



SHRI RAMDEOBABA COLLEGE OF ENGINEERING AND MANAGEMENT, NAGPUR-440013

An Autonomous College affiliated to
Rashtrasant Tukadoji Maharaj Nagpur University,
Nagpur, Maharashtra (INDIA)

NEP BASE PROGRAMME SCHEME & SYLLABI

2023-2024 - I Year

2024-2025 - II Year

2025-2026 - III Year

2026-2027 - IV Year

B.Tech. (CIVIL ENGINEERING)

Shri Ramdeobaba College of Engineering and Management, Nagpur.
Department of Civil Engineering
Teaching and Evaluation Scheme B.Tech (Civil Engineering) NEP-2020 based
To be implemented from Session: 2023-24

Semester – I

Course Code	Category	Name of Course	Lecture	Tutorial	Practical	Credits	Theory Course				Practical Course	
							CA	ESE	Total	ESE Duration	LA-1	LA-2
PHT 1004	BSC-T	Physics for Civil Engineering	2	1	0	3	50	50	100	3	0	0
PHP 1004	BSC-P	Physics for Civil Engineering Lab	0	0	2	1	0	0	0	0	25	25
MAT1001	BSC-T	Applied Mathematics-I	2	1	0	3	50	50	100	3	0	0
MAP1001	BSC-P	Computation Mathematics Lab	0	0	2	1	0	0	0	0	25	25
CET1001	PCC-T	Infrastructure Components	1	0	0	1	50	0	50	0	0	0
CET1002	ESC-T	Basics of Surveying	2	0	0	2	50	50	100	2	0	0
CEP1002	ESC-P	Basics of Surveying Lab	0	0	2	1	0	0	0	0	25	25
CET1003	PCC-T	Building Services	2	0	0	2	50	50	100	2	0	0
CEP1004	VSEC	Conceptual Drawing and Drafting	0	0	4	2	0	0	0	0	25	25
HUT1002	AEC-T	English for Professional Communication	2	0	0	2	50	50	100	2	0	0
HUP1002	AEC-P	English for Professional Communication Lab	0	0	2	1	0	0	0	0	25	25
HUP1003-1 to HUP1003-10, PEP0001-21-22 and CHP0001-31-32*	CC-P	Liberal/Performing Art	0	0	2	1	0	0	0	0	25	25
HUT1004	VEC	Foundation course in Universal Human Values	1	0	0	1	50	0	0	0	0	0
			12	2	14	21	350	250	550	12	150	150

*List of Liberal/Performing Art courses is enclosed

Shri Ramdeobaba College of Engineering and Management, Nagpur

Department of Civil Engineering

Syllabus and Scheme for Liberal/Performing Arts Basket

Sr. No.	Course Code	Course Name	Sem	Hours/week	Credits	Maximum marks	Department
						Continuous Evaluation	
1)	HUP0001-1	Fundamentals of Indian Classical Dance: Bharatnatayam	I/II	2	1	50	Humanities
2)	HUP0001-2	Fundamentals of Indian Classical Dance: Kathak	I/II	2	1	50	Humanities
3)	HUP0001-3	Introduction to Digital Photography	I/II	2	1	50	Humanities
4)	HUP0001-4	Introduction to Japanese Language and Culture	I/II	2	1	50	Humanities
5)	HUP0001-5	Art of Theatre	I/II	2	1	50	Humanities
6)	HUP0001-6	Introduction to French Language	I/II	2	1	50	Humanities
7)	HUP0001-7	Introduction to Spanish Language	I/II	2	1	50	Humanities
8)	HUP0001-8	Art of Painting	I/II	2	1	50	Humanities
9)	HUP0001-9	Art of Drawing	I/II	2	1	50	Humanities
10)	HUP0001-10	Nature camp	I/II	2	1	50	Humanities
11)	PEP0001-21	Disaster Management through Adventure Sports	I/II	2	1	50	Physical Education
12)	PEP0001-22	Self-defense Essentials and Basics Knowledge of Defense forces	I/II	2	1	50	Physical Education
13)	CHP0001-31	Art of Indian traditional cuisine	I/II	2	1	50	Chemistry
14)	CHP0001 -32	Remedies by Ayurveda	I/II	2	1	50	Chemistry

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Semester-II

Course Code	Category	Name of Course	Lecture	Tutorial	Practical	Credits	Theory Course				Practical Course	
							CA	ESE	Total	ESE Duration	LA-1	LA-2
CHT2001	BSC-T	Engineering Chemistry for Civil Engineers	2	0	0	2	50	50	100	2	0	0
CHP 2001	BSC-P	Engineering Chemistry for Civil Engineers Lab	0	0	2	1	0	0	0	0	25	25
MAT2001	BSC-T	Applied Mathematics-II	2	1	0	3	50	50	100	3	0	0
CET2001	ESC-T	Construction Materials	3	0	0	3	50	50	100	3		
CEP2001	ESC-P	Construction Materials Lab	0	0	2	1	0	0	0	0	25	25
CET2002	ESC-T	Engineering Mechanics	3	1	0	4	50	50	100	3	0	0
CET2003	ESC-T	Programming for Civil Engineers	2	0	0	2	50	50	100	2		
CEP2003	VESC	Application of python in Civil Engineering	0	0	2	1	0	0	0	0	25	25
HUT2001	IKS-T	Foundation literature of Indian civilization	2	0	0	2	50	50	100	2	0	0
PET2001	CC-T	Yoga/SportsRecreation	1	0	0	1	50	0	50	0	0	0
PEP2001	CC-P	Yoga/SportsRecreation	0	0	2	1	0	0	0	0	25	25
			15	2	8	21	350	300	650	15	100	100

Exit Option

Option 1	Infrastructure/Real Estate/Industry Internship (1 Month)	0	0	0	8	Industry Internship completion certificate along with report
Option 2	Mini Project with report(1 Month)	0	0	0	8	Mini project report to be assessed by supervisor

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Semester-III

Course Code	Category	Name of Course	Lecture	Tutorial	Practical	Credits	Theory Course				Practical Course	
							CA	ESE	TOTAL	ESE Duration	LA-1	LA-2
CET3001	PCC-T	Fluid Mechanics I	3	0	0	3	50	50	100	3	0	0
CEP3001	PCC-P	Fluid Mechanics I	0	0	2	1	0	0	0	0	25	25
CET3002	PCC-T	Geotechnical Engineering	3	0	0	3	50	50	100	3	0	0
CEP3002	PCC-P	Geotechnical Engineering	0	0	2	1	0	0	0	0	25	25
CET3003	PCC-T	Solid Mechanics	3	0	0	3	50	50	100	3	0	0
CEP3003	PCC-P	Solid Mechanics	0	0	2	1	0	0	0	0	25	25
CET3004	PCC-T	Concrete Mix Design	1	0	0	1	25	25	50	1	0	0
CETM3005	MDM-T	Basic of Electrical Engineering	2	0	0	2	50	50	100	2	0	0
CET2980	OE-T	Open Elective - I	2	0	0	2	50	50	100	2	0	0
CET3006	MGMT-T	Finance Management for Civil	2	0	0	2	50	50	100	2	0	0
CEP3007	FP-P/VEC-T	Mini Project	0	0	4	2	0	0	0	0	25	25
			16	0	10	21	400	400	800	16	100	100

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Semester-IV

Course Code	Category	Name of Course	Lecture	Tutorial	Practical	Credits	Theory Course				Practical Course	
							CA	ESE	TOTAL	ESE Duration	LA-1	LA-2
CET4001	PCC-T	Structural Analysis	3	0	0	3	50	50	100	3	0	0
CEP4001	PCC-P	Structural Analysis	0	0	2	1	0	0	0	0	25	25
CET4002	PCC-T	Environmental Engineering - I	3	0	0	3	50	50	100	3	0	0
CEP4002	PCC-P	Environmental Engineering - I	0	0	2	1	0	0	0	0	25	25
CET4003	PCC-T	Reinforced Concrete Structures	3	1	0	4	50	50	100	3	0	0
CETM4004	MDM-T	Automation in Civil Engineering	2	0	0	2	50	50	100	2	0	0
CET2990	OE-T	Open Elective - II	3	0	0	3	50	50	100	3	0	0
CEP4005	VSEC-P	Drawing Assessment & calculation	0	0	2	1	0	0	0	0	25	25
CET4006	AEC-T	Technical Report Writing	1	0	0	1	50	0	50	0	0	0
CET4007	MGMT-T	Contracts Accounts and Work Management	2	0	0	2	50	50	100	2	0	0
			17	1	6	21	350	300	650	16	75	75

Option 1	Infrastructure/Real Estate/Industry Internship (1 Month)	0	0	0	8	Industry Internship completion certificate along with report
Option 2	Mini Project with report (1 Month)	0	0	0	8	Mini project report to be assessed by supervisor

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Semester-V

Course Code	Category	Name of Course	Lecture	Tutorial	Practical	Credits	Theory Course				Practical Course	
							CA	ESE	TOTAL	ESE Duration	LA-1	LA-2
CET5001	PCC-T	Transportation Engineering	3	0	0	3	50	50	100	3	0	0
CEP5001	PCC-P	Transportation Engineering Lab	0	0	2	1	0	0	0	0	25	25
CET5002	PCC-T	Foundation Engineering	3	0	0	3	50	50	100	3	0	0
CET5003	PCC-T	Environmental Engineering – II	3	0	0	3	50	50	100	2	0	0
CEP5003	PCC-P	Environmental Engineering – II Lab	0	0	2	1	0	0	0	0	25	25
CET5004	PCC-T	Advanced Construction Materials	1	0	0	1	25	25	50	1	0	0
CET5005	PEC-T	Program Elective - I	3	0	0	3	50	50	100	3	0	0
CEP5005	PEC-P	Program Elective – I Lab	0	0	2	1	0	0	0	0	25	25
CETM5006	MDM-T	Recent Trends in Civil Engineering	2	1	0	3	50	50	100	3	0	0
*IDT3980	OE-T	Open Elective - III	3	0	0	3	50	50	100	2	0	0
			18	1	6	22	350	350	700	18	75	75

Program Elective – I (T&P)

CET5005-1/CEP5005-1	Advanced Construction Techniques	CET5005-2/CEP5005-2	Water and Waste water Treatment	CET5005-3/CEP5005-3	Advanced Structural Analysis	CET5005-4/CEP5005-4	Ground Improvement
CET5005-5/CEP5005-5	Railway Engineering						

***IDT3980-2 for Open elective Coursera**

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Semester-VI

Course Code	Category	Name of Course	Lecture	Tutorial	Practical	Credits	Theory Course				Practical Course	
							CA	ESE	TOTAL	ESE Duration	LA-1	LA-2
CET6001	PCC-T	Estimating & Costing	3	0	0	3	50	50	100	3	0	0
CET6002	PCC-T	Design of Steel Structures	2	1	0	3	50	50	100	3	0	0
CET6003	PCC-T	Fluid Mechanics - II	3	0	0	3	50	50	100	3	0	0
CEP6003	PCC-P	Fluid Mechanics – II Lab	0	0	2	1	0	0	0	0	25	25
CET6004	PEC-T	Program Elective - II	3	0	0	3	50	50	100	3	0	0
CEP6004	PEC-P	Program Elective - II	0	0	2	1	0	0	0	0	25	25
CET6005	PEC-T	Program Elective - III	4	0	0	4	50	50	100	3	0	0
CETM6006	MDM-T	Remote Sensing & GIS	2	0	0	2	50	50	100	2	0	0
CEP6007	VSEC-T	Computed Aided Design in Civil Engineering	0	0	4	2	-	-	-	0	25	25
			18	0	8	22	300	300	600	17	75	75

Exit Option

Option 1	Infrastructure/Real Estate/Industry Internship (1 Month)	0	0	0	8	Industry Internship completion certificate along with report
Option 2	Minor Project with report (1 Month)	0	0	0	8	Mini project report to be assessed by supervisor

Program Elective – II (T&P)

CET6004-1 /CEP6004-1	Design of Concrete Structure	CET6004-2/CEP6004-2	Environmental Impact Assessment	CET6004-3/CEP6004-3	Traffic Engineering and Management
CET6004-4 /CEP6004-4	Geotechnical Explorations	CET6004-5/CEP6004-5	Sustainable Construction Methods		

Program Elective – III (T)

CET6005-1	Advanced Concrete Technology	CET6005-2	Solid Waste Management	CET6005-3	Urban Transportation Planning
CET6005-4	Reinforced Earth	CET6005-5	Energy Efficient Buildings	CET6005-6	Integrated Water Resources Management

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Semester-VII

Course Code	Category	Name of Course	Lecture	Tutorial	Practical	Credits	Theory Course				Practical Course	
							CA	ESE	TOTAL	ESE Duration	CA	ESE
CET7001	PCC-T	Hydrology and Water Resources	3	0	0	3	50	50	100	3	0	0
CET7002	PCC-T	Construction Engineering & Management	3	0	0	3	50	50	100	3	0	0
CET7003	PEC-T	Program Elective - IV	3	0	0	3	50	50	100	3	0	0
CEP7003	PEC-P	Program Elective - IV	0	0	2	1	-	-	-	0	25	25
CET7004	PEC-T	Program Elective - V	3	0	0	3	50	50	100	3	0	0
CET7005	PEC-T	Program Elective - VI	3	0	0	3	50	50	100	3	0	0
CETM7006	MDM-T	Metro Rail Transportation Design and Construction	2	0	0	2	50	50	100	2	0	0
CEP7007	VEC/ Project-P	Minor Project	0	0	8	4	0	0	0	0	50	50
			17	0	10	22	300	300	600	17	50	50

Program Elective – IV (T & P)

CET7003-1/ CEP7003-1	Contracts Management	CET7003-2 /CEP7003-2	Earth and Rockfill Dams	CET7003-3 /CEP7003-3	Earthquake Resistant Design of RCC Structures
CET7003-4 /CEP7003-4	Industrial Waste Water Treatment	CET7003-5/ CEP7003-5	Pavement Design	CET7003-6/ CEP7003-6	Open Channel Hydraulics

Program Elective – V (T)

CET7004-1	Airport Planning and Design	CET7004-2	Special Geotechnical Constructions	CET7004-3	Industrial Structures
CET7004-4	Air Pollution & Control	CET7004-5	Digital Technologies for Civil Engineers	CET7004-6	Watershed Conservation and Management

Program Elective – VI (T)

CET7005-1	Highway Construction And Management	CET7005-2	Advanced Geotechnical Engineering	CET7005-3	Bridge Engineering
CET7005-4	Environmental System Modeling	CET7005-5	Numerical Method for Civil Engineers	CET7005-6	Climate Change & Mitigation

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Semester-VIII

2024-2025 (Proposed) to be discuss in BoS

Course Code	Category	Name of Course	Lecture	Tutorial	Practical	Credits	Theory Course				Practical Course	
							CA	ESE	TOTAL	ESE Duration	CA	ESE
Option 1 - Project												
CEP8001	VEC/ Project-P	Major Project	0	0	12	6	0	0	0	0	100	100
CET8002	PCC-T	Retrofitting & Rehabilitation of Civil Infrastructure	3	0	0	3	50	50	100	3	0	0
CET8003	PCC-T	Irrigation Engineering	3	0	0	3	50	50	100	3	0	0
Option 2 – Industry Internship												
CEP8004	II-P	Industry Internship	0	0	24	12	0	0	0	0	100	100
Option 3 - Research Internship												
CEP8005	RI-P	Research Internship	0	0	18	9	0	0	0	0	100	100
CET8006	PCC	MOOC/Classwork suggested by Supervisor	3	0	0	3	50	50	100	3	0	0
Option 4 - TBI Internship												
CEP8007	TBI	TBI Internship	0	0	24	12	0	0	0	0	100	100
			0	0	0	12	0	0	0	0	100	100

Breakup of Semester wise Credits

Semester	Lecture	Tutorial	Practical	Credits
1	12	2	14	21
2	15	2	8	21
3	16	0	10	21
4	17	1	6	21
5	16	3	6	22
6	16	2	8	22
7	17	0	10	22
8	0	0	24	12
Total	109	10	86	162

Shri Ramdeobaba College of Engineering and Management, Nagpur.

Department of Civil Engineering

Syllabus for Semester B.Tech VII

Course Code: CET7001

Course Name: Hydrology and water Resources

L : 3 Hrs., P : 0 Hrs., Per Week

Credits: 3

Course Outcomes

The students would be able to,

CO1: Explain the fundamentals of hydrology, hydrological cycle, meteorological factors, hydrological equation, and precipitation analysis using rainfall measurement and estimation methods.

CO2: Apply the concepts of interception, evaporation, evapotranspiration, and hydrological loss estimation methods .

CO3: Analyze infiltration characteristics, infiltration indices, runoff components, and runoff estimation methods for watershed studies.

CO4: Analyze and develop flood hydrographs, direct runoff hydrographs , unit hydrographs and triangular hydrograph methods.

CO5: Evaluate peak flood estimation methods, design flood concepts, reservoir planning, and climate change impacts on water resources systems

Unit - I

- Introduction: Definition and its applications in civil engineering. Hydrological cycle, Meteorological factors affecting hydrological cycle, hydrological equation and its application.
- Precipitation : Definition, various forms. Determination of optimum numbers of rain gauges and estimation of missing rainfall data. Various methods of estimation of mean rainfall over the catchment. Hyetograph.

Unit - II

- Initial losses from precipitation : Interception and depression storage.

- Evaporation : Definition, mechanism, factors affecting evaporation. Measurement of evaporation by IS class 'A' pan, Evaporimeter. Estimation of evaporation by using empirical formulas and water budget equations.

- Evapotranspiration : Definition, mechanisms and factors affecting evapotranspiration.

Estimation of evapotranspiration.

Unit – III

- Infiltration : Definition, mechanism and factors affecting infiltration. Infiltration capacity curve and its application. Indices and its application.

- Runoff : Definition, components of runoff, factors affecting runoff and estimation methods.

Unit –IV

Hydrograph

Analysis : Definition, types and components of flood hydrograph. Base flow separation from flood hydrograph, Derivation of unit hydrograph from flood hydrograph. Analysis of unit hydrograph by superposition method and S-curve method. Triangular hydrograph and its analysis.

Unit - V

Statistical Methods for estimation of Peak flood and Design flood : Probability and recurrence interval of a flood magnitude. Frequency of point rainfall. Gumbel's probability distribution method. Rational method. Design floods and its types. Indian Standard guideline for design floods for dams (IS: 11223-1985). Risk, reliability, safety factor and safety margin of design flood. Impact of climate change on extreme flow events.

Reservoir Planning : Types, Site Selection, Fixing of reservoir levels; storage zones in reservoir; Determination of storage capacity, Reservoir sedimentation; Multipurpose water resource projects. Economic planning of the reservoir.

Text Books

- S. K. Garg, Hydrology and Water Resource Engineering, Khanna publication, Edition 2015
- B.C. Punmia, Water power engineering, Laxmi Publication.

- M. L. Kansal and P. K. Agarwal , Hydrology and Water Resource Engineering, Khanna publishing House, 2026
- Jaya Rami Reddy P.: Hydrology and Water Resource Engineering, University Science Press, Edition 2013 & Latest
- Subramanyam K.: Hydrology and Water Resource Engineering, TataMcGraw Hill
- publication, Edition 2011 & Latest

References

- Water Resources Engineering by Ray K. Linsley (McGraw-Hill series in water resources and environmental Engineering).
- Applied Hydrology by Ven Te Chow, David R. Maidment, Larry W. Mays (McGraw-Hill Book Company)

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Department of Civil Engineering

Syllabus for Semester B.Tech VII

Course Code: CET7002 Course Name: Construction Engineering & Management

L : 3 Hrs., P : 0 Hrs., Per Week Credits: 3

Course Outcomes:

- 1.The students will be able to understand aspect of construction management.
2. The students will be able to evaluate the effect of implementation of resources.
3. The students will be able to analyze methods of cost control and material management.

General

Construction Economics; Resource levelling, Project Control and Material Management.

Unit - I : Construction Management

Planning for Construction Projects, Principles of Planning, Objectives, construction projects types and features, phases of a project, agencies involved and their methods of execution; role of client and contractor. Process of development of plans and schedules, work break-down structure, activity lists.

Unit - II : Project Planning

Construction Planning, Project planning, milestone schedules, WBS, Concept of productivities, estimating durations, sequence of activities, activity utility data; Gantt Charts, Network techniques, CPM, PERT and Line of Balancing Techniques, Resource Planning, Scheduling, Productivity chart, Project tracking

Unit - III : Resource Planning

Resources leveling and smoothing. Crashing of networks, direct cost, Indirect Cost, Normal cost, crash cost, cost-time optimization, Use of application software for Project Management, Allocation of Resources.

Unit - IV : Construction Project Control

Construction Project Control Methodologies and Productivity Improvement: EVM, BIM, LBM. Earned Value Management- meaning and definition, Earned value, cost performance index, schedule performance index, cost variances, schedule variance, Final Cost, Final Project Duration. Funds: cash flow, sources of funds; Histograms and S-Curves. Common causes of time and cost overruns and corrective measures.

Unit - V : Material Management

Material Management: Functions, objectives, purchasing, procedures, Material Stock, Storing, Recording, Inventory control, Inventory control techniques, Break even analysis, ABC analysis, and EOQ models

Reference Books

1. Sengupta B., Guha M, (1998), "Construction Management and Planning", McGraw Hill Companies.
2. Construction Project Scheduling and Control, 3rd Edition, by Saleh Mubarak. ISBN : 978-1-118-86400-1
3. Peurifoy, R.L. Construction Planning, Methods and Equipment, McGraw Hill, 2011
4. Code for Practice for Project Management for Construction and Development, 5th Edition Wiley Blackwell by CIOB (The Chartered Institute of Building).
5. National Building Code of India 2016 (NBC 2016)
6. K.K. Chitkara, Construction Project Management, 2nd Edition, McGraw Hill Publication
7. Harold Kerzner Project Management CBS Publishers & Distributors 2nd Edition.
8. Frank Harris & Ronald Mc Caffer Modern Construction Management Blackwell Science 4th Edition.
9. Roy Pilcher Principles of Construction Management McGraw Hill London.
10. Kumar Neeraj Jha, Construction Project Management, Pearson Publication.
11. Project Management Body of Knowledge, 5th Edition, PMI Global Standard
12. Harvey Maylor, Project Management, 3rd Edition, Pearson
7. K.K. Chitkara, Construction Project Management, 2nd Edition, McGraw Hill Publication
13. P G. Gahoi & B.M. Dhir, Construction Management, New age international (p) Ltd.

14. Srinath L, CPM & PERT, East-West Press Pvt. Ltd New Delhi.
15. N.D. Vora, Quantitative Techniques in Management, Tata McGraw Hill, New Delhi, 3rd Edition.
16. Daniel Halpin, Construction Management, 3rd Edition, John Wiley & Sons, Inc.

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Department of Civil Engineering

Syllabus for Semester B.Tech VII

Course Code: CET/CEP 7003-1 Course Name : Contracts Management

L :3 Hrs., P :2 Hrs., Per Week Credits: 4

Course Outcome

1. Explain the procedures involved in preparation, submission, evaluation, and award of construction tenders .
2. Analyze bids, proposals, and various types of construction contracts based on principles of contract management and the Indian Contract Act .
3. Prepare and interpret engineering contract documents, R.A. bills, final bills, and contract claims.
4. Evaluate dispute resolution methods such as negotiation, mediation, conciliation, and arbitration in construction projects.
5. Assess contractual issues related to delays, cost escalation, damages, force majeure, insurance, and FIDIC conditions in construction contracts

GENERAL

Overview of Tender; Types of contract; Conditions of contract

Unit - I

Preparation of Tender Documents and its submission, Evaluation of Tender and Award of contract – Letter of Award, Letter of Intent, Issues in tendering process: Pre - Registration, Pre – Qualification, Nominated Tendering, Rejection of Tenders, Repeat Orders, Revocation of Tenders and Unbalanced Bidding.

Unit - II

Bids & Proposals; Bid Evaluation; General Principles of Contracts Management: Indian Contract Act, Valid & Voidable Contracts; Prime and sub-contracts; Joint Ventures & Consortium, Build-Own- Operate & variations; Public- Private Partnerships; International Commercial Terms, Breach of contract.

Unit - III

Essentials for a legally valid contract, Documents for an Engineering Contract; Types of contracts relative merits, general and special conditions, termination of contracts, extra work and Changes, R.A. Bill & Final Bill, Payment of advance, insurance, claims, price variation, etc.

Unit - IV

General, Methods for dispute resolution–Negotiations, Mediation, Conciliation, Dispute Resolution Boards (DRB), Arbitration : – appointment, challenge, jurisdiction, powers, grounds of challenge, procedure and court assistance; Award including Form and content, Grounds for setting aside an award, Enforcement, Appeal and Revision.

Unit - V

Variations & Changes in Contracts; Differing site conditions; Cost escalation; Delays, Suspensions & Terminations; Time extensions & Force Majeure; Delay Analysis; Damage Assessment, and Claims for Damages. Liquidated damages & Penalties; Insurance & Taxation; Introduction to FIDIC.

Text Books

1. Meena Rao (2006), Fundamental concepts in Law of Contract, 3rd Edn. Professional Offset.
2. L.S. Ranaga Rao Contract Management and Dispute Resolutions Engineering staff College of India
January 2008.
3. General Conditions of Contract, Central Public Works Department, New Delhi, 2010
4. S. Ranaga Rao, Contract Management & Dispute Resolutions, Engineering staff College of India,
January 2008
5. V. K. Raina, Construction & Contract Management Practices, SPD, New Delhi
6. Patil B. S., (2009) "Civil Engineering Contracts and Estimates", University Press.
7. John G. Betty (1993/ Latest Edition) "Engineering Contracts", McGraw Hills.

Reference Books

1. Dutt (1994), Indian Contract Act, Eastern Law House
2. FIDIC Contract Conditions
3. Prakash V. A.,(1997) "Contracts Management in Civil Engineering Projects", NICMAR
4. Vaid K.N., (1998)"Global perspective on International Construction Contracting Technology and Project Management", NICMAR, Mumbai
5. Albett Robert W., (1961/ Latest Edition) "Engineering Contracts and Specifications", John Willey and Sons, New York.
6. Vasavada B. J.,(1997), "Engineering Contracts and Arbitration", (Self Publication by Jyoti B.Vasavada).

Course Name: Contracts Management Lab

Assignments (minimum 8) based on above said syllabus & case studies on **Contracts Management**

1. Preparation of tender documents and submission procedures.
2. Tender evaluation and preparation of LOI and LOA.
3. Study of tendering procedures and bidding process.
4. Preparation and evaluation of bids and proposals.
5. Drafting of engineering contract documents.
6. Study of different types of construction contracts.
7. Preparation of R.A. Bill and Final Bill.
8. Study of variations, claims, escalation, and extra items.
9. Study of dispute resolution methods and arbitration process.
10. Delay analysis, liquidated damages, and time extension.
11. Introduction to FIDIC conditions of contract.
12. Seminar / case study on construction contracts and disputes.

Shri Ramdeobaba College of Engineering and Management, Nagpur.

Department of Civil Engineering

Syllabus for Semester B.Tech VII

Course Code: CET/CEP 7003-2 Course Name : Earth and Rock Fill Dams

L : 3 Hrs., P : 2 Hrs., Per Week Credits: 4

Course Outcomes:

On completion students will be able to: CO1- Recognize potential failure modes or deformation types for soil slopes and embankments CO2- Determine the stability of a slope using slope stability software CO3- Distinguish the common causes/triggering mechanisms for landslides/slope instabilities CO4- Design proper slope and stable earthen structure as per requirement

Course Contents

Effective stress analysis; Stability of earth and rock fill dams; Steady state seepage and rapid draw down cases. Design of earth dams; Pore pressure during construction stage; Methods of seepage control in earth dams. Seismic analysis of embankment. Analysis of reinforced slope.

Text / Reference Books:

1. L. W Abramson, T. S Lee, S Sharma and G M Boyce, Slope Stability and Stabilization Methods, Willey Interscience publications
2. B M Das, Principles of Geotechnical Engineering, Thomson Brooks/Cole
3. T W. Lambe and R V Whitman, Soil Mechanics, John Wiley & sons
4. V N S Murthy, Principles of Soil Mechanics and Foundation Engineering, UBS Publishers Private Ltd

Course Name: Earth and Rock Fill Dam Lab

Assignments (minimum 8) based on above said syllabus & case studies on **Earth and Rock Fill Dam**

Shri Ramdeobaba College of Engineering and Management, Nagpur.

