrete Walls, Corbels &amp; Edge (Spandrel) Beams.</td>
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<td><strong>UNIT III</strong></td>
<td>SLABS: Design of Circular &amp; Flat Slabs. Yield Line Analysis of Slabs.</td>
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<tr>
<td><strong>UNIT IV</strong></td>
<td>FOLDED PLATES: General Features, Structural Behavior, Analysis &amp; Design of Folded Plates.</td>
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### Teaching Scheme

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### Examination Scheme

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**Approximate Total 39 Hours**

### References:

1. N. Krishna Raju, Advanced Reinforced Concrete Design, CBS Publishers & Distributors
2. P.C. Varghese, Advanced Reinforced Concrete Design, Prentice Hall of India
## CE 413T Department Elective-III (Reinforced Earth and Geosynthetics)

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### UNIT I
Reinforced Earth: History, field of applications, natural fibers, overview of Geotextiles, Geomembranes, Geogrids, Geonets, Geowebs, Geomats and Geocomposites and economic aspects of their applications.

Production of Geotextiles, composites, physico-mechanical, hydraulic and chemical properties. Functions of Geosynthetics, fluid transmission, filtration, separation, protection.

### UNIT II
Soil Reinforcement: Basic principle of soil reinforcement, shear strength of reinforced soil, theoretical strength models, factors affecting, requirements on synthetic reinforcement, installation techniques.

### UNIT III
Calculation methods: Basic concepts, embankment on soft soils, internal stability, overall stability, foundation stability and bearing capacity failures - Construction of the steep slope, retaining walls-external stability, internal stability.

### UNIT IV
Use of Geosynthetics in Roads and Railways, drainage system - Control of groundwater level, dewatering and reclamation of land, use of Geomembranes - For lining application, management and maintenance.

**APPROXIMATE TOTAL 39 Hours**

### References:
UNIT I

UNIT II

UNIT III

UNIT IV

APPROXIMATE TOTAL 39 Hours

References:
UNIT I
Environmental Problems and Issues: Explosion of Environmental issues and scientific, technological and regulatory responses. Effects on ecology, environment, society, health and economy. Review of national and international developments on environmental issues; Review of Remedial Actions: Rural and urban approaches, energy approach, transportation approach, industrial approach, agricultural approach, Technological solutions and Role of technology; religious-philosophical approaches and concept of deep ecology, market based instruments including taxation for pollution control; Role of environmental ethics.

UNIT II

UNIT III
Sustainable development: Concept of limits to growth in terms of population, Food, Resources, Capital, Energy, Land Services, Use of Systems approach including feedback loops. Carrying capacity of systems, prerequisites for sustainable development, concepts of sustainable development in the various sectors of economy such as Industry, Agriculture and Infrastructure

UNIT IV
Impact Assessment: Collection of baseline data, concept and methodologies for initial environmental examination (IEE), Environmental Impact Assessment (EIA), Environmental Impact Statement (EIS), Environmental Audit (EA), Risk Assessment (RA)

APPROXIMATE TOTAL 39 Hours

References:
1. Ecology and Environment by P.D.Sharma
2. Environment Management in India by R.K.Sapru.
UNIT I
Role of ground improvement in foundation engineering - methods of ground improvement – Geotechnical problems in alluvial, laterite and black cotton soils -Selection of suitable ground Improvement techniques based on soil condition.

UNIT II
DRAINAGE AND DEWATERING
Drainage techniques - Well points - Vaccum and electroosmotic methods - Seepage analysis for two dimensional flow-fully and partially penetrating slots in homogenous deposits (Simple cases only).

UNIT III
Insitu densification of cohesionless and consolidation of cohesive soils -Dynamic compaction and consolidation - Vibrofloation - Sand pile compaction - Preloading with sand drains and fabric drains – Stone columns – Lime piles - Installation techniques only - relative merits of various methods and their limitations

UNIT IV
EARTH REINFORCEMENT
Concept of reinforcement - Types of reinforcement material - Applications of reinforced earth – use of Geotextiles for filtration, drainage and separation in road and other works.

Types of grouts - Grouting equipment and machinery - Injection methods - Grout monitoring – Stabilisation with cement, lime and chemicals - Stabilisation of expansive soils.

APPROXIMATE TOTAL 39 Hours

References:
UNIT I
Sources of Air pollution, effects of Air pollution on plants, animals, human health, classification of pollutants, properties of gaseous and particulate matter, Sampling and Analysis: Ambient air sampling, stack sampling, Air quality standard.

UNIT II
Atmospheric transport of pollutant: winds, wind profiles, inversions, plume behaviour, convective current, turbulence, Dispersion and diffusion of Air pollution, Prediction of effective stack height - physics of plume rise, Holland's equation, Briggs equation, etc. modifications of Gaussian dispersion models; indoor air quality models.

