

**ACADEMIC REGULATIONS  
COURSE STRUCTURE AND SYLLABI**

**M.TECH.  
INFRASTRUCTURE ENGINEERING  
AND MANAGEMENT  
(Department of Civil Engineering)**

**2013 – 2014**



**COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

**GAYATRI VIDYA PARISHAD  
COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

Accredited by NAAC with A Grade with a CGPA of 3.47/4.00

Affiliated to JNTUK-Kakinada

MADHURAWADA, VISAKHAPATNAM – 530 048



## ***VISION***

*To evolve into and sustain as a Centre of  
Excellence in Technological Education  
and Research with a holistic approach.*

## **MISSION**

*To produce high quality engineering graduates with the requisite theoretical and practical knowledge and social awareness to be able to contribute effectively to the progress of the society through their chosen field of endeavor.*

*To undertake Research & Development, and extension activities in the fields of Science and Engineering in areas of relevance for immediate application as well as for strengthening or establishing fundamental knowledge.*

## **FOREWORD**

*Two batches of students have successfully completed the M.Tech. programme under autonomous status, which gave us a lot of satisfaction and encouragement. In the light of changing scenario of accreditation process globally, to upkeep the quality of education further, a major revision in the curriculum has been taken up with an objective to provide outcome based education.*

*As the college is getting funds under TEQIP-II, S.C.1.2 for up-scaling P.G education and research, two more P.G programmes in the thrust areas are being introduced from this academic year leading to a total of 13 programmes.*

*We could execute these changes through the contributions of our dedicated faculty, the commendable academicians from Institutions of repute, the enthusiastic representatives from Industry, affiliating University JNTU-K and UGC present in the Boards of Studies, Academic Council and Governing Body.*

*It is hoped that the new regulations and curriculum will enhance the all-round ability of students so that they can technically compete at global level with native ethical standards.*

**PRINCIPAL**

**MEMBERS ON THE BOARD OF STUDIES  
IN  
CIVIL ENGINEERING**

**Dr. K. Raja Gopal,**

Professor in Civil Engg., IIT Madras, Chennai – 600 036.

**Sri K. Ravi Kumar,**

Project Director, Sheladia Inc., Near TTD Kalyana Mandapam,  
M.V.P. Colony, Visakhapatnam – 530 017.

**Dr. B. Sivarama Sarma,**

Head (R&D), Research & Testing Centre, L & T Construction,  
B.O.Box No.979, Chennai – 600 089.

**Dr. D.S.R. Murthy,**

Professor, Department of Civil Engg., College of Engineering,  
Andhra University, Visakhapatnam – 530 003.

**Dr. P. Uday Bhaskar,**

Principal, JNTU College of Engineering, Vizianagaram.

**Prof. D. Nagesh Kumar,**

Professor, Water Resources & Environmental Engineering  
Department of Civil Engg., Indian Institute of Science,  
Bangalore – 560 012.

**Ms. Hasini Alahari,**

Flat # 401, Rajasam Apartments, TV Tower Road, ASR Nagar,  
Bhimavaram.

## M.TECH. ACADEMIC REGULATIONS

(Effective for the students admitted into first year from the Academic Year 2013 - 14)

The M.Tech. Degree of Jawaharlal Nehru Technological University Kakinada shall be recommended to be conferred on candidates who are admitted to the program and fulfill all the following requirements for the award of the Degree.

### 1.0 ELGIBILITY FOR ADMISSION:

Admission to the above program shall be made subject to the eligibility, qualifications and specialization as per the guidelines prescribed by the APSCHE and AICTE from time to time.

### 2.0 AWARD OF M.TECH. DEGREE:

- a. A student shall be declared eligible for the award of the M.Tech. degree, if he pursues a course of study and completes it successfully for not less than two academic years and not more than four academic years.
- b. A student, who fails to fulfill all the academic requirements for the award of the Degree within four academic years from the year of his admission, shall forfeit his seat in M.Tech. Course.
- c. The duration of each semester shall normally be 20 weeks with 5 days a week. A working day shall have 7 periods each of 50 minutes.

### 3.0 STRUCTURE OF THE PROGRAMME:

Semester	No. of Courses per Semester	Credits
	Theory + Lab	
I	(5 +1*) + 1	20
II	(5+1*) + 1	20
III	Seminar	02
III, IV	Project Work	40
<b>TOTAL</b>		<b>82</b>

\*Elective

#### **4.0 ATTENDANCE:**

The attendance shall be considered subject wise.

- a. A candidate shall be deemed to have eligibility to write his end semester examinations in a subject if he has put in at least 75% of attendance in that subject.
- b. Shortage of attendance up to 10% in any subject (i.e. 65% and above and below 75%) may be condoned by a Committee on genuine and valid reasons on representation by the candidate with supporting evidence.
- c. Shortage of attendance below 65% shall in no case be condoned.
- d. A student who gets less than 65% attendance in a maximum of two subjects in any semester shall not be permitted to take the end- semester examination in which he/she falls short. His/her registration for those subjects will be treated as cancelled. The student shall re-register and repeat those subjects as and when they are offered next.
- e. If a student gets less than 65% attendance in more than two subjects in any semester he/she shall be detained and has to repeat the entire semester.

#### **5.0 EVALUATION:**

The performance of the candidate in each semester shall be evaluated subject-wise with 100 marks for each theory subject and 100 marks for each practical, on the basis of Internal Evaluation and External End -Semester Examination. The question paper of the external end semester examination shall be set externally and valued both internally and externally. If the difference between the first and second valuations is less than or equal to 9 marks, the better of the two valuations shall be awarded. If the difference is more than 9 marks, the scripts are referred to third valuation and the corresponding marks are awarded.

- a. A candidate shall be deemed to have secured the minimum academic requirement in a subject if he secures a minimum of 40% of marks in the End Semester Examination and aggregate minimum of 50% of the total marks of the End Semester Examination and Internal Evaluation taken together.

- b. For the theory subjects, 60 marks shall be awarded based on the performance in the End Semester examination and 40 marks shall be awarded based on the Internal Evaluation. One part of the internal evaluation shall be made based on the average of the marks secured in the two internal examinations of 30 marks each conducted one in the middle of the Semester and the other immediately after the completion of instruction. Each mid-term examination shall be conducted for a duration of 120 minutes with 4 questions without any choice. The remaining 10 marks are awarded through an average of continuous evaluation of assignments / seminars / any other method, as notified by the teacher at the beginning of the semester.
- c. For practical subjects, 50 marks shall be awarded based on the performance in the End Semester Examinations, 50 marks shall be awarded based on the day-to-day performance as Internal marks. A candidate has to secure a minimum of 50% in the external examination and has to secure a minimum of 50% on the aggregate to be declared successful.
- d. There shall be a seminar presentation during III semester. For seminar, a student under the supervision of a faculty member(advisor), shall collect the literature on a topic and critically review the literature and submit it to the Department in a report form and shall make an oral presentation before the Departmental Committee. The Departmental Committee shall consist of the Head of the Department, advisor and two other senior faculty members of the department. For Seminar, there will be only internal evaluation of 50 marks. A candidate has to secure a minimum of 50% to be declared successful.
- e. In case the candidate does not secure the minimum academic requirement in any subject (as specified in 5.a to 5.c), he has to reappear for the End Examination in that subject. A candidate shall be given one chance to re-register for each subject provided the internal marks secured by a candidate in that subject is less than 50% and he has failed in the end examination. In such a case, the candidate must re-register for the subject (s). In the event of re-registration, the internal marks and end examination marks obtained in the previous attempt are nullified.

- f. In case the candidate secures less than the required attendance in any subject(s), he shall not be permitted to appear for the End Examination in those subject(s). He shall re-register for the subject(s) when they are next offered.
- g. Laboratory examination for M.Tech. subjects must be conducted with two Examiners, one of them being Laboratory Class Teacher and second examiner shall be other than the Laboratory Teacher.

#### **6.0 EVALUATION OF PROJECT / DISSERTATION WORK:**

Every candidate shall be required to submit the thesis or dissertation after taking up a topic approved by the Departmental Research Committee (DRC).