Department of Civil Engineering

Syllabus for Semester B.Tech VI

Course Code: CET/CEP 7003-3 Course Name: Earthquake Resistant Design of RCC Structures

L : 3 Hrs., P : 2 Hrs., Per Week Credits: 4

COURSE OUTCOMES:

1. The graduates will be able to understand the fundamental concept, principle & application of earthquake engineering.
2. The graduates will be able to understand seismic coefficient method to determine earthquake forces.
3. The graduates will be able to understand the codal provision for earthquake resistance design of structures as per the Indian standard.

Basic Concepts: Origin of earthquake, quantification of earthquake, Magnitude, energy, intensity of earthquake) Determination of magnitude, epicentre, epicentre distances, focal depth, and seismic zones in India.

Seismic performance of structures and structural components during past earthquakes, ground motion and their characteristics, factor affecting ground motion, causes or sources of earthquake damages.

Seismic Analysis of Buildings: Equivalent Static Analysis, I.S. code provision for seismic analysis of buildings

Modelling concept of reinforced concrete building: Seismic Design of Building Components such as Beam and column

Text Books :

1. Pankaj Agarwal and Shrikhande, M. "Earthquake Resistant Design of Structures." PHI Learning private limited New Delhi 11001, 2011
2. Kramer, S.L. "Geotechnical Earthquake Engineering", Prentice Hall, New Jersey, 1996.

3. Arya A.S., "Introduction to Earthquake Engineering Structures. "Published by New Chand & Bros., Roorkee, in 1987.
4. S.K. Duggal, "Earthquake Resistant Design of Structures."Oxford; 2nd edition (19 September 2013)

References Books :

1. Murthy, C.V.R. "Earthquake Tips." IIT Kanpur Documents
2. Chopra A.K., Dynamics of Structures, Theory & Application to earthquake Engineering, 2nd edition Pearson Education (Singapore) Pvt, Ltd, New Delhi, 1995.
3. Dowrick, D.J. "Earthquake Resistant Design for Engineers and Architects", 2nd Edition,1987.
4. Design of Multistoried Buildings for Earthquake Ground Motions, J. A. Blume, Portland Cement

Reference codes :

1. IS:1893-2002 and 2016 Part I Earthquake Criteria
2. IS:13920-1993 and 2016 Ductile Detailing

Course Name: Earthquake Resistant Design of RCC Structures

lab

Assignments (minimum 8) based on above said syllabus & case studies **Earthquake resistant design of RCC structures**

Shri Ramdeobaba College of Engineering and Management, Nagpur.

Department of Civil Engineering

Syllabus for Semester B.Tech VI

Course Code: CET/CEP 7003-4 Course Name: Industrial Waste Water Treatment

L : 3 Hrs., P : 2 Hrs., Per Week Credits: 4

Course Outcomes

The students would be able to;

1. Describe and explain the necessity and importance of industrial wastewater treatment along with the basic principles and fundamentals of waste minimization for reuse recycling and recovery, treatment processes and disposal methods in industrial wastewater.
2. Apply the knowledge of various principles, theories and equations in process analysis and in the design of various treatment methodologies for various industrial waste waters.

Syllabus

Unit - I

Necessity and importance of industrial waste water treatment, Generation of Industrial wastewater, characteristics of industrial waste water and its variation, sampling and analysis of wastewater, statistical analysis of data, standards for wastewater disposal, Environmental impacts due to discharge of wastewater on streams, land and sewerage system.

Unit - II

Basic concept of Reuse, Recycling and Resource recovery; Volume and strength reduction; Construction, working, design parameters and design of Equalization, and Neutralization and floatation.

Unit - III

Treatment flow sheet of wastewater from various industries viz. Pulp and paper, tanning, Sugar, Dairy, Cement, Fertilizers, Metal Finishing, textile, Etc. Joint treatment of industrial waste.

Unit - IV

Types of biological processes used in treatment of wastewater. Construction, working and design parameters of Stabilization pond, aerated lagoon, oxidation ditch, biological denitrification processes, membrane biological reactors. Anaerobic treatment of industrial wastewater.

Unit - V

Industrial waste survey; Stream sanitation, stream sampling, Stream survey; Principles and techniques for Industrial pollution prevention and control.

Text Books

1. Nemerow N. L. Theories and Practices of Industrial Waste Treatment, Addison Wesley Publishing Co. NY. 2nd Edition.
2. W.W. Eckenfelder, Industrial Water Pollution Control Mc-Graw Hill Book Co. 2nd Edition.
3. Freeman H.M., Industrial Pollution Prevention Handbook Mc-Graw Hill 1st Edition.
4. E.B. Bess Elivievre, Treatment of Industrial Waste, Mc-Graw Hill Book Co. 1st Edition.
5. Metcalf and Eddy, Wastewater Engineering, Treatment, Disposal And Reuse, 3rd Edition Mc- Graw Hill 1991.
6. A. D. Patwardhan, Industrial waste water treatment, PHI Learning Pvt. Ltd, 2nd Edition. June 2017

Reference Books

1. Central Pollution Control Board, India, Comprehensive Industry Document Series.
2. Gupta K R, Environmental Legislation of India, Atlantic publishers, 2006.
3. CPHEEO Manual on Sewerage & sewage treatment.

Course Name: Industrial Waste Water Treatment Lab

Assignments (minimum 8) based on above said syllabus & case studies **Industrial Waste**

Water Treatment

Shri Ramdeobaba College of Engineering and Management, Nagpur.

Department of Civil Engineering

Syllabus for Semester B.Tech VI

Course Code: CET7003-5 Course Name: Pavement Design

L : 3 Hrs., P : 2 Hrs., Per Week

Credits: 4

Course Outcomes

1. The student can understand, analyze, apply and evaluate various parameters required in the design of flexible and rigid pavement of highway and airfield pavements.
2. They can analyze, apply and evaluate the analysis of flexible and rigid of highway and airfield pavements.
3. They can analyze, apply and evaluate the design of flexible and rigid of highway and airfield pavements.
4. They will be able to conduct field tests and can analyze, apply and evaluate the design strengthening of pavements.

Unit I

General: Types and component parts of pavements, Factors affecting design and performance of pavements.

Design parameters: Design wheel load, Standard axle load and wheel assemblies for road vehicles. Under carriage system of aircraft. Tyre and contact pressure, contact area, imprints, computation of ESWL for flexible and rigid pavements. ESWL of multiple wheels, repeated loads and EWL factors. Pavement behaviour under transient traffic loads. airport traffic areas, Serviceability concept.

Unit II

Analysis of flexible pavement : Stress, strain, deflection analysis one layer system by Boussinesq's. Burmister's two layer theory, three layer and multi-layer theories; wheel

load stresses, Layer equivalent concepts, Stress and deflections for rigid pavements due to load and temperature, influence charts

Analysis of Rigid pavement : Wheel load stresses, warping stresses, frictional stresses, combined stresses.

Unit III

Highway Flexible pavement design : Empirical, semi-empirical and theoretical approaches, Triaxial (Kansas state method), Design using the latest IRC code, AASHTO method of design.

Unit IV

Highway Rigid pavement design: Design of CC pavement for roads and runways as per IRC latest code, design of joint details for longitudinal joints, contraction joints and expansion joints, PCA and AASHTO methods

Unit V

Airfield flexible pavement design : Mcleod (Canadian method), FAA, US Corps of engineering, CBR.

Airfield rigid pavement design : Definitions of ACN, PCN, LCN, Calculation of LCN value, Ultimate load analysis and yield lines patterns method, FAA, PCA & LCN methods.

Unit VI

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Pavement testing and evaluation : Pavement Failures in both Flexible Pavement & Rigid Pavement - types and causes, condition surveys and surface evaluation for unevenness, rut depth, profilometers, bump integrators, falling weight deflectometer.

Failures of pavements : Causes and remedies, maintenance and rehabilitation of pavements. **Strengthening of pavements :** Benkleman beam deflection study.

Text Books

1. Pavement Design by Srinivasa Kumar, R, Orient Black Swan, 2013.
2. Pavement Evaluation and Maintenance Management System by Srinivasa Kumar, R, Universities Press (India) Private Limited
3. Pavement Analysis and Design by Yang H. Huang 2nd Edition, Pearson Education, Inc., Pearson Prentice Hall Company.

4. Airport Engineering by G Venkatappa Rao, Tata McGraw -Hill Publishing Company Ltd.
5. IRC-37: (Latest Code) Guide lines for Design of Flexible Pavement
6. IRC-58: (Latest code) Guide lines for Design of Plain Jointed Rigid Pavement for highways

References

1. Principles of Pavement Design by H.J.Yoder and Witczak, John wiley and sons.
2. Pavement Engineering: Principles and Practice, Third Edition Book by Rajib Basu Mallick and Tahar El-Korchi Publisher: CRC press, Taylor and Francis
3. Airport Engineering by Khanna and Arora, Nemchand & Brothers.
4. Highway Engineering by Khanna O.P, Justo C.G., Nem Chand Publishers
5. MOST Specifications for Road and Bridge Works, 1994 (Third Revision)
6. NPTEL Course on Pavement Design

Course Name: Pavement design lab

Assignments (minimum 8) based on above said syllabus & case studies **Pavement design**

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Department of Civil Engineering

Syllabus for Semester B.Tech VII

Course Code: CET/CEP 7003-6 Course Name: Open Channel Hydraulics

L : 3 Hrs., P :2 Hrs., Per Week Credits: 4

Course Outcomes

- (1) Identify Hydraulic behaviour of open channel and their causes.
- (2) Predict the behaviour of open channel in different situations.
- (3) Analyze and design of artificial channels with rigid boundary.
- (4) Apply this knowledge in the fields like irrigation, flood control and water shed management.

Unit I

Introduction to Open channel Flow : Review of types of channels and its suitability, Geometrical parameters of channel, Classification of flow, Basics equations and velocity distribution of channel sections.

Unit 2

Uniform Flow in rigid Boundary channels : Characteristics of Uniform Flow, Chezy's formula, Manning's formula , factors affecting roughness coefficient, Most economical section of channels, computation of uniform flow. Design of Rigid boundary channels.