UNIT III
Air pollution control devices, Air sampling and analysis, theory and equipment ambient and Stack sampling, monitoring of quality emission standards and Indoor air pollution, Control of Particulate matter: Dusts, fumes, smoke, samples, settling chambers, cyclones, spray towers, electrostatic precipitators, etc. for control.

UNIT IV
Noise Pollution: Basics of acoustics and specification of sound; sound power, sound intensity and sound pressure levels; plane, point and line sources, multiple sources; outdoor and indoor noise propagation; psycho-acoustics and noise criteria, effects of noise on health, annoyance rating schemes; special noise environments: Infra-sound, ultrasound, impulsive sound and sonic boom; noise standards and limit values; noise instrumentation and monitoring procedure, Noise indice.

APPROXIMATE TOTAL 39 Hours

References:
**UNIT I**
Definition, Basic forms, Components of Bridge, Classification, Importance of Bridges, Need for Investigation, Selection of bridge site, Economical Span, Investigation report, Choice of Bridge type, Importance of proper investigation.

**UNIT II**
Introduction, Indian Roads Congress Bridge Code, Codal Provisions, Width of carriageway, Clearances, Different loads to be considered for analysis and design of bridges, IRC standard live loads.

**UNIT III**
Various types of R. C. C. bridges (brief description of each type), design of R.C.C. culvert and T-beam bridges, Hydraulic and Structural design of piers, abutments, wing walls and approaches.

**UNIT IV**
Brief description of bearings and joints, articulation and other details, Various types, necessary investigations and design criteria of well foundation.

**APPROXIMATE TOTAL 39 Hours**

**References:**
2. N. Krishna Raju Design of Bridges, Oxford & IBH, New Delhi
5. Vazirani and Ratwani, design of Concrete Bridge, Khanna publisher, 1986
7. IRC6-2000 Standard specifications and code of practice for road bridges
UNIT I
Historical Development and Introduction to Management: Historical development of management; Role and responsibilities of managers; How managers are different from operative employees; Type of managers; Management & administration; Organizations & need for management; Efficiency & effectiveness; Demings fourteen point theory.
Planning: Overview and need for planning; Importance of planning at organizations, Planning & performance; Management by objectives.

UNIT II
Decision making: Decision making process; Decision making conditions; Time and human relationships in decision making.
Organizing: Principles of organization; Organization charts; Classification of organizations. Case studies.

UNIT III
Directing: Managing creativity & innovation; Individual creativity; Organization creativity & innovation.
Leadership: Managers versus leaders; Defining leadership; Contingency approaches to leadership; Developing leadership skills; Case studies.
Globalization: Need for globalization; Internationalization and collaboration; Developing global managers

UNIT IV
Motivation: Need for motivation; Challenge of motivation; Current issues in motivation; Effects and impacts of motivation. Case studies.
Communication: Importance of effective communication; Modes of communication; Interpersonal and organizational communication; Vertical and lateral communication; Developing communication skills; Impact of soft skills. Case studies.

APPROXIMATE TOTAL 39 Hours

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SCHOOL OF TECHNOLOGY

CE 415T Project Management

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Unit I

Introduction: Parameters affecting a project; Project planning & implementation cycle; Definition, concept & scope of project management; Role of project manager; Enhancing the probability of success of a project; Phases of a project – Identification, feasibility, execution, completion & commissioning; Project life cycle.

Project Organization: Factors responsible for organizational revolution; Formal & informal organization structures; Requirements of a project organization; Matrix organization structure; Selecting a project organization structure; Criteria to help determine a suitable organizational form in a given project environment.

Unit II

Work Break Down Structure (WBS):
Role of project manager in developing WBS; Rules facilitating the preparation of WBS; Typical hierarchy in the WBS of a project; Desirable characteristics of work packages; Project oriented WBS; Functionally oriented WBS.

Project Scheduling & Planning: Scheduling principles; Bar charts (Gantt charts); Milestones charts; S-curve, Critical path method: Arrow diagram; Network logic diagram; Time estimates; Slack; Total, free & independent floats; Case studies. PERT (Project evaluation & review techniques): Three time estimates (optimistic, most likely, pessimistic); Beta distribution; Expected time; Variance in project duration.

Unit III

Project Control: Concept; Control cycle; Basic controlling parameters; Line of Balance; Role of project management on control cycle; Basic planning & developing a classification system for controlling. Time control: Measures to be taken by project manager for time control. Cost control: Strategic planning & cost programming; Potentiality of cost reduction during different phases of a project; Cost planning; Control curves; Cash flow; Time cost trade-off planning for minimum costs; Cost slope concept; Crash point; Normal point; Total project cost; Controlling cost overrun & time overrun. Quality control: Need of QA/QC programs; Objectives of QA/QC; Quality assurance techniques.
Unit IV

Project Monitoring:
Measurement of performance; Reporting of performance; Corrective measures for infavourable variations; Major functions of monitoring; Influence of decision making authority in project monitoring

APPROXIMATE TOTAL 39 Hours

References: