

Autonomous
6th Sem

Priyadarshini J. L. College of Engineering
An Autonomous Institute, Affiliated to RTM Nagpur University, Na
Department of Civil Engineering
Scheme of Teaching & Examination
Sixth Semester for B-Tech Programme (NEP)

Scheme :- BTECH/CE/NEP-24/RO

Sixth Semester

Sr. No.	Type of Course	Credits as per Category	Course Code	Course Title	Teaching Scheme (Clock Hours/Week)			Credits	Maximum Marks			Minimum Marks			End Semester Exam Duration (Hrs)
					L	T	P		Continuous Evaluation	End Semester Exam	Total Marks	Continuous Evaluation	End Semester Exam	Total Marks	
					1	PCC	11		CE601T	Fluid Mechanics	3	0	0	3	
2	CE601P	Fluid Mechanics Lab	0	0	2			1	25	25	50	---	---	25	---
3	CE602T	Design of Steel Structure	3	0	0			3	40	60	100	---	15	45	4
4	CE602P	Design of Steel Structure Lab	0	0	2			1	25	25	50	---	---	25	---
5	CE603T	Surveying and Geomatics	3	0	0			3	40	60	100	---	15	45	3
6	PEC	7	CE604T	Program Elective-II Refer Program Elective Basket	3	0	0	3	40	60	100	---	15	45	3
7			CE604P	Program Elective-II Lab Refer Program Elective Basket	0	0	2	1	25	25	50	---	---	25	---
8			CE605T	Program Elective-III Refer Program Elective Basket	3	0	0	3	40	60	100	---	15	45	3
9	MDM	2	CSE / AI / ETC / EE / 606T	Branch Wise Course (CSE / AI / ETC / EE)	2	0	0	2	20	30	50	---	8	23	2
10	VSEC	2	CE607P	Field Surveying	0	0	4	2	50	50	100	---	---	50	---
Total =					17	0	10	22			800				

- NOTE:- 1. Refer Annexure - I for MDM Courses - CSE / AI / ETC / EE / 606T
2. Refer Annexure - II for Exit Option of B. Voc. in Civil Engineering.
3. Internship / OJT after sixth sem examination

Abbreviations:-

L- Lecture, T- Tutorial, P- Practical

PCC - Programme Core Course, PEC - Programme Elective Course, MDM - Multidisciplinary Minor, VSEC - Vocational and skill enhancement Courses.

Multidisciplinary Minor			
Sr. No.	Category	Course Code	Course Name
1	MDM	CE606T	Property Acquisition and Legal Aspects.

Programme Elective Basket			
Sr. No.	Category	Course Code	Course Name
1	PEC-III	CE605TA	Advanced Concrete Technology
2		CE605TB	Climate Change And it's Mitigation
3		CE605TC	Railway Engineering
4		CE605TD	Repair and Rehabilitation of Civil Engineering Structures

Programme Elective Basket			
Sr. No.	Category	Course Code	Course Name
1	PEC-II	CE604TA	Advanced Concrete Structure
		CE604PA	Advanced Concrete Structure Lab
		CE604TB	Water and Waste Water Treatment
2		CE604PB	Water and Waste Water Treatment Lab
		CE604TC	Advanced Reinforced Cement Concrete Design
3		CE604PC	Advanced Reinforced Cement Concrete Design Lab

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Dr. Mohan Prasad Patil

Chairman, BOS (Civil Engg.)

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DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS OF THIRD YEAR BACHELOR OF TECHNOLOGY,
SEMESTER VI

COURSE :- FLUID MECHANICS

COURSE CODE: CE601T

Hours/ Week	Credits	Duration of End Sem Exam	Continuous Evaluation	End Sem Exam	Total Marks
3 Hrs	3	3 Hrs	40	60	100

Course Objectives:

1.	To impart the importance and practical significance of various fluid properties.
2.	To discuss and evaluate various forces acting on partially and fully submerged bodies.
3.	To discuss and evaluate the importance of various parameters on the fluid motion.
4.	To discuss various flow measuring devices with their practical applications.
5.	To deliberate the concept of impulse momentum principle, dimensional analysis and model analysis of a fluid phenomenon.

Course Outcomes:

After completion of the course, the student will be able to

CO1	Understand the importance and practical significance of various fluid properties.
CO2	Comprehend and estimate various forces acting on partially and fully submerged bodies.
CO3	Evaluate the importance of various parameters on the fluid motion.
CO4	Know various flow measuring devices with their practical applications.
CO5	Illustrate the concept of impulse momentum principle, dimensional analysis and model analysis of a fluid phenomenon.

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D. D. Chitambar

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Scheme :- BTECH/CE/NEP-24/RO

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SYLLABUS:

UNIT I	(8 Hours) (12 Marks)
Fluid Mechanics and its importance in Civil Engineering, Rheological diagram and its significance. Fluid Properties: Basic Properties, Viscosity and its Significance, Surface Tension, Capillarity, Compressibility, Vapour Pressure. Pressure and its measurement: Pressure at a point and its representation, atmospheric and gauge pressure, Pressure measurement by manometer, information about mechanical and digital pressure gauges.	
UNIT II	(7 Hours) (12 Marks)
Hydrostatics: Total Pressure and centre of pressure on for a plane surface and curved surface immersed in fluid. Numerical Problems. Stability of Floating Bodies: Archimedes Principle, Metacentre and centre of buoyancy, Metacentric height and its determination, Stability of floating bodies partially submerged and fully submerged. Fluid masses subjected to relative equilibrium, effect of horizontal and vertical acceleration on the moving fluid masses.	
UNIT III	(7 Hours) (12 Marks)
Kinematics of Flow: Euler and Lagrangian approaches, velocity and acceleration of fluid, local and convective acceleration, Continuity equation, Stream function and velocity potential functions, Streamline, Path line and streak lines. Kinetics of Flow: Forces acting on a fluid mass, Euler's Equation of motion, Bernoulli's Equation.	
UNIT IV	(7 Hours) (12 Marks)
Flow measuring Devices: For pipeline- Venturimeter, orifice meter, Nozzle meter, Pitot Tube for velocity measurement For tank- Orifice and its types, hydraulic coefficients, mouth piece and its types. For Open Channel- Notches and weirs, velocity of approach, End contraction, Sharp crested, broad crested weir and Labrynth weir	
UNIT V	(7 Hours) (12 Marks)
Impulse momentum principle and its application, impact of jet, concept of velocity triangle. Dimensional Analysis, Dimensionally Homogenous equation, Methods of Dimensional Analysis, Dimensionless numbers Model Analysis: Types of similarities, Reynold's and Froude's model law, Distorted and Undistorted model.	

List of Books:

Text Books:

1. Hydraulics & Fluid Mechanics- Dr. Modi & Dr. Seth
2. Fluid Mechanics- Streeter & Wylie
3. Fluid Mechanics- Dr. A.K. Jain
4. A Text Book of Fluid Mechanics and Hydraulic Machines - R.K. Bansal

Scheme :- BTECH/CE/NEP-24/RO

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DEPARTMENT OF CIVIL ENGINEERING
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SEMESTER VI

COURSE :- FLUID MECHANICS LAB

COURSE CODE: CE601P

Hours/ Week	Credits	Continous Evaluation	End Sem Exam	Total Marks
2 Hrs	1	25	25	50

- 1) The practicals are based on theory subject of **FLUID MECHANICS** and CO's.
- 2) Minimum 08 practicals, from the list given below shall be performed:
- 3) Any one practical may be performed using virtual lab.

List of Experiments

1. Determination of Metacentric height and its importance.
2. Calibration of Venturimeter and its practical utility.
3. Calibration of Orifice meter and its practical utility.
4. Calibration of Rectangular Notche.
5. Calibration of V-Notche.
6. Hydraulic Coefficients of an orifice.
7. Hydraulic Coefficients of a Mouthpiece.
8. Verification of Bernoulli's Theorem.
9. Impact of jet apparatus.
10. Reynold's number
11. Major Losses
12. Minor Losses

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Scheme :- BTECH/CE/NEP-24/RO

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DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS OF THIRD YEAR BACHELOR OF TECHNOLOGY,
SEMESTER VI

COURSE :- DESIGN OF STEEL STRUCTURE

COURSE CODE: CE602T

Hours/ Week	Credits	Duration of End Sem Exam	Continuous Evaluation	End Sem Exam	Total Marks
3 Hrs	3	4 Hrs	40	60	100

Course Objectives:

1	To understand the structural properties of various rolled and built-up sections.
2	To understand the possible failure modes of structural members.
3	Applying various checks for strength assessment and design the member.
4	To impart knowledge to design of axially loaded built up columns.
5	To familiarize the students with concept of gusseted base.

Course Outcomes:

After completion of the course, the student will be able to

CO1	Use the knowledge of structural properties in assessing its strength and understand design philosophy.
CO2	Apply the knowledge of various techniques in analysing and design the members subjected to axial loading of simple bolt and welded connections.
CO3	Make use of knowledge of analysis in structural planning and design of various components of building subjected to bending.
CO4	Apply engineering concept to design members subjected to complex nature of loading.
CO5	Make use of knowledge to design footings.

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Dr. M. G. Patil

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M. D. Chitambar

R. H. Mohankar
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M. D. Pidumkar
M. D. Pidumkar

R. S. Bhat
R. S. Bhat

Dr. O. V. S.
Dr. O. V. S.

SYLLABUS:

Unit No.1	(8 Hours) (12 Marks)
Steel as a structural material, various grades of structural steel properties; Introduction to I.S. 800, 808, 816, 875 etc. Introduction to Shape Factor and collapse load. Design of axially loaded members: Tension members.	
UNIT II:	(7 Hours) (12 Marks)
Structural Fasteners: Behavior of bolted and welded connections. Strength of bolt and strength of weld. Efficiency of joints. Design of simple bolt and welded connections. Moment resistant bolted and welded connection. Design of connection: Beam to beam, beam to column.	
UNIT III:	(7 Hours) (12 Marks)
Design of simple and built up beams: Laterally restrained and un-restrained. (symmetrical and unsymmetrical section).	
UNIT IV:	(7 Hours) (12 Marks)
Design of axially loaded built up columns. Laced and battened (Column bases).	
UNIT V:	(7 Hours) (12 Marks)
Design of slab base, gusseted base and moment resistant bases.	

List of Books:

Text Books:

1. Design of structures Steel, N Sbramanian, Oxford university press.
2. Fundamentals of Structural Steel Design, M L Gambhir McGraw Hill Education (India) Pvt ltd, Design of structures, Steel S Ramamurtham, Dhanpat publishijng Company Rai.
3. Design of Steel structures, S K Duggal, Tata McGraw.

List of Code/Handbook

1. Indian Standard For General Construction In Steel – Code of Practice 2007
2. Steel Structural Handbook / Steel Table

Scheme :- BTECH/CE/NEP-24/RO

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SEMESTER VI

COURSE :- DESIGN OF STEEL STRUCTURE LAB

COURSE CODE: CE602P

Hours/ Week	Credits	Continous Evaluation	End Sem Exam	Total Marks
2 Hrs	1	25	25	50

- 1) The practicals are based on theory subject of design of steel structure and CO's.
- 2) Minimum 08 practicals, from the list given below shall be performed:
- 3) Any one practical may be performed using virtual lab/ Software program.

List of Experiments

1. Introduction to Shape Factor
2. Design of axially loaded Tension members
3. Design of Structural Fasteners Bolted
4. Design of Structural Fasteners welded
5. Design of simple and built up beams: Laterally restrained
6. Design of axially loaded built up columns. Battern
7. Design of axially loaded built up columns. Laced
8. Design of slab base
9. Design of gusseted base
10. One Field visit/site visit with submission of report (Compulsory)

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DEPARTMENT OF CIVIL ENGINEERING
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SEMESTER VI

COURSE : SURVEYING AND GEOMATICS

COURSE CODE: CE603T

Hours/ Week	Credits	Duration of End Sem Exam	Continous Evaluation	End Sem Exam	Total Marks
3 Hrs	3	3 Hrs	40	60	100

Course Objectives:

1.	To make the students aware of various surveying instruments, operating principles and their suitability.
2.	To develop skills of handling instruments, taking measurements and Perform calculations based on the observation.
3.	Identification of source of errors and rectify them.
4.	To prepare the students to plot and also read the various maps.
5.	To make the students aware of various surveying instruments, operating principles and their suitability.

Course Outcomes:

After completion of the course, the student will be able to

CO1	Measure length and bearing of lines using various instruments and calculate area of given field.
CO2	Use the theodolite to measure angle and distances for traversing also identify and correct the errors in traverse. Design and lay-out the various types of curves.
CO3	To carry out levelling and contouring also able to determine volume of earthwork.
CO4	Understand application of modern instrument like Total Station , GPS, DGPS for surveying.
CO5	Understand application of Remote Sensing and Geographical Information System (GIS), UAV Drone and LiDAR Survey

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Scheme :- BTECH/CE/NEP-24/RO

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SYLLABUS:

UNIT I	(8 Hours) (12 Marks)
LINEAR AND ANGULAR MEASUREMENT	
Principal of Surveying, Classification, measurement of distance using tape, EDM-Principle and types. Survey Station, Survey Lines, Ranging. Error and correction in length. Measurement of area by tape and cross-staff.	
Compass Surveying: Prismatic Compass & Surveyor compass, Bearings, Local attraction, Fieldwork & Plotting, Plane table surveying.	
UNIT II	(7 Hours) (12 Marks)
THEODOLITE TRAVERSING AND CURVES	
Uses of theodolite, measurement of horizontal angle, vertical angle, Deflection Angle, Latitude and Departure, Errors and corrections in traverse.	
Introduction to simple circular curves, Transition curves, vertical curves and Reverse Curve. Methods of Setting out Curves- Offset from long Chord, and Rankine's Method.	
UNIT III	(7 Hours) (12 Marks)
LEVELING AND CONTOURING	
Levelling, types of levelling, Auto level, temporary adjustments, calculation of Reduced level by rise and fall & H.I. method.	
Contours: Definition, characteristics, uses, locating and plotting of contour map.	
Computation of area and volume: Trapezoidal and Simpsons Rule.	
UNIT IV	(7 Hours) (12 Marks)
MODERN SURVEYING	
Total station: advantages and Applications, Field Procedure for total station survey, Error in total station survey, Calculation of area, Contour map.	
Introduction to GPS and DGPS (Differential Global Positioning System) Principle and Applications for Static and Real Time Kinematic (RTK) Survey.	
UNIT V	(7 Hours) (12 Marks)
REMOTE SENSING AND GIS	
Photogrammetry Survey, Areal Photograph, Introduction to UAV Drone and LiDAR Survey and applications.	

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List of Books:

Text books:

1. Surveying and Levelling, N. N. Basak, Tata McGraw-Hill education (P) Ltd
2. Surveying and Levelling, Kanetkar and Kulkarni, Vidhatigrihan Prakashan
3. Advance Surveying: Total Station, GIS and Remorte Sensing, Madhu, N, Sathikumar, R and Satheesh Gobi, Pearson India
4. Surveying (Vol-I) (Vol-II), Dr. B.C. Punmia, A.K. Jain, Laxmi Publications (P)Ltd.
5. Geomatics Engineering, Manoj, K Arora and Badjatia, Nem Chand & Bros
6. Remote sensing Geographical Information system, Anji Reddy, B. S. Publication

Reference books:

1. Elementary Surveying: An Introduction to Geomatics Paul R. Wolf, Mason & Dixon Thomas Pynchon.

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DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS OF THIRD YEAR BACHELOR OF TECHNOLOGY,
PROGRAM ELECTIVE COURSE-II
SEMESTER VI

COURSE :- ADVANCED CONCRETE STRUCTURE COURSE CODE: CE604TA

Hours/ Week	Credits	Duration of End Sem Exam	Continuous Evaluation	End Sem Exam	Total Marks
3 Hrs	3	3 Hrs	40	60	100

Course Objective	
1	To understand the design concepts and learning various codes related to advanced reinforced concrete structure.
2	To understand the structural behavior of steel and concrete.
3	To apply conventional methods for design structural components of building.

Course Outcomes:

After completion of the course, the student will be able to

CO1	Understand the behaviour and failure modes of different RC structural members
CO2	Analyze and apply the results in designing various RC structural members.
CO3	Apply the knowledge and skills in practical problems
CO4	Understand the relevant software and use the same in the analysis and design of RC members.

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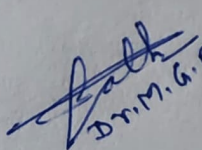
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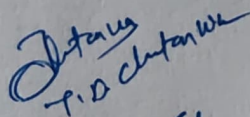
Unit – I	(9 Hours) (15 Marks)
Design of RC columns subjected to biaxial moments. Design of Isolated footing, for axial load & uniaxial moment. (square, rectangular footing)	
Unit – II	(9 Hours) (15 Marks)
Design of circular water tank resting on ground by IS code method (IS3370:2021). Design of Dog-legged and Open well Staircase	
Unit – III	(9 Hours) (15 Marks)
Design of RCC Cantilever and Counter fort Retaining wall.	
Unit – IV	(9 Hours) (15 Marks)
Analysis and design of portal frames (single bay single storey) hinged or fixed at base. Design of hinge connection at base. Design of combined footing: Rectangular, Trapezoidal, Strap Beam footing	

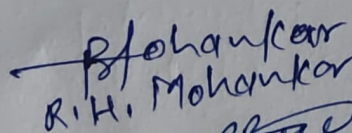
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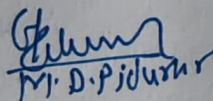
Text Books:

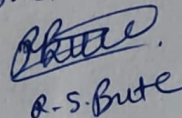
1. Devdas Menon, Structural Analysis, Narosa Publishing House,
2. Hibbeler, R. C. (2002). Structural Analysis, 6/e, Pearson Education
3. Norris, C.H., Wilbur, J.B., and Utku, S., Elementary Structural Analysis, McGraw Hill
4. Wang, C.K., Intermediate Structural Analysis, McGraw Hill,


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PROGRAM ELECTIVE COURSE-II
SEMESTER VI

COURSE :- ADVANCED CONCRETE STRUCTURE LAB

COURSE CODE: CE604PA

Hours/ Week	Credits	Continuous Evaluation	End Sem Exam	Total Marks
2 Hrs	1	25	25	50

- 1) The practicals are based on theory subject of advanced concrete structure and CO's.
- 2) Minimum 08 practicals, from the list given below shall be performed:
- 3) Any one practical may be performed using virtual lab/Software Program.

List of Experiments

1. Design of RC columns subjected to biaxial moments.
2. Design of Isolated square footing, for axial load & uniaxialmoment.
3. Design of Isolated rectangular footing, for axial load & uniaxialmoment
4. Design of circular water tank resting on ground by IS code method (IS3370:2021).
5. Design of Dog-legged Staircase.
6. Design of Open well Staircase.
7. Design of Counter fort Retaining wall.
8. Design of Cantilever Retaining wall.
9. Analysis and design of portal frames (single bay single storey) hinged or fixed at base.
10. Design of hinge connection at base
11. Design of Rectangular combined footing.
12. Design of Trapezoidal combined footing .

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PROGRAM ELECTIVE COURSE-II
SEMESTER VI

COURSE :-WATER AND WASTE WATER TREATMENT

COURSE CODE: CE604TB

Hours/ Week	Credits	Duration of End Sem Exam	Continuous Evaluation	End Sem Exam	Total Marks
3 Hrs	3	3 Hrs	40	60	100

Course Objectives:

1.	To provide the knowledge regarding the different sources of water & waste water, characteristics, available treatment technologies and designs.
2.	To design and implement the different water and wastewater treatment units.
3.	To provide the knowledge regarding real problems finding and handling strategies of water and wastewater treatments.
4.	To learn recent and advanced treatments of water and wastewater and disposals methods.
5.	To understand Biological unit processes.

Course Outcomes:

After completion of the course, the student will be able to

CO1	Understand the process and design components of water treatment such as Aeration, coagulation-flocculation and Sedimentation.
CO2	Understand the process and design the components of water treatment such as Filtration, Disinfection.
CO3	Understand the various sources characteristics and disposal methods of wastewater.
CO4	Understand and design the different preliminary and primary waste-water treatment.
CO5	Understand and design the different Secondary waste-water treatment.

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Scheme :- BTECH/CE/NEP-24/RO

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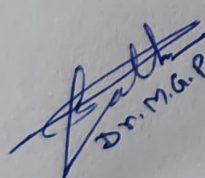
List of Books:

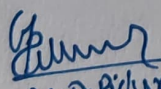
Text Books:

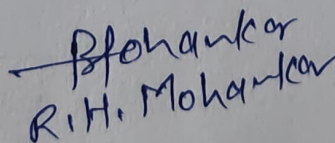
1. Waste Water Treatment for Pollution Control and Reuse. Soli J. Arcelvala, Tata Mcgraw Hill, 2008.
2. Water Supply Engineering, Environmental Engineering Vol.-I, Dr. P.N. Modi, Standard Publication.
3. Water Supply Engineering, Environmental Engineering Vol.-II, Dr. P.N. Modi, Standard Publication.
4. Design of Water Treatment Plant, Dr. A.G. Bhole, IWWA, Nagpur centre.

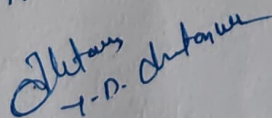
Reference Books:

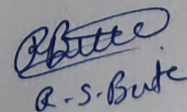
1. Environmental Engineering Vol- I & II, Dr. B.C. Punmia, Laxmi Publication.
2. Water and Waste Water Treatment, Disposal And reuse, Metcalf and Eddy, Tata McGraw Hill.


Dr. M.G. Pathan


M.D. Achurker


R.H. Mohankar


T.D. Chaturvedi


R.S. Butte

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DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS OF THIRD YEAR BACHELOR OF TECHNOLOGY
PROGRAM ELECTIVE COURSE-II
SEMESTER VI

COURSE :- WATER AND WASTE WATER TREATMENT LAB

COURSE CODE: CE604PB

Hours/ Week	Credits	Continuous Evaluation	End Sem Exam	Total Marks
2 Hrs	1	25	25	50

- 1) The practicals are based on theory subject of Water And Waste Water Treatment and CO's.
- 2) Minimum 08 practicals, from the list given below shall be performed:
- 3) Any one practical may be performed using virtual lab.

List of Experiments

1. Determination of pH
2. Determination of Conductivity
3. Determination of Turbidity
4. Determination Chlorides
5. Determination of Solid's (Suspended & dissolved)
6. Determination of Acidity and alkalinity
7. Determination of Dissolved Oxygen
8. Determination of Available Chlorine
9. Determination of Residual Chlorine
10. Jar Test(optimum dose of coagulant)
11. Determination of Conductivity BOD.
12. Determination of COD
13. Bacteriological Plate count and MPN tests

Dr. M. G. Pathan

M. D. Achkar

R. H. Mohankar
T. D. Chitambar

R. S. Butte

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DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS OF THIRD YEAR BACHELOR OF TECHNOLOGY,
PROGRAM ELECTIVE COURSE-II
SEMESTER VI

COURSE:- ADVANCED REINFORCED CEMENT CONCRETE DESIGN

COURSE CODE: CE604TC

Hours/ Week	Credits	Duration of End Sem Exam	Continuous Evaluation	End Sem Exam	Total Marks
3 Hrs	3	3 Hrs	40	60	100

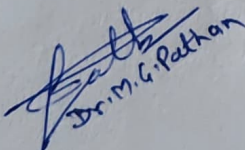
Course Objectives:

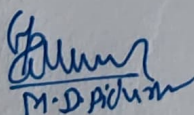
1.	To understand the philosophies of design of reinforced cement concrete and to justify this is the best
2.	To know design of advanced structural elements with safety, stability and economical way
3.	To study of provisions in IS 1893 and IS 456 for design of structures

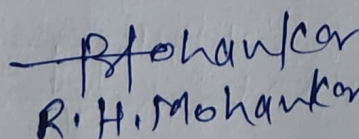
Course Outcomes:

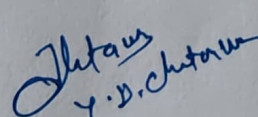
After completion of the course, the student will be able to

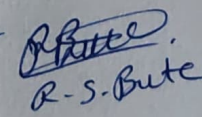
CO1	Understand the conceptual design of overhead circular service reservoirs.
CO2	Analysis and design of Highway Bridge: Slab type and Girder type
CO3	Analyze and Design building frames using Limit state Method.
CO4	Select the parameters in beam theory for design cylindrical shells


Dr. M. G. Patil


M. D. Patil


R. H. Mohankar


Y. D. Chitambar


R. S. Bute

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SYLLABUS

UNIT – I	(9Hours) (15 Marks)
Design of overhead circular service reservoirs. (IS 3370-2021) Analysis of staging by cantilever method. Analysis and design for earthquake as per relevant IS codes. (IS 1893-Part-II-2014)	
UNIT – II	(9Hours) (15 Marks)
Design of highway bridge with IRC loading and equivalent UDL Slab type, Two/Three girder type (IRC-06-2017)	
UNIT – III	(9 Hours) (15 Marks)
Design of building frames up to two bay/two storey, including design of foundation.	
UNIT – IV	(9 Hours) (15 Marks)
Design of cylindrical shells by beam theory, advantages, assumptions, ranges of validity and beam analysis. Design of shells with or without edge beam.	

List of Books:

Text Books

1. Comprehensive RCC Design by Dr. B. C. Punmia, A. K. Jain, Laxmi Publication Pvt. Ltd.
2. Illustrated Reinforced Concrete Design by V. L. Shah, S. R. Karve, Structures Publication.
3. Advanced Reinforced Concrete Design by RAJU N. K., Publisher: CBS;
4. Limit State design of Reinforced Concrete, P.C.Varghese, PHI Learning Pvt Ltd.
5. Design of Reinforced Concrete, M.L.Gambhir, PHI Learning Pvt Ltd.
6. Fundamental of Reinforced Concrete Design, M.L.Gambhir, PHI Learning Pvt Ltd.

Reference Book

1. Ashok K. Jain, Reinforced Concrete: Limit State Design, Nem Chand.
2. T.R. Jagadeesh, M.A. Jayaram, Design of Bridge Structures, PHI Learning Pvt. Ltd.
3. S.S Bhavikatti ,Design Of R.C.C Structural Elements, New Age Publisher.

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M.D. Pidim

R.H. Mohankar
R.H. Mohankar
Jitendra
T.D. Chatur

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R. S. Bate



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DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS OF THIRD YEAR BACHELOR OF TECHNOLOGY,
PROGRAM ELECTIVE COURSE-II
SEMESTER VI

COURSE:- ADVANCED REINFORCED CEMENT CONCRETE DESIGN

COURSE CODE: CE604PC

Hours/ Week	Credits	Continuous Evaluation	End Sem Exam	Total Marks
2 Hrs	1	25	25	50

- 1) The practicals are based on theory subject of advanced concrete structure and CO's.
- 2) Minimum 06 practicals, from the list given below shall be performed.
- 3) Any one practical may be performed using virtual lab/Software Program.