Unit 3

Non Uniform flow (Energy and momentum principles) : Specific energy curve, critical flow computations, first and second hydraulic exponent, specific force. Measurement of Discharge and velocity:- Venturi Flume , Standing wave flume, Broad crested weir, Current meter.

Unit 4

Gradually Varied Flow Theory : Dynamic equation of GVF, Classification of channels bed slope ,surface profiles for combination of slopes, control sections, transitional depth, analysis of GVF.

Unit 5

Gradually Varied Flow Computation : Computation of water surface profile by numerical and analytical approaches, Direct step method, Direct Integration method. Bresse's method , advanced numerical method.

Unit 6

Rapidly Varied flow- Hydraulic Jump : Theory, Elements and Characteristics of hydraulic Jump in Rectangular channel, Length, Height and Location of jump, types of jump, general equation for jump in Prismatic channels, jump in horizontal and sloping rectangular channel. Energy dissipation and other uses of jump, Ogee spillway, Culverts hydraulics.

Text Books

(1) K. Subramanya, Flow in Open Channels, Tata Mc Graw Hill, 2009 and latest edition (4th).

References

(1) V.T.Chow, Open Channel Hydraulics, Tata Mc Graw Hill, 2009.

(2) M.H.Chaudhury, Open Channel Flow , Prentice hall of India 2008 and later edition.

(3) NPTEL Web Resources on Open Channel Flow / Hydraulics.

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Department of Civil Engineering

Syllabus for Semester B.Tech VII

Course Code: CET7004-1

Course Name :Airport Planning and Design

L :3 Hrs., P : Hrs., Per Week

Credits: 3

course Outcome

1. Students should be able to understand and memorize various terms related to airport Engineering

2. Students should be aware of various facilities in terminal building

3. Students should be able to describe and explain various geometric parameters of Runway and

Taxiway

4. Students should understand various air traffic management and visual aids

Syllabus

UNIT - I

Aircraft characteristics; Aircraft performance characteristics: Airport planning Airport Site Selection; Windrose, cross wind component, Runway Orientation and configuration.

UNIT - II

Terminal Building, Facilities for passengers, Aircraft Parking.

UNIT - III

Geometric Design of the Airfield: Determination of Runway Capacity and Delay - Taxiway and GateCapacity

UNIT - IV

Air Traffic Management: Navigational aids: ground based systems, satellite based systems – Air traffic control and surveillance facilities. Visual Aids: Airport marking and Lighting for runway, Taxiway and other areas. Air traffic control: Need, network, control aids, instrumental landing systems, advances in air traffic controls.

Text Book

1. Airport Engineering: Khanna and Arora, Nem Chandra & Brothers, Roorkee
2. Airport Engineering: G. Venkatappa Rao, Tata McGraw-Hill Publishing

Reference Book

1. Planning and Design of Airports: Robert Herorjeff, McGraw-Hill Publishing

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Syllabus for Semester B.Tech VII

Course Code: CET7004-2 Course Name : Special Geotechnical Constructions

L :3 Hrs., P : Hrs., Per Week

Credits: 3

Course Outcomes

1. The graduate will be aware of the latest trends, modern standards and state-of-the-art techniques

for solving geotechnical engineering problems.

2. The graduate will be able to develop design a geosynthetic system to meet desired needs such as

economic, environmental and sustainability related.

3. The graduate will be able to identify, formulates and solve soil stability related problems.

Syllabus

The special geotechnical constructions and process to be studied are:

Dewatering, Braced Excavation, Diaphragm walls, Ground (soil and rock) anchors, Soil nailing,

Screw piles, Secant pile walls, Gabbion walls, Deep soil mixing walls, Geofoam and Geocells.

The state of the art, studying with respect to the following aspects is expected:

1. Types, uses and applications
2. Construction techniques / methods
3. Equipments, machineries required
4. General design considerations
5. Analysis and quantitative design solution

6. Important case studies (in India and Abroad)

Text Book

1. Construction of Diaphragm wall : I. Hajal, J. Morton and Z. Regals, series in Engineering Publications.
2. Foundation Engineering Handbook: Chapter no. 26, H.Y. Fang, CBS Publishers (2004).
3. Theory & practice of foundation Design: Som N.N. & Das S.C., Prentice Hall Edn, Asia (2002).

Reference Books

1. FHWA Reports and Publications.
2. Relevant IS codes and papers from various refereed journals and proceedings.

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Department of Civil Engineering

Syllabus for Semester B.Tech VII

Course Code: CET7004-3 Course Name : Industrial structures

L :3 Hrs., P : Hrs., Per Week

Credits: 3

Course Outcomes

- 1. An ability to understand the provision of IS code used for design of industrial structures.**
- 2. An ability to estimate various loading coming on industrial structures and understand its behaviour due to its influence.**
- 3. An ability to produce safe and economical design of various industrial structures satisfying codal requirements.**

Syllabus

Introduction : Industrial building frames: Types of frames, bracing, gantry girders and columns, workshop sheds, trussed bents. Introduction to Pre Engineered Buildings.

Chimneys : Loads and stresses in chimney shaft, earthquake and wind effect, stresses due to temperature difference, combined effect of loads and temperature, temperature. Design of chimney; Silos and Bunkers : Jassen's theory, Airy's theory, Shallow and deep bins. Rectangular bunkers with slopping bottom, Rectangular bunkers with high side walls; Steel stacks; introduction, force acting on a steel stack, design consideration, design example of stacks; Machine foundations : Introduction, machine vibration, structural design of foundation to rotary machines, impact machines, vibration characteristics, design consideration of foundation to impact machine, grillage, pile and raft foundation. Pre engineered structures.

Text Books

- 1. Illustrated Design of RC Buildings by V. L. Shah and S. R. Karve, Standard Publisher**

2. Limit State Theory and Design of Reinforced Concrete, Karve S.R. and Shah V.L, Structures Publications, Pune. 2007
3. Practical Design of Reinforced Concrete Structures, Ghosh Karuna Moy, PHI Learning Pvt. Ltd.
4. Jain A.K., "Introduction to Earthquake Engineering Structures."
5. S.K. Duggal, "Earthquake Resistant Design of Structures."
6. Design & Construction of Silos & Bunkers: Sargis S. Safarian, Earnest C Harris

References Books

1. Chopra A.K., Dynamics of Structures, Theory & Application to earthquake Engineering, 2nd edition Pearson Education (Singapore) Pvt, Ltd, New Delhi, 1995.
2. Seismic design of RC & masonry buildings: Paulay & Prestiley, Thomas P. & M. J. N. Prestiley A.Wiley, Inter Science Publication.
3. RCC Design, Menon & Pillai, Tata McGraw-Hill publications
4. Limit state Design of reinforced conc. (As per IS 456:2000), Dr. BC Punmia, A.K. Jain, Laxmi publications.

Reference Codes

1. IS:1893-2002 and 2016 Part I Earthquake Criteria
2. IS:13920-1993 and 2016 Ductile Detailing
3. IS:9178-1979 reaffirmed 1995
4. IS: 4995(Part 1 and Part 2)-1974 5. IS 456-2007 / IS 800 2007
6. ACI 313-77 (1984)
7. BS 5061

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Department of Civil Engineering

Syllabus for Semester B.Tech VII

Course Code: CE7004-4 Course Name : Air Pollution &Control

L :3 Hrs., P : Hrs., Per Week Credits: 3

Course Outcomes

The students would be able to:

1. Understand and describe various types of air pollutants and its sources, air pollution parameters, Effects of air pollutants.
2. Determination techniques of air pollutants along with the importance of meteorological parameters in air pollution. methods of sampling and analysis of air pollutants
3. Knowledge about Control of various air pollutants methodology and modelling.
4. Knowledge of noise pollution its management and control.

Unit I

Introduction to air pollution, Air pollutants, Sources, classification, Effects on Health, vegetation, materials and atmosphere, Reactions of pollutants in the atmosphere and their effects- Smoke, smog and ozone layer disturbance, Greenhouse effect.

Unit II

Meteorological parameters affecting air pollution, Micrometeorological processes lapse rate and

atmospheric stability, plume behavior, wind rose, pollution rose, Stack height computation, Regional air quality models, Source inventories and significance, Gaussian and other dispersion model.

Unit III

Air sampling and pollution measurement methods, principles and instruments, Ambient air quality and emission standards, Air pollution indices, Air Act, legislation and regulations,

control principles, Removal of gaseous pollutants by adsorption, absorption, reaction and other methods.

Unit IV

Particulate emission control, settling chambers, cyclone separation, Wet collectors, fabric filters, electrostatic precipitators, scrubbers and other removal methods like absorption, adsorption, precipitation etc. Biological air pollution control technologies, Indoor air quality.

Unit V

Noise pollution : Sources, Basics of acoustics and specification of sound; sound power, sound intensity and sound pressure levels, calculation of weighted noise level index; plane, point and line sources, multiple sources; outdoor and indoor noise propagation, effects of noise on health, annoyance rating schemes;

Unit VI

Introduction to vehicular pollution, special noise environments; noise standards and limit values; noise instrumentation and monitoring procedure, Noise indices, Noise management and control methods.