- a. A Departmental Research Committee (DRC) shall be constituted with the Head of the Department as the Chairman and two senior faculty as Members to oversee the proceedings of the project work from allotment of project topic to submission of the thesis.
- b. A Central Research Committee (CRC) shall be constituted with a Senior Professor as Chair Person, Heads of the Departments which are offering the M.Tech. programs and two other senior faculty members from the same department.
- c. Registration of Project Work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the subjects (theory and practical subjects.)
- d. After satisfying 6.0 c, a candidate has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work to the DRC for its approval. Only after obtaining the approval of DRC the student can initiate the Project work.
- e. If a candidate wishes to change his supervisor or topic of the project he can do so with the approval of the DRC. However, the Departmental Research Committee shall examine whether the change of topic/supervisor leads to a major change in his initial plans of project proposal. If so, his date of registration for the Project work shall start from the date of change of Supervisor or topic as the case may be whichever is earlier.

- f. A candidate shall submit and present the status report in two stages at least with a gap of 3 months between them after satisfying 6.0 d. The DRC has to approve the status report, for the candidate to proceed with the next stage of work.
- g. The work on the project shall be initiated in the beginning of the second year and the duration of the project is for two semesters. A candidate shall be permitted to submit his dissertation only after successful completion of all theory and practical subject with the approval of CRC but not earlier than 40 weeks from the date of registration of the project work. For the approval by CRC the candidate shall submit the draft copy of the thesis to the Principal through the concerned Head of the Department and shall make an oral presentation before the CRC.
- h. Three copies of the dissertation certified by the Supervisor shall be submitted to the College after approval by the CRC.
- i. For the purpose of adjudication of the dissertation, an external examiner shall be selected by the Principal from a panel of 5 examiners who are experienced in that field proposed by the Head of the Department in consultation with the supervisor.
- j. The viva-voce examination shall be conducted by a board consisting of the supervisor, Head of the Department and the external examiner. The board shall jointly report the candidate's work as:
  - A. Excellent
  - B. Good
  - C. Satisfactory
- k. If the adjudication report is not favorable, the candidate shall revise and resubmit the dissertation, in a time frame prescribed by the CRC. If the adjudication report is unfavorable again, the dissertation shall be summarily rejected and the candidate shall change the topic of the Project and go through the entire process afresh.

## **7.0 AWARD OF DEGREE AND CLASS :**

A candidate shall be eligible for the degree if he satisfies the minimum academic requirements in every subject and secures satisfactory or higher grade report on his dissertation and viva-voce.

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of M.Tech. Degree, he shall be placed in one of the following three classes.

<b>% of Marks secured</b>	<b>Class Awarded</b>
70% and above	First Class with Distinction
60% and above but less than 70%	First Class
50% and above but less than 60%	Second Class

The grade of the dissertation shall be mentioned in the marks memorandum.

### **8.0 WITHHOLDING OF RESULTS:**

If the candidate has not paid any dues to the college or if any case of indiscipline is pending against him, the result of the candidate shall be withheld and he will not be allowed into the next higher semester. The recommendation for the issue of the degree shall be liable to be withheld in all such cases.

### **9.0 TRANSITORY REGULATIONS:**

- a. A candidate who has discontinued or has been detained for want of attendance or who has failed after having studied the subject is eligible for admission to the same or equivalent subject(s) as and when subject(s) is/are offered, subject to 4.0 d, e and 2.0.
- b. Credit equivalences shall be drawn for the students re-admitted into 2013 regulations from the earlier regulations. A Student has to register for the substitute / compulsory / pre-requisite subjects identified by the respective Boards of Studies.
- c. The student has to register for substitute subjects, attend the classes and qualify in examination and earn the credits.
- d. The student has to register for compulsory subjects, attend the classes and qualify in examination.
- e. The student has to register for the pre-requisite courses, attend the classes for which the evaluation is totally internal.

## 10.0 GENERAL

1. The academic regulations should be read as a whole for purpose of any interpretation.
2. In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman, Academic Council is final.
3. The College may change or amend the academic regulations and syllabus at any time and the changes amendments made shall be applicable to all the students with effect from the date notified by the College.
4. Wherever the word he, him or his occur, it will also include she, hers.

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## COURSE STRUCTURE

### SEMESTER - I

<b>COURSE CODE</b>	<b>THEORY/LAB</b>	<b>L</b>	<b>P</b>	<b>C</b>
13CE2101	Infrastructure Planning and Finance Management	4	-	3
13CE2102	Contracts and Arbitration	4	-	3
13CE2103	Remote Sensing and GIS in Civil Engineering	4	-	3
13CE2104	Industrial Structures	4	-	3
13CE2105	Urban Hydrology, Storm Drainage and Management	4	-	3
	<b>Elective-I</b>	4	-	3
13CE2106	Management of Human Resources, Safety, and Quality in Construction			
13CE2107	Airport Planning			
13CE2108	Power Plant Design			
13CE2109	Geographic Information System Lab	-	3	2
	<b>Total</b>	<b>24</b>	<b>3</b>	<b>20</b>

### SEMESTER- II

<b>COURSE CODE</b>	<b>THEORY/LAB</b>	<b>L</b>	<b>P</b>	<b>C</b>
13CE2110	Construction Planning, Scheduling and Management	4	-	3
13CE2111	Construction Methods and Equipment	4	-	3
13CE2112	Environmental Impact Assessment and Management	4	-	3
13CE2113	Geotechniques for Infrastructure	4	-	3
13CE2114	Urban Transport Alternatives	4	-	3
	<b>Elective-II</b>	4	-	3
13CE2115	Ports & Harbour Structures			
13CE2116	Pavement Evaluation and Management			
13CE2117	Irrigation Water Distribution Systems			
13CE2118	Project Management Lab		3	2
	<b>Total</b>	<b>24</b>	<b>3</b>	<b>20</b>

**SEMESTER – III**

<b>Course Code</b>	<b>SEMINAR/ PROJECT WORK</b>	<b>CREDITS</b>
13CE2119	SEMINAR	2
13CE2120	PROJECT WORK (Contd..)	-

**SEMESTER – IV**

<b>Course code</b>	<b>PROJECT WORK</b>	<b>CREDITS</b>
13CE2120	PROJECT WORK	40

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**INFRASTRUCTURE PLANNING AND FINANCE  
MANAGEMENT****Course Code: 13CE2101****L P C  
4 0 3****Course Educational Objectives:**

To advocate and promote an effective, accountable, efficient, fair and inclusive system for the planning and authorization of infrastructure projects and to improve knowledge, skills, understanding and engagement and so provide learning and education opportunities on national infrastructure planning.

**Course Outcomes:**

To create more visibility for industry of the infrastructure investment pipeline and to work closely with industry to active more innovative and commercial solutions in infrastructure design and delivery.

**UNIT-I****Infrastructure**

Governing features, Historical Overview of Infrastructure Development in India; Infrastructure Organizations and Systems.

**UNIT-II****Infrastructure Planning and Control**

Infrastructure Project Budgeting, Funding and Sources of Funding; Regulatory Framework.

**UNIT-III****Introduction to Financial Accounting**

Accounting: Principles, concepts, conventions, double entry book keeping, Journal, Ledger & Trial Balance, Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments

**UNIT-IV****Fundamentals of Financial Management**

Nature and Scope of Financial Management; Financial Planning – Capitalization- Types of Capital.

**UNIT-V****Capital Budgeting & Working Capital Management**

Nature, Importance, Process and Methods of Capital Budgeting, Traditional (Accounting Rate of Return and Pay Back Period) and Discounted methods of Capital Budgeting (Net Present Value, Internal Rate of Return and Profitability Index) -Simple Numerical Problems

Meaning, Classification, Importance of Working Capital; Factors Determining Working Capital, Components of Working Capital; Management of Receivables, Cash and Inventory; Estimation of Working Capital Requirements (Simple Numerical Problems)

**TEXT BOOKS**

1. S P Jain & K L Narang, “*Cost and Management Accounting*” 3<sup>rd</sup> edition, Kalyani Publishers, 2004.
2. Shashi Gupta & RK Sharma, “*Management Accounting Principles and Practice*”, 1<sup>st</sup> edition, Kalyani Publishers, 2004.

**REFERENCES**

1. B Sengupta and H Guha, “*Construction Management and Planning*”, 1<sup>st</sup> edition, Tata Mc Graw Hill, 2009.
2. I M Pandey, “*Financial Management*”, 12<sup>th</sup> edition, Vikas Publishers, 2012.

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**CONTRACTS AND ARBITRATION****Course Code: 13CE2102****L P C**  
**4 0 3****Course Educational Objective:**

1. To impart the knowledge of construction specifications and contract laws.
2. To familiarize the student with arbitration and dispute resolution

**Course Outcome:**

Student will demonstrate the ability to understand the specifications of a given construction project.

1. To impart the knowledge of specifications in construction.
2. To impart the students, with the knowledge of contracts and its management.
3. To impart the students, with the knowledge of laws of contracts.
4. To impart the students, with the knowledge of laws related to construction industry.

**UNIT-I****CONSTRUCTION SPECIFICATIONS**

Standard specifications, development and interpretation.

**UNIT- II****CONTRACTS AND MANAGEMENT OF CONTRACTS**

Types of engineering contracts, procurement philosophy - Definition and essentials of a contract - Clauses for contracts – Types of engineering contracts and its formulation -Preparation of tender documents – Issues related to tendering process –Awarding contract.

**UNIT- III****CONTRACT LAWS**

Provisions of contract law, Indian Contract Act 1872 – Breach of contract. Contracts for projects under International AID. Performance of Contracts- Time of performance - Discharge of a contract – Classification of contracts – Extras and variations in engineering contracts.

**UNIT- IV****LAWS RELATED TO CONSTRUCTION INDUSTRY**

Labour and Industrial laws – Payment of Wages Act, Contract labour Workmen’s Compensation act – Insurance, Industrial dispute act.

**UNIT- V****ALTERNATIVE AND DISPUTE RESOLUTION**

**Arbitration of engineering contracts:** Indian Arbitration Act 1940 – Issues in arbitration process – Institutional arbitration

**Alternate dispute resolution and arbitration:** The arbitration and reconciliation ordinance 1996 – Law on contracts 1994

**TEXT BOOKS**

1. “*Codes of Practice and Standard Specifications*” of AP PWD, CP WD, MES etc.,
2. B.J. Vasavada, “*Engineering Contracts and Arbitration*”, 2<sup>nd</sup> Edition, Jubilee Publications, 1996.
3. G.T. Gajaria “*Laws relating to Building and Engineer’s Contracts*” 1<sup>st</sup> Edition, M.M. Tripathi Private Limited, Mumbai, 1985.

**REFERENCES**

1. Roshan Namavat “*Professional Practice*”, 5<sup>th</sup> Edition, Published by Anupbhai Publications, Mumbai, 1996.
2. M.O’c Horgon and F.R. Roulstion “*Project Control of Engineering contracts E and FN, SPON, NY*, 2<sup>nd</sup> Edition, 1988.
3. K. Collex, “*Managing Construction Contracts*”, 5th Edition, Reston Publishing Company, Virginia, 1982.
4. W.B. Park “*Construction Bidding for Projects*”, 1<sup>st</sup> Edition, John Wiley, Ny, 1978.
5. "Latest Amendments to latest versions of Building Bye-Laws and Engineering Contract Laws”.

**REMOTE SENSING AND GIS IN CIVIL ENGINEERING****Course Code: 13CE2103****L P C**  
**4 0 3****Course Educational Objectives:**

1. To impart the knowledge of Remote Sensing & GIS along with simple applications in Civil Engineering.
2. To familiarize the student with Satellites and Sensors.

**Course Outcomes:**

1. Student will demonstrate the ability to understand the latest developments in Remote Sensing Satellites and sensor characteristics.
2. Students will be able to know the interpretation of satellite images visually and with help of digital image processing techniques.
3. Students will be able to know GIS and its applications in different fields of Civil Engineering.

**UNIT-I****FUNDAMENTALS OF REMOTE SENSING**

**Aerial photography:** Types of aerial photographs scale of a vertical aerial photograph.

**Photogrammetry:** Stereoscopy, Parallax measurement.

**Remote Sensing:** Definition, Physics of Remote Sensing, Electromagnetic radiation and its interactions with Atmosphere, Spectral reflectance of Earth objects of Vegetation, Water and Soil.

**UNIT-II****DATA ACQUISITION**

**Platforms and Sensors :** Characteristics of LANDSAT, IRS, SPOT, QUICKBIRD, INSAT & NOAA. Optical, Thermal and Microwave Remote Sensing, Different types of data products.

**UNIT –III**

**DATA ANALYSIS:** Visual Interpretation keys, Digital Image Processing – Principles, Pre-classification processing, Classification techniques – Supervised and Unsupervised.

**UNIT –IV****GEOGRAPHICAL INFORMATION SYSTEM**

Introduction to GIS, Components of GIS, Data representation – Raster and Vector - Manual scanning and digitization, manipulation and data analysis – Integration of Remote sensing, GPS and GIS.

**UNIT–V****GEOGRAPHICAL INFORMATION SYSTEM APPLICATIONS**

Conservation and management of natural resources – Land use/land cover mapping –Wasteland management – site selection studies - Flood control – Urban and Coastal Zone Management. Air Pollution – EIA – Detection and identification of pollution sources of surface and ground water – water quality mapping and monitoring.

**TEXT BOOKS**

1. A.M. Chandra, S.K. Ghosh, “*Remote Sensing and Geographical Information System*”, 1<sup>st</sup> Edition, Narosa Publishing house, 2007.
2. M. Anji reddy, “*Remote Sensing and Geographical Information Systems*”, 3<sup>rd</sup> Edition, B.S. Publications, 2006.

**REFERENCES**

1. Bernhardsen, “*Geographic Information Systems, an Introduction*”, 3<sup>rd</sup> Edition, Published by John Wiley Sons, 2006.
2. Lillesand T.M. and Kiefer R.W. “*Remote Sensing and Image Interpretation*”, 5<sup>th</sup> Edition John Wiley and Sons, 2008.
3. Peter A Burrough, “*Principles of Geographical Information Systems*”, 1<sup>st</sup> Edition, Oxford publisher, 1998.

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**INDUSTRIAL STRUCTURES**Course Code: **13CE2104****L P C**  
**4 0 3****Course Educational Objectives: :**

1. To impart the knowledge on planning and functional requirement of industrial structures
2. To familiarize the student with prefabrication and construction techniques of industrial structures

**Course Outcomes:**

1. The students will demonstrate the ability to learn design and constructional aspects of industrial structures
2. To impart the students, with the knowledge of planning and functional requirements of industrial structures.
3. To impart the students, with the knowledge of loads on Industrial structures.
4. To impart the students, with the knowledge of tower cranes and transmission line and communication towers.

**UNIT –I****PLANNING AND FUNCTIONAL REQUIREMENTS:**

Classification of Industrial structures - Choice of site - General requirements of different types of industries for safety, space requirements, services and landplanning for layout requirements regarding lighting, ventilation and fire safety - Protection against noise and vibration - Guidelines from factories act - Codes of practice in the design and construction

**MATERIALS:** Properties of Concrete, Steel, R.C.C, Prestressed Concrete, Aluminum, PVC that affect the structural performance – relative merits and demerits – suitability as construction material in Industrial Structures.

**UNIT- II****LOADS ON INDUSTRIAL BUILDINGS, AND VARIOUS CONFIGURATIONS**

- Loads on Industrial structures – Gravity load, Live load, wind load and Earthquake load - Configuration of various Industrial buildings, Need for large column free areas - Various types of floors, roofs and roof coverings.

**UNIT-III**

**STEEL PORTAL FRAMES:** Introduction to plastic analysis - Shape factor – Plastic moment carrying capacity of simple beams and portal frames – Design of steel portal frames with and without gantry girders.

**UNIT-IV**

**STEEL TRUSS:** Tower cranes and transmission line and communication towers - Analysis and design of bracing systems in industrial sheds.

**UNIT-V**

**PREFABRICATION AND CONSTRUCTION TECHNIQUES:** Pre-casting techniques - Planning, analysis and design considerations suitability for Industrial structures - Handling techniques – Transportation, storage and erection of structures -Test on precast elements - Quality control - Repairs and economical aspects on prefabrication.

**TEXTBOOKS**

1. Duggal, S.K., “*Design of Steel Structures*”, 3<sup>rd</sup> Edition, Tata McGraw-Hill Publications, 2006.
2. Krishna Raju N. “*Advanced Reinforced Concrete Design*”, 2<sup>nd</sup> Edition, CBS Publishers, 2006

**REFERENCES**

1. “*Teaching Resource for Structural Steel Design*” – INSDAG, Kolkata, 2008
2. IS: 456 – 2000, IS: 800 – 2007, IS: 875 – 1964, BIS, New Delhi
3. “*Large Panel Prefabricated Constructions*”, Proc. of Advance Course by SERC, Madras, 2004.
4. “*National Building Code*”, BIS, New Delhi, 2005.
4. Subrahmanyam, N., “*Space Structures*”, 1st Edition, Wheeler & Co., Allahabad, 1999.

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**URBAN HYDROLOGY, STORM DRAINAGE AND  
MANAGEMENT****Course Code: 13CE2105****L P C  
4 0 3****Course Educational Objectives: :**

1. To impart the knowledge on urbanization and urban water systems.
2. To familiarize the student with storm water modeling and management.
3. To introduce the concept of urban drainage systems and its maintenance.

**Course Outcomes:**

1. The students will be able to design of urban water sub systems and sewer systems.
2. Student would be able to model storm water systems and urban drainage systems.
3. Students will be having the knowledge of urban hydrologic process.

**UNIT-I****INTRODUCTION – HISTORICAL DEVELOPMENT**

Sources of water, Water supply and disposal systems. Urban water supply demand forecast, factors affecting rate of demand water quantity requirements, water pressure requirements, hydraulics of distribution system.

**UNIT-II****URBAN HYDROLOGICAL CYCLE**

Effects of urbanization on catchment hydrology, planning objectives, interaction of urban and surrounding areas, approaches to urban drainage, separate, separate and combined systems, data requirements, master drainage plans.

**UNIT- III****ESTIMATION OF URBAN WASTE WATER QUANTITY AND QUALITY**

Estimation of urban storm water quantity catchment characteristics, process parameters, hydrological losses in developing, watersheds, design period, calculation of runoff and peak flow. Rational method, NRCS curve number method, hydrologic and hydrodynamic methods. Trends of urbanization and industrialization – domestic waste water and industrial wastewater, various types of urban-runoff, storm runoff and wastewater collection systems – types of sewer systems – sewer network analysis – quality aspects – receiving water quality standards.

**UNIT-IV****STORM WATER STORAGE FACILITIES**

Planning for local disposal by infiltration and percolation, roof top storage, detention ponds, storage in sewer networks, storage at sewer treatment plants. Estimating the storage volumes – sizing of infiltration and percolation basins, detention facilities, design of storm sewer network systems – Linear Reservoir Model (Viessman) – Chere and Shubinski model – QUURM model – TVA model.

**UNIT-V****STORM WATER MANAGEMENT**

Storm water quality enhancement – Storm water pollutants, suspended solids in storm water, sedimentation principles, sizing of basins using surface load theory. Use of models – SWMM, SMADA, Operation and maintenance of urban drainage system, interaction between urban drainage and solid waste management.

**TEXT BOOKS**

1. Hal M J , “*Urban Hydrology*”, 2<sup>nd</sup> Edition, Wilevser Applied Science Publishers, 1984.
2. Viessman W.I., Knapp J.W., Lewis G.L. and Heutrough, T.E., “*Introduction to Hydrology*”, , 2<sup>nd</sup> edition, Harper and Row Publishers, 1977.
3. Stephenon D. “*Stormwater Hydrology and Drainage*” 2<sup>nd</sup> edition, Elwiver publishers, 1981.

**REFERENCES**

1. Genger, W.F., Marsaiek, J. Zudima and Rawis, G. J, (1987) “*Manual on Drainage in Urban Areas*” 2 volumes, UNESCO, Press.
2. Stalne P Urbonas B, “*Storm Water Detention for Drainage, Water Quality and CSO Management*, Prentice Hall, New Jersey, 1994.
3. Chertus D.E., and Madana M.E., “*Storm Water Modelling Academic Press*, 2<sup>nd</sup> edition, NY, 1976.
4. Wanielista, M.P., and Yousef, Y.A., “*Storm water Management*”, 2<sup>nd</sup> Edition, John Willy Sons, Inc. New York, 1993.
5. Adams, B.J. and Papa F “*Urban Storm water Management Planning*” 2000.
6. Overterns D.E., and Meadows M.E., “*Urban Hydrology*”, Acadmic Press, NY 1976.
7. Timothy R.Lopez, “*Urban Hydrology*”, Ann Arbor Publisheres Co. M.I., 1979.

**MANAGEMENT OF HUMAN RESOURCES, SAFETY,  
AND QUALITY IN CONSTRUCTION  
(ELECTIVE – I)**

**Course Code: 13CE2106**

**L P C  
4 0 3**

**Course Educational Objectives:**

To understand and apply the policies and practices and to gain knowledge, skills, abilities, attitudes in the areas of human resource, safety and quality in construction.

**Course Outcomes:**

To regularly promote the significance of ownership, a sense of belonging, and meaningful involvement of the site workforce in safety procedures and the advantages of sharing information.

**UNIT-I**

**INTRODUCTION TO HUMAN RESOURCES MANAGEMENT**

Introduction – Concept– Growth – Role and functions of HRM– Manpower Planning for Construction Companies – Line & Staff functions - Attendance, Wage and salary administration – Discipline– Separation.

**UNIT-II**

**LABOUR LEGISLATION**

Labour laws - Interstate migration- Industrial relations –Collective Bargaining – Worker’s participation in management-Grievance handling- disciplinary procedure - women in construction industry

**UNIT-III**

**LABOR LAWS**

Labor Act-2003, Social security measures in labor laws. Introduction in social security laws; Payment of gratuity act – 1972, Employees fund & Miscellaneous Provisions Act- 1952, Employees State Insurance Act- 1948, workmen’s Compensation Act- 1923  
Labor welfare: Meaning- Statutory and Non Statutory Act

**UNIT-IV**

**SAFETY MANAGEMENT**

Importance of safety – causes of accidents – responsibility for safety – Role of various parties in safety management – safety benefits – approaches to improve safety in Construction for different works – Measuring safety

**UNIT-V****QUALITY MANAGEMENT**

Importance of quality , Elements of Quality-quality characteristics – design quality- quality conformance, contractor quality control- important specifications- incentives and penalties in specifications- workmanship as a mark of quality – final inspection – quality assurance techniques - inspection, testing, sampling.

**TEXTBOOKS**

1. Mallik P L, Sumeet Mallik, “*Industrial Law*”, 24<sup>th</sup> Edition, Eastern Book Company, 2013.
2. Prasad R.M., “*Human Resource Management*”, 2<sup>nd</sup> Edition, S.Chand Publishers, 2005

**REFERENCES**

1. Dwivedi R S, “*Human Relations and Organizational Behavior*”, 5<sup>th</sup> Edition, Mc Millan, 2011.
2. Mamoria C.B & Gankar S.V., “*Pesrsonal Management*”, 29<sup>th</sup> Edition, Himalaya Publishing House, 2009.

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**AIRPORT PLANNING****(Elective-I)****Course Code:** 13CE2107**L P C****4 0 3****Course Educational Objectives:**

1. To impart the knowledge on characteristics on aircraft and air-traffic control.
2. To familiarize the student with the knowledge of geometric design of runways, taxiways, apron and terminal services.

