Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
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Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. 08645 - 350200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2577715, 2576129.

To
The Dean -Academics
K L Deemed University
Vaddeswaram

Dear Sir,

Sub: Minutes of the 11th BOS meeting-Department of Civil Engineering held on 12th June 2019 held in M 212 Reg.,

The 11th BOS of Department of civil engineering for 2019-20 Academic Year is conducted on 12-06-2019 in M212. The details of minutes and annexures of BoS conducted is attached below.

Thanking You,

Yours sincerely

12/06/2019

BOS Chair
Chairman BOS

Head
Department of Civil Engineering
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Minutes of the 12th BOS meeting, Civil Engineering Department held on 12th June 2019 held in M 212

AGENDA ITEMS

Point No.	Agenda Item	Resolution
CE_BOS_01	To consider and approve the curriculum for 2019-20 admitted batch of B.Tech & M.Tech admitted batch as per the suggestions and feedback received from stake holders discussed in DAC	Approved and Recommended to Academic council.
CE_BOS_02	To consider and approve the revisions proposed by the course coordinators in syllabus / Course Outcomes /experiments / teaching pedagogies for the courses to be offered in 2019-20 odd and even semesters.	Approved and Recommended to Academic council.
CE_BoS_03	To consider and approve the curriculum structure for M.Tech SE, CTM admitted students	Approved and Recommended to Academic council.
CE_BoS_04	To consider and approve the new M.Tech program "Energy and Environmental Management" offered in 2019-20 admitted batch students.	Approved and Recommended to Academic council.
CE_BOS_05	To consider and approve the value-added courses for 2019 admitted batch	Approved and Recommended to Academic council.
CE_BOS_06	To approve the points discussed in DAC meeting	Approved and Recommended to Academic council.
CE_BOS_07	To approve the feedback from stakeholders regarding 2019-20 batch admitted students	Approved and Recommended to Academic council.
CE_BOS_08	To consider and approve the new MSC Geology Program offered in 2019-20 admitted batch students.	Approved and Recommended to Academic council.

BOS MEMBERS & EXTERNAL STAKEHOLDERS

S. No	Name of the Person	Institution	Department of the Person	Designation of the person	Position of the person in the meeting
1	Dr. K. Naga Chaitanya	K L E F	CIVIL	Associate Professor, Department Chair/ HoD	BOS Chairman
2	Dr. Pranvir S Satvat	K L E F	CIVIL	Dean- Academics	Dean-Academics
3	Dr. G. Appa Rao	IIT Madras	CIVIL	Professor	External Academic BOS Member
4	Dr. Lalit Kumar Jain	L. K. Jain Consulting Group	CIVIL	Head	Industry Expert BOS Member
5	M. H. Reddy	APCRDA	Housing & Buildings	DEE	External Expert BOS Member
6	D. Naveen Kumar	APCRDA	CIVIL	Asst. Engineer, Building (Maintenance Services of Temporary Assembly)	Alumni Member
7	P. Prabhu Teja	Water Resource Dept., KLRSPP Division No.1, VJA	CIVIL	AEE	Alumni Member
8	Dr. V. Ranga Rao	K L E F	CIVIL	Professor	BOS Member
9	Dr. B. Kameswara Rao	K L E F	CIVIL	Professor	BOS Member

RESOLUTIONS

Detailed Description of Resolutions Made:

CE_BOS_01: Curriculum for 2019-20 (upcoming batch) B.Tech & M.Tech admitted batches have been approved by BoS members and recommended to Academic council. Course structure of B.Tech 2019-20 admitted batches are available in **Annexure-1**

CE_BOS_02: The revisions proposed by the course coordinators in syllabus /experiments / teaching pedagogies for the courses to be offered in 2019-20 admitted batches have been approved by BoS members and recommended to Academic council. Modified Syllabi of 2019-20 batch have been furnished in **Annexure-2**

CE_BOS_03: Curriculum structures for M.Tech Structural Engineering, Construction Technology and Management for 2019-20 admitted batch have been approved by BoS members and recommended to Academic council and structure is attached in **Annexure -3.**

CE_BOS_04: A new M.Tech program entitled **"Energy and Environmental Management"** is introduced from A.Y.2019-20 for B.Tech civil engineering passed out students have been approved by BoS members and recommended to Academic council and structure and syllabus is attached in **Annexure -4**

CE_BOS_05: The value-added courses for 2019 admitted batch are approved by BoS members and recommended to Academic council. List of courses is attached in **Annexure-5**

CE_BOS_06: The points discussed in DAC meeting were approved by BoS members and recommended to Academic council. DAC minutes and proofs are mentioned in **Annexure-6**

CE_BOS_07: Feedback from stakeholders regarding 2019-20 admitted batch and feedback on DAC minutes have been approved by BoS members and recommended to Academic council. Action Taken Report is attached **Annexure-7**

CE_BOS_08: A new **MSC Geology** is introduced from A.Y.2019-20 have been approved by BoS members and recommended to Academic council and structure and syllabus is attached in **Annexure -8**

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10	Dr. A. Aravindan	K L E F	CIVIL	Professor	BOS Member
11	Dr. Sanjeet Kumar	K L E F	CIVIL	Associate Professor & RPAC Chairman	BOS Member
12	Dr. K. Raja Sekhar Reddy	K L E F	Department of Arts	HOD	Interdisciplinary BOS Member
13	Dr. A. V. Rao	K L E F	CIVIL	Associate Professor	BOS Member
14	Mr. K. Hemantha Raja	K L E F	CIVIL	Assistant Professor/ Dy HOD	BOS Member
15	Mr. B. G.Rahul	K L E F	CIVIL	Assistant Professor	Internal Alumni BOS Member
16	Mr. K. J. Brahma Chari	K L E F	CIVIL	Assistant Professor	BOS Member
17	Mr. K. Shyam Chamberlin	K L E F	CIVIL	Assistant Professor	BOS Member
18	Dr. D. Satish Chandra	K L E F	CIVIL	Associate Professor	BOS Member

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Annexure - 1: B.Tech Y19 curriculum Structure

B.Tech 2019-20 Admitted Category wise Courses, Credits and Contact hours Count					
Sl No	**Course Category**	**Short Name**	**courses**	**Minimum Credits**	**Contact Hours**
1	Humanities & Social Sciences	HSS	7	14.0	26
2	Basic Sciences	BS	7	23.0	33
3	Engineering Sciences	ES	5	14.5	26
4	Professional Core	PC	17	65.0	80
5	Flexi Core	FC	0	0.0	0
6	Professional Electives	PE	5	15.0	15
7	Project Courses	PR	4	16.0	56
8	Open Electives	OE	4	11.0	11
9	Mandatory Courses	SKILL	7	7.5	30
Total			**59**	**172.0**	**283**

Structure for B. Tech 2019-20 Admitted Students

The following structure is approved for B. Tech Civil Engineering 2019-20 admitted students.

S.No	Course Code	Course Title	L	T	P	S	Cr	CH
BASIC SCIENCES								
1	19PH1010	Mechanics	3	1	0	0	4	4
2	19MT1101	Mathematics For Computing	3	1	0	4	5	8
3	19SC1101	Problem Solving And Computer Programming	3	0	2	0	4	5
4	19MT2102	Mathematics For Engineers	3	0	0	0	3	3
5	19MT2007	Probability and Optimization Techniques	2	1	0	0	3	3
6	20UC1102	Design Thinking And Innovation-1	1	0	0	4	2	5
7	20UC1203	Design Thinking And Innovation-2	1	0	0	4	2	5
TOTAL CREDITS							**23**	33
ENGINEERING SCIENCES								
1	19ME1103	Design Tools Workshop - I	0	0	4	0	2	4
2	19CE1002	Engineering Graphics For Civil Engineers	0	0	2	0	1	2
3	19SC1202	Data Structures	3	0	2	3	4.75	8
4	19CS1203	Object Oriented Programming	3	0	2	3	4.75	8

5	19SC1209	Design Tools Workshop - II	0	0	4	0	2	4
						TOTAL CREDITS	**14.5**	26
HUMANITIES & SOCIAL SCIENCES								
1	19UC1101	Basic English	0	0	4	0	2	4
2	19UC1202	English Proficiency	0	0	4	0	2	4
3	19UC2103	Professional Communication Skills	0	0	4	0	2	4
4	19UC0010	Universal Human Values & Professional Ethics	2	0	0	0	2	2
5	19UC2204	Aptitude Builder-I	0	0	4	0	2	4
6	19UC3105	Aptitude Builder-II	0	0	4	0	2	4
7	19UC3206	Campus to Corporate	0	0	4	0	2	4
						TOTAL CREDITS	**14**	26
MANDATORY COURSES								
1	19UC0009	Ecology & Environment	2	0	0	0	2	2
2	19UC0008	Indian Constitution	2	0	0	0	2	2
3	19UC0007	Indian Heritage and Culture	2	0	0	0	2	2
						TOTAL CREDITS	**6**	6
PROFESSIONAL CORE COURSES								
1	19CE2101	Solid Mechanics	3	0	2	0	4	5
2	19CE2102	Fluid Mechanics	3	0	2	0	4	5
3	19CE2103	Surveying	3	0	2	0	4	5
4	19CE2104	Construction Materials & Concrete Technology	3	0	2	0	4	5
5	19CE2105	AI & ML Applications in Civil Engineering	2	0	0	4	3	6
6	19CE2201	Structural Analysis	3	1	0	0	4	4
7	19CE2202	Building Planning, Drawing & Construction Management	3	0	2	0	4	5
8	19CE2203	Hydraulics and Hydraulic Machines	3	0	2	0	4	5
9	19CE2204	Environmental Engineering	3	0	2	0	4	5
10	19CE2205	Engineering Geology	3	0	2	0	4	5
11	19CE3101	Design of Reinforced Concrete Structures	3	0	2	0	4	5
12	19BT1001	Biology for Engineers	2	0	0	0	2	2
13	19CE3102	Water Resources Engineering	3	1	0	0	4	4
14	19CE3103	Transportation Engineering	3	0	2	0	4	5
15	19CE2206	Geo technical Engineering	3	0	2	0	4	5
16	19CE3201	Quantity Surveying Estimation	3	0	2	0	4	5
17	19CE3203	Design of Steel Structures	3	1	0	0	4	4
						TOTAL CREDITS	**65**	80
PROFESSIONAL ELECTIVES								
1	PE-1	Professional Elective-1	3	0	0	0	3	3
2	PE-2	Professional Elective-2	3	0	0	0	3	3
3	PE-3	Professional Elective-3	3	0	0	0	3	3
4	PE-4	Professional Elective-4	3	0	0	0	3	3

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5	PE-5	Professional Elective-5	3	0	0	0	3	3
						TOTAL CREDITS	15	15
		OPEN ELECTIVES						
1	OE	Foreign Language Elective	2	0	0	0	2	2
2	OE	Management Elective	3	0	0	0	3	3
3	OE-1	Open Elective-1	3	0	0	0	3	3
4	OE-2	Open Elective-2	3	0	0	0	3	3
						TOTAL CREDITS	11	11
		PROJECT						
1	19IE2246	Industrial Training (Summer Break)	0	0	4	0	2	4
2	19IE3247	Term Paper	0	0	4	0	2	4
3	19IE4048	Project (Part I)	0	0	0	24	6	24
4	19IE4049/ 19IE4050/ 19IE4051	Project (Part II)/ Practice School/ ICP	0	0	0	24	6	24
						TOTAL CREDITS	16	56
		SKILLING						
1	19SC1106	Technical Skills - 1 (Coding)	0	0	0	6	1.5	6
2	19TS2001	Skilling for Engineers-1	0	0	0	4	1	4
3	19TS2002	Skilling for Engineers-2	0	0	0	4	1	4
4	19TS2003	Skilling for Engineers-3	0	0	0	4	1	4
5	19TS2004	Skilling for Engineers-4	0	0	0	4	1	4
6	19TS2005	Technical Proficiency & Training- 1	0	0	0	4	1	4
7	19TS2006	Technical Proficiency & Training-2	0	0	0	4	1	4
						TOTAL CREDITS	7.5	30
GRAND TOTAL			**105**	**6**	**72**	**100**	**172.0**	**283**

PROFESSOIONAL ELECTIVES

Structural Engineering								
PE	**Course Code**	**Course Name**	**L**	**T**	**P**	**S**	**Cr**	**Prerequisite**
PE1	19CE3211	Advanced Structural Analysis	3	0	0	0	3	NIL
PE2	19CE3221	Advanced Design of Reinforced Concrete Structures	3	0	0	0	3	NIL
PE3	19CE3231	Prestressed concrete	3	0	0	0	3	NIL
PE4	19CE4141	Bridge engineering	3	0	0	0	3	NIL
PE5	19CE4151	Sustainable construction technologies	3	0	0	0	3	NIL
Geotechnical Engineering								

PE	Course Code	Course Name	L	T	P	S	Cr	Prerequisite
PE1	19CE3212	Foundation engineering	3	0	0	0	3	NIL
PE2	19CE3222	Ground improvement techniques	3	0	0	0	3	NIL
PE3	19CE3232	Design of earth retaining structures	3	0	0	0	3	NIL
PE4	19CE4142	Geotechnical earthquake engineering	3	0	0	0	3	NIL
PE5	19CE4152	Forensics in Civil Engineering	3	0	0	0	3	NIL
Environmental Engineering								
PE	**Course Code**	**Course Name**	**L**	**T**	**P**	**S**	**Cr**	**Prerequisite**
PE1	19CE3213	Sustainable engineering & technology	3	0	0	0	3	NIL
PE2	19CE3223	Environmental impact assessment and life cycle analyses	3	0	0	0	3	NIL
PE3	19CE3233	Solid Waste Management and Landfills	3	0	0	0	3	NIL
PE4	19CE3214	River engineering	3	0	0	0	3	NIL
PE5	19CE3224	Urban water hydrology and hydraulics	3	0	0	0	3	NIL
Construction Technology & Management								
PE	**Course Code**	**Course Name**	**L**	**T**	**P**	**S**	**Cr**	**Prerequisite**
PE1	19CE3216	Construction Contracts	3	0	0	0	3	NIL
PE2	19CE3226	Resource Safety And Quality Management	3	0	0	0	3	NIL
PE3	19CE3236	Form Work	3	0	0	0	3	NIL
PE4	19CE4146	Engineering Economy	3	0	0	0	3	NIL
PE5	19CE4156	Advanced Construction Technology	3	0	0	0	3	NIL
Transportation Engineering								
PE	**Course Code**	**Course Name**	**L**	**T**	**P**	**S**	**Cr**	**Prerequisite**
PE1	19CE3215	Intelligent transportation systems	3	0	0	0	3	NIL
PE2	19CE3225	Pavement materials &design	3	0	0	0	3	NIL

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PE3	19CE3235	Traffic engineering and management	3	0	0	0	3	NIL
PE4	19CE4145	Urban transportation systems planning.	3	0	0	0	3	NIL
PE5	19CE4155	Railway engineering airport planning and design	3	0	0	0	3	NIL

List of Open Electives

S.No	Course Code	Course Name	L	T	P	S	CR	Pre-requisites
1	19BT40A1	IPR & Patent Laws	3	0	0	0	3	NIL
2	19CE40A2	Environmental Pollution Control Methods	3	0	0	0	3	NIL
3	19CE40A3	Solid and Hazardous waste management	3	0	0	0	3	NIL
4	19CE40A4	Remote Sensing & GIS	3	0	0	0	3	NIL
5	19CE40A5	Disaster Management	3	0	0	0	3	NIL
6	19CS40A6	Fundamentals of DBMS	3	0	0	0	3	NIL
7	19CS40A7	Fundamentals of Software Engineering	3	0	0	0	3	NIL
8	19CS40A8	Fundamentals of Information Technology	3	0	0	0	3	NIL
9	19EC40A9	Image Processing	3	0	0	0	3	NIL
10	19EM40B1	Linux Programming	3	0	0	0	3	NIL
11	19EM40B2	E-Commerce	3	0	0	0	3	NIL
12	19EE40B3	Renewable Energy Sources	3	0	0	0	3	NIL
13	19ME40B4	Robotics	3	0	0	0	3	NIL
14	19ME40B5	Mechatronics	3	0	0	0	3	NIL
15	19ME40B6	Operations Research	3	0	0	0	3	NIL
16	19PH40B7	Nano Materials & Technology	3	0	0	0	3	NIL
17	19PE40B8	Subsea Engineering	3	0	0	0	3	NIL
18	19PE40B9	Oil and Gas Management	3	0	0	0	3	NIL

19	19GN40C1	Photography	3	0	0	0	3	NIL
20	19GN40C2	History of Sculpture	3	0	0	0	3	NIL
21	19GN40C3	Web Technologies	3	0	0	0	3	NIL
22	19GN40C4	Self Development	3	0	0	0	3	NIL
23	19GN40C5	Emotional Intelligence	3	0	0	0	3	NIL
24	19GN40C6	Behavioral Sciences	3	0	0	0	3	NIL

List of Management Electives

S.No	Course Code	Course Name	L	T	P	S	CR	Pre-requisites
1	19MB4051	Paradigms in Management thought	3	0	0	0	3	NIL
2	19MB4052	Indian Economy	3	0	0	0	3	NIL
3	19MB4053	Managing Personal Finances	3	0	0	0	3	NIL
4	19MB4054	Basics of Marketing for Engineers	3	0	0	0	3	NIL
5	19MB4055	Organization Management	3	0	0	0	3	NIL
6	19MB4056	Resources Safety and Quality Management	3	0	0	0	3	NIL
7	19MB4057	Economics for Engineers	3	0	0	0	3	NIL

LIST OF FOREIGN LANGUAGES

S.No	Course Code	Course Name	L	T	P	S	CR	Pre-requisites
1	19FL3051	ARABIC LANGUAGE	2	0	0	0	2	NIL
2	19FL3052	BENGALI LANGUAGE	2	0	0	0	2	NIL
3	19FL3053	CHINESE LANGUAGE	2	0	0	0	2	NIL
4	19FL3054	FRENCH LANGUAGE	2	0	0	0	2	NIL
5	19FL3055	GERMAN LANGUAGE	2	0	0	0	2	NIL
6	19FL3056	HINDI LANGUAGE	2	0	0	0	2	NIL
7	19FL3057	ITALIAN LANGUAGE	2	0	0	0	2	NIL
8	19FL3058	JAPANESE	2	0	0	0	2	NIL

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		LANGUAGE						
9	19FL3059	KANNADA LANGUAGE	2	0	0	0	2	NIL
10	19FL3060	RUSSIAN LANGUAGE	2	0	0	0	2	NIL
11	19FL3061	SIMHALI LANGUAGE	2	0	0	0	2	NIL
12	19FL3062	SPANISH LANGUAGE	2	0	0	0	2	NIL

ANNEXURE – 2: New courses and revisions proposed by the course coordinators and other stake holders in syllabus / Course Outcomes /experiments / teaching pedagogies for the courses to be offered in 2019 20 odd and even semesters. The changes were approved and recommended to Academic council.

NEW COURSES: B.TECH

No	Detailed Description	Resolution Passed
1	A new course "AI & ML Applications in Civil Engineering (19CE2105)" is to be introduced in B.Tech 2-1 semester to meet the technology and industry requirements.	Approved and added in B.Tech 2-1 semester
2	Soil mechanics course is to be replaced with Geotechnical Engineering with updated syllabus to meet the Employability , technology and industry requirements	Geotechnical Engineering course is added to curriculum with updated syllabus
3.	New courses "Design thinking and Innovation 1 &2 introduced in B.Tech 1-2 & 2-1 semesters to meet the Entrepreneurship, Skill development technology and industry requirements.	Approved and added in B.Tech 1-2 and 2-1 semesters

REVISIONS – B.TECH

No	Detailed Description	Resolution Passed
1	Syllabus for Building Planning and Construction is very old and need modifications.	The course is changed to Building Planning, Drawing & Construction Management (19CE2202) with introduction of construction management and latest application tools.
2	Stair cases and its design to be added in Design of Reinforced Concrete Structures	Added in Co4 in the course "Design of Reinforced Concrete Structures"
3	Workshop for civil engineers is to be modified as Design Tools workshop-I & II	New courses Design Tools Workshop –I & II to the curriculum
4	Syllabus for Engineering chemistry is to be updated with respect to latest trends	Syllabus is modified and attached in the annexure.
5	Addition of the topic "Engineering properties of Rocks" in Engineering Geology.	The topic "Engineering properties of Rocks" in Engineering Geology is added in CO2.
6	Sectional views are not available in Engineering graphics for civil	Section views are recognized as one of the important concepts and added in CO2 in the

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	Engineers course and only isometric views are there.	course "Engineering Graphics for Civil Engineers"
7	Water distribution systems topic should be added in environmental engineering course and this topic will be help for students applying for jobs in public water works	The topic "Water distribution systems" is added in CO2 in environmental engineering course
8	Flow through pipes topic is missing when compared to GATE syllabus	Flow through pipes and its losses were added to fluid mechanics course in CO4
9	Lateral Earth Pressure topic gives additional weightage to foundation engineering course, and it is very important	The topic "lateral Earth Pressure is added to Foundation engineering course in CO3
10	Open channel flow topic is missing when compared to GATE syllabus	Flow through open channel flows and its relevant topics were added to Hydraulics and Hydraulic Machines course in CO1
11	Suggestion to add Engineering drawing practice and various methods of drawings in Skilling for Engineers – I course	The topic Engineering drawing practice is added in CO 4 in the course "Skilling for Engineers – I"
12	Include "Theories of failure topic" in solid mechanics solid mechanics course	"Theories of failure topic" is added in CO2 in solid mechanics course
13	Add topics related to Levelling and contouring in surveying course	Levelling and contouring is added in CO2 in surveying course
14	Basic soil properties relevant to pavement applications is required in transportation engineering	The topic basic soil properties relevant to pavement applications is added in CO3 in Transportation Engineering course
15	Ductile Design and Detailing is required in Earthquake Resistant Design of structures course	The topic Ductile Design and Detailing is added in CO3 in Earthquake Resistant Design of structures course for M.Tech SE students
16	Analysis of Frames and Trusses is required in Finite Element Analysis course	The topic "Analysis of Frames and Trusses" is added in CO2 Finite Element Analysis course for M.Tech SE students
17	Include "Free Vibrations for MDOF systems topic in Structural Dynamics course	Added Free Vibrations for MDOF systems topic in Structural Dynamics course for M.Tech SE students
18	A course related to Design Thinking is required for students to apply this in regular core courses	Introduced Design Thinking and Innovation -I and Design Thinking and Innovation-II in the curriculum structure

REVISIONS- M. TECH – CTM

No	Detailed Description	Resolution Passed
1	Advanced Prestressed Concrete	Introduced the Design of Continuous prestressed concrete member.
2	Construction Planning Scheduling and Control	Introduced the Project Management Information System.
3	Green Buildings	Introduced the Indoor Environment Quality and

		occupational Health.
4	Mechanized Construction and Machinery	Introduced the Screening Equipment.
5	Quality Management and Safety Management Systems in Construction	Introduced the Safety Management Systems.

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Existing and Revised Syllabus

(New Course)

AI & ML APPLICATIONS IN CIVIL ENGINEERING

Course Code: 19CE2105 L-T-P-S:2-0-0-4

Prerequisite: NIL Credits: 3

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO NO	DESCRIPTION	PO	BTL
CO1	Apply the basic operations and data modifications in python	1,2,5	3
CO2	Apply the regression analysis on the given data	1,2,5	3
CO3	Apply some basic machine learning techniques on given data	1,2,5	3
CO4	Understand the deep learning concepts	1,2,5	2
CO5	Apply AI and ML techniques in Python	1,5,7	3

Syllabus:

Python for AI-ML: Python Basics, Datatypes and Operators, Conditional Statements, Loops, Standard Libraries, Built-in Functions, Scope of Variables, OOPS, Data Pre-processing, Data Manipulation, Data Visualization.

Predictive Analytics: Descriptive statistics and Inferential Statistics, exploratory data analysis, Linear & Non – Linear Regression, Logistic Regression, Multiple Linear Regression.

Machine Learning: Introduction to Machine Learning, Supervised Learning - Decision Tree, Random Forest, Naive Bayes, KNN, SVM, Model Selection and Boosting. Unsupervised Learning, Dimensionality Reduction, Principal Component Analysis, Time Series Analysis.

Deep Learning: Introduction to Deep Learning, Perceptron, Single Layer Perceptron, Multilayer Perceptron.Artificial Neural Networks, PNN, GA and Fuzzy neural networks.

Text Books :

1. Pradhan Manaranjan, Machine Learning Using Python, Wiley India Pvt. Ltd.

Web Links :https://pytorch.org/deep-learning-with-pytorch

MOOCS : https://www.youtube.com/watch?v=JMUxmLyrhSk&t=1620s

(Existing)

BUILDING PLANNING & CONSTRUCTION

Course Code: 18CE2202 L–T–P-S: 3-0-2-0
Pre-requisite: NIL Credits: 4

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO No.	Course Outcomes	PO	BTL
1	Understand about building bye-laws for construction of buildings, different types of buildings and walls	1,4	2
2	Understand about the different types of masonry and flooring	1,4	2
3	Understand about the types of roofs, arches and weathering courses	1,4	2
4	Understand about the different types stairs, building components and types of form work for building components	1,4	2

Syllabus:

Brick Masonry: Technical terms; Types of bonds in brickwork and their suitability. Stone Masonry: Technical terms; Classification of stone masonry.

Dampness and Damp Proofing: Introduction, Methods of preventing dampness; Damp proofing materials and their classification; Methods of providing DPC under different situations.

Floors: Technical terms; Different types of floors – concrete, mosaic, terrazzo, stone floors, ceramic tile floors, vinyl floors and wood floors. Roofs: Technical terms; Classification of roofs; Steel sloping roofs; Roof covering materials; Types of flat roofs. Scaffolding, Shoring, Under Pinning and Form Work: Types of scaffolding; Types of shoring; Methods of underpinning; Types of formwork; Centering

Building Planning: Introduction to Buildings, Classification of Buildings, National Building Code Building Planning: Selection of Site, Orientation, Ventilation, Furniture requirements, Roominess, Sanitation, Lighting, Space for equipment for air–conditioning, Space for machinery etc.; Aspect and prospect, Privacy, Elegance and economy; Climatic considerations; Materials selection, Wall thickness and Scales

Building Bye–Laws & Regulations: Objectives of Building Bye–Laws, Building regulations; Calculation of Plinth Area (PA), floor area and carpet area; Floor Area Ratio (FAR), Floor Space Index (FSI), Height of Buildings as per local code book

Construction Equipment: Classification of construction equipment; Concreting plant and equipment; Factors affecting the selection; Factors affecting cost of owning and operating the equipment. Quality Control: Importance of quality; Elements of quality; Organization for quality control; Quality assurance techniques; Quality control circles; Total quality management

Project Management Through Networks: Objectives of network techniques; Fundamentals of network analysis; Events; Activities; Dummies; Advantages of network techniques over

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conventional techniques. Program Evaluation and Review Technique (PERT): Introduction; Time estimates; Earliest expected time; Latest allowable occurrence time; Slack; Critical path; Probability of completion time for a project.

Critical Path Method (CPM) & Cost Control: Introduction; Earliest event time; Latest event time; Activity time; Float; Critical activities and critical path; Difference between CPM and PERT, Direct cost; Indirect cost; Total project cost

Textbook:

1. Varghese P.C," Building construction", Prentice hall of India (P) Ltd, New Delhi 2nd Edition 2008
2. Seetharaman.S," Construction Engineering and Management", Umesh Publications, Nai Sarak, Delhi, 2008

Reference Books:

1. Punmia B. C, " Building construction", Laxmi Publications, New Delhi 5th Edition
2. Sengupta.B & Guha.H "Construction Management & Planning", Tata McGraw – Hill Publishing Co. Ltd., New Delhi.

List of Experiments:

1. Draw the Sign Conventions for Engineering Materials, Water supply & Sanitary fixtures and Electrical Installations etc. using Manual & Auto cad.
2. Draw the English bond & Flemish bond for one, one and half brick walls using Auto cad.
3. Draw the Doors, Windows and Ventilators using Auto cad.
4. Draw the Residential Building and School Building line diagrams using Auto cad.
5. Draw the Commercial Building and Hospital Building line diagrams using Auto cad.
6. Draw the Sloped roof building with Load Bearing walls using Auto cad
7. Draw the Flat Roof Building with Framed construction using Auto cad
8. Draw the Stair Case Plan, Sectional elevations including T- Beam, Landing Beam & landing slab using Auto cad
9. Draw the Plan, section & elevation for given line plans of Single storied building using Auto cad
10. Draw the Plan, section & elevation for given line plans of Double storied building using Auto cad

(New Syllabus)

BUILDING PLANNING, DRAWING & CONSTRUCTION MANAGEMENT

Course Code: 19CE2202 L–T–P-S: 3-0-2-0
Pre-requisite: NIL Credits: 4

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO No.	Course Outcomes	PO	BTL
1	Understand about building bye-laws for construction of buildings, different types of buildings and walls	1,4	2
2	Understand about the different types of masonry and flooring	1,4	2
3	Understand about the types of roofs, arches and weathering courses	1,4	2
4	Understand about the different types stairs, building components and types of form work for building components	1,4	2

Syllabus:

Brick Masonry: Technical terms; Types of bonds in brickwork and their suitability. Stone Masonry: Technical terms; Classification of stone masonry.

Dampness and Damp Proofing: Introduction, Methods of preventing dampness; Damp proofing materials and their classification; Methods of providing DPC under different situations.

Floors: Technical terms; Different types of floors – concrete, mosaic, terrazzo, stone floors, ceramic tile floors, vinyl floors and wood floors. Roofs: Technical terms; Classification of roofs; Steel sloping roofs; Roof covering materials; Types of flat roofs. Scaffolding, Shoring, Under Pinning and Form Work: Types of scaffolding; Types of shoring; Methods of underpinning; Types of formwork; Centering

Building Planning: Introduction to Buildings, Classification of Buildings, National Building Code Building Planning: Selection of Site, Orientation, Ventilation, Furniture requirements, Roominess, Sanitation, Lighting, Space for equipment for air–conditioning, Space for machinery etc.; Aspect and prospect, Privacy, Elegance and economy; Climatic considerations; Materials selection, Wall thickness and Scales

Building Bye–Laws & Regulations: Objectives of Building Bye–Laws, Building regulations; Calculation of Plinth Area (PA), floor area and carpet area; Floor Area Ratio (FAR), Floor Space Index (FSI), Height of Buildings as per local code book

Construction Equipment: Classification of construction equipment; Concreting plant and equipment; Factors affecting the selection; Factors affecting cost of owning and operating the equipment. Quality Control: Importance of quality; Elements of quality; Organization for quality control; Quality assurance techniques; Quality control circles; Total quality management

Construction Management: Introduction, Construction projects, Objectives of Construction management; Steps involved in Project management, Project failures. Planning: Steps

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involved in planning; Objectives of planning; Principles of planning; Advantages and Limitations of planning, Stages of planning. Scheduling: Scheduling, Methods of scheduling; Bar charts; Mile stone charts; Controlling; Job layout; Factors affecting job layout; Project work break down; Activities involved.

Project Management Through Networks: Objectives of network techniques; Fundamentals of network analysis; Events; Activities; Dummies; Advantages of network techniques over conventional techniques. Program Evaluation and Review Technique (PERT): Introduction; Time estimates; Earliest expected time; Latest allowable occurrence time; Slack; Critical path; Probability of completion time for a project.

Critical Path Method (CPM) & Cost Control: Introduction; Earliest event time; Latest event time; Activity time; Float; Critical activities and critical path; Difference between CPM and PERT, Direct cost; Indirect cost; Total project cost

Textbook:

3. Varghese P.C," Building construction", Prentice hall of India (P) Ltd, New Delhi 2nd Edition 2008
4. Seetharaman.S," Construction Engineering and Management", Umesh Publications, Nai Sarak, Delhi, 2008

Reference Books:

2. Punmia B. C, " Building construction", Laxmi Publications, New Delhi 5th Edition
2. Sengupta.B & Guha.H "Construction Management & Planning", Tata McGraw – Hill Publishing Co. Ltd., New Delhi.

List of Experiments:

11. Draw the Sign Conventions for Engineering Materials, Water supply & Sanitary fixtures and Electrical Installations etc. using Manual & Auto cad.
12. Draw the English bond & Flemish bond for one, one and half brick walls using Auto cad.
13. Draw the Doors, Windows and Ventilators using Auto cad.
14. Draw the Residential Building and School Building line diagrams using Auto cad.
15. Draw the Commercial Building and Hospital Building line diagrams using Auto cad.
16. Draw the Sloped roof building with Load Bearing walls using Auto cad
17. Draw the Flat Roof Building with Framed construction using Auto cad
18. Draw the Stair Case Plan, Sectional elevations including T- Beam, Landing Beam & landing slab using Auto cad
19. Draw the Plan, section & elevation for given line plans of Single storied building using Auto cad
20. Draw the Plan, section & elevation for given line plans of Double storied building using Auto cad

(Existing)

DESIGN OF REINFORCED CONCRETE STRUCTURES

Course Code: 18CE3101 L-T-P-S: 3-0-2-0
Prerequisite: NIL Credits: 4

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO No.	Course Outcomes	PO	BTL
1	WSM: Design of Singly Reinforced Beam & Doubly Reinforced Beam, LSM: Introduction, Design of singly Reinforced Beam & Doubly Reinforced Beam	1,5	6
2	Design of Flanged Beams (T- Beam & L – Beam), Design concepts of shear, development length and torsion for beams	1,5	6
3	Design of Reinforced concrete slabs and columns	1,5	6
4	Design of isolated footings (Square, Rectangular & Circular)	1,5	6
5	Analysis and Design of Structures using software such as ETABS/Staad Pro/CYPE CADD etc.	11	

Syllabus:

Introduction to working stress method: Introduction, Design for bending, Analysis and design of singly reinforced and doubly reinforced beams.

Introduction to limit state design: Concepts of limit state design, Characteristic loads, Characteristic strength, Partial loads and Material Safety factors, Representative stress, Strain curves, Assumptions in limit state design, Stress block parameters, Limiting moment of resistance.

Singly and doubly reinforced beams: Limit state analysis and design of singly reinforced, doubly reinforced beams. **Flanged sections**: Limit state design of T and L beam sections.

Shear, torsion and bond: Limit state analysis and design of sections for shear and torsion, Concept of bond, anchorage and development length, I.S Code provisions. Design examples in simply supported beams.

Slabs: Design of one-way slabs, two-way slabs, Continuous slabs using IS coefficients.

Columns: Short and long columns Uni axial loads Uni - axial bending and bi-axial bending I.S code provisions.

Footings: Footings: Different types of footings–Design of isolated, square, rectangular and circular footings.

Textbook:

1. P.C. Varghese "Design of Reinforced Concrete Design.
2. Pillai & Devdas Menon, "Reinforced concrete design", 3rd Edition, Tata McGraw Hill, New Delhi, 2009.

Reference Books:

1. N.C. Sinha and S.K Roy, "Fundamentals of Reinforced Concrete", 4th Edition, S. Chand publishers, 2002
2. N. Krishna Raju and R.N. Pranesh, "Reinforced Concrete Design", 8th Edition, New age International Publishers, New Delhi, 2004.

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DESIGN OF REINFORCED CONCRETE STRUCTURES

Course Code: 19CE3101 L-T-P-S: 3-0-2-0
Prerequisite: NIL Credits: 4

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO No.	Course Outcomes	PO	BTL
1	WSM: Design of Singly Reinforced Beam & Doubly Reinforced Beam, LSM: Introduction, Design of singly Reinforced Beam & Doubly Reinforced Beam	1,5	6
2	Design of Flanged Beams (T- Beam & L – Beam), Design concepts of shear, development length and torsion for beams	1,5	6
3	Design of Reinforced concrete slabs and columns	1,5	6
4	Design of isolated footings (Square, Rectangular & Circular)	1,5	6
5	Analysis and Design of Structures using software such as ETABS/Staad Pro/CYPE CADD etc.	11	

Syllabus:

Introduction to working stress method: Introduction, Design for bending, Analysis and design of singly reinforced and doubly reinforced beams.

Introduction to limit state design: Concepts of limit state design, Characteristic loads, Characteristic strength, Partial loads and Material Safety factors, Representative stress, Strain curves, Assumptions in limit state design, Stress block parameters, Limiting moment of resistance.

Singly and doubly reinforced beams: Limit state analysis and design of singly reinforced, doubly reinforced beams. **Flanged sections**: Limit state design of T and L beam sections.

Shear, torsion and bond: Limit state analysis and design of sections for shear and torsion, Concept of bond, anchorage and development length, I.S Code provisions. Design examples in simply supported beams.

Slabs: Design of one-way slabs, two-way slabs, Continuous slabs using IS coefficients.

Columns: Short and long columns Uni axial loads Uni - axial bending and bi-axial bending I.S code provisions.

Footings: Footings: Different types of footings–Design of isolated, square, rectangular and circular footings.

Stair Cases: Introduction to Staircases: Importance, Applications, Types and Terminology, Staircase Design: Design of dog-legged staircase, open-well staircase

Textbook:

1. P.C. Varghese "Design of Reinforced Concrete Design.
2. Pillai & Devdas Menon, "Reinforced concrete design", 3rd Edition, Tata McGraw Hill, New Delhi, 2009.

Reference Books:

1. N.C. Sinha and S.K Roy, "Fundamentals of Reinforced Concrete", 4th Edition, S. Chand publishers, 2002
2. N. Krishna Raju and R.N. Pranesh, "Reinforced Concrete Design", 8th Edition, New age International Publishers, New Delhi, 2004.

(New COURSE)

DESIGN TOOLS WORKSHOP –I

COURSE CODE :19ME1103 L-T-P-S: 0-0-4-0

Pre-requisite: NIL Credits: 2

Mapping of Course Outcomes with PO/PSO:

CO	Course Outcome	PO/PSO	BTL
CO1	Practice design thinking by developing artistic skills	PO-3	2
CO2	Visualize and practice innovative design by final drafting using photogrammetric and model the design using prototyping technique	PO-4	3
CO3	Apply the concept of AI & Data analytics & finalize the requirements to design his idea	PO-5	3
CO4	Draft a report of his project from the initial stage & make a report which include scope, time and cost management of his project	PO-4	3

Syllabus:

Introduction to Design thinking: Design thinking, usage of visualization tool, Physics and preparation for Innovation, Idea generation and mind mapping, Strategic opportunities, Storytelling tool.
Photogrammetry: Basic concepts of photogrammetry, types of photogrammetric techniques and measurements.
Prototyping: Prototyping, including paper and tool-based prototyping,design principles and patterns, 3D Modeling, 360 Prototyping, 3DPrinting.
Engineering Project Management: Scope, Time and Cost Management.
Data Analytics: Introduction, Basics of Statistical Analysis System (SAS), Logistic regression using SAS.
Artificial Intelligence: Introduction, Turing Test, Breadth first Search techniques, Depth first Search techniques using python.
Machine Learning: Linear regression, Naive Bayes, gradient descent algorithms using python.

Text books:

1. "Complete Design Thinking Guide for Successful Professionals" by Daniel Ling
2. "Project Management" by K.Nagarajan, 7th Edition, New Age International Publishers.
3. "Augmented Reality and Virtual reality" by Timothy Jung, M.ClaudiaTomDieck, Springer.
4. "Rapid Prototyping: Principles and Applications"by Chua C.K., Leong and Lim. C.S, 2nd Edition, World Scientific.

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5. "Artificial Intelligence: A Modern Approach" by Stuart Russell and Peter Norvig, 3rd Edition, Prentice Hall.

(New COURSE)

DESIGN TOOLS WORKSHOP –II

COURSE CODE :19SC1209 L-T-P-S: 0-0-4-0

Pre-requisite: NIL Credits: 2

Mapping of Course Outcomes with PO/PSO:

CO No.	Course Outcome	PO/PSO	BTL
CO1	Practice the design ideology by artistic skill	PO-3	2
CO2	Visualize the design ideology by using VR technology	PO-4	3
CO3	Visualize the design ideology by incorporating VR technique	PO-5	3
CO4	Visualize and present his design idea by applying AR technique	PO-4	3

Syllabus:

Design Thinking in Modern Art &Ideas: Modern Art & Ideas, Transforming everyday objects, Abstract painting, clay modeling, poetry and literary.

Virtual Reality: Hardware and History, VR Applications, Psychology of VR: the three illusions, challenges in virtual reality, Future of Embodiment in VR, Realism, Graphics, Real-Time 3D Graphics in Games, Basic Concepts in 3D Computer Graphics, Realism Animation, Navigation, Nausea.

Room Scale VR, Holography, Mirror Reality: Setting up room scale VR, Simulation of virtual environment, Stereoscopic Vision, Perspective, Interference and Diffraction, Laser Viewable Holograms, Real and Virtual Images, Introduction to mirror reality.

Augmented Reality: Augmented Reality, characteristics of AR systems and main components of an AR architecture, Augmented Reality with Geolocation,Customizing an augmented reality game.

Text books:

1. "Complete Design Thinking Guide for Successful Professionals" by Daniel Ling
2. "Project Management" by K. Nagarajan, 7th Edition, New Age International Publishers.
3. "Augmented Reality and Virtual reality" by Timothy Jung, M.ClaudiaTomDieck, Springer.
4. "Rapid Prototyping: Principles and Applications"by Chua C.K., Leong and Lim. C.S, 2nd Edition, World Scientific.
5. "Artificial Intelligence: A Modern Approach" by Stuart Russell and Peter Norvig, 3rd Edition, Prentice Hall.

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(EXISTING)

ENGINEERING CHEMISTRY

Course code: 18CY1001 L-T-P-S: 3-0-2-0

Pre-Requisites:NIL Credits: 4

Mapping of Course Outcomes to Program outcomes: The students will be able to

CO No.	Course Outcomes	PO	BTL
1	Describe some important design considerations in choosing a battery for a specific application.	1,3,7	2
2	Predict potential complications from combining various chemicals or metals in an engineering setting	1,3	2
3	Examine water quality and select appropriate purification technique for intended problem	1,7	2
4	Explain the role of chemical kinetics in the formation and destruction of ozone in the atmosphere and predict the connection between molecular behavior and observable physical properties.	1,7	2
5	An ability to analyze & generate experimental skills	1,4	3

Syllabus:

Energy and Chemistry: Energy Use and the World Economy, Defining Energy, Energy Transformation and Conservation of Energy, Heat Capacity and Calorimetry. Enthalpy, Hess's Law and Heats of Reaction, Energy and Stoichiometry.

Electro Chemistry: Single electrode potential and its measurement, Electrochemical cells, EMF series, Nernst equation, Cell emf measurement, Reversible and irreversible cells, Concentration cells, Reference electrodes-- Determination of pH using glass electrode.

Gas Sensors: Capacitance Manometer and Mass Spectrometer. **Batteries:** Chemistry, construction and engineering aspects of Primary (mercury battery) and secondary (lead-Acid cell, Ni-Metal hydride cell, Lithium cells) and fuel cells–Hydrogen–Oxygen fuel cell, advantages of fuel cell.

Corrosion: Causes and different types of corrosion and effects of corrosion. Theories of corrosion– Chemical, Electrochemical corrosion, Pitting corrosion, stress corrosion, Galvanic corrosion. Factors affecting corrosion– Nature of metal, galvanic series, over voltage, purity of metal, nature of oxide film, nature of corrosion product. Nature of environment- effect of temperature, effect of pH, Humidity, effect of oxidant. Cathodic protection, sacrificial anode, impressed current cathode, electroplating.

Water Chemistry: Introduction, Hardness: Causes, expression of hardness – units – types of hardness, estimation of temporary and permanent hardness of water, numerical problems. Alkalinity and estimation of alkalinity of water, numerical problems. **Boiler troubles** – Scale

& sludge formation, caustic embrittlement, Boiler corrosion, priming & foaming. **Softening of water**: Internal and external treatments -Lime soda, Ion exchange process. **Desalination-** reverse osmosis and electro dialysis.

Chemical Kinetics: Ozone Depletion, Rates of Chemical Reactions, Rate Laws and the Concentration Dependence of Rates, Integrated Rate Laws, Temperature and Kinetics, Reaction Mechanisms, Catalysis, insight into Troposphere Ozone.

Molecules and Materials: polymers- Types of polymerization-Mechanisms, Plastics – Thermoplastic resins and thermosetting resins - Preparation, properties and engineering applications of: polyethylene, PVC, Teflon, Bakelite, Urea Formaldehyde. Conducting Polymers: Polyacetylene, polyaniline, conduction, doping and applications. Carbon nano tubes and Applications.

Text Books:

1. Engineering Chemistry, Jain & Jain, Dhanpat Rai Publishing Company. New Delhi.
2. Engineering Chemistry, O G Palanna, The Tata McGraw Hill, New Delhi.

Reference Books:

1. Chemistry in Engineering and Technology, Volume 2, J C Kuriacose & J Rajaram, Tata McGraw Hill, New Delhi.
2. Chemistry for Engineers Rajesh Agnihotri, Wiley, New Delhi.
3. Engineering Chemistry, B. Sivasankar, The Tata McGraw Hill, New Delhi.
4. A text book of Engineering Chemistry, Shashi Chawla, Dhanpat Rai & Co. New Delhi.
5. Engineering Chemistry, C Parameswara Murthy, C V Agarwal and Andra Naidu, B S Publications, Hyderabad.
6. Engineering Chemistry, Shikha Agarwal, Cambridge University Press.

List of Experiments:

1. Total Hardness of Water; Determination of carbonate and non-carbonate hardness of water sample
2. Determination of Alkalinity of water sample
3. Chloride Content in Water; Residual Chlorine in Tap water
4. Determination of Dissolved oxygen
5. Potentiometry
6. Conductometry
7. P^H Metre
8. Rate of Corrosion
9. Estimation of iron by redox titration
10. Saponification value of oil
11. Preparation of Urea-Formaldehyde and Bakelite resins
12. Determination of Viscosity of polymer solution using survismeter
13. Flash Point by Pensky-Marten`s Apparatus
14. Green Tech titration for experimental resource saving in analytical lab using econo burette.

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ENGINEERING GEOLOGY

Course Code: 18CE2204 L-T-P-S: 3-0-2-0
Prerequisite: NIL Credits: 4

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO No:	CO	PO	BTL
1	Understand the significance of engineering geology, basics of geological processes that modify the surface of the earth, earthquakes, landslides.	1,8	2
2	Understand the basics of minerals and rocks, geological structures exhibited by rocks and their influence ,	1,8	2
3	analyze the geological conditions to identify suitable site for civil engineering projects.	1,8	3
4	analyze the geological conditions to identify potential sites for groundwater, sites for dam and reservoir and tunnels	1,8	3
5	analyze the geological conditions for suitability of the site for a major civil engineering project	2,8	4

Syllabus:

INTRODUCTION: Importance of geology from Civil engineering point of view,
PHYSICAL GEOLOGY: Introduction; Weathering Process, types of weathering and its importance in civil engineering; Soil formation, Soil profile, soil conservation measures; Geological action of Rivers, stages in a river system, features of river erosion and deposition.
EARTHQUAKES AND SEISMIC HAZARDS: Terminology; Classification, Causes and effects of earthquakes; seismic waves, measuring instruments, seismic zones of India, Seismic belts, seismic hazards in India ; Civil Engineering considerations in seismic areas. A step towards urban earthquake vulnerability reduction.

LAND SLIDES: Classification; Causes and effects of Landslides; Preventive measures of Landslides.

MINERALOGY: Definition of mineral; physical properties of minerals. Study of common rock forming minerals - Quartz, Feldspar, Muscovite, Asbestos calcite, Talc, Kaolin
PETROLOGY: Introduction; Rock Cycle, major rock types, formation of Igneous rocks; Structures of Igneous rocks. Formation of Sedimentary rocks; Structures of Sedimentary Rocks. agents of metamorphism, Structures of Metamorphic rocks, distinguisition of major rock types,

STRUCTURAL GEOLOGY: Introduction; Strike and Dip; Outcrop. Parts and classification of Folds; Faults; Joints; and their importance in Civil Engineering constructions.

SITE INVESTIGATION TECHNIQUES FOR CIVIL ENGINEERING PROJECTS: Introduction, Different stages of site investigation, toposheets/topographic maps; Geological maps and their interpretation in site investigation; Geophysics in civil engineering, electrical resistivity investigations, seismic survey, remote sensing , Geographical information systems and their application

GROUND WATER: sources of ground water, factors controlling ground water, water bearing properties of rocks and soils, types of aquifers, exploration of ground water

DAMS: Dams terminology; Types of dams and suitable foundations; guidelines for major dam and reservoir investigations;

TUNNELS: Purpose of tunneling; types of tunnels, tunnels and underground excavations – methods of site selection, tunnel excavation in various rock types, geological problems, Geology of some tunnel sites;

Textbook:

1. Engineering Geology by D.Venkat Reddy; Vikas Publishing House Pvt.Ltd., Noida
2. Engineering and General Geology by Parbin Singh; S. K. Kataria & Sons, New Delhi.

Reference Books:

3. Engineering Geology and Geo techniques by Krynine and Judd, Mc Graw – Hill Book Company.
4. Engineering geology by Subinoy Gangopadhyay: Oxford University Press.

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(NEW SYLLABUS)

ENGINEERING GEOLOGY

Course Code: 19CE2205 L-T-P-S: 3-0-2-0

Prerequisite: NIL Credits: 4

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO No:	CO	PO	BTL
1	Understand the significance of engineering geology, basics of geological processes that modify the surface of the earth, earthquakes, landslides.	1,8	2
2	Understand the basics of minerals and rocks, geological structures exhibited by rocks and their influence ,	1,8	2
3	analyze the geological conditions to identify suitable site for civil engineering projects.	1,8	3
4	analyze the geological conditions to identify potential sites for groundwater, sites for dam and reservoir and tunnels	1,8	3
5	analyze the geological conditions for suitability of the site for a major civil engineering project	2,8	4

Syllabus:

INTRODUCTION: Importance of geology from Civil engineering point of view,
PHYSICAL GEOLOGY: Introduction; Weathering Process, types of weathering and its importance in civil engineering; Soil formation, Soil profile, soil conservation measures; Geological action of Rivers, stages in a river system, features of river erosion and deposition.
EARTHQUAKES AND SEISMIC HAZARDS: Terminology; Classification, Causes and effects of earthquakes; seismic waves, measuring instruments, seismic zones of India, Seismic belts, seismic hazards in India ; Civil Engineering considerations in seismic areas. A step towards urban earthquake vulnerability reduction.

LAND SLIDES: Classification; Causes and effects of Landslides; Preventive measures of Landslides.

MINERALOGY: Definition of mineral; physical properties of minerals. Study of common rock forming minerals - Quartz, Feldspar, Muscovite, Asbestos calcite, Talc, Kaolin
PETROLOGY: Introduction; Rock Cycle, major rock types, formation of Igneous rocks; Structures of Igneous rocks. Formation of Sedimentary rocks; Structures of Sedimentary Rocks. agents of metamorphism, Structures of Metamorphic rocks, distinguisition of major rock types,
ENGINEERING PROPERTIES OF ROCKS: Different Engineering property of rocks. Description of some important Rocks – Granite - Basalt – Dolerite – Sand Stone – Lime Stone – Shale – Laterite - Granite gneiss – schist – Marble – K hondalite – Charnockite.

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STRUCTURAL GEOLOGY: Introduction; Strike and Dip; Outcrop Parts and classification of Folds; Faults; Joints; and their importance in Civil Engineering constructions.

SITE INVESTIGATION TECHNIQUES FOR CIVIL ENGINEERING PROJECTS: Introduction, Different stages of site investigation, toposheets/topographic maps; Geological maps and their interpretation in site investigation; Geophysics in civil engineering, electrical resistivity investigations, seismic survey, remote sensing , Geographical information systems and their application

GROUND WATER: sources of ground water, factors controlling ground water, water bearing properties of rocks and soils, types of aquifers, exploration of ground water

DAMS: Dams terminology; Types of dams and suitable foundations; guidelines for major dam and reservoir investigations;

TUNNELS: Purpose of tunneling; types of tunnels, tunnels and underground excavations – methods of site selection, tunnel excavation in various rock types, geological problems, Geology of some tunnel sites;

Textbook:

1. Engineering Geology by D.Venkat Reddy; Vikas Publishing House Pvt.Ltd., Noida
2. Engineering and General Geology by Parbin Singh; S. K. Kataria & Sons, New Delhi.

Reference Books:

3. Engineering Geology and Geo techniques by Krynine and Judd, Mc Graw – Hill Book Company.
4. Engineering geology by Subinoy Gangopadhyay: Oxford University Press.

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(Existing)

Engineering Graphics AND DESIGN FOR Civil Engineers

Course Code: 18CE1002 L-T-P-S: 0-0-4-0
Prerequisite: NIL Credits:2

Mapping of Course outcomes with student outcomes: The students are able to

CO No.	Course Outcomes	PO	B T L
1	Understand the principles of drawing and use of drafting instruments	1, 10, 12	2
2	Draw engineering curves	1, 10, 12	2
3	Draw the projections of points, lines, planes and solids	1, 10, 12	2
4	Draw the total surface of solids by development of surfaces and the sections of Solids.	1, 10, 12	2
5	Understand the principles of Design.	1, 12	2

Syllabus:

Introduction to Engineering Drawing:

Geometrical Constructions- Engineering Curves used in Engineering Practice & their Constructions, Conic Sections, Special Curves.

Orthographic Projection in First Angle Projection: Projections of Planes & Solids, Sections and Development Solids.

Isometric Projections: Transformation of Projections, Design Principles.

Text Books:

1. N.D. Bhatt "Engineering Drawing" Charotar publishing House
2. Saeed Moaveni "Engineering Fundamentals- An Introduction to Engineering" Cengage Learning.

Reference Books:

1. Engineering Drawing and Graphics, Venugopal / New age.
2. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication.

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(New Syllabus)

Engineering graphics for Civil Engineers

Course Code: 19CE1002 L-T-P-S: 0-0-2-0
Prerequisite: NIL Credits:1

Mapping of Course outcomes with student outcomes: The students are able to

CO No.	Course Outcomes	PO	B T L
1	Understand the principles of drawing and use of drafting instruments	1, 10, 12	2
2	Draw engineering curves	1, 10, 12	2
3	Draw the projections of points, lines, planes and solids	1, 10, 12	2
4	Draw the total surface of solids by development of surfaces and the sections of Solids.	1, 10, 12	2
5	Understand the principles of Design.	1, 12	2

Syllabus:

Introduction to Engineering Drawing:

Geometrical Constructions- Engineering Curves used in Engineering Practice & their Constructions, Conic Sections, Special Curves.

Orthographic Projection in First Angle Projection: Projections of Planes & Solids, Sections and Sectional Views, Development Solids.

Isometric Projections: Transformation of Projections, Design Principles.

Text Books:

3. N.D. Bhatt "Engineering Drawing" Charotar publishing House
4. Saeed Moaveni "Engineering Fundamentals- An Introduction to Engineering" Cengage Learning.

Reference Books:

3. Engineering Drawing and Graphics, Venugopal / New age.
4. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication.

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(EXISTING)

ENVIRONMENTAL ENGINEERING

Course Code: 18CE2205 L-T-P-S: 3-0-2-0

Prerequisite: NIL Credits: 4

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO No.	Course Outcomes	PO	BTL
1	Understand various aspects related to water supply and water treatment process	3	2
2	Analyze and design water treatment and sewerage system	3	4
3	Understand design of waste water treatment process	3	2
4	Understand impacts of air pollution and control techniques, from sources to disposal of solid waste	3	2
5	Test the water & wastewater, design of water, wastewater treatment plant& distribution system	2	4

Syllabus:

Water Supply: Necessity of protected water supply. Role of Civil Engineer. Water demand, per capita consumption and factors affecting. Effect of variations of water demand. Design period – population forecasting, Sources of water - quality parameters and their significance. Drinking water quality standards in India. Intake structures design.

Water Treatment: Types and origin of impurities, Need for water treatment. Purpose, principles of operation and design considerations of plain sedimentation, sedimentation with coagulation, flocculation clarifier design. Design of filters. Disinfection methods.

Introduction to Sewerage system: Sewerage systems, Quantity estimation, Velocity in sewers, Storm water sewers-Strom water estimation by rational method. Sewerage system design, Objectives and extent of wastewater treatment, characteristics of sewage – examination of sewage – B.O.D. – C.O.D. equations.

Sewage Treatment: Purpose, principle and design considerations of Preliminary treatment -. Screens, grit chambers; Primary Treatment-Sedimentation – rectangular and circular tanks; Secondary treatment- Activated sludge process, Trickling filter and UASB. Septic tanks - design parameters and working principles.

Noise Pollution & Solid waste Management: Noise pollution, types, Impacts on environment and control measures. Solid Wastes - Types, sources and composition of solid wastes, Methods of collection and disposal

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Air Pollution. Air Pollution-Types, Impacts on environment, and Principles of control techniques

Textbook:

3. Wastewater Engineering Treatment, Disposal & Reuse by Met Calf & Eddy, Tata McGraw – Hill publishing Co. Ltd., New Delhi.
4. Environmental Engineering (Vol I), Water Supply Engineering, S. K. Garg, Khanna Publishers, New Delhi, Twelfth Revised Edition, 2010

Reference Books:

3. Environmental Engineering by Howard S. Peavy, Donald R. Rowe and George Tchobanoglous, Mc Graw-Hill International Editions, New York.
4. Water and Wastewater Technology, Mark. J Hammer and Mark. J Hammer, Eastern Economy Edition, PHI-Learning, New Delhi (2008).

List of Experiments:

Determination of the following parameters present in the given water / wastewater sample:

5. a) pH b) Electrical Conductivity
6. a) Turbidity b) Jar test
7. Hardness
8. a) Acidity b) Alkalinity
9. Available chlorine and Residual Chlorine
10. Fluoride
11. Iron
12. Total solids, Dissolved solids, Suspended solids & Settleable solids
13. Dissolved Oxygen(DO)
14. Biochemical Oxygen Demand (BOD)
15. Chemical Oxygen Demand (COD)
16. Chlorides

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(NEW SYLLABUS)

ENVIRONMENTAL ENGINEERING

Course Code: 19CE2204 L-T-P-S: 3-0-2-0

Prerequisite: NIL Credits: 4

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO No.	Course Outcomes	PO	BTL
1	Understand various aspects related to water supply and water treatment process	3	2
2	Analyze and design water treatment and sewerage system	3	4
3	Understand design of waste water treatment process	3	2
4	Understand impacts of air pollution and control techniques, from sources to disposal of solid waste	3	2
5	Test the water & wastewater, design of water, wastewater treatment plant& distribution system	2	4

Syllabus:

Water Supply: Necessity of protected water supply. Role of Civil Engineer. Water demand, per capita consumption and factors affecting. Effect of variations of water demand. Design period – population forecasting, Sources of water - quality parameters and their significance. Drinking water quality standards in India. Intake structures design.

Water Treatment: Types and origin of impurities, Need for water treatment. Purpose, principles of operation and design considerations of plain sedimentation, sedimentation with coagulation, flocculation clarifier design. Design of filters. Disinfection methods.

Distribution systems -Design procedures- Hardy Cross and equivalent pipe methods– Layout of distribution system. Joints, valves such as sluice valves, air valves, scour valves and check valves water meters – laying and testing of pipe lines.

Introduction to Sewerage system: Sewerage systems, Quantity estimation, Velocity in sewers, Storm water sewers-Strom water estimation by rational method. Sewerage system design, Objectives and extent of wastewater treatment, characteristics of sewage – examination of sewage – B.O.D. – C.O.D. equations.

Sewage Treatment: Purpose, principle and design considerations of Preliminary treatment -. Screens, grit chambers; Primary Treatment-Sedimentation – rectangular and circular tanks; Secondary treatment- Activated sludge process, Trickling filter and UASB. Septic tanks - design parameters and working principles.

Noise Pollution & Solid waste Management: Noise pollution, types, Impacts on environment and control measures. Solid Wastes - Types, sources and composition of solid wastes, Methods of collection and disposal

Air Pollution: Air Pollution-Types, Impacts on environment, and Principles of control techniques

Textbook:

5. Wastewater Engineering Treatment, Disposal & Reuse by Met Calf & Eddy, Tata McGraw – Hill publishing Co. Ltd., New Delhi.
6. Environmental Engineering (Vol I), Water Supply Engineering, S. K. Garg, Khanna Publishers, New Delhi, Twelfth Revised Edition, 2010

Reference Books:

17. Environmental Engineering by Howard S. Peavy, Donald R. Rowe and George Tchobanoglous, Mc Graw-Hill International Editions, New York.
18. Water and Wastewater Technology, Mark. J Hammer and Mark. J Hammer, Eastern Economy Edition, PHI-Learning, New Delhi (2008).

List of Experiments:

Determination of the following parameters present in the given water / wastewater sample:

19. a) pH b) Electrical Conductivity
20. a) Turbidity b) Jar test
21. Hardness
22. a) Acidity b) Alkalinity
23. Available chlorine and Residual Chlorine
24. Fluoride
25. Iron
26. Total solids, Dissolved solids, Suspended solids & Settleable solids
27. Dissolved Oxygen(DO)
28. Biochemical Oxygen Demand (BOD)
29. Chemical Oxygen Demand (COD)
30. Chlorides

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(EXISTING)

FLUID MECHANICS

Course Code: 18CE2103 L- T- P-S: 3-0-2-0
Pre-requisite: NIL Credits: 4

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO No.	Course Outcomes	PO	BTL
1	Understand the properties of the fluid and Analyze static fluid	1,3	3,4
2	Understand the fluids of kinematic and Analyze dynamic states	1,3	3,4
3	Analyze the flow through pipes	1,3	3,4
4	Perform dimensional analysis and develop simulate model	1,3	3,4
5	Demonstrate and design the flow through notches and pipes	1,3	4

Syllabus:

Fluid properties: Definition of fluid, classification of fluids, properties of fluid density, specific weight, specific gravity, viscosity, surface tension and capillarity, vapour pressure and cavitation.

Fluid statics: Introduction, pressure, Pascal's law, hydrostatic law, measurement of pressure-simple and differential manometers, Total pressure and centre of pressure on vertical, horizontal and Inclined surfaces.

Fluid statics-buoyancy and floatation: Buoyancy, centre of buoyancy, Meta-centre, Meta-centric height.

Fluid kinematics: Introduction, types of fluid flow, Discharge, Continuity equation, Continuity equation in three-dimensional flow, velocity potential function and stream function **Fluid dynamics:** Introduction, Euler's equation of motion, Bernoulli's equation and applications, Venturimeter, Orificemeter, Pitot-tube, the coefficient of discharge, Introduction to orifices and mouth pieces, Notches -V and Rectangular.

Momentum equation: Impulse-momentum equation, Force exerted by flowing fluid on pipe-bend.

Dimensional analysis & model similitude: Introduction, Buckingham's PI theorem, Model analysis, Types of similarities, Dimensionless numbers, Classification of models, Model laws-Reynolds and Froude model law.

Textbooks:

1. Fluid Mechanics by John F. Douglas, Tata McGraw Hill publications
2. Fluid Mechanics and Machinery, C.S.P.Ojha, R. Berndtsson and P. N. Chadramouli, Oxford University Press, 2010

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Reference Books:

1. Fluid Mechanics and machinery by Manish Kumar Goyal: PHI Publishers, Delhi.
2. Fluid Mechanics and machinery by C.S.P.Ojha: Oxford Higher Education Publishers, Chennai.

Lab Experiments:

1. Measurement of viscosity
2. Study of Pressure Measuring Devices
3. Stability of Floating Body
4. Hydrostatics Force on Flat Surfaces/Curved Surfaces
1. Verification of Bernoulli's Theorem
2. Venturimeter
3. Orifice meter
4. Impacts of jets
5. Flow Visualization -Ideal Flow
6. Length of establishment of flow
7. Velocity distribution in pipes
8. Laminar Flow

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(NEW SYLLABUS)

FLUID MECHANICS

Course Code: 19CE2102 L- T- P-S: 3-0-2-0
Pre-requisite: NIL Credits: 4

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO No.	Course Outcomes	PO	BTL
1	Understand the properties of the fluid and Analyze static fluid	1,3	3,4
2	Understand the fluids of kinematic and Analyze dynamic states	1,3	3,4
3	Analyze the flow through pipes	1,3	3,4
4	Perform dimensional analysis and develop simulate model	1,3	3,4
5	Demonstrate and design the flow through notches and pipes	1,3	4

Syllabus:

Fluid properties: Definition of fluid, classification of fluids, properties of fluid density, specific weight, specific gravity, viscosity, surface tension and capillarity, vapour pressure and cavitation.

Fluid statics: Introduction, pressure, Pascal's law, hydrostatic law, measurement of pressure-simple and differential manometers, Total pressure and centre of pressure on vertical, horizontal and Inclined surfaces.

Fluid statics-buoyancy and floatation: Buoyancy, centre of buoyancy, Meta-centre, Meta-centric height.

Fluid kinematics: Introduction, types of fluid flow, Discharge, Continuity equation, Continuity equation in three-dimensional flow, velocity potential function and stream function **Fluid dynamics:** Introduction, Euler's equation of motion, Bernoulli's equation and applications, Venturimeter, Orificemeter, Pitot-tube, the coefficient of discharge, Introduction to orifices and mouth pieces, Notches -V and Rectangular.

Momentum equation: Impulse-momentum equation, Force exerted by flowing fluid on pipe-bend.

Flow through pipes: Introduction, major and minor energy losses, hagen-poiseuille law, Hydraulic gradient and total energy line, pipes in series, parallel and Water hammer. **Dimensional analysis & model similitude:** Introduction, Buckingham's PI theorem, Model analysis, Types of similarities, Dimensionless numbers, Classification of models, Model laws-Reynolds and Froude model law.

Textbooks:

3. Fluid Mechanics by John F. Douglas, Tata McGraw Hill publications
4. Fluid Mechanics and Machinery, C.S.P.Ojha, R. Berndtsson and P. N. Chadramouli,

Oxford University Press, 2010

Reference Books:

3. Fluid Mechanics and machinery by Manish Kumar Goyal: PHI Publishers, Delhi.
4. Fluid Mechanics and machinery by C.S.P.Ojha: Oxford Higher Education Publishers, Chennai.

Lab Experiments:

5. Measurement of viscosity
6. Study of Pressure Measuring Devices
7. Stability of Floating Body
8. Hydrostatics Force on Flat Surfaces/Curved Surfaces
9. Verification of Bernoulli's Theorem
10. Venturimeter
11. Orifice meter
12. Impacts of jets
13. Flow Visualization -Ideal Flow
14. Length of establishment of flow
15. Velocity distribution in pipes
16. Laminar Flow

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(EXISTING)

FOUNDATION ENGINEERING

Course Code: 18CE3104 L-T-P-S:3-1-0-0
Pre-requisite: Nil Credits: 4

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO	Course Outcome	PO/PSO	BTL
CO1	Analyze Bearing capacity of soils	1	4
CO2	Estimate the load carrying capacity of piles	1,3	4
CO3	Analyze lateral stability of well foundation	1,3	4
CO4	Analyze stability of slopes and earth retaining structures	1,3	4

Syllabus:

Site Investigations: Various geotechnical field investigations, geotechnical field report.

Bearing Capacity Of Shallow Foundations: Introduction, Basic definitions, Principal modes of soil failures, Terzaghi's bearing capacity theory/ equation and its modifications for square, rectangular and circular foundation, Skempton's bearing capacity analysis for clays, Meyerhof's analysis, Hansen's bearing capacity theory, Vesic's bearing capacity theory, IS code recommendations for bearing capacity, Bearing capacity of granular soils based on SPT value and Static cone resistance, Bearing capacity of footings on layered soils, Factors influencing bearing capacity, Allowable bearing pressure. General requirements of foundations, Factors affecting location and depth of foundation, Choice of type of foundations, Steps involved in the proportioning of footings.

Pile Foundations: Use of piles, Types of piles, Construction, Selection of pile type, Types of foundations to suit subsoil conditions, Pile load capacity, Static formulae, Dynamic formulae, Load tests, on piles, Group action of piles, Load carrying capacity of pile groups, Negative skin friction, Piles subjected to uplift loads.

Well Foundations: Types of wells and caissons, components of well foundation, shapes of wells, depth of a well foundation, forces acting on a well foundation, lateral stability of well foundation, construction and sinking of a well.

Settlement Analysis: Consolidation settlement, immediate settlement, Corrections to settlement due to consolidation, Settlement in different soil types/Settlement from field tests, Allowable settlement, Settlement of pile group.

Stability of Slopes: Infinite slopes and translational slides, Definitions of factor of safety, Finite slopes-Forms of slip surface, Limiting equilibrium method and Critical stages in stability, Total stress and effective stress methods of analysis, $ø_u = 0$ Analysis (total analysis), c ø analysis - method of slices, Location of the most critical circle, Friction circle method, Taylor's stability number.

Earth Pressure and Retaining Walls: Effect of wall movement on earth pressure, Earth pressure at rest, Rankine's theory of earth pressure, Coulomb's theory of earth pressure, Coulomb's equation for c = 0 back fills, Cullman's graphical method, Passive earth pressures-Friction circle method, Design considerations retaining walls.

Textbook:

1. Gopal Ranjan and ASR Rao, Basic and Applied Soil Mechanics New Age International Publishers, Second Edition, 2007.

(NEW SYLLABUS)

FOUNDATION ENGINEERING

Course Code: 19CE3212 L-T-P-S:3-0-0-0
Pre-requisite: Nil Credits: 3

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO	Course Outcome	PO/PSO	BTL
CO1	Analyze Bearing capacity of soils	1	4
CO2	Estimate the load carrying capacity of piles	1,3	4
CO3	Analyze lateral stability of well foundation	1,3	4
CO4	Analyze stability of slopes and earth retaining structures	1,3	4

Syllabus:

Site Investigations: Various geotechnical field investigations, geotechnical field report.

Bearing Capacity Of Shallow Foundations: Introduction, Basic definitions, Principal modes of soil failures, Terzaghi's bearing capacity theory/ equation and its modifications for square, rectangular and circular foundation, Skempton's bearing capacity analysis for clays, Meyerhof's analysis, Hansen's bearing capacity theory, Vesic's bearing capacity theory, IS code recommendations for bearing capacity, Bearing capacity of granular soils based on SPT value and Static cone resistance, Bearing capacity of footings on layered soils, Factors influencing bearing capacity, Allowable bearing pressure. General requirements of foundations, Factors affecting location and depth of foundation, Choice of type of foundations, Steps involved in the proportioning of footings.

Pile Foundations: Use of piles, Types of piles, Construction, Selection of pile type, Types of foundations to suit subsoil conditions, Pile load capacity, Static formulae, Dynamic formulae, Load tests, on piles, Group action of piles, Load carrying capacity of pile groups, Negative skin friction, Piles subjected to uplift loads.

Well Foundations: Types of wells and caissons, components of well foundation, shapes of wells, depth of a well foundation, forces acting on a well foundation, lateral stability of well foundation, construction and sinking of a well.

Settlement Analysis: Consolidation settlement, immediate settlement, Corrections to settlement due to consolidation, Settlement in different soil types/Settlement from field tests, Allowable settlement, Settlement of pile group.

Stability of Slopes: Infinite slopes and translational slides, Definitions of factor of safety, Finite slopes-Forms of slip surface, Limiting equilibrium method and Critical stages in stability, Total stress and effective stress methods of analysis, $ø_u = 0$ Analysis (total analysis), c ø analysis - method of slices, Location of the most critical circle, Friction circle method, Taylor's stability number.

Earth Pressure and Retaining Walls: Effect of wall movement on earth pressure, Earth pressure at rest, Rankine's theory of earth pressure, Coulomb's theory of earth pressure, Coulomb's equation for c = 0 back fills, Cullman's graphical method, Passive earth pressures-Friction circle method, Design considerations retaining walls.

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Textbook:

1. Gopal Ranjan and ASR Rao, Basic and Applied Soil Mechanics New Age International Publishers, Second Edition, 2007.

Reference:

2. J.E. Bowles, Foundation Analysis and Design MacGraw Hill, 1996.
3. V. N. S. Murthy, Soil Mechanics and Foundation Engineering CBS Publishers & Distributors, New Delhi.

(LMSTING)

HYDRAULICS AND HYDRAULICS MACHINES

Course Code: 18CE2203 L- T- P-S: 3-0-2-0

Pre-requisite: Credits: 4

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO No.	Course Outcomes	PO	BTL
1	Design open channels for most economical sections like rectangular, trapezoidal and circular sections	1,3	3,4
2	Understand Gradually Varied flow and Rapidly Varied Flow though the channels and its applications.	1,3	3,4
3	Understand the mechanics of impact of jet on various types of vanes and components, function and design of Pelton Turbine	1,3	3,4
4	Design of Reaction Turbines	1,3	3,4
5	Demonstrate and calculate the dimensions of channels and hydraulics machines	1,3	4

Syllabus:

Gradually Varied Flow (GVF): Gradually varied flow in rectangular channels-equation, Water surface slope w.r.t. channel bed and horizontal, Classification of channel slopes, classification of surface profiles, Backwater and draw down curves.

Rapidly Varied Flow (RVF): Hydraulic jump, elements and characteristics of hydraulic jump, Types of hydraulic jump, Location and applications of hydraulic jump, Energy loss in a hydraulic jump.

Impact of Jets: Force exerted by the jet on a stationary plate – vertical, inclined and curved, Force exerted by a jet on a hinged plate on moving plates, force exerted by jet on flat plates and series of vanes.

Turbines: Introduction, classification of turbines, pelton wheel, velocity triangles and work done on Pelton wheel, Design of Pelton wheel. Reaction Turbines Radial flow reaction turbine, Velocity triangles and work done by water on runner, Francis turbine, Design of Francis turbine, Axial flow reaction turbine – Kaplan turbine, head and efficiency, Draft tube-types, draft tube theory, efficiency of draft tube, Specific speed, Unit quantities, Selection of turbines, Cavitation.

Centrifugal Pumps: Manometric head; losses and efficiencies; work done, working principle; priming; velocity triangles; performance and characteristics curves; multistage and double suction pumps, Cavitation effects.

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Reciprocating Pumps: Classification of reciprocating pump, working principle, Discharge through reciprocating pump, Negative slip Discharge, work done, and power required to drive double acting pump.

Textbook:

1. Hydraulics & Fluid Mechanics by P. N. Modi & S. N. Seth; Standard Book house, New Delhi
2. Fluid Mechanics by A. K. Jain; Khanna Publishers, Delhi.

Reference Books:

- Open Channel flow by V.T.Chow, Mc Graw Hill book company
- Subramanya K,"Flow in Open channels", Tata McGraw-Hill Publishing Company,1994.

Experimental List:

1. Study of performance characteristics of a centrifugal pump at constant speed
2. Study of performance characteristics of a centrifugal pump at different speeds
3. Study of performance characteristics of a reciprocating pump at constant speed
4. Study of performance characteristics of a gear pump at constant speed
5. Study of performance characteristics of a Pelton wheel turbine at constant speed
6. Study of performance characteristics of a Francis turbine at constant speed
7. Study of performance characteristics of a Kaplan turbine at constant speed
8. Determination of force exerted by a jet of water on a fixed vane
9. Determination of coefficient of discharge of open channel flow measurement
10. Study of characteristic curves

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(NEW SYLLABUS)

HYDRAULICS AND HYDRAULICS MACHINES

Course Code: 19CE2203 L- T- P-S: 3-0-2-0

Pre-requisite: Credits: 4

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO No.	Course Outcomes	PO	BTL
1	Design open channels for most economical sections like rectangular, trapezoidal and circular sections	1,3	3,4
2	Understand Gradually Varied flow and Rapidly Varied Flow though the channels and its applications.	1,3	3,4
3	Understand the mechanics of impact of jet on various types of vanes and components, function and design of Pelton Turbine	1,3	3,4
4	Design of Reaction Turbines	1,3	3,4
5	Demonstrate and calculate the dimensions of channels and hydraulics machines	1,3	4

Syllabus:

Open Channel Flow: Definition, classification, and Comparison between open channel flow and pipe flow, Types of channels, Chezy's and Manning's equation, Flow through rectangular, Trapezoidal and Circular Channels Most efficient channel section -Rectangular, Trapezoidal. Specific energy, Specific energy diagram, Critical flow, critical flow in rectangular channel, critical slope, Froude's number Channel transitions.

Gradually Varied Flow (GVF): Gradually varied flow in rectangular channels-equation, Water surface slope w.r.t. channel bed and horizontal, Classification of channel slopes, classification of surface profiles, Backwater and draw down curves.

Rapidly Varied Flow (RVF): Hydraulic jump, elements and characteristics of hydraulic jump, Types of hydraulic jump, Location and applications of hydraulic jump, Energy loss in a hydraulic jump.

Impact of Jets: Force exerted by the jet on a stationary plate – vertical, inclined and curved, Force exerted by a jet on a hinged plate on moving plates, force exerted by jet on flat plates and series of vanes.

Turbines: Introduction, classification of turbines, pelton wheel, velocity triangles and work done on Pelton wheel, Design of Pelton wheel. Reaction Turbines Radial flow reaction turbine, Velocity triangles and work done by water on runner, Francis turbine, Design of Francis turbine, Axial flow reaction turbine – Kaplan turbine, head and efficiency, Draft tube-types, draft tube theory, efficiency of draft tube, Specific speed, Unit quantities, Selection of turbines, Cavitation.

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Centrifugal Pumps: Manometric head; losses and efficiencies; work done, working principle; priming; velocity triangles; performance and characteristics curves; multistage and double suction pumps, Cavitation effects.

Reciprocating Pumps: Classification of reciprocating pump, working principle, Discharge through reciprocating pump, Negative slip Discharge, work done, and power required to drive double acting pump.

Textbook:

3. Hydraulics & Fluid Mechanics by P. N. Modi & S. N. Seth; Standard Book house, New Delhi
4. Fluid Mechanics by A. K. Jain; Khanna Publishers, Delhi.

Reference Books:

- Open Channel flow by V.T.Chow, Mc Graw Hill book company
- Subramanya K,"Flow in Open channels", Tata McGraw-Hill Publishing Company,1994.