Text Books

1. Rao M.N. and Rao H.V. N, Air Pollution, Tata Mc-Graw Hill Publishing Co. New Delhi, Third Edition, 1992.
2. Rao C.S., Environmental Pollution Control Engg, New Age International Pvt. Ltd. Publishers, 2006.
3. Y. Anjaneyulu, A textbook of air pollution & control technology, Allied publishers
4. Environmental Noise Pollution – PE Cunniff, McGraw Hill, New York, 1987

References

1. Air Pollution, NEERI Manual.
2. Nevers N.D, Air Pollution control Engineering, Editions Civil Engineering series, 1995.
3. Stern A. C, Air pollution, Tata McGraw Hill International, Vol I to IX

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Department of Civil Engineering

Syllabus for Semester B.Tech VII

Course Code: CET7004-5 Course Name : Digital Technologies for Civil Engineerings

L :3 Hrs., P : Hrs., Per Week

Credits: 3

Course Objectives (COs)

1. To introduce modern digital tools and technologies transforming civil engineering practice.
 2. To develop skills in Building Information Modelling (BIM), data-driven decision-making, and automation.
 3. To familiarize students with emerging technologies like IoT, AI, and digital twins in infrastructure.
 4. To enable students to integrate design, analysis, and project management using digital platforms.
-

Course Outcomes (As per NBA Guidelines)

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

- **CO1:** Explain key digital technologies and their applications in civil engineering. (K2)
 - **CO2:** Apply BIM tools for integrated modelling, coordination, and documentation. (K3)
 - **CO3:** Analyze civil engineering problems using data analytics and computational tools. (K4)
 - **CO4:** Develop basic automation workflows using programming/scripting tools. (K3)
 - **CO5:** Evaluate the impact of emerging technologies (AI, IoT, Digital Twins) on infrastructure systems. (K5)
-

Module-wise Syllabus

Module 1: Introduction to Digital Transformation in Civil Engineering (6 Hours)

- Evolution from CAD to BIM and Digital Engineering

- Industry 4.0 in construction
 - Digital lifecycle of infrastructure projects
 - Overview of digital platforms and workflows
 - Case studies of digital construction projects
-

Module 2: Building Information Modelling (BIM) – Advanced Concepts (10 Hours)

- BIM levels and maturity (Level 0–3)
 - 3D, 4D (time), 5D (cost), and 6D (sustainability) BIM
 - Model coordination and clash detection
 - Interoperability and data exchange (IFC format)
 - Common Data Environment (CDE)
 - BIM execution planning
-

Module 3: Data Analytics and Computational Tools (8 Hours)

- Role of data in civil engineering
 - Data collection, cleaning, and visualization
 - Introduction to tools like Excel, Python basics
 - Predictive analysis for construction and infrastructure
 - Use of dashboards for decision-making
-

Module 4: Automation and Parametric Design (8 Hours)

- Concepts of automation in civil engineering
 - Visual programming tools (e.g., Dynamo for Revit)
 - Parametric modelling concepts
 - Workflow automation in drafting and modelling
 - Introduction to APIs and scripting basics
-

Module 5: Emerging Digital Technologies (8 Hours)

- Artificial Intelligence (AI) in civil engineering
- Internet of Things (IoT) for smart infrastructure
- Digital Twin concept and applications
- Use of drones (UAV) in surveying and monitoring
- 3D printing in construction

Module 6: Project Management and Digital Collaboration (6 Hours)

- Digital project management tools
 - Scheduling integration (4D BIM)
 - Cost estimation integration (5D BIM)
 - Cloud-based collaboration platforms
 - Version control and document management
-

Module 7: Smart Cities and Sustainable Infrastructure (4 Hours)

- Role of digital technologies in smart cities
 - Sustainable infrastructure planning
 - Case studies (Indian and global context)
-

Practical / Laboratory Component (2 Hours/Week)

1. Advanced modelling using Revit (multi-disciplinary model)
 2. Clash detection using BIM tools (e.g., Navisworks)
 3. Basic scripting using Dynamo
 4. Data analysis using Excel/Python
 5. 4D simulation (linking schedule with model)
 6. Mini-project: Digital workflow for a small civil project
-

Text Books

1. Eastman et al. – *BIM Handbook*
 2. Kensek & Noble – *Building Information Modeling*
 3. Sacks, Eastman, Lee – *BIM for Construction Management*
-

Reference Books

1. P. Teicholz – *BIM for Facility Managers*
2. McKinsey Reports – *Digital Transformation in Construction*
3. Smith – *Introduction to Digital Construction*
4. Selected research papers and IS codes (latest)

Suggested Assignments / Projects

- BIM-based modelling of a residential/commercial building
- Clash detection report and resolution strategy
- Development of parametric model using Dynamo
- Data analytics case study (construction productivity, cost)
- Study report on Digital Twin or Smart City project

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Department of Civil Engineering

Syllabus for Semester B.Tech VII

Course Code: CET7004-6 Course Name : Watershed Conservation and Management

L :3 Hrs., P : Hrs., Per Week

Credits: 3

- **C01:** Explain watershed concepts, hydrological cycle, and basin characteristics. *(K2)*
 - **C02:** Analyze runoff, infiltration, erosion, and sediment transport processes. *(K3)*
 - **C03:** Design watershed management strategies including soil and water conservation measures. *(K4)*
 - **C04:** Apply GIS and remote sensing tools for watershed planning and evaluation. *(K3)*
 - **C05:** Evaluate socio-economic and environmental impacts of watershed projects. *(K5)*
-

Module-wise Syllabus

Module 1: Introduction to Watershed (6 Hours)

- Definition and concept of watershed
 - Watershed characteristics: size, shape, slope, drainage density
 - Hydrological cycle in watershed context
 - Types of watersheds (micro, mini, macro)
 - Watershed problems: soil erosion, flooding, drought
-

Module 2: Hydrological Processes in Watershed (8 Hours)

- Rainfall-runoff relationship
 - Infiltration and evapotranspiration
 - Surface runoff estimation methods
 - Hydrograph analysis
 - Groundwater recharge mechanisms
-

Module 3: Soil Erosion and Sediment Transport (8 Hours)

- Causes and types of soil erosion

- Erosion prediction models (USLE concept)
 - Sediment yield estimation
 - Impact of erosion on reservoirs and rivers
 - Erosion control measures
-

Module 4: Watershed Management Practices (10 Hours)

- Principles of watershed management
 - Structural measures:
 - Check dams
 - Contour bunding
 - Terracing
 - Gully control structures
 - Non-structural measures:
 - Afforestation
 - Crop management
 - Land use planning
 - Rainwater harvesting techniques
-

Module 5: Watershed Planning and Modelling (8 Hours)

- Watershed planning approach
 - Prioritization of watersheds
 - Hydrological modelling basics
 - Introduction to decision support systems
 - Climate change impact on watershed
-

Module 6: GIS & Remote Sensing Applications (6 Hours)

- Basics of GIS in watershed management
 - Remote sensing data interpretation
 - Digital Elevation Models (DEM)
 - Watershed delineation using GIS tools
 - Case studies using GIS
-

Module 7: Socio-Economic and Environmental Aspects (6 Hours)

- Community participation in watershed development
 - Integrated watershed management
 - Environmental impact assessment
 - Government schemes (e.g., watershed development programs in India)
 - Sustainability and policy framework
-
-

Text Books

1. K. Subramanya – *Engineering Hydrology*
 2. Murthy, J.V.S. – *Watershed Management*
 3. Tideman, E.M. – *Watershed Management: Guidelines*
-

Reference Books

1. R. Suresh – *Soil and Water Conservation Engineering*
2. Chow, V.T. – *Applied Hydrology*
3. FAO Guidelines – *Watershed Management Field Manual*
4. Jha & Singh – *Watershed Planning and Management*

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Department of Civil Engineering

Syllabus for Semester B.Tech VII

Course Code: CET7005-1 Course Name: Highway Construction and Management

L :3 Hrs., P : Hrs., Per Week

Credits: 3

Course Outcome

1. Students should be able to describe and explain design principle of Flexible pavement
2. Students should be able to describe and explain design principle of Concrete pavement
3. Student should be able to explain various material required for construction of roads along with their properties
4. Students should be able to describe various evaluation techniques for pavements along with the maintenance measures.

UNIT - I Flexible Pavement Construction Earthwork, compaction and construction of embankments, specifications of materials, construction methods and field control checks for various types of flexible pavement materials in sub-base, base, binder and surface course layers and their choice

UNIT - II Cement Concrete Pavement Layers Specifications and method of cement concrete pavement construction; Construction of interlocking block pavements, Quality control tests; Construction of various types of joints; Soil Stabilized Pavement Layers: Principles of gradation/proportioning of soil aggregate mixes and compaction; Design factors, mix design, construction control and quality control checks for mechanical, soil- cement, soil-bitumen and soil-lime stabilization methods. Use of additives, Numerical problems on mix design and applications

UNIT - III Pavement Evaluation Pavement Distress - Functional and structural condition of pavements, Pavement distress survey, Functional condition evaluation of pavements- Roughness, Skid Resistance. Structural evaluation of pavements non-destructive testing, Benkelman beam and Falling Weight Deflectometer, Pavement strengthening based on deflection as per IRC

UNIT - IV Maintenance and rehabilitation techniques Pavement Management Systems - Pavement Management Systems- Components, structure, data requirements, Project level and Network level needs, Pavement performance prediction – concepts, modelling techniques– AASTHO, CRRRI and HDM models, Budget forecasting for maintenance and rehabilitation, Ranking and optimization methodologies, life cycle costing.

Text Books

1. Highway Engineering : Khanna & Justo
2. A text book of highway engineering: R Srinivas Kumar

Reference Book 1. Pavement Analysis and Design: Yang H Huang

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Department of Civil Engineering

Syllabus for Semester B.Tech VII

Course Code: CET7005-2 Course Name: Advanced Geotechnical Engineering

L : 3 Hrs., P : Hrs., Per Week

Credits: 3

Course Outcomes

On successful completion of the course students would be able to;

1. Understand the various properties of the soils and their determination.
2. Do the settlement analysis in different conditions and design the foundations.
3. Analyse the modern approach for investigations of soil properties.