**Course Outcomes:**

1. The students will demonstrate the ability to learn planning of air-traffic control and geometric design of runways.
2. To impart the students, with the knowledge of terms and components of airports.
3. To impart the students, with the knowledge of Planning of Airport, Runways, Terminal service facilities, Operations and scheduling.

**UNIT-I**

**AIR TRANSPORTATION:** Airport terminology, component parts of Aeroplane, Classification and size of airports; Aircraft characteristics.

Air traffic control need for ATC, Air traffic control network, Air traffic control aids –enroute aids, landing aids.

Airport site location and necessary surveys for site section, airport obstructions.

**UNIT-II**

**PLANNING:** Airport master plan – FAA recommendations, Regional Planning, ICAO recommendations, Estimation of future air port traffic needs- layout of Air Port.

**UNIT-III**

**RUNWAYS:** Runway orientation, basic runway length, corrections for elevation, temperature and gradient, runway geometric design.

**UNIT-IV**

**TAXIWAYS AND APRONS:** Loading aprons – holding aprons – Geometric design standards, exit taxiways – optional location, design, and fillet and separation clearance.

**UNIT-V**

**TERMINAL SERVICE FACILITIES:** Passenger, baggage and cargo handling systems; Lighting, visual airport marking, air port lighting aids, airport drainage.

**OPERATIONS AND SCHEDULING:** Ground transportation facilities; Airport capacity, runway capacity and delays.

**TEXT BOOKS**

1. Khanna S.K., Arora M.G., Jain S.S., “*Airport Planning & Design*”, 1<sup>st</sup> Edition, Nemchand Bros. Roorkee, 2009.
2. Robert Horonjeff, Francis McKelvey, William Sproule and Seth Young, “*Planning and Design of Airports*” 5<sup>th</sup> Edition, 2010.

**REFERENCES**

1. Heronjeff, R, Mc Kelvey, F.X, “*Planning & Design of Airports*”, 2<sup>nd</sup> Edition, Mc Graw Hill Book Co, 1994.
2. Norman J. Ashford, Saleh Mumayiz and Paul H. Wright, “*Planning, Design and Development of 21<sup>st</sup> Century Airports*”, 4<sup>th</sup> Edition, John Wiley & Sons, 2011.
3. Subramian K.P., “*Highway, Railway, Airport and Harbour Engineering*”, 1<sup>st</sup> Edition, Scitech Publications Private Limited, 2013.
4. Alexander T.Wells, Ed.D & Seth, B. Young, “*Airport Planning and Management*’, 5<sup>th</sup> Edition, 2008.

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**POWER PLANT DESIGN**  
**(Elective – I)**Course Code: **13CE2108****L P C**  
**4 0 3****Course Educational Objectives:**

1. To impart the knowledge on power plants, chimneys and cooling towers
2. To familiarize the student with the design of ware house structures

**Course Outcomes:**

1. The students will be able to analyze and design power plants, chimneys, cooling towers and ware house structures.
2. To impart the students, with the knowledge of intake towers.
3. To impart the students, with the knowledge of analysis of warehouse structures.

**UNIT –I****POWER PLANTS:** Planning and layout of different types of Power plants.**CHIMNEYS:** Analysis and Design of Chimneys. IS codal provisions.**UNIT –II****COOLING TOWERS:** Induced draught and natural draught cooling towers.**UNIT –III****FOUNDATION:** Machine foundations & Turbo generator foundations.**UNIT –IV****INTAKE TOWERS:** Dams, wells and Intake galleries**UNIT –V****STORAGE STRUCTURES:** Analysis and design of ware house structures.

**TEXT BOOKS**

1. Vijay K. Puri and Shamsheer Prakash, “*Foundations for Machines - Analysis and Design (Series in Geotechnical Engineering)*”, 2<sup>nd</sup> Edition, John Wiley & Sons, 2000.
2. Krishna Raju N. “*Advanced Reinforced Concrete Design*”, 2<sup>nd</sup> Edition, CBS Publishers and Distributors, 2006

**REFERENCES**

1. Eldey Mc. K., Naxey Brooke K.K. “*The Industrial Cooling Tower with special reference to design, construction, operation and maintenance of water cooling tower*”, 1<sup>st</sup> Edition, Elsevier Publishing company, 1990.
2. Smith, Bryan Stafford & Alex C., “*Tall Building Structures & Analysis Design*”, 1<sup>st</sup> Edition, John Wiley, 2011.
3. Srinivasulu, P and Vaidyanathan, G.V., “*Handbook of Machine Foundations*”, 2<sup>nd</sup> Edition, Tata McGraw Hill, 1999.

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**GEOGRAPHIC INFORMATION SYSTEMS LAB****Course Code: 13CE2109****L P C**  
**0 3 2****Course Educational Objectives:**

1. To familiarize student with remote sensing and GIS software.
2. Use of GIS software's for infrastructure planning and management.

**Course Outcome:**

The student will demonstrate the ability to prepare various thematic maps and its applications in various fields like water resources and transportation Engineering.

**LIST OF EXERCISES**

1. Opening and Importing of an Image.
2. Rectification of Images.
3. Subset by Inquire Box method.
4. Subset by AOI method.
5. Mosaic of Images.
6. Digitization
7. Attribute data entry and manipulation
8. Supervised Classification
9. Unsupervised classification.
10. Developing Digital Elevation model, Draping of an image.
11. Data analysis – Reclassification, Overlay and Buffer.
12. Map generation with Patterns and Legends.

**GIS SOFTWARE :**

Arc GIS / ERDAS / Mapinfo / ILWIS

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**CONSTRUCTION PLANNING, SCHEDULING AND  
MANAGEMENT****Course Code: 13CE2110****L P C  
4 0 3****Course Educational Objectives:**

1. To impart knowledge about construction process and management.
2. To familiarize students with the knowledge of planning, scheduling and resource management for civil engineering projects

**Course Outcomes:**

1. Students should be capable of preparing CPM and PERT network for construction projects.
2. Student will demonstrate basic knowledge about resolving construction disputes and their settlement.
3. To impart the students, with the knowledge of planning and scheduling for civil engineering projects.

**UNIT-I**

**CONTRACT MANAGEMENT** : Introduction and types of contract – Contract documents – possible contractual obligations – meaning of specification – tender notice – types – tender documents – earnest money deposit (EMD) and security deposits (SD) – scrutiny and acceptance of a tender – contract agreement – contractual changes and termination of contract – subcontract – rights and duties of sub contractor.

**UNIT-II**

**PLANNING AND SCHEDULING FOR CIVIL ENGINEERING PROJECT:** Objectives of planning – its advantage to client and engineer – limitations –stages of planning by owner & contractor. Scheduling – definition – its preparation – uses and advantages – classification – methods of scheduling – bar chart – job layout – Gantt chart – work breakdown chart (WBC)

**RESOURCE MANAGEMENT** : Definition – need for resource management – optimum utilization of resources- finance, materials, machinery, human resources – resources planning – resource leveling and its objectives” – Time – cost trade off – crashing – need for crashing an activity – methods & tips for crashing – time vs. cost optimization curve – cost slope – its significance in crashing.

**UNIT-III**

**PROJECT MANAGEMENT THROUGH NETWORKS:** Activity – Event – Dummies – basic assumptions in creating a network – rules for drawing networks – Fulkerson’s rule for numbering the events, PERT – time estimates – earliest expected time – latest allowable occurrence time – slack. Standard deviation, variance.

**QUALITY MANAGEMENT AND SAFETY:** Importance of quality – elements of quality – quality assurance techniques (inspection, testing, and sampling) importance of safety – causes of accidents – role of various parties (designer / employer / worker) in safety management – benefits – approaches to move safety in construction.

**UNIT-IV**

**PRECEDENCE NETWORKS:** Creating network logic, Relationship Types – Finish to Start, Start to Start, Finish to Finish, Start to Finish, critical path method – ES, EF, LS, LF, Floats – significance of critical path.