Experimental List:

1. Study of performance characteristics of a centrifugal pump at constant speed
2. Study of performance characteristics of a centrifugal pump at different speeds
3. Study of performance characteristics of a reciprocating pump at constant speed
4. Study of performance characteristics of a gear pump at constant speed
5. Study of performance characteristics of a Pelton wheel turbine at constant speed
6. Study of performance characteristics of a Francis turbine at constant speed
7. Study of performance characteristics of a Kaplan turbine at constant speed
8. Determination of force exerted by a jet of water on a fixed vane
9. Determination of coefficient of discharge of open channel flow measurement
10. Study of characteristic curves

(EXISTING)

Skilling For Engineers - I

Course code: 18TS2101 L–T–P-S: 0-0-0-4

Pre-requisites: NIL Credits: 1

Mapping of Course Outcomes (CO) to Program outcomes:

CO NO	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
CO1	Application of construction activities such as excavation, brick masonry etc. by inspecting various construction sites and gain knowledge and importance and independency of various activities and technical aspects involved in workman ship and safety precautions	PO1,PO5	3
CO2	Apply the tools and equipment involved in workmanship of brick masonry, concrete laying and mixing plastering pointing,	PO5,PO1	3
CO3	Apply the acquired knowledge of, carpentry, welding, plumbing and finishing works to handle tools and instruments and use them for preparing various bonds, jobs such as joineries, welds, pipe networks et. of specific shape and size	PO1,PO5	3
CO4	Able to construct and interpret appropriate drawing, scale as per the situation by using common drafting tools., Best practices in Civil Engineering	PO1,PO5	3

Syllabus :

Introduction, Different types of masonry, advanced civil Engineering structures, construction activities, tools and equipment used for excavation Concrete laying, proper mixing of concrete, use of tools for mixing , vibrators , form work, scaffolding, centring /shuttering Importance and interdependency of different components of building

Brick masonry: Types of bricks, workmanship and safety precautions, different types of joints/bonds Stone masonry, tools and equipment used in brick

Stone masonry: concepts of plumb, right angle and water level, plastering methods tools used for plastering; methods and tools, pointing , tools for pointing, flooring, skirt,

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Dado Carpentry: Types of wood/timber, different types tools machines and accessories in wood works Welding, fittings, use of safety equipment, processes of welding, welding of different types of materials, selection of welding rod material

Plumbing: Different types of pipes, joints, taps, fixtures and accessories used in plumbing, components pipes, bends, chambers etc. Used in sanitary/sewage lines Scheme/plan for water supply and sanitary system for simple residential building

Painting: White washing and painting brush, roller and spray painting, types finishing of preparation of surface, need for primer for timber, steel and plastered surface

Reference Books :

1. Hand book on building Construction practices by Bureau of Indian Standards
2. Engineering drawing practice for schools and colleges by Bureau of Indian Standards

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(NEW SYLLABUS)

Skilling For Engineers - I

Course code: 19TS2001 L–T–P-S: 0-0-0-4

Pre-requisites:NIL Credits: 1

Mapping of Course Outcomes (CO) to Program outcomes:

CO NO	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
CO1	Application of construction activities such as excavation, brick masonry etc. by inspecting various construction sites and gain knowledge and importance and independency of various activities and technical aspects involved in workman ship and safety precautions	PO1,PO5	3
CO2	Apply the tools and equipment involved in workmanship of brick masonry, concrete laying and mixing plastering pointing,	PO5,PO1	3
CO3	Apply the acquired knowledge of, carpentry, welding, plumbing and finishing works to handle tools and instruments and use them for preparing various bonds, jobs such as joineries, welds, pipe networks et. of specific shape and size	PO1,PO5	3
CO4	Able to construct and interpret appropriate drawing, scale as per the situation by using common drafting tools., Best practices in Civil Engineering	PO1,PO5	3

Syllabus :

Introduction, Different types of masonry, advanced civil Engineering structures, construction activities, tools and equipment used for excavation Concrete laying, proper mixing of concrete, use of tools for mixing , vibrators , form work, scaffolding, centring /shuttering Importance and interdependency of different components of building

Brick masonry: Types of bricks, workmanship and safety precautions, different types of joints/bonds Stone masonry, tools and equipment used in brick

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Stone masonry: concepts of plumb, right angle and water level, plastering methods tools used for plastering; methods and tools, pointing , tools for pointing, flooring, skirt,

Dado Carpentry: Types of wood/timber, different types tools machines and accessories in wood works Welding, fittings, use of safety equipment, processes of welding, welding of different types of materials, selection of welding rod material

Plumbing: Different types of pipes, joints, taps, fixtures and accessories used in plumbing, components pipes, bends, chambers etc. Used in sanitary/sewage lines Scheme/plan for water supply and sanitary system for simple residential building

Painting: White washing and painting brush, roller and spray painting, types finishing of preparation of surface, need for primer for timber, steel and plastered surface

Lecture on Engineering drawing practice: planning of assembly drawings, lines, lettering, projection methods, technical drawing, conventional representation of screws and threads, threaded parts, springs and gears, Dimensioning, tolerances, cones, simplified representation, study of technical drawing Best practices in construction

Reference Books :

1. Hand book on building Construction practices by Bureau of Indian Standards
2. Engineering drawing practice for schools and colleges by Bureau of Indian Standards

(EXISTING)

SOIL MECHANICS

Course Code: 18CE2206 L-T-P-S: 3-0-2-0

Prerequisite: NIL Credits: 4

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO No	CO	PO	BTL
1	Analyze the physical and engineering properties and classification of soils.	1	4
2	Analyze the effective stress variation and seepage by conducting the appropriate laboratory or field tests	1,3	4
3	Analyze the stresses in the soil due to super structure loads, and consolidation settlements due to these loads	1,3	4
4	Analyze shear strength parameters by conducting laboratory test.	1,3	4
5	Analyze and interpret the physical and engineering properties of soil by performing the required laboratory tests	2,7	4

Syllabus:

Introduction to the history of Geotechnical Engineering and its importance in Civil Engineering; ORIGIN OF SOIL & GRAIN SIZE: Rock Cycle, Soil formation due to weathering of rocks, Transported soils, soil classification based on size, clay minerals, Mechanical Analysis of soils, particle shape; WEIGHT – VOULME RELATIONS: Phase diagrams, Simple definitions of Index Properties, Inter relations among index properties; PLASTICITY & STRUCTURE OF SOIL: Atterberg Limits, Liquidity Index, Activity, sensitivity, Plasticity Chart, structure of soil; SOIL COMPACTION: Laboratory tests on compaction test, Factors affecting compaction, Structure and engineering behavior of Compacted cohesive soils; PERMEABILITY: Permeability of stratified soil deposits, Indirect methods, Factors affecting permeability; SEEPAGE: Laplace Equation, Estimation of seepage using flownet;

INSITU STRESSES: Total stress, Pore Water Pressure, Effective Stress, seepage forces, quicksand condition; STRESSES IN A SOIL MASS: Vertical stress distribution using Boussinq equation, Fadum Chart and Newmarks chart; COMPRESSIBILITY: Calculation of initial Settlement, consolidation settlement, laboratory consolidation test; Normally Consolidated Clay, Over Consolidated Clay, compressibility characteristics and estimation of primary consolidation Settlement and time – rate of consolidation; SHEAR STRENGTH OF SOIL: Determination of shear strength and shear strength parameters using Mohr–coulomb Failure Criterion, laboratory tests using Direct Shear, Unconfined Compression test, Vane Shear Test and Triaxial Shear Tests.

LATERAL EARTH PRESSURE: Types of Lateral earth pressure, Earth pressure at rest, Active and Passive pressure and estimation of lateral earth pressure using Rankine's theory,

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Coulombs wedge theory, and Culmann's graphical method; STABILITY OF SLOPES: Types of Slope failures, Factor of Safety against shear strength, cohesion and friction, Stability of an Infinite slope, Stability analysis by friction circle method, Taylor's Stability number; RETAINING WALLS – Types and Principles in the designing of a retaining wall; SUBSOIL INVESTIGATION: Depth of Exploration, Methods of Exploration, Borings for Exploration, Depth of Exploration, Methods of Exploration, Borings for Exploration, Field tests - Plate load test, Penetration test.

SHALLOW FOUNDATIONS: Types of foundations and choice of foundations, Bearing capacities, Terzaghi's bearing capacity theory, influence of water table on bearing capacity, safe bearing capacity of soil using IS Code; SETTLEMENT OF FOUNDATIONS: Settlement of shallow foundation, Allowable bearing pressure of granular soils based on standard penetration test value; PILE FOUNDATIONS: Types of piles, Necessity, pile driving, Load carrying capacity of piles – Static and dynamic formulae, Negative skin friction, Pile load tests, Load carrying capacity of group of piles.

Textbook:

1. Soil Mechanics and Foundation Engineering by K.R. Arora, Standard Publications Distributors,2011

Reference Books

1. Soil Mechanics and Foundation Engineering by V. N. S. Murthy, CBS Publishers &Distributors, New Delhi.
2. Basic and Applied Soil Mechanics by Gopal Ranjan and ASR Rao, New Age International Publishers, second Edition, 2007
3. Other Books, References: (As recommended for reference by the course team, if any)
4. NPTEL Lecture Notes and Online Lectures

Practical Work: List of tests on-

1. Field Density using Core Cutter method.
2. Field Density using Sand replacement method.
3. Natural moisture content using Oven Drying method.
4. Field identification of Fine-Grained soils.
5. Specific gravity of Soils.
6. Grain size distribution by Sieve Analysis.
7. Grain size distribution by Hydrometer Analysis.
8. Consistency limits by Liquid limit
9. Consistency limits by Plastic limit
10. Consistency limits by Shrinkage limit.
11. Permeability test using Constant-head test method.
12. Permeability test using Falling-head method.
13. Compaction test: Standard Proctor test.
14. Compaction test: Modified Proctor test.
15. Relative density.
16. Consolidation Test.
17. Triaxial Test (UU)
18. Vane shear test
19. Direct Shear Test
20. Unconfined Compression Strength Test.

(NEW SYLLABUS)

Geotechnical Engineering

Course Code: 19CE2206 L-T-P-S: 3-0-2-0

Prerequisite: NIL Credits: 4

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO No	CO	PO	BTL
1	Analyze the physical and engineering properties and classification of soils.	1	4
2	Analyze the effective stress variation and seepage by conducting the appropriate laboratory or field tests	1,3	4
3	Analyze the stresses in the soil due to super structure loads, and consolidation settlements due to these loads	1,3	4
4	Analyze shear strength parameters by conducting laboratory test.	1,3	4
5	Analyze and interpret the physical and engineering properties of soil by performing the required laboratory tests	2,7	4

Syllabus:

Introduction to the history of Geotechnical Engineering and its importance in Civil Engineering; ORIGIN OF SOIL & GRAIN SIZE: Rock Cycle, Soil formation due to weathering of rocks, Transported soils, soil classification based on size, clay minerals, Mechanical Analysis of soils, particle shape; WEIGHT – VOULME RELATIONS: Phase diagrams, Simple definitions of Index Properties, Inter relations among index properties; PLASTICITY & STRUCTURE OF SOIL: Atterberg Limits, Liquidity Index, Activity, sensitivity, Plasticity Chart, structure of soil; SOIL COMPACTION: Laboratory tests on compaction test, Factors affecting compaction, Structure and engineering behavior of Compacted cohesive soils; PERMEABILITY: Permeability of stratified soil deposits, Indirect methods, Factors affecting permeability; SEEPAGE: Laplace Equation, Estimation of seepage using flownet;

INSITU STRESSES: Total stress, Pore Water Pressure, Effective Stress, seepage forces, quicksand condition; STRESSES IN A SOIL MASS: Vertical stress distribution using Boussinq equation, Fadum Chart and Newmarks chart; COMPRESSIBILITY: Calculation of initial Settlement, consolidation settlement, laboratory consolidation test; Normally Consolidated Clay, Over Consolidated Clay, compressibility characteristics and estimation of primary consolidation Settlement and time – rate of consolidation; SHEAR STRENGTH OF SOIL: Determination of shear strength and shear strength parameters using Mohr–coulomb Failure Criterion, laboratory tests using Direct Shear, Unconfined Compression test, Vane Shear Test and Triaxial Shear Tests.

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LATERAL EARTH PRESSURE: Types of Lateral earth pressure, Earth pressure at rest, Active and Passive pressure and estimation of lateral earth pressure using Rankine's theory, Coulombs wedge theory, and Culmann's graphical method; STABILITY OF SLOPES: Types of Slope failures, Factor of Safety against shear strength, cohesion and friction, Stability of an Infinite slope, Stability analysis by friction circle method, Taylor's Stability number; RETAINING WALLS – Types and Principles in the designing of a retaining wall; SUBSOIL INVESTIGATION: Depth of Exploration, Methods of Exploration, Borings for Exploration, Depth of Exploration, Methods of Exploration, Borings for Exploration, Field tests - Plate load test, Penetration test.

SHALLOW FOUNDATIONS: Types of foundations and choice of foundations, Bearing capacities, Terzaghi's bearing capacity theory, influence of water table on bearing capacity, safe bearing capacity of soil using IS Code; SETTLEMENT OF FOUNDATIONS: Settlement of shallow foundation, Allowable bearing pressure of granular soils based on standard penetration test value; PILE FOUNDATIONS: Types of piles, Necessity, pile driving, Load carrying capacity of piles – Static and dynamic formulae, Negative skin friction, Pile load tests, Load carrying capacity of group of piles.

Textbook:

2. Soil Mechanics and Foundation Engineering by K.R. Arora, Standard Publications Distributors,2011

Reference Books

5. Soil Mechanics and Foundation Engineering by V. N. S. Murthy, CBS Publishers &Distributors, New Delhi.
6. Basic and Applied Soil Mechanics by Gopal Ranjan and ASR Rao, New Age International Publishers, second Edition, 2007
7. Other Books, References: (As recommended for reference by the course team, if any)
8. NPTEL Lecture Notes and Online Lectures

Practical Work: List of tests on-

1. Field Density using Core Cutter method.
2. Field Density using Sand replacement method.
3. Natural moisture content using Oven Drying method.
21. Field identification of Fine-Grained soils.
22. Specific gravity of Soils.
23. Grain size distribution by Sieve Analysis.
24. Grain size distribution by Hydrometer Analysis.
25. Consistency limits by Liquid limit
26. Consistency limits by Plastic limit
27. Consistency limits by Shrinkage limit.
28. Permeability test using Constant-head test method.
29. Permeability test using Falling-head method.
30. Compaction test: Standard Proctor test.
31. Compaction test: Modified Proctor test.
32. Relative density.
33. Consolidation Test.
34. Triaxial Test (UU)

(EXISTING)

SOLID MECHANICS

Course Code: 18CE2102 L- T- P-S: 3-0-2-0
Pre-requisite: Credits: 4

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO No.	Course Outcomes	PO	BTL
1	Understand and apply the concepts of stress, strain and mechanical properties of solids	2	4
2	Determine Shear force and Bending moment of the determinate beams	2	4
3	Determine the bending, Shear and Principal stresses in beams	2	4
4	Analyse buckling of columns, and torsional members	2	4
5	Demonstrate experimental verification of various material strengths	2	4

Syllabus:

Simple stresses and strains: Elasticity and plasticity; Types of stresses and strains; Hooke's law; stress strain diagram for mild steel and HYSD-bars Working stress; Factor of safety; Lateral strain, Poisson's ratio and volumetric strain; Elastic constants and the relationship between them Bars of varying section; composite bars; Temperature stresses. Resilience-Gradual, sudden, impact and shock loadings simple applications.

Shear Force and Bending Moment: Diagrammatic conventions for supports; Diagrammatic conventions for loading; Classification of beams; Concept of shear force and bending moment; relationship between load, shear force and bending moment, Shear force and bending moment diagrams for statically determinate beams.

Pure Bending and Shearing Stresses of Beams: The flexure formula; Computation of the moment of inertia; Remarks on the flexure formula. Flexural strength of composite Beams, Shearing stress formula for beams; Shear stress distribution for various sections; Unsymmetrical Bending and Shear centre.

Analysis of Plane Stress: Equations for the transformation of plane stress; Principal Stresses; Principal planes; Maximum shearing stresses; Mohr's circle of stress; Construction of Mohr's circle of stress.

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Torsion: Torsional deformations of a circular bar, circular bar of elastic materials, stresses and strain in pure shear, relationship between E and G.