List of Experiments

1. Study of SP 34: Handbook on concrete reinforcement and detailing.
2. Design of overhead circular service reservoirs.
3. Design of staging for overhead water tank.
4. Design for earthquake as per relevant IS codes.
5. Design of highway bridge with IRC loading.
6. Design of building frames up to two bay and two storey.
7. Design of building foundation.
8. Design of cylindrical shells by beam theory.
9. Design of shells with edge beam.
10. Design of shells without edge beam.

Bath
MGP

M. D. Patil
M. D. Patil

T. D. Chitambar
T. D. Chitambar

R. H. Mohanekar
R. H. Mohanekar

S. S. Bate
S. S. Bate

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DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS OF THIRD YEAR BACHELOR OF TECHNOLOGY
PROGRAM ELECTIVE COURSE -III
SEMESTER VI

COURSE :- ADVANCED CONCRETE TECHNOLOGY COURSE CODE: CE605TA

Hours/ Week	Credits	Duration of End Sem Exam	Continous Evaluation	End Sem Exam	Total Marks
3 Hrs	3	3 Hrs	40	60	100

Course Objectives:

1.	To understand the chemical properties of cement and evaluate the aggregate properties for concrete performance.
2.	To analyze and compare special concretes and their applications with different materials and techniques.
3.	To understand mix design procedures using IS and other codes for design concretes of special performance needs.
4.	To know the concrete behavior under different conditions including creep, shrinkage, strength and temperature effects.
5.	To assess durability and deterioration in concrete and apply Non Destructive tests techniques for condition assessment.

Course Outcomes:

After completion of the course, the student will be able to

CO1	explain the chemical properties of cement and evaluate the aggregate properties
CO2	compare special concretes and their applications with different materials and techniques.
CO3	design concrete mix using IS code for concretes of special performance needs.
CO4	explain failure modes of concrete under different conditions like creep, shrinkage, strength and temperature effects.
CO5	identify and assess deterioration in concrete and evaluate Non Destructive tests results for condition assessment.

M.P.
M.D. Pidumna
T.D. Chitambar
R.H. Mohankar
A.S. Bute
dr. OVS

SYLLABUS:

UNIT I	(8 Hours) (12 Marks)
Cement - Chemical composition, hydration, heat of hydration, hydrated structure, water requirement of cement Aggregates - Utility in concrete, Elongation and Flakiness test, Deleterious substances, Organic impurities and other fine materials in aggregate Advanced Curing methods - Advance curing methods of concrete- Electric Curing Tank, Steam Curing	
UNIT II	(7 Hours) (12 Marks)
Concrete with difference cementitious materials: fly ash, GGBS, Silica fume. Concrete with different Aggregates: No fines, high weight, gap graded, Recycled aggregate, Auto clave aerated concrete. Modified property: high density, high performance, ultra rapid hardening concrete, transportation concrete, Fiber reinforcement concrete, Self compacting, Self healing, Ferrocement Techniques: RMC, Underwater concrete, Shotcrete, nano concrete, 3D Concreting, Pumped concrete, Hot and Cold weather concreting	
UNIT III	(7 Hours) (12 Marks)
Concept of design of concrete, Quality Control, Indian Standard method, Comparison with British and American methods of mix design. Acceptance criteria. Design of High Strength, Light Weight Aggregate Concrete, Fly Ash Cement Concrete, High Density Concrete Mixes, Standards, Specifications and Code of Practice.	
UNIT VI	(7 Hours) (12 Marks)
Failure modes in concrete, type deformation stress strain relation and modulus of elasticity, Shrinkage cause, Factors Affecting and control, Creep, causes, Factors influencing and effects, Effects of temperature. Compressive strength, Tensile strength, Fatigue strength and impact strength, Factors influencing strength of concrete.	
UNIT V	(7 Hours) (12 Marks)
Deterioration by surface wear/abrasion, Freezing and thawing of concrete, Alkali-Aggregate reaction (Alkali-Silica Reaction / Alkali-Carbonate Reaction), Deterioration by Fire, Guide to durable concrete Non-Destructive Testing Methods: NDT and Rebound hammer method, Ground Penetration Radar, Probe Penetration, Pull Out Test, Electrical/Magnetic Methods, Nuclear Methods And Infrared Thermograph	

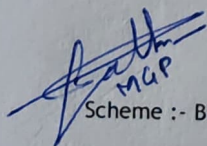
List of Books

Text books

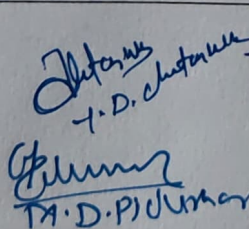
1. Concrete Technology by MS Shetty, S.Chand Publication New Delhi.
2. Concrete Technology: Theory and Practice by M. L. Gambhir, McGraw Hill Education
3. Concrete Technology by S. S. Bhavikatti, TechSar Pvt. Ltd.
4. Concrete Technology: Theory & Practice by Sasankasekhar Mandal, Vishwajit Anand and Sushil Kumar Agarwala (AICTE- publication, 2023)
5. Civil Engineering Materials by Sivakugan et al. (Cengage India)

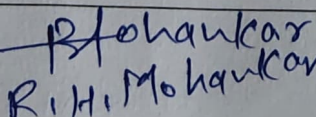
SYLLABUS:

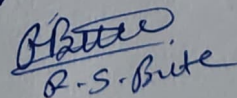
UNIT I	(8 Hours) (12 Marks)
Earth's Climate System	
Introduction to Climate Change; History and Trends of Climate, Atmosphere – weather and Climate, Causes of global and regional climate change, climate parameters – Temperature, Rainfall, Humidity. Wind – Global ocean circulation and its effect. Carbon cycle.	
UNIT II	(7 Hours) (12 Marks)
Greenhouse Gases	
Introduction and effect of Carbon dioxide, methane, nitrous oxide, water vapor, ozone and chlorofluorocarbons. Chemistry of greenhouse gases. Sources and sinks, their cycle in atmosphere. Radiative forcing. Effects on plants and animals. instruments used for quantification.	
UNIT III	(7 Hours) (12 Marks)
Impacts of Global Climate Change	
Impacts of Climate Change on various sectors – Agriculture, Forestry. Methods and Scenarios, changes in agricultural production. Impact on Human Health, Industry and society. Spread of epidemics and Risk of Irreversible Changes. Traditional practices to cope with climate change impacts.	
UNIT IV	(7 Hours) (12 Marks)
Waste to Energy, Clean Technologies and Greener Fuels	
Introduction to MSW & Bio waste, Biomedical, Industrial waste, International and Regional cooperation. Alternate Energy: Hydrogen, CBS, Bio-fuels, Solar Energy, Wind, Hydroelectric Power. Examples of future Clean Technologies, Bio-diesel, Natural Compost, Eco- Friendly Plastic. Study of waste to energy projects.	
UNIT V	(7 Hours) (12 Marks)
Climate Change Mitigation	
Climate change response measures: definition and evolution. Introduction to mitigation of GHGs and stabilization scenario, characteristics of mitigation in regional and national context, mainstreaming climate change in development agenda, short-term mitigation options Role of fossil fuels in climate change. Role of Governments, industries, and individuals	


MGP

Scheme :- BTECH/CE/NEP-24/RO


T.D. Chaturvedi


R.H. Mohankar


R.S. Brite

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List of Books:

Text Books:

1. Essentials of the Earth's Climate System, Roger G. Barry & Eileen A. Hall-McKim, Cambridge University Press
2. Climate Change and Greenhouse, Pratap Bhattachary, CRC Press
3. Gases Emissions, Shumita Munda, Pradeep Kumar Dash
4. Global Climate Change, Suruchi Singh, Pardeep Singh, S. Rangabhashiyam, K.K. Srivastava
5. Implementing the climate regime, Jon Hovi, Olav Stokke and GeirUlfstein, International compliance, Earthscan
6. Energy Systems and Sustainability: Power for a Sustainable Future, G Boylr, B Everest, J Ramage, Oxford
7. Climate change and it's control, Dr. R.N.Patil, Dr. R.M. Dhoble, Dr. A. M. Bhamburkar, Book Rivers Publication

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M.D. Patil

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R.H. Mohankar

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T.D. Chaturvedi

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A.S. Bute

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DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS OF THIRD YEAR BACHELOR OF TECHNOLOGY,
PROGRAM ELECTIVE COURSE-III
SEMESTER VI

COURSE : RAILWAY ENGINEERING

COURSE CODE: CE605TC

Hours/ Week	Credits	Duration of End Sem Exam	Continous Evaluation	End Sem Exam	Total Marks
3 Hrs	3	3 Hrs	40	60	100

Course Objectives:

1.	To explain and describe various terms in railway engineering.
2.	To explain, discriminate and design various geometric features of railway track.
3.	To define and describe the points, joints, junctions and layouts of railway track.
4.	To Understand the maintenance and rahabitaion of railway tracks ans use of signalling
5.	To Understand the devolpment of modern railway tracks.

Course Outcomes:

After completion of the course, the student will be able to

CO1	Explain components of railway track, different railway gauges
CO2	Design the geometry of track as per given requirements
CO3	Discuss various types of fundamentals use in railway track
CO4	Evaluate the importance of maintenance and rahabilitation in railway tracks
CO5	Describe the need of development of future railway network in cities as well as in India

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M.D. Pravin
Y.D. Chaturvedi

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R.H. Mohankar

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R.S. Brite

SYLLABUS:

UNIT I	(7 Hours) (12 Marks)
Railway track, Gauges, Alignment of railway lines, Engineering surveys, Construction of new lines, Tracks and track stresses	
UNIT II	(8 Hours) (12 Marks)
Rails, sleepers, Ballast, Subgrade and formation, Track fittings and fastenings, Creep of rails, Geometric design of tracks, Curves and super-elevation	
UNIT III	(7 Hours) (12 Marks)
Points and crossings, Track junctions, Simple track layouts, Rail joints and welding of rails, Track maintenance, Track drainage, Turnouts in tracks, Tractive resistance and power	
UNIT IV	(7 Hours) (12 Marks)
Modern methods of track maintenance, Rehabilitation of track, Renewal of track, , Railway stations, Railway yards, Signalling, Interlocking	
UNIT V	(7 Hours) (12 Marks)
Railway tunnelling Modern development in railways- Metro train and Bullet Trains, Development of high speed and super high speed railway track, Maintenance of railway tracks for high speed trains Types of rail transit, rail transit system development in Indian cities	

List Books:

Text Books:

1. Railway Engineering by Saxena and Arora, Dhanpat Rai & Sons
2. Railway Engineering by S.C. Rangawala, Charotar Publishing House Pvt. Ltd.
3. Railway Tracks Engineering by J.S. Mundrey, Tata McGraw- Hill Publishing
4. Railway Engineering by Satish Chandra and M. M. Agrawal
5. Railway Engineering and Systems by Marshall Roy, Clanrye International

References:

1. Railway Engineering: Pioneering the Future of Transportation by Prabhu TL. (Online)

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Dr. M. G. Pathan

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DEPARTMENT OF CIVIL ENGINEERING
SYLLABUS OF THIRD YEAR BACHELOR OF TECHNOLOGY,
PROGRAM ELECTIVE COURSE-III
SEMESTER VI

**COURSE:- REPAIRS & REHABILITATION OF CIVIL ENGINEERING
STRUCTURES**

COURSE CODE: CE605TD

Hours/ Week	Credits	Duration of End Sem Exam	Continuous Evaluation	End Sem Exam	Total Marks
3Hrs.	3	03 Hrs.	40	60	100

Course Objectives:

1.	To Familiarize Students with deterioration of concrete in structures
2.	To Equip student with concepts of NDT and its evaluation
3.	To Understand failures and causes for failures in structures
4.	To get Familiarized with different materials used for repairs of structures.
5.	To Understand procedure to carryout physical Investigation of structure and its repair Techniques.

Course Outcomes:

After completion of the course, the student will be able to

CO1	Explain deterioration of concrete in structures
CO2	Carryout analysis using NDT and evaluate structures
CO3	Assess failures and causes of failures in structures.
CO4	Identify and Assess different materials used for repairs and rehabilitation of structures.
CO5	Carryout physical investigation of structure and assess various repair Techniques.

Scheme :- BTECH/CE/NEP-24/RO

Dr. M. G. Pathan

T. D. Chitambar

M. D. P. P. P.

R. H. Mohankar

R. S. Buti

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SYLLABUS

Unit -I	(7 Hours) 12 Marks
Deterioration of Concrete in Structures	
Physical processes of deterioration like Freezing and Thawing, Wetting and Drying, Abrasion, Erosion, Pitting, Chemical processes like Carbonation, Chloride ingress, Corrosion, Alkali aggregate reaction, Sulphate attack Acid attack, Cracks: Cracks in concrete, type, pattern, measurement & preventive measures.	
Unit -II	(7 Hours) 12 Marks
Non Destructive Testing	
Nondestructive test methods for concrete including Rebound hammer, Ultrasonic pulse velocity, Rebar locator, Corrosion meter, Penetration resistance and Pull out test, Core cutting. Corrosion: Methods for corrosion measurement and assessment including half-cell potential and resistivity, Mapping of data.	
Unit -III	(7 Hours) 12 Marks
Failure of buildings	
Definition of building, failure- types of failures, Causes of Failures- Faulty Design, Accidental over Loading, Poor quality of material and Poor Construction practices, Fire damage - Methodology for investigation of failures, diagnostic testing methods and equipments, repair of cracks in concrete.	
Unit -IV	(7 Hours) 12 Marks
Materials for Repair and Rehabilitation	
Various repair materials, Criteria for material selection, Health and safety precautions for handling and applications of repair materials, Admixtures- types of admixtures, purposes of using admixtures, chemical composition, Natural admixtures- Fibres, wraps, Glass and Carbon fibre wraps, Steel Plates, Concrete behavior under corrosion, disintegrated mechanisms, moisture effects and thermal effects.	
Unit -V	(8 Hours) 12 Marks
Investigation of Structures & Repair Techniques	
Visual investigation: Distress, observation and preliminary test methods. Case studies: related to rehabilitation of bridge piers, dams, canals, heritage structures, corrosion and erosion damaged structures.	
Repair Techniques: Grouting, Jacketing, Shotcreting, Acoustical emission methods, Corrosion activity measurement, Ultrasound pulse velocity methods - Pull out tests, externally bonded plates, Nailing, Underpinning and under water repair Materials, Equipments, Precautions and Processes.	

Jitendra
T.D. Chaturvedi

Rohankar
R. H. Mohankar 04/05

Shamir
M. D. Pichum

R. S. Dute
R. S. Dute

Dr. M. G. Pathan
Dr. M. G. Pathan

List of Books:

Text Books:

1. Maintenance & Repair of Civil Structures : B.L. Gupta & Amit Gupta
2. Rehabilitation of Concrete Structures : B. Vidivelli , Standard Publishers

Reference Book:

3. Concrete repair and maintenance Illustrated: Peter.H.Emmons, Galgotia publications Pvt. Ltd., 2001.
4. Repair and protection of concrete structures: Noel P.Mailvaganam, CRC Press, 1991.

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V. D. Chaturvedi

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M. D. Acharya

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R. H. Mohankar

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R. S. Butte



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SEMESTER VI

COURSE: FIELD SURVEYING

COURSE CODE: CE607P

Hours/ Week	Credits	Continous Evaluation	End Sem Exam	Total Marks
4 Hrs	2	50	50	100

- 1) The practicals are based on theory subject of **FIELD SURVEYING** and CO's.
- 2) Minimum 08 practicals from the list given below shall be performed:

List of Experiments:

A. Any 7

1. Determination of area of given polygon by tape and cross staff survey.
2. Measurement of fore and back bearing of traverse by compass Survey and Plotting.
3. Traversing by plane table survey
4. Measurement of Horizontal angle and Vertical Angle by vernier Theodolite
5. Setting out of simple circular curve by offsets from long chord method.
6. Measurement and booking of levels by auto level.
7. Levelling– Longitudinal and cross-section and plotting.
8. Determination of Area using total station.
9. Contour Map Using Total Station
10. Study of EDM, GPS, Digital Planimeter.

B. Two days Survey Camp on any ONE using advanced survey instruments

1. Contouring
2. Road Survey
3. Lay outing, Location of Boundary and area calculation.