Syllabus

- General Concepts: Soil Structure, Consistency of Cohesive Soils, plasticity, Clay Activity, Atterberg Limits, USCS and AASHTO Soil Classification.
- Stresses in Soils: Geostatic and External Stresses in Soils, Pore Water Pressure Concept, Boussinesq and Westergaard Relationships for External Stress. Calculations, Effect of Ground Water Table.
- Shear Strength of Soils: Stress Path, Mohr Circle, Mohr-Coulomb Failure Criteria, Shear Strength in the Laboratory (Direct Shear Test, Triaxial Compression Test, CU, UU and CD tests), Skempton's Pore Water Pressure Parameters, Shear Strength in the Field (Vane Shear, CPT, SPT, PMT, CBR)
- Settlement Analysis of Soils: Consolidation Theory, Immediate Settlement in Granular Soils, Primary consolidation, Secondary Compression, Time Rate of Settlement, Methods for Accelerating Consolidation Settlements, Pre-compression.
- Design of Foundations: Introduction, general principles, strip and pad foundations, building on shrinkable soil, building on fill, raft foundation –

variable soil and make up ground, pile foundation – choice, types; construction problems.

- Introduction to Unsaturated Soil Mechanics: Types of problems, typical profiles of unsaturated, tropical and residual soil, expansive and collapsing type of soils. Origin and formation, identification and classification of expansive and collapsing soils, Contractile skin.
- Collapse and Heave: Collapse potential and swell potential, importance and their determination by different laboratory methods, Heave prediction based on Oedometer tests, suction tests and empirical procedures, heave and collapse settlement.
- Technical Forensic Investigation: Collection of data, problem characterization, development of failure hypotheses, a realistic backanalysis, field observations and performance monitoring, modelling of failure hypothesis and quality control of formal and technical aspects of the work. Numerical Problems.

Text Book

1. Das, B. M. (2008). Advanced Soil Mechanics. Taylor and Francis Group, London, Second edition.
2. Murthy, V.N.S. (2002). Geotechnical Engineering: Principles and Practices of Soil Mechanics and Foundation Engineering. CRC Publications
3. Coduto, D. P. (1999). Geotechnical Engineering: Principles and Practices, Prentice Hall
4. Gopal Ranjan, Rao A.S.R. (2007). Basic and Applied Soil Mechanics Foundation Engineering, New Age Publications
5. Som N. N. & Das S.C. (2002): Theory & practice of foundation Design, Prentice Hall Edn, Asia

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Department of Civil Engineering

Syllabus for Semester B.Tech VII

Course Code: CET7005-3

Course Name :Bridge Engineering

L :3 Hrs., P : Hrs., Per Week

Credits: 3

- I Introduction to bridges, classification, computation of discharge, linear waterway, economic span, afflux, scour depth
Design loads for bridges, introduction to I.R.C. loading standards, Load Distribution Theory, Bridge slabs, Effective width,

Introduction to methods as per I.R.C.
- II Straight and skew slab bridges
- III Design of T beam bridges (up to three girders only)
Proportioning of components, analysis of slab using IRC Class AA tracked vehicle, structural design of slab, analysis of cross girder for dead load & IRC Class AA tracked vehicle, structural design of cross girder, analysis of main girder using Courbon's method, calculation of dead load BM and SF, calculation of live load B M & S F using IRC Class AA Tracked vehicle. Structural design of main girder.
- IV Other Bridges: Design of Box culvert (Single vent only), Design of Pipe culverts
- VI Substructures - Design of Piers and abutments, Introduction to Bridge bearings, Hinges and Expansion joints.

Essential Readings

1. N Krishna Raju, "Design of Bridges, Oxford and IBH publishing company
2. T R Jagadeesh and M A Jayaram, "Design of bridge structures", Prentice Hall of India

Supplementary Readings

1. Jain and Jaikrishna, "Plain and Reinforced Concrete", Vol.2., Nem Chand Brothers
2. Standard specifications and code of practice for road bridges, IRC section I, II, III and IV.
3. "Concrete Bridges", The Concrete Association of India

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Department of Civil Engineering

Syllabus for Semester B.Tech VII

Course Code: CET7005-4 Course Name : Environmental System Modeling

L :3 Hrs., P : Hrs., Per Week

Credits: 3

COURSE CONTENT

1 Introduction:

Scope of Environmental Modeling, Mass balances, Basic concepts of transport phenomena, Chemical reaction kinetics, equilibrium, chemical modeling.

2 Environmental Modeling: Eutrophication of lakes, stoichiometry, phosphorus as a limiting nutrient, mass balance on total phosphorus in lakes ,dynamic ecosystem, Models for Eutrophication Assessments

3 Conventional pollutants in rivers: Introduction, mass balance equation, plugs flow systems, Streeter- Phelps equation, modifications to Streeter Phelps equation, Dissolved oxygen in rivers & estuaries.

4 Ground water contamination: Introduction, Darcy's law, flow equations, Contaminant solute transport equation, Bio transformations.

5 Air Quality Modeling: Types of modeling techniques, Modeling for nonreactive pollutants, single source, multi source and area source models, fixed box models, diffusion models, dispersion models, receptor and source oriented models

6 Applications: Software based applications- Air quality and water quality modeling

Reference Books:

1. Environmental modelling: Fate & transport of pollutants in Water, Air and Soil by Jerald L

Schnoor.

2. Environmental Modelling by John Wainwright & Mark Mulligan

3. Modelling the Eutrophication Process by M W Lorenzen

Course Outcome:

After learning the course the students should be able to:

1. Understand the fate and transport of pollutant which is discharge into environmental sinks like

river, lake and atmosphere.

2. Predict the ground water contamination.

List of Experiments: Term work will comprise of assignment and exercises based on mass balances, Basic

concepts of transport phenomena, chemical modeling, Eutrophication of lakes, Conventional pollutants in

rivers, ground water contamination, climate and climate system modeling

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Department of Civil Engineering

Syllabus for Semester B.Tech VII

Course Code: CET7005-5 Course Name: Numerical Methods for Civil Engineers

L :3 Hrs., P : Hrs., Per Week

Credits: 3

Course Outcomes

1. An ability to apply numerical methods to obtain approximate solutions to mathematical problems involved in civil engineering domain.
2. Ability to analyse and evaluate accuracy of various numerical methods and their applicability in civil engineering.

Syllabus

Solution of algebraic equations : Bisection Method, Regula Falsi Method, Newton-Raphson method

Interpolation & Extrapolation techniques : Newton's Forward Difference Technique, Newton's

Backward Difference Technique

Numerical integration techniques : Simpson's method, Trapezoidal method, Gauss Quadrature

method

Solution of linear algebraic equations : Direct methods and iterative methods Eigen values problems: Direct,

Jacobi, Givens Method, Householders method.

Text Books

1. S.S.Sastry, Introductory methods of numerical analysis, PHI,4 Edition,2005.
2. Numerical methods, Principles, Analyses and Algorithms: Srimanth Pal, Oxford University Press, New Delhi.
3. Numerical Mehtods: Salvadori M., PHI learning Pvt, ltd., New Delhi, (1987

Shri Ramdeobaba College of Engineering and Management, Nagpur.

Department of Civil Engineering

Syllabus for Semester B.Tech VII

Course Code: CET7005-6 Course Name: Climates Change & Mitigation

L : 3 Hrs., P : Hrs., Per Week

Credits: 3

About the course

Course content

The course addresses the main drivers of climate change and the challenge posed by climate mitigation: approaches to avoid a uncontrolled and large climate change through global warming. The course addresses following issues:

- (1) The greenhouse effect, global warming and the response of the climate system to anthropogenic emissions or land use changes;
- (2) possible consequences of climate change, adaptation and associated costs;
- (3) biogeochemical cycles of carbon and other important greenhouse gases and biophysical properties of land-climate interactions;
- (4) analysis of the dynamics of emissions using scenario models (SSPs, RCPs) and quantification of climate change impacts and mitigation benefits (radiative forcing, temperature, CO₂-equivalents);
- (5) technological options to reduce emissions (renewable energy, changes in lifestyle, negative emission technologies and solar radiation management) and land management strategies for climate change mitigation, their characteristics, costs, co-benefits and barriers;
- (6) climate mitigation status and experience in selected sectors, such as industry, transport, energy and households;
- (7) climate policy instruments and framework conditions (Paris Agreements).

Learning outcome

Knowledge: The student should be able to

i) explain causes of global warming, as well as emission trends and driving forces that are responsible for fossil fuel emissions and deforestation

ii) identify technological options to reduce emissions, their barriers and costs and co-benefits.

iii) explain climate policy tools, their theoretical merits and practical experiences iv) explain the understanding of climate mitigation in different disciplines and the discipline's contribution to climate mitigation. v) recognize co-benefits, tradeoffs, potentials, and limitations of a wide range of climate change mitigation options, from the energy to the land sector (including negative emission technologies and geoengineering). Competences: The student should be able to i) Identify, find and interpret relevant knowledge in the scientific literature on climate mitigation. ii) Explain the terminology and principles for assessing climate mitigation measures. iii) Identify actors and assess potential challenges and barriers associated with the implementation of climate mitigation measures and policies as well as the consequences of these. iv) Quantify climate change impacts and mitigation benefits through appropriate metrics. v) Report and discuss climate-relevant aspects in a scientifically rigorous way. General competency: The student should be able to i) Understand anthropogenic climate change and its causes. ii) Understand the challenge posed by climate change with respect to ethics and international politics. iii) Understand the assessment of climate mitigation measures. iv) Interpret analyses and model results in the field of climate mitigation.