**UNIT-V**

**CONSTRUCTION DISPUTES AND THEIR SETTLEMENT:** Introduction – development in disputes – categories of disputes – modes of settlements – Arbitration

**CONSTRUCTION LABOUR AND LEGISLATION:** Need for legislation – Payment of wages Act – Factories Act – Contract labour (Regulation and abolition Act – Employees Provident Fund (EPF) Act.

**TEXTBOOKS**

1. Sengupta.B, & H.Guha., “*Construction Management and Planning*”, 1<sup>st</sup> edition, Tata Mc. Graw Hill Publishing Company Ltd., New Delhi, 2004.
2. Seetharaman. S, “*Construction Engineering & Management*”, 2<sup>nd</sup> Edition, Umesh Publications, Nai Sarak, New Delhi, 2006.

**REFERENCES**

1. Rangwala.S.C., “*Construction of Structures and Management of Works*”, 3rd edition Charotar Publishing House, , 2000.
2. Mincks and Johnston, “*Construction Jobsite Management*”, 4<sup>th</sup> edition, Narosa Publications, Delmar, 1998.

**CONSTRUCTION METHODS AND EQUIPMENT****Course Code: 13CE2111****L P C**  
**4 0 3****Course Educational Objectives:**

1. To impart the knowledge on special earth work excavation techniques and methods of concreting in superstructure.
2. To familiarize the student with the knowledge of erection of construction units and management of construction equipment.

**Course Outcomes:**

1. The students will demonstrate the ability to identify and plan construction equipments for various construction units.
2. To impart the students, with the knowledge of substructures and super structure.
3. To impart the students, with the knowledge of construction equipment and machinery

**UNIT- I**

**SUBSTRUCTURE:** Digging and excavation of trenches – Grading – Special earth work excavation – Drilling and blasting techniques. Pile driving techniques – sinking wells.

**SUPERSTRUCTURE:** Concrete and reinforced concrete works – forms work – reinforcement – concreting – mechanized methods of erection of Buildings and installations. Cast-in-situ and pre-cast concrete. Concreting below G.L. – wall in situ method for cast in situ and precast concrete – under water concreting design of forms.

**UNIT- II**

**ERECTION OF CONSTRUCTION UNITS:** different types – scaffolding. Erection of steel structures – Tunneling techniques. Pre cast and prefabricated construction – need and advantages. Modular co-ordination – I.S. recommendations for modular planning, standardization, mass production and methods of transportation.

**UNIT- III**

**CONSTRUCTION EQUIPMENT AND MACHINERY:** Earthmoving Equipment Power shovels, Back hoe, Dragline, Clam shell; tunneling machine – types.

**EXCAVATING EQUIPMENT:** Scraper, Bulldozer.

**COMPACTING EQUIPMENT:** Smooth wheel roller sheep-foot roller – Pneumatic typed rollers.

**UNIT- IV**

**CONSTRUCTION EQUIPMENT:** Hoisting equipment – such as hoist winch, hoisting chains, and hooks and slings, various types of cranes –tower crane, mobile crane and derrick crane. Their characteristics, performance and safety in operation.

**HAULING EQUIPMENT:** Dump trucks and dumpers.

**CONVEYING EQUIPMENT:** Belt Conveyors, Screw conveyor, Bucket conveyor.

**AGREEMENT AND CONCRETE PRODUCTION EQUIPMENT** Concrete mixers, truck mixers, pneumatic concrete placer, concrete vibrators. Pile Driving Equipment - Tunneling and rock drilling equipment – Pumps and dewatering equipment.

**UNIT- V**

**TIME AND MOTION STUDIES:** process charts – application of queuing or wait line models management of construction equipment

**MANAGEMENT OF CONSTRUCTION EQUIPMENT:** Need for mechanization of construction – planning and financing construction plant and equipment – Owning and operating equipment versus hiring – planning for infrastructure mechanization equipment management – equipment maintenance and repair.

**TEXT BOOKS**

1. S.Seetharaman, “*Construction Engineering and Management*”, 4<sup>th</sup> Edition , Umesh publications, New Delhi, 1999.
2. Mahesh varma, , “*Construction Equipment and its Planning and Applications*”, 5th edition, Metroplolitan Book Co. Publishers,, 2005.

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**REFERENCES:**

1. Sengupta and Guha, “*Construction Management and Planning*”, 2nd edition, TMH, 2002.
2. Rangwala, S.C., “*Construction of Structures and Management of Works*”, 5th edition, Charotar publishers, 2005
3. Srivatsava, U.K., “*Construction Planning and Management*”, 1st edition, Galgotia Publications Pvt. Ltd., New Delhi, India, 1999.
4. “*Construction Machinery and Equipment in India*”. (A compilation of articles Published in Civil Engineering and Construction Review) Published by Civil Engineering and Construction Review, New Delhi, 1991.
5. Jay P.K. “*Hand Book of Construction Management*” 1st edition, – Mamillan India Ltd., New Delhi, 1990.
6. National Building Code, ISI, New Delhi, 2005.
7. Ghalot P.S. and Dhir B.M., “*Construction Management*”, 2<sup>nd</sup> edition, Wiley-Eastern, 1999.
8. Peurifoy, R.L., “*Construction Planning, Equipment and Methods*”, 2nd edition, 1996.

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**ENVIRONMENTAL IMPACT ASSESSMENT AND  
MANAGEMENT****Course Code: 13CE2112****L P C  
4 0 3****Course Educational Objectives:**

1. To familiarize student with the knowledge of preparing E.I.A for various projects.
2. To impart awareness of environmental issues in water resource and industrial development.
3. To create an understanding of applying various methodologies for carrying out environmental impact assessment.

**Course Outcomes:**

1. Student will be able to prepare environmental impact statement of a project.
2. Student will be capable of interpreting and analyzing data and report environmental impact assessment.
3. Acquiring the knowledge of environmental indicators.
4. Use and application of knowledge of environmental issues in water resource development and industrial development.

**UNIT – I****BASIC CONCEPTS OF EIA**

Elements of EIA – Preparation of environmental base map, classification of environmental parameters – Environmental setting – Environmental Indicators.

**UNIT – II****EIA METHODOLOGIES**

Introduction, criteria for the selection of EIA methodology, Categorization of methodologies, Ad-hoc methods, matrix methods, Network method, Environmental Media quality index method, overlay methods, cost / benefit analysis.

**UNIT – III****IMPACT OF DEVELOPMENTAL ACTIVITIES AND LAND  
USE**

Introduction and methodology for the assessment of soil and ground water, delineation of study area, identification of activities.

Procurement of relevant soil quality, impact prediction, assessment of impact significance, identification and incorporation of mitigation measures.

#### **UNIT-IV**

#### **METHODOLOGY FOR THE ASSESMENT OF IMPACTS OF SOME ATTRIBUTES**

Surface water, air and biological environment. Methodlogy and generalized approach for the assessment of impact of development activities on vegetation and wildlife, environmental impact of deforestation.

#### **UNIT – V**

#### **ENVIRONMENTAL AUDIT – LEGAL ASPECTS**

Environmental audit and environmental legislation objectives of environmental audit, types of environmental audit, audit protocol, stages of environmental audit, onsite activities, evaluation of audit data and preparation of audit report – Legal aspects – case studies.

#### **TEXT BOOKS**

1. CANTER L.W., “*Environmental Impact Assesement*”, International 1996, Mcgraw Hill Inc. New York
2. Jain, R.K. Urban L.V.Stracy, G.S. “*Environmental Impact Analysis*”, 2<sup>nd</sup> edition, Vau Nostrand Reinhold Co, New York.
3. Anjaneyulu, Vall Manickam,” *Environmental Impact Assessment Methodologies*”, 2<sup>nd</sup> Edition, B.S.Publications, Sultanbazar, Hyderabad.