Columns: Stability of equilibrium; The Euler's formula for columns with different end restraints; Limitations of the Euler's formulas; Generalized Euler buckling - load formulas; Rankine's empirical formula.

Textbooks:

1. Ferdinand P Beer, E. Russell Johnston, Jr. John T. Dewolf, David F. Mazurek, Mechanics of materials sixth edition, Mc Graw Hill education.
2. J.M. Gere, Thomsom brooks/Cole India edition, Mechanics of materials Sixth edition, 2006.

Reference Books:

1. Strength of materials by R. Subramanian, Oxford University Press.
2. S P Timoshenko. Strength of Materials Part I & II CBS Publishers and distributors, New Delhi, 3rd Edition.

List of Experiments:

1. Tests on Mechanical and Elastic properties of HYSD Bars
2. Tests on Wood and Aluminum Section Profiles
3. Hardness test on metals like Steel, Brass, Copper and Aluminum
4. Torsion test on steel reinforcement
5. Impact test on Steel Specimen - Charpy and Izod test
6. Test on Closely coiled helical springs.
7. Compression tests on concrete cubes
8. Bending test on cantilever beam and simply supported beam.

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(NEW SYLLABUS)

SOLID MECHANICS

Course Code: 19CE2101 L- T- P-S: 3-0-2-0
Pre-requisite: Credits: 4

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO No.	Course Outcomes	PO	BTL
1	Understand and apply the concepts of stress, strain and mechanical properties of solids	2	4
2	Determine Shear force and Bending moment of the determinate beams	2	4
3	Determine the bending, Shear and Principal stresses in beams	2	4
4	Analyse buckling of columns, and torsional members	2	4
5	Demonstrate experimental verification of various material strengths	2	4

Syllabus:

Simple stresses and strains: Elasticity and plasticity; Types of stresses and strains; Hooke's law; stress strain diagram for mild steel and HYSD-bars Working stress; Factor of safety; Lateral strain, Poisson's ratio and volumetric strain; Elastic constants and the relationship between them Bars of varying section; composite bars; Temperature stresses. Resilience-Gradual, sudden, impact and shock loadings simple applications.

Shear Force and Bending Moment: Diagrammatic conventions for supports; Diagrammatic conventions for loading; Classification of beams; Concept of shear force and bending moment; relationship between load, shear force and bending moment, Shear force and bending moment diagrams for statically determinate beams.

Pure Bending and Shearing Stresses of Beams: The flexure formula; Computation of the moment of inertia; Remarks on the flexure formula. Flexural strength of composite Beams, Shearing stress formula for beams; Shear stress distribution for various sections; Unsymmetrical Bending and Shear centre.

Theories of Failure: Introduction-Various theories of failure-maximum principal stress theory, Maximum principal strain theory, Strain energy and Shear strain energy theory (Von Mises Theory).

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Analysis of Plane Stress: Equations for the transformation of plane stress; Principal Stresses; Principal planes; Maximum shearing stresses; Mohr's circle of stress; Construction of Mohr's circle of stress.

Torsion: Torsional deformations of a circular bar, circular bar of elastic materials, stresses and strain in pure shear, relationship between E and G.

Columns: Stability of equilibrium; The Euler's formula for columns with different end restraints; Limitations of the Euler's formulas; Generalized Euler buckling - load formulas; Rankine's empirical formula.

Textbooks:

3. Ferdinand P Beer, E. Russell Johnston, Jr. John T. Dewolf, David F. Mazurek, Mechanics of materials sixth edition, Mc Graw Hill education.
4. J.M. Gere, Thomsom brooks/Cole India edition, Mechanics of materials Sixth edition, 2006.

Reference Books:

3. Strength of materials by R. Subramanian, Oxford University Press.
4. S P Timoshenko. Strength of Materials Part I & II CBS Publishers and distributors, New Delhi, 3rd Edition.

List of Experiments:

9. Tests on Mechanical and Elastic properties of HYSD Bars
10. Tests on Wood and Aluminum Section Profiles
11. Hardness test on metals like Steel, Brass, Copper and Aluminum
12. Torsion test on steel reinforcement
13. Impact test on Steel Specimen - Charpy and Izod test
14. Test on Closely coiled helical springs.
15. Compression tests on concrete cubes
16. Bending test on cantilever beam and simply supported beam.

(EXISTING)

SURVEYING

Course code: 18CE2104 L–T–P-S: 3-0-2-0

Pre-requisite: NIL Credits: 4

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO No.	Course Outcomes	PO	BTL
1	Apply the knowledge of plane surveying for computation of bearings in a traverse	1,5	2
2	Calculate the differences in elevation using differential levelling techniques and preparation of contour plan	1,5	2
3	Computation of areas of field and volume of earthwork	1,5	2
4	Apply the knowledge of theodolite and tacheometric survey, and total station for calculation of height of building	1,5	2
5	Analyze surveying results to conceptualize the project	11	2

Syllabus:

Surveying: Introduction to surveying, Overview of plane surveying (chain, compass and plane table), Objectives, Principles and classifications.

Distances and Direction - Distance measurement conventions and methods; use of chain and tape, Electronic distance measurements, Meridians, Azimuths and Bearings, declination, computation of angle.

Computation of Areas and Volumes - Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

Theodolite - Theodolite, description, uses and adjustments, measurement of horizontal and vertical angles. Principles of Electronic Theodolite, Trigonometrical leveling, Traversing.

Tachometric Surveying - Stadia and tangential methods of Tacheometry. Distance and Elevation formulae for Staff vertical position.

Curves - Types of curves, design and setting out of simple curves.

Total Station: Introduction – Accessories with description - Features of total station – Onboard software electronic data reading - Summary of total stations characteristics - Field procedure of total stations in topographic survey, Global positioning system, Introduction to Geographic information system (GIS).

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TEXTBOOKS:

1. Surveying and Levelling by R. Subramanian, Oxford University Press, 2nd edition, 2012
2. Surveying Vol - I, II, III - Dr. B.C. Punmia Laxmi publications, Delhi-6

Reference Books:

1. Surveying and levelling part I & II by Kanetkar.T.P. & S.V.Kulkarni, Puna vidyarthi girha, Prakashan,23rd edition,1993.
2. Arora K. R, "Surveying Vol-I", Rajsons Publications Pvt. Ltd, 10th Edition, 2008.

List of Experiments

1. Determination of area of a polygon by a ranging and taking offsets.
2. Measuring distance between two stations by indirect ranging when they are obstacles.
3. Measuring of bearing of sides of the traverse and preparation of map.
4. Determination of elevation of various points with a level by collimation method
5. Determination of elevation of various points with a level by rise & fall method
6. Measurement of horizontal angles using theodolite
7. Measurement of vertical angles using theodolite
8. Location of points in an area using total station.

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(NEW SYLLABUS)

SURVEYING

Course code: 19CE2103 L–T–P-S: 3-0-2-0

Pre-requisite: NIL Credits: 4

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO No.	Course Outcomes	PO	BTL
1	Apply the knowledge of plane surveying for computation of bearings in a traverse	1,5	2
2	Calculate the differences in elevation using differential levelling techniques and preparation of contour plan	1,5	2
3	Computation of areas of field and volume of earthwork	1,5	2
4	Apply the knowledge of theodolite and tacheometric survey, and total station for calculation of height of building	1,5	2
5	Analyze surveying results to conceptualize the project	11	2

Syllabus:

Surveying: Introduction to surveying, Overview of plane surveying (chain, compass and plane table), Objectives, Principles and classifications.

Distances and Direction - Distance measurement conventions and methods; use of chain and tape, Electronic distance measurements, Meridians, Azimuths and Bearings, declination, computation of angle.

Leveling and Contouring - Concept and Terminology, adjustments- method of leveling. Characteristics and Uses of contours- methods of conducting contour surveys and their plotting.

Computation of Areas and Volumes - Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

Theodolite - Theodolite, description, uses and adjustments, measurement of horizontal and vertical angles. Principles of Electronic Theodolite, Trigonometrical leveling, Traversing.

Tachometric Surveying - Stadia and tangential methods of Tacheometry. Distance and Elevation formulae for Staff vertical position.

Curves - Types of curves, design and setting out of simple curves.

Total Station: Introduction – Accessories with description - Features of total station – Onboard software electronic data reading - Summary of total stations characteristics - Field

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procedure of total stations in topographic survey, Global positioning system, Introduction to Geographic information system (GIS).

TEXTBOOKS:

1. Surveying and Levelling by R. Subramanian, Oxford University Press, 2nd edition, 2012
2. Surveying Vol - I, II, III - Dr. B.C. Punmia Laxmi publications, Delhi-6

Reference Books:

1. Surveying and levelling part I & II by Kanetkar.T.P. & S.V.Kulkarni, Puna vidyarthi girha, Prakashan,23rd edition,1993.
2. Arora K. R, "Surveying Vol-I", Rajsons Publications Pvt. Ltd, 10th Edition, 2008.

(EXISTING)

TRANSPORTATION ENGINEERING

Course Code: 18CE3103 L-T-P-S:3-0-2-0

Prerequisite: NIL Credits: 4

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO No.	Course Outcomes	PO	BTL
1	understand the Current road projects in India highway alignment and project preparation	1	2
2	design highway cross section elements	2	4
3	understand the Traffic Characteristics and use of materials in pavements	1	2
4	design flexible and rigid pavement	2	4

Syllabus:

Highway Network Planning: Different modes of transportation, role of highway transportation, classification, network patterns, planning surveys, preparation of plans, final report, master plan, evaluation by saturation system, 20 year road development plans, salient features, determination of road lengths, introduction to highway economics.

Highway Alignment And Geometric Design: Principles of highway alignment, requirements, controlling factors, engineering surveys, importance of geometric design, design controls and criteria, cross section elements, pavement surface characteristics, camber, carriageway, kerbs, road margins, formation, right of way, typical cross sections, sight distance, stopping sight distance, overtaking sight distance, sight distance at intersections, design of horizontal alignment, super elevation, transition curves, design of vertical alignment, gradients, vertical curves.

Pavement Materials and Mix Design: Types of pavement structures, functions of pavement component layers, materials used in pavements, properties of aggregate, blending of aggregates, tests on bitumen, grading of bitumen, bituminous mix design using Marshall method.

Design of Pavements: Stresses in flexible pavements: layered system concepts, stress solution for one, two and three layered systems, fundamental design concepts; variables considered in pavement design: axle types, standard and legal axle loads, ESWL, EWLF, vehicle damage factor, ADT, AADT, growth factor, lane distribution factor, directional distribution factor, tyre pressure, contact pressure, design life; design of flexible pavement using IRC method; stresses in rigid pavements: Westergaard's theory and assumptions, stresses due to curling, stresses and deflections due to loading, frictional stresses, design of joints; design of rigid pavement using IRC method.

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Traffic Engineering Principles: Traffic characteristics; components of traffic stream: flow-speed Density, measurement and analysis, q-k-v relationships, design hourly volume, concept of EPCU, capacity and level of service, parking studies and road safety

Textbook:

1. Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros, 2017
2. Kadiyalai, L.R., ' Traffic Engineering and Transport Planning', Khanna Publishers.

Reference Books:

1. Partha Chakraborty, ' Principles of Transportation Engineering, PHI Learning,
2. Fred L. Mannering, Scott S. Washburn, Walter P. Kilareski,'Principles of Highway
3. Engineering and Traffic Analysis', 4th Edition, John Wiley

(NEW SYLLABUS)

TRANSPORTATION ENGINEERING

Course Code: 19CE3103 L-T-P-S:3-0-2-0
Prerequisite: NIL Credits: 4

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO No.	Course Outcomes	PO	BTL
1	understand the Current road projects in India highway alignment and project preparation	1	2
2	design highway cross section elements	2	4
3	understand the Traffic Characteristics and use of materials in pavements	1	2
4	design flexible and rigid pavement	2	4

Syllabus:

Highway Network Planning: Different modes of transportation, role of highway transportation, classification, network patterns, planning surveys, preparation of plans, final report, master plan, evaluation by saturation system, 20 year road development plans, salient features, determination of road lengths, introduction to highway economics.

Highway Alignment And Geometric Design: Principles of highway alignment, requirements, controlling factors, engineering surveys, importance of geometric design, design controls and criteria, cross section elements, pavement surface characteristics, camber, carriageway, kerbs, road margins, formation, right of way, typical cross sections, sight distance, stopping sight distance, overtaking sight distance, sight distance at intersections, design of horizontal alignment, super elevation, transition curves, design of vertical alignment, gradients, vertical curves.

Pavement Materials and Mix Design: Types of pavement structures, functions of pavement component layers, materials used in pavements, basic soil properties relevant to pavement applications, properties of aggregate, blending of aggregates, tests on bitumen, grading of bitumen, bituminous mix design using Marshall method.

Design of Pavements: Stresses in flexible pavements: layered system concepts, stress solution for one, two and three layered systems, fundamental design concepts; variables considered in pavement design: axle types, standard and legal axle loads, ESWL, EWLF, vehicle damage factor, ADT, AADT, growth factor, lane distribution factor, directional distribution factor, tyre pressure, contact pressure, design life; design of flexible pavement using IRC method; stresses in rigid pavements: Westergaard's theory and assumptions, stresses due to curling, stresses and deflections due to loading, frictional stresses, design of joints; design of rigid pavement using IRC method.

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Traffic Engineering Principles: Traffic characteristics; components of traffic stream: flow-speed Density, measurement and analysis, q-k-v relationships, design hourly volume, concept of EPCU, capacity and level of service, parking studies and road safety

Textbook:

1. Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros, 2017
2. Kadiyalai, L.R., ' Traffic Engineering and Transport Planning', Khanna Publishers.

Reference Books:

3. Partha Chakraborty, ' Principles of Transportation Engineering, PHI Learning,
4. Fred L. Mannering, Scott S. Washburn, Walter P. Kilareski,'Principles of Highway Engineering and Traffic Analysis', 4th Edition, John Wiley

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(EXISTING)

Earthquake resistance design of structures

Course Code :18CE5207 **L-T-P-S : 3-0-2-0**

Pre-requisite: NIL **Credits: 4**

Mapping of Course Outcome with Program Outcome:

CO	Course Outcome	PO	BTL
CO 1	Understand the building categories, seismic behavior and dynamics of structures earthquake causes, ground motion behavior, Seismic resistant building architecture	PO1	2
CO 2	Analyze of single degree of freedom and Compute equivalent lateral seismic loads and carryout a seismic design as per IS codal provisions	PO2, PO4	4
CO 3	Assessment of ductile Members and design for earthquake loads. Design the 2 storey building with Linear static analysis and non linear dynamic analysis	PO2, PO4	4
CO 4	Analyze the concept of base Isolation and design principles	PO2, PO4	4
CO 5	ETABS software to develop the models, analyze and design the structures under linear and non-linear static and dynamic conditions	PO4	4

Seismic-resistant buildings: Introduction; Lateral load resisting systems- moment resisting frame, building with shear wall or bearing wall system, building with dual system; Building configuration – Problems and solutions; Building characteristics – Mode shape and fundamental period, building frequency and ground period, damping, ductility, seismic weight, hyper stativity/redundancy,

Design forces for buildings: Introduction, Equivalent static method; Mode superposition technique; Dynamic inelastic-time history analysis; Response Spectrum Analysis, Pushover analysis, advantages and disadvantages of these methods; Determination of lateral forces on an intermediate plane frame using Equivalent static method and Model analysis using response spectrum; Analysis of the intermediate frame for various load combinations as per IS1893(Part 1); Identification of design forces and moments in the members

Shear Wall Design: Introduction to Shear Walls, Types of shear walls, Design of shear wall for a Lateral Load resisting frame, Design of shear wall for multi storied structure.

Base isolation of structures: Introduction; Considerations for seismic isolation; Basic elements of seismic isolation; seismic-isolation design principle; Feasibility of seismic isolation; Seismic-isolation configurations.