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Syllabus for Semester B.Tech VII

Course Code: CETM7006 Course Name : Metro Rail Transportation Design and Construction

L : 2 Hrs., P : Hrs., Per Week Credits: 2

- **C01:** Explain concepts of MRTS, metro rail systems, and urban transport integration. *(K2)*
- **C02:** Analyze metro rail planning principles including demand forecasting and TOD. *(K4)*
- **C03:** Design basic components of metro systems such as alignment, stations, and track structures. *(K3)*
- **C04:** Select suitable construction techniques including tunneling and underground works based on ground conditions. *(K3)*
- **C05:** Evaluate instrumentation, monitoring systems, and safety aspects in metro rail construction. *(K4)*

Unit 1: Introduction to MRTS and Metro Rail Systems

- Urban transportation problems
 - Mass Rapid Transit Systems (MRTS) – Types and characteristics
 - Role of metro rail in sustainable urban development
 - Case studies of Indian metro systems
-

Unit 2: Planning of Metro Rail Systems

- Urban transport planning principles
 - Demand forecasting techniques
 - Route alignment and corridor selection
 - Transit-Oriented Development (TOD) concepts
 - Integration with other transport modes
-

Unit 3: Design Components of Metro Rail

- Track structure (ballasted and ballastless track)
 - Rolling stock basics
 - Station planning and design
 - Signaling and control systems
 - Power supply and electrification
-

Unit 4: Construction of Metro Rail Systems

- Construction methodologies (elevated, at-grade, underground)
 - Tunneling methods:
 - Tunnel Boring Machine
 - New Austrian Tunneling Method
 - Cut-and-cover construction
 - Pre-excavation and ground support systems
-

Unit 5: Instrumentation, Monitoring & Safety

- Tunnel instrumentation systems
 - Ground movement monitoring
 - Risk assessment and safety practices
 - Quality control in metro construction
 - Environmental and social impacts
-

Text Books

1. V.N. Vazirani & S.P. Chandola – *Transportation Engineering*
 2. Metro Rail Corporation Manuals (DMRC Publications)
 3. S.C. Saxena – *Tunnel Engineering*
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Reference Books

- Urban Mass Transit Systems and Technology
- Railway Engineering
- Delhi Metro Rail Corporation Reports & Manuals
- Ministry of Housing and Urban Affairs Guidelines on Metro Rail Policy

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Department of Civil Engineering

Syllabus for Semester B.Tech VII

Course Code: 25ES01PR0705 Course Name : Minor project

L : 0 Hrs., P : 8 Hrs., Per Week Credits: 4

Project work on any civil Engineering topics

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Department of Civil Engineering

Syllabus for Semester B.Tech VIII

(Option 1)

Course Code: CEP8001 Course Name : Major Project

L : 0 Hrs., P : 12 Hrs., Per Week Credits: 6

Project work on any civil Engineering topics

Shri Ramdeobaba College of Engineering and Management, Nagpur.

Department of Civil Engineering

Syllabus for Semester B.Tech VI

Course Code: CET8002

Course Name: Retrofitting & Rehabilitation of Civil Infrastructure

L : 3 Hrs., P : 0 Hrs., Per Week

Credits: 3

Course Outcomes

Student shall be able to

1. visualize and elaborate the root causes of damage and deterioration of structures
2. identify, suggest and explain damage assessment method based on condition of structure
3. aware of different available repairing materials and their specific application
4. aware of different available repairing techniques and case studied

Unit1

Strength and Durability of structures 10

a. Inspection, identification and diagnosis of common defects and failure with possible cause in

buildings and infrastructural utilities

b. Holistic Models of deterioration in RCC

c. Corrosion in RCC: Type of corrosion, causes of corrosion of embedded reinforcement in

concrete, effect of reinforcement, corrosion on concrete. Oxidation process between two metals in

contacts and its preventive maintenance.

d. Permeability in concrete

Unit2

DamageAssessment methods 10

- a. Concept of structural auditing
- b. Condition Survey
- c. Non Destructive testing of Structures (UPV, Rebound hammer, Half cell potentiometer, RCPT,Covermeter,Coretesting,etc.)
- d. Performance evaluation

Unit3

Repairing materials 10

- a. Grouts, FRP wrapping materials, Micro concrete, Adhesives and sealants, Corrosion inhibitors,Specialtypesofconcretesetc.

Unit4

TechniquesforRepairandProtectionMethods 10

- a. Shoring,Underpinning,Jacketing,FRPapplication,Grouting,Guniting,Case studies

References

1. Denison Campbell, Allen and Harold Roper, "Concrete Structures, Materials,Maintenance and Repair",LongmanScientificandTechnicalUK,1991.
2. Shetty M.S.,"Concrete Technology -Theory and Practice", S.Chand and Company, 2008
3. HandBookonrepairandrehabilitationofRCCbuilding,CPWD,GOI,NewDelhi
- 4.Ravishankar.K., Krishnamoorthy.T.S, " Structural Health Monitoring, Repair andRehabilitationofConcreteStructures",AlliedPublishers,2004.
5. Dov Kominetzky.M.S., "Design and Construction Failures, TMH

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Syllabus for Semester B.Tech VIII

Course Code: CET8003 Course Name Irrigation Engineering

L : 3 Hrs., P : Hrs., Per Week Credits: 3

Course Outcomes

The students would be able to:.

Identify, describe and explain the necessity and scope of irrigation engineering.

Understand the various types of irrigation schemes, its components and their functions.

Apply knowledge of basic science and engineering principles for analysis and design of various

components of irrigation scheme.

Justify and describe the necessity of various repairs and maintenance work and its methodology

for various components of irrigation scheme.

Unit I

Introduction : Necessity ,Importance, Benefits and ill effects of Irrigation; Classification of Irrigation schemes; General principles of flow, lift, perennial, inundation Irrigation systems; Comparative study of sprinkler and drip Irrigation systems.

Water Requirement of Crops : Suitability of soils for Irrigation, Standards of Irrigation water; PET-R method of crop water requirements; Depth & frequency of Irrigation; Command area classification, Relation between duty and delta; Factors affecting duty; Principal crops in India; Crop rotation; Methods of assessment of Irrigation water.

Unit II

Dams : Classification of dams on basis of use, hydraulic design and materials; Factors governing, selection of type of dam. Gravity Dam : Definition; forces acting on gravity dam; stability requirements; Theoretical & practical profile of gravity dam; Low & High dam; Galleries.

Unit III

Earthen Dams : Types and component parts of earthen dams, seepage and drainage arrangements; Failure of earthen dams; Plotting of phreatic line for homogeneous earthen dams with horizontal filters; Stability checks.

Unit IV

Spillways : Types of spillway, design principles of ogee spillway; Spillway gates – vertical lift, radial, rolling and drum; Energy dissipation methods on downstream of spillways.

Diversion Head Works : Parts of diversion headworks; Causes of failure of weirs on permeable foundation; Bligh's Creep theory; Dr. Khosla's theory for design of weirs on permeable foundations.

Unit V

Canals: Types of canal; Alignments of canal; Cross section of Irrigation canals; Balancing depth; Losses in canals. Canals In Alluvial Soils : Kennedy's silt theory – Design procedure, silt supporting capacity, drawbacks; Lacey's silt theory - Definition of initial, final and permanent regime channels, Lacey's Regime equation, channel design procedure, drawbacks; Garret's diagram and Lacey's diagram for channel design. Lined Canals : Design procedure, types of lining, relative merits and demerits of canal lining, Economics of canal lining

Unit VI

Canal Regulation Works : Theoretical aspects of location, objects, classification, components and schematic section of Head Regulator, Cross regulators, canal escapes,

Canal falls and canal outlets. Cross Drainage Works : Theoretical aspects of location, objects, classification, components and

schematic section of aqueducts, siphon aqueducts, super passage, canal siphon, inlets and level

crossings. Water Logging and Land Drainage : Causes, effects, preventive measures of water logging, Types of drains, Layout of tile drains system, flow of ground water to drains.

Soil Erosion : Causes, effects and control

Text Books

Santosh Kumar Garg , Irrigation Engineering and Hydraulic Structures, Khanna Publishers.

B. C. Punmia , Irrigation Engineering and water Power Engineering, Laxmi Publications.

References

K. R. Arora, Engineering and Hydraulic Structures, Standard Publishers.

R. K. Sharma , Irrigation Engineering and Hydraulic Structures, S. Chand Publications.

G. L. Asawa , Irrigation and Water Resources Engineering , New Age International Publishers.

P. N. Modi , Irrigation Engineering, Standard Publishers

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Department of Civil Engineering

Syllabus for Semester B.Tech VIII

(Option 2)

Course Code: CEP8004 Course Name : Industry Internship

L : Hrs., P : Hrs.24, Per Week Credits: 12

Course Outcomes

The students would be able to;

1. Acquired the knowledge about construction process and technical information about the execution and maintenance of civil engineering works.
2. Understand the processes and work ethics so as to develop the essential skills.

Students are required to complete minimum six week internship in industry/research organization /IIT / IISc / IIIT / NIT / In-house research internship at RCOEM during the winter/summer vacations prior to the Commencement of Semester-VII.

On completion, the student has to submit the internship report/s and internship completion

certificate/s issued by the organization(s) where it was completed, to the department.

The department will evaluate the same by way of Seminar/Viva-voce etc in the department in

Semester-VII as an Audit Course. Student shall be required to secure Satisfactory 'SF' grade in it.

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Department of Civil Engineering

Syllabus for Semester B.Tech VIII

(Option 3)

Course Code: CEP8005 Course Name : Research Internship

L : Hrs., P : Hrs.18, Per Week Credits: 9

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Syllabus for Semester B.Tech VIII

Course Code: CEP8006 Course Name : MOOC\Classwork suggested by Supervisor

L : 3 Hrs., P : Hrs., Per Week Credits: 3

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Syllabus for Semester B.Tech VIII

(Option 4)

Course Code: CEP8007 Course Name : TBI Internship

L : Hrs., P : Hrs.24, Per Week Credits: 12

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REQUIRED**