#### **REFERENCES**

1. Ran, J.G. & Wooten, D.C.,” *Environmental Impact Assessment*”, 1<sup>st</sup> edition, Mc Graw Hill Pub. Co. Ltd, New York.
2. UNESCO, 1987, “*Methodologies, Guidelines for the Integrated Environmental Evaluation of Water Resources Development*”, UNESCO/UNEP, Paris.

**GEOTECHNIQUES FOR INFRASTRUCTRE****Course Code: 13CE2113****L P C**  
**4 0 3****Course Educational Objectives: :**

1. To impart the knowledge on raft foundations and pile foundations.
2. To familiarize the student with the knowledge on foundations for transmission line towers and chimneys.

**Course Outcome:**

1. The students will demonstrate the understanding of foundation systems in weak soils.
2. To impart the students, with the knowledge of raft foundations.
3. To impart the students, with the knowledge of pile foundations
4. To impart the students, with the knowledge of foundations for transmission line towers & chimneys.

**UNIT- I****RAFT FOUNDATIONS**

Types, loads on rafts, stiffness / rigidity of soil structure system; allowable soil pressures for rafts in cohesion less & cohesive soils, calculation of bearing capacity of raft foundation.

**UNIT – II****PILE FOUNDATIONS**

Lateral load carrying capacity, introduction to p-y method and Evans & Duncan's methods. Effect of pile group on lateral load carrying capacity.

**UNIT – III****FOUNDATIONS FOR TRANSMISSION LINE TOWERS & CHIMNEYS**

Behavior of pad and chimney foundations, geotechnical design of chimney and pad foundation, geotechnical design of foundations for concrete towers and chimneys.

**UNIT – IV****FOUNDATIONS ON WEAK SOILS**

Soil improvement and foundation techniques for construction on weak and compressible soils. Foundation techniques on expansive soils, estimating heave typical structural distress patterns.

**UNIT – V****SHEET PILE WALLS & ANCHORED BULKHEADS**

Materials used types of sheet pile walls, analysis of cantilever sheet pile walls in cohesion less & cohesive soils, stability analysis of anchored bulkheads by free & fixed earth support methods.

**TEXT BOOKS :**

1. Varghese, P.C., “*Foundation Engineering*”, 2nd Edition, Prentice Hall of India, 2009.
2. Bowles, J.E., “*Foundation Analysis and Design*”, 5th Edition, Mc Graw Hill, 2006.
3. Dr.P. Purushotham Raj, “*Soil Mechanics and Foundation Engineering*”, 2nd Edition, Pearson Education, 2008

**REFERENCES :**

1. Dr.P.Purushotham Raj, “*Ground Improvement Techniques*”, 1<sup>st</sup> Ed, Univ. Sci Press, 2006.
2. M.P. Mosely, K.Krish, “*Ground Improvement*”, 1<sup>st</sup> Ed., Sponpress, , 2004.
3. Swami Saran, “*Analysis and Design of substructures*”, 3<sup>rd</sup> Ed., Oxford Publishers, 2006.

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**URBAN TRANSPORT ALTERNATIVES****Course Code: 13CE2114****L P C**  
**4 0 3****Course Educational Objectives:**

1. To impart the knowledge on transport planning and traffic survey forecasting.
2. To familiarize the student with transport economics and transport systems.

**Course Outcomes:**

1. The students will demonstrate the ability to select land use transport models and economic evaluation of transport plans.
2. To impart the students, with the knowledge of transport planning process, traffic surveys and forecasting.
3. To impart the students, with the knowledge of transport planning process, traffic surveys and forecasting.
4. To impart the students, with the knowledge of transport economics and environment.

**UNIT-I****TRANSPORT PLANNING PROCESS:** Systems approach to transport planning- Land use transport interaction.**TRAFFIC SURVEYS AND FORECASTING**

Survey and analysis of existing conditions – Forecast analysis of future conditions and plan synthesis – Transportation surveys analysis and application.

**UNIT-II****STAGES IN TRANSPORT PLANNING:**

Trip generation – theory and modeling techniques – Trip distribution – theory and modelling techniques and methodologies.

Trip assignment – theory and modelling techniques and methodologies – Modal split- theory and analytical techniques.

**UNIT-III**

**LAND USE TRANSPORT MODELS:** Selection of land use transport models – Systems dynamics principles and application – Model building techniques and validation – Transport modes, technology and selection.

**UNIT-IV**

**TRANSPORT ECONOMICS AND ENVIRONMENT:** Economic evaluation of transport plans – Vehicle operating costs – Value of travel time savings and accident costs – Fuel crisis and promotion of public transport. Severance and land consumption.

**UNIT-V****TRANSPORT SYSTEMS**

Planning and design issues of various transport systems – Bus, Train, Tram, LRT, Waterways – Capacity and space utilization – Containers in transportation – Integrated planning of various transport systems.

**TEXT BOOKS**

1. Michael D. Meyer and Eric J. Miller, “*Urban Transportation Planning : A Decision Oriented Approach*”, 2<sup>nd</sup> Edition, McGraw-Hill Book Company, New York, 1984.
2. Dr.L.R. Kadiyali, “*Traffic Engineering and Transport Planning*”, 6<sup>th</sup> edition, Khanna Publishers, 1999.

**REFERENCES**

1. Thirumurthy A.M., “*Environmental Facilities and Urban Development in India –A System Dynamic Model for Developing Countries, Academic Foundations*”, 1<sup>st</sup> Edition, India, 1992.
2. James H.Banks, “*Introduction to Transportation Engineering*”, 2<sup>nd</sup> edition, Tata Mc Graw Hill, 1995.
3. David Hensher and others (Eds), Proceedings of Seventh World Conference on Transport Research : Volume 1 – Travel Behaviour, Volume 2 – Modelling Transport Systems, Volume 3 – Transport Policy, Volume 4 – Transport Management, Pergammon Press, USA, 1996.
4. John W. Dickey, “*Metropolitan Transportation Planning*”, 2<sup>nd</sup> Edition, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 1980.

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**PORTS AND HARBOUR STRUCTURES  
(ELECTIVE-II)****Course Code: 13CE2115****L P C  
4 0 3****Course Educational Objectives:**

1. To impart the knowledge on planning of ports and Harbours
2. To inculcate in students the understanding of port operations and construction aspects of ports and Harbours.

**Course Outcomes:**

1. Student will demonstrate the ability to design the infrastructure facility for port and Harbour for a given area.
2. To impart the students, with the knowledge of Introduction to Ports and harbours.
3. To impart the students, with the knowledge of Design of port infrastructures.
4. To impart the students, with the knowledge of maintenance and development of waterways and ports.

**UNIT-I****INTRODUCTION AND FUNDAMENTALS**

**Introduction:** Ports and harbours – an infrastructure layer between two transport media, planning of ports and harbours.

**The fundamentals:** Tide and current conditions inside harbour, water circulation; breakwaters, jetties and quay walls; mooring, berthing and ship motion inside the port; model studies, physical and mathematical studies.

**UNIT-II****DESIGN ISSUES AND DESIGN OF PORT INFRASTRUCTURES**

**Design issues:** Sea port layout with regards to (1) wave action (2) siltation (3) navigability berthing facilities.

**Design of Port Infrastructures:** Design of port infrastructures with regards to (1) cargo handling (2) cargo storage (3) integrated transport of goods, planning multipurpose port terminals.

**UNIT-III****PORT OPERATIONS**

Allowable wave conditions for cargo handling, wave conditions for human safety on quays and breakwaters, forcecasting/nowcasting of wave and current conditions for port operations, dredging and navigability, hazard scenarios; VTMS and management of computerized container terminal, safety & environment (handling of fire, oil spill, rescue, etc.).

**UNIT-IV****INLAND WATERWAYS AND PORTS**

Maintenance of waterways, construction of environmentally engineered banks, dredging and disposal processing and storing of polluted dredged materials, development of river information services.

**UNIT-V****CONSTRUCTION ASPECTS AND SUSTAINABILITY**

Planning and construction expansion and renovation of port and Inland Port Infrastructure.

Global trade and port restructuring/reforms, impact of possible climate change scenarios, sustainable development strategies for cities and ports.

**TEXT BOOKS**

1. Muir Wood, A.M., and Fleming. C.A., "*Coastal Hydraulics Sea and Inland Port Structures*", 1<sup>st</sup> Edition, Hallstead Press, 2002.
2. Ozha & Ozha, "*Dock and Harbour Engineering*", 1<sup>st</sup> Edition, Charotar Books, Anand., 1990

**REFERENCES**

1. S.Seetharaman, "*Construction Engineering and Management*", 4<sup>th</sup> Edition , Umesh publications, New Delhi, 1999.
2. Richard L. Silister, "*Coastal Engineering Volume I & II*, Elsevier Publishers, 2000.
3. Pera Brunn, "*Port Engineering*", 1<sup>st</sup> Edition, Gulf Publishing Company, 2001

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**PAVEMENT EVALUATION AND MANAGEMENT  
(ELECTIVE – II)**

**Course Code: 13CE2116**

**L P C  
4 0 3**

**Course Educational Objectives:**

1. To impart the knowledge on pavement structure and evaluation.
2. To familiarize the student with design of flexible overlays and rigid overlays.

**Course Outcomes:**

1. The students will demonstrate the ability to understanding pavement management systems, models and methodologies.
2. To impart the students, with the knowledge of pavement surface condition & its evaluation.
3. To impart the students, with the knowledge of pavement structure & its evaluation.
4. To impart the students, with the knowledge of pavement overlays & design.

**UNIT – I**

**PAVEMENT SURFACE CONDITION & ITS EVALUATION:**

Various Aspects of Surface and their Importance; Causes, Factors Affecting, Deterioration and Measures to Reduce:

**RIDING QUALITY:** Measurement of Skid Resistance, Unevenness, Ruts and Cracks. Pavement Surface Condition Evaluation by Physical Measurements, by Riding Comfort and Other Methods; their Applications. Surface unevenness-Bump Integrator

**UNIT – II**

**PAVEMENT STRUCTURE & ITS EVALUATION-I:** Factors affecting Structural Condition of Flexible and Rigid Pavements; Effects of Sub grade Soil, Moisture, Pavement Layers, Temperature, Environment and Traffic on Structural Stability, Pavement Deterioration.

**PAVEMENT STRUCTURE & ITS EVALUATION-II:** Evaluation by Non-Destructive Tests such as FWD, Benkelman Beam Rebound Deflection, Plate Load Test, Wave Propagation and other methods of Load Tests; Evaluation by Destructive Test Methods, and Specimen Testing

**UNIT – III**

**PAVEMENT OVERLAYS & DESIGN-I:** Pavement Overlays, Design of Flexible Overlay over Flexible Pavement by Benkelman Beam Deflection and other Methods.

**UNIT – IV**

**PAVEMENT OVERLAYS & DESIGN-II:** Flexible Overlays and Rigid Overlays over Rigid Pavements, Use of Geo-synthetics in Pavement Overlays.

**UNIT – V**

**PAVEMENT MANAGEMENT SYSTEM:** Concepts of pavement management systems, pavement performance prediction – concepts, modeling techniques, structural conditional deterioration models, HDM.

**MODELS AND METHODOLOGIES:** Mechanistic & empirical models, functional condition deterioration models, unevenness deterioration models and other models, ranking and optimization methodologies.

**TEXT BOOKS**

1. Yoder E.J. and Witzak, “*Principles of Pavement Design*”, 2<sup>nd</sup> Edition, John Wiley and Sons, 1975.
2. Shahin, M Y, “*Pavement Management for Airport, Roads and Parking lots*”, 1<sup>st</sup> Edition, Chapman and Hall, , 1994.
3. Huang, Yang H., “*Pavement Analysis and Design*”, 3<sup>rd</sup> Edition, Prentice Hall, 2009.

**REFERENCES**

1. Babkov, “*Road Conditions and Traffic Safety*”, 1<sup>st</sup> Edition, Mir Publications, 1975.
2. Woods, K.B., “*Highway Engineering Hand Book*”, 1<sup>st</sup> Edition, McGraw Hill Book Co., 1960.
3. David Croney, “*The Design and Performance of Road Pavements*”, 2<sup>nd</sup> Edition, HMSO Publications, 1991
4. Haas and Hudson, “*Pavement Management System*”, 2<sup>nd</sup> Edition, McGraw Hill Book Co., New York, , 1978
5. Per Ullitz, “*Pavement Analysis*”, 1<sup>st</sup> Edition, Elsevier, Amsterdam, 1987.
6. HRB/TRB/IRC/International Conference on Structural Design of Asphalt Pavements, 2000.

**IRRIGATION WATER DISTRIBUTION SYSTEMS  
(ELECTIVE-II)****Course Code: 13CE2117****L P C  
4 0 3****Course Educational Objectives:**

1. To impart the knowledge on irrigation systems and distribution works.
2. To familiarize the student with design of channels and block/chak.

**Course Outcome:**

1. The students will demonstrate the ability to designing of channels and block/chak.
2. To impart the students, with the knowledge of types of irrigation systems.
3. To impart the students, with the knowledge of distribution works.
4. To impart the students, with the knowledge of closed conduit distribution.

**UNIT-I**

**INTRODUCTION:** Irrigation development in India – type of irrigation system – method of distribution – RWS, Warabandi, Shejpati and localization.

**UNIT-II**

**DISTRIBUTION WORKS:** Types of Head works – Classification of Channels – Regulations - Drops Canal escapes – Sluices – Sand vent – Tail dams – Syphons.

**UNIT-III**

**CANAL:** Design of erodible – non-erodible channels – diversion box – outlet – proportional dividers – bed dam.

**UNIT-IV**

**BLOCK / CHAK DESIGN:** Command ability – realignment of block – operation and maintenance.

**CLOSED CONDUIT DISTRIBUTION:** Drip – Sprinkler – Underground pipe design – Layout – Evaluation – Operation and Maintenance.

**UNIT-V**

**FLOW MEASUREMENTS:** Flow measuring structures – Flumes Weirs – Orifices – Dilution Techniques – Channel transitions – Canal losses – Measurement of losses.

**TEXT BOOKS**

1. Varshney R.S., Gupta S.C. and Gupta R.L., “*Theory and Design of Irrigation Structures*”, 2nd edition, Nemchand & Brothers, Roorkee, 1992.
2. Sharma R.K., “*Irrigation Engineering and Hydraulic Structures*”, 1st edition, Oxford and IBH Publishing Co., New Delhi, 1984.
3. S.K Garg, “*Irrigation engineering and hydraulic structures*”, 24<sup>th</sup> Edition, Khanna Publishers, 2012.

**REFERENCES**

1. Ellis H.W., “*College of Engineering Irrigation Manual*”, Govt. of Tamil Nadu, 1973.
2. Richard H. Cuneca, “*Irrigation Systems Design (An Engineering Approach)*”, 1st Edition, Prentice Hall Inc., 1989.
3. Michael A.M., “*Irrigation Theory and Practice*”, 2nd edition, Vikas Publishing House Pvt. Ltd., 1995.

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**PROJECT MANAGEMENT LAB****Course Code: 13CE2118****L P C**  
**0 3 2****Course Educational Objectives:**

1. To impart the knowledge on planning, scheduling and resourcing.
2. To familiarize the student with resource leveling and float constraints.

**Course Outcome:**

The students will demonstrate the ability to define resource calendars and resource leveling.

**EXPERIMENTS:**

1. Creation, saving and opening layouts.
2. Working with activities.
3. Defining relationships – Editing and selecting relationships.
4. Preparing a schedule, usage of date and float constraints.
5. Defining resource calendars.
6. Breaking down project components.
7. Defining custom data items.
8. Planning resources and costs.
9. Resource leveling.
10. Mini Project –I
11. Mini Project –II
12. Mini Project –III

**REFERENCES**

1. Harris P.E., “*Project Management using Primavera*”, 2<sup>nd</sup> Edition, Eastern Harris Publications, 2008.
2. M.S. Project – Microsoft Press, 1<sup>st</sup> Edition, 2003.