Text Books:

1. Earthquake Resistant Design of Building Structures by Dr. Vinod Hosur, Wiley Corporation, 2012
2. Earthquake resistant design of structures by Pankaj Agarwal and Manish Shrikhande, Prentice-Hall of India, 2006

Reference Books:

1. Basics of structural dynamics and aseismic design by Damodaraswamy S.R and S. Kavitha, Prentice Hall India Learning Private Limited; 5th Edition (2009)
2. Seismic design of reinforced concrete and masonry buildings by T. Paulay and M.J.N. Priestley, John Wiley & Sons, 1991.

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(NEW SYLLABUS)

Earthquake resistance design of structures

Course Code :18CE5208 **L-T-P-S : 3-0-2-0**

Pre-requisite: NIL **Credits: 4**

Mapping of Course Outcome with Program Outcome:

CO	Course Outcome	PO	BTL
CO 1	Understand the building categories, seismic behavior and dynamics of structures earthquake causes, ground motion behavior, Seismic resistant building architecture	PO1	2
CO 2	Analyze of single degree of freedom and Compute equivalent lateral seismic loads and carryout a seismic design as per IS codal provisions	PO2, PO4	4
CO 3	Assessment of ductile Members and design for earthquake loads. Design the 2 storey building with Linear static analysis and non linear dynamic analysis	PO2, PO4	4
CO 4	Analyze the concept of base Isolation and design principles	PO2, PO4	4
CO 5	ETABS software to develop the models, analyze and design the structures under linear and non-linear static and dynamic conditions	PO4	4

Seismic-resistant buildings: Introduction; Lateral load resisting systems- moment resisting frame, building with shear wall or bearing wall system, building with dual system; Building configuration – Problems and solutions; Building characteristics – Mode shape and fundamental period, building frequency and ground period, damping, ductility, seismic weight, hyper stativity/redundancy,

Design forces for buildings: Introduction, Equivalent static method; Mode superposition technique; Dynamic inelastic-time history analysis; Response Spectrum Analysis, Pushover analysis, advantages and disadvantages of these methods; Determination of lateral forces on an intermediate plane frame using Equivalent static method and Model analysis using response spectrum; Analysis of the intermediate frame for various load combinations as per IS1893(Part 1); Identification of design forces and moments in the members

Ductility considerations in earthquake resistant design of RCC buildings: Introduction; Impact of ductility; Requirements for ductility; Assessment of ductility– Member/element ductility, Structural ductility; Factor affecting ductility; Ductility factors; Ductility considerations as per IS13920. Design and detailing of typical flexural member, typical column as per IS13920.

Shear Wall Design: Introduction to Shear Walls, Types of shear walls, Design of shear wall for a Lateral Load resisting frame, Design of shear wall for multi storied structure.

Base isolation of structures: Introduction; Considerations for seismic isolation; Basic elements of seismic isolation; seismic-isolation design principle; Feasibility of seismic isolation; Seismic-isolation configurations.

Text Books:

1. Earthquake Resistant Design of Building Structures by Dr. Vinod Hosur, Wiley Corporation, 2012
2. Earthquake resistant design of structures by Pankaj Agarwal and Manish Shrikhande, Prentice-Hall of India, 2006

Reference Books:

1. Basics of structural dynamics and aseismic design by Damodaraswamy S.R and S. Kavitha, Prentice Hall India Learning Private Limited; 5th Edition (2009)

(EXISTING)

Finite Element Analysis

Course Code :18CE5205 **L-T-P-S : 3-0-2-0**

Pre-requisite: NIL **Credits: 4**

Mapping of Course Outcome with Program Outcome:

CO	Course Outcome	PO	BTL
CO 1	Understand the Basic Finite Element Concepts	PO1, PO4	4
CO 2	Analysis of Trusses, Beam Bending, Structural Frames and Column buckling using Finite Element Methods	PO1, PO4	4
CO 3	Analysis of Higher order elements for one dimensional problems and Isometric quadrilateral elements and triangular elements	PO1, PO4	3
CO 4	Analyse the applications based on general two-dimensional boundary value problem	PO1, PO4	4
CO 5	Demonstrate the ANSYS software to develop the models using Finite element method	PO1, PO4, PO5	4

Basic Finite Element Concepts, Approximate solution of boundary value problems-Methods of weighted residuals, Modified Galerkin method, Boundary conditions and general comments, Two dimensional example, Basic ideas in a finite element solution, General finite element solution procedure, Finite element equations using modified Galerkin method, Application: Axial deformation of bars.

Higher order elements for one dimensional problems, Shape functions for second order problems, Iso parametric mapping concept, Quadratic Iso parametric element for general one dimensional boundary value problem, one dimensional numerical integration, Two dimensional boundary value problems using triangular elements, A triangular element for general 2D BVP, Numerical Examples

Isometric quadrilateral elements and triangular elements, Shape functions for rectangular elements, Iso parametric mapping for quadrilateral elements, and Numerical integration for quadrilateral elements, four node quadrilateral element for 2D BVP, and Eight node serendipity element for 2D BVP, Natural (or Area) coordinates for triangles, Numerical integration for triangles, Six node triangular element for general 2D BVP

Applications based on general two dimensional boundary value problem, Torsion of 2 prismatic bars, Two dimensional elasticity, Governing differential equations, Constant strain triangular element, Four node quadrilateral element, Eight node Iso parametric element.

Axisymmetric Solids, Three-Dimensional Solids

Textbooks:

1. Introduction to Finite Elements in Engineering by R.T. Chandrupatla and A.D. Belegundu, Prentice Hall of India, 1997.

Reference Books:

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1. Bhatti, M.A., Fundamental Finite Element Analysis and Applications: With Mathematica and MATLAB Computations, John Wiley & Sons, 2005.
2. Bhatti, M.A., Advanced Topics in Finite Element Analysis of Structures: With Mathematica and MATLAB Computations, John Wiley & Sons, 2006.
3. Finite Element Analysis by Abel and Desai, New Age Publishers, 2007.
4. Finite Element Analysis: Theory and Programming by C. S. Krishnamoorthy, Tata McGraw-Hill, 1995.
5. Finite Element Procedures in Engineering Analysis by K. J. Bathe, Prentice Hall Inc.,1996.
6. The Finite Element Method by O.C. Zienkiewicz, and R.L.Taylor, McGraw – Hill, 1987.

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(NEW SYLLABUS)

Finite Element Analysis

Course Code :18CE5206 **L-T-P-S : 3-0-2-0**

Pre-requisite: NIL **Credits: 4**

Mapping of Course Outcome with Program Outcome:

CO	Course Outcome	PO	BTL
CO 1	Understand the Basic Finite Element Concepts	PO1, PO4	4
CO 2	Analysis of Trusses, Beam Bending, Structural Frames and Column buckling using Finite Element Methods	PO1, PO4	4
CO 3	Analysis of Higher order elements for one dimensional problems and Isometric quadrilateral elements and triangular elements	PO1, PO4	3
CO 4	Analyse the applications based on general two-dimensional boundary value problem	PO1, PO4	4
CO 5	Demonstrate the ANSYS software to develop the models using Finite element method	PO1, PO4, PO5	4

Basic Finite Element Concepts, Approximate solution of boundary value problems- Methods of weighted residuals, Modified Galerkin method, Boundary conditions and general comments, Two dimensional example, Basic ideas in a finite element solution, General finite element solution procedure, Finite element equations using modified Galerkin method, Application: Axial deformation of bars.

Analysis of Trusses, Beam Bending, Analysis of Structural Frames, Two dimensional truss element, three dimensional space truss element, Governing differential equation for beam bending, two node beam element, exact solution of uniform beams subjected to distributed loads using superposition, Calculation of stresses in beams, Plane frame element, Thermal stresses in frames, three dimensional space frame element.

Higher order elements for one dimensional problems, Shape functions for second order problems, Iso parametric mapping concept, Quadratic Iso parametric element for general one dimensional boundary value problem, one dimensional numerical integration, Two dimensional boundary value problems using triangular elements, A triangular element for general 2D BVP, Numerical Examples

Isometric quadrilateral elements and triangular elements, Shape functions for rectangular elements, Iso parametric mapping for quadrilateral elements, and Numerical integration for quadrilateral elements, four node quadrilateral element for 2D BVP, and Eight node serendipity element for 2D BVP, Natural (or Area) coordinates for triangles, Numerical integration for triangles, Six node triangular element for general 2D BVP

Applications based on general two dimensional boundary value problem, Torsion of 2 prismatic bars, Two dimensional elasticity, Governing differential equations, Constant strain triangular element, Four node quadrilateral element, Eight node Iso parametric element.

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Axisymmetric Solids, Three-Dimensional Solids

Textbooks:

2. Introduction to Finite Elements in Engineering by R.T. Chandrupatla and A.D. Belegundu, Prentice Hall of India, 1997.

Reference Books:

7. Bhatti, M.A., Fundamental Finite Element Analysis and Applications: With Mathematica and MATLAB Computations, John Wiley & Sons, 2005.
8. Bhatti, M.A., Advanced Topics in Finite Element Analysis of Structures: With Mathematica and MATLAB Computations, John Wiley & Sons, 2006.
9. Finite Element Analysis by Abel and Desai, New Age Publishers, 2007.
10. Finite Element Analysis: Theory and Programming by C. S. Krishnamoorthy, Tata McGraw-Hill, 1995.
11. Finite Element Procedures in Engineering Analysis by K. J. Bathe, Prentice Hall Inc.,1996.
12. The Finite Element Method by O.C. Zienkiewicz, and R.L.Taylor, McGraw – Hill, 1987.

(EXISTING)

Structural Dynamics

Course Code :18CE5103 **L-T-P-S : 3-0-2-0**

Pre-requisite: NIL **Credits: 4**

Mapping of Course Outcome with Program Outcome:

CO	Course Outcome	PO	BTL
CO 1	Solve response of free and forced vibrations	PO2	3
CO 2	Solve response to Arbitrary, Step and Pulse Excitations (SDOF)	PO2	3
CO 3	Solve Earthquake Response of Linear Systems (SDOF)	PO2	3
CO 4	Build Generalized Multi Degree of Freedom Systems	PO3	3
CO5	Solve response of Multi Degree Freedom System	PO3	3

Equation of Motions, Problem Statement, Solution Methods of Single Degree of Freedom Systems (SDOF): Basic concepts of structural dynamics; single degree of freedom system, force displacement relationship, damping force, equation of motion, mass-spring-damper system, methods of solution of differential equation. Free Vibration (SDoF): Undamped free vibration, viscously damped free vibration, energy in free vibration. Response to Harmonic and Periodic Excitations (SDoF): Harmonic vibration of undamped systems, Harmonic vibration with viscous damping, response to vibration generator, natural frequency and damping from harmonic test, force transmission and vibration isolation, vibration measuring instruments, energy dissipated in viscous damping. Response to periodic force.

Response to Arbitrary, Step and Pulse Excitations (SDoF): Response to unit impulse, response to arbitrary force, step force, ramp force, response to pulse excitations, solution methods, effects of viscous damping. Numerical Evaluation of Dynamic Response (SDoF): Time stepping methods, methods based on interpolation of excitation, central difference method, Newmark's method, stability and computational error, analysis of nonlinear response by Newmark's method.

Earthquake Response to Linear Systems (SDoF) Earthquake excitation, equation of motion, response quantities, response history, response spectrum concept, deformation, pseudo-velocity and pseudo acceleration response spectra, peak structural response from the response spectrum, response spectrum characteristics, elastic design spectrum, comparison and distinction between design and response spectra.

Generalized Single Degree of Freedom Systems: Generalized SDoF systems, rigid body assemblages, systems with distributed mass and elasticity, lumped mass system-shear building, natural vibration frequency by Rayleigh's method.

Multi -degree of freedom systems (MDoF): Equation of motions: simple system-two storey shear building, general approach for linear systems, static condensation, and symmetric plan

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systems: ground motion. Multiple support excitation, methods of solving the equation of motions.

Text Books:

1. Dynamics of structures by Anil K Chopra; Prentice-Hall of India Limited, New Delhi.3rd edition 2006.

2. Dynamics of Structures by R.W. Clough and P.E. Penzien, McGraw-Hill. 1st edition 1975

Reference books:

1. Structural Dynamics for Structural Engineers by G. C. Hart & K. Wang; John Wiley & Sons. 1st edition 1991

2. Structural Dynamics by Mario Paz, CBS Publishers, 1st edition 1991.

(NEW SYLLABUS)

Structural Dynamics

Course Code :18CE5104 **L-T-P-S : 3-0-2-0**

Pre-requisite: NIL **Credits: 4**

Mapping of Course Outcome with Program Outcome:

CO	Course Outcome	PO	BTL
CO 1	Solve response of free and forced vibrations	PO2	3
CO 2	Solve response to Arbitrary, Step and Pulse Excitations (SDOF)	PO2	3
CO 3	Solve Earthquake Response of Linear Systems (SDOF)	PO2	3
CO 4	Build Generalized Multi Degree of Freedom Systems	PO3	3
CO5	Solve response of Multi Degree Freedom System	PO3	3

Equation of Motions, Problem Statement, Solution Methods of Single Degree of Freedom Systems (SDOF): Basic concepts of structural dynamics; single degree of freedom system, force displacement relationship, damping force, equation of motion, mass-spring-damper system, methods of solution of differential equation. Free Vibration (SDoF): Undamped free vibration, viscously damped free vibration, energy in free vibration. Response to Harmonic and Periodic Excitations (SDoF): Harmonic vibration of undamped systems, Harmonic vibration with viscous damping, response to vibration generator, natural frequency and damping from harmonic test, force transmission and vibration isolation, vibration measuring instruments, energy dissipated in viscous damping. Response to periodic force.

Response to Arbitrary, Step and Pulse Excitations (SDoF): Response to unit impulse, response to arbitrary force, step force, ramp force, response to pulse excitations, solution methods, effects of viscous damping. Numerical Evaluation of Dynamic Response (SDoF): Time stepping methods, methods based on interpolation of excitation, central difference method, Newmark's method, stability and computational error, analysis of nonlinear response by Newmark's method.

Earthquake Response to Linear Systems (SDoF) Earthquake excitation, equation of motion, response quantities, response history, response spectrum concept, deformation, pseudo-velocity and pseudo acceleration response spectra, peak structural response from the response spectrum, response spectrum characteristics, elastic design spectrum, comparison and distinction between design and response spectra.

Generalized Single Degree of Freedom Systems: Generalized SDoF systems, rigid body assemblages, systems with distributed mass and elasticity, lumped mass system-shear building, natural vibration frequency by Rayleigh's method.

Multi -degree of freedom systems (MDoF): Equation of motions: simple system-two storey shear building, general approach for linear systems, static condensation, and symmetric plan systems: ground motion. Multiple support excitation, methods of solving the equation of motions. Free Vibration (MDoF): Natural frequencies and modes: systems without damping, modal and spectral matrices, orthogonality of modes, normalization of modes. Solution of undamped free vibration systems, solution methods for eigenvalue problem.

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Text Books:

1. Dynamics of structures by Anil K Chopra; Prentice-Hall of India Limited, New Delhi.3rd edition 2006.

2. Dynamics of Structures by R.W. Clough and P.E. Penzien, McGraw-Hill. 1st edition 1975

Reference books:

1. Structural Dynamics for Structural Engineers by G. C. Hart & K. Wang; John Wiley & Sons. 1st edition 1991

2. Structural Dynamics by Mario Paz, CBS Publishers, 1st edition 1991.

(Existing)

Advanced Prestressed Concrete

Course Code : 18CE**5104** **L-T-P-S : 3-0-2-0**

Pre-requisite: NIL **Credits: 4**

Mapping of Course Outcome with Program Outcome:

CO	Course Outcome	PO	BTL
CO 1	Understand the concepts of prestressed concrete and analyze the prestressed concrete beams.	PO1, PO6	2
CO 2	Analyze losses in prestressed concrete and deflection of the prestressed concrete members	PO1, PO4, PO6	4
CO 3	Design reinforcement for Ultimate shear, torsion and bending of prestressed concrete members.	PO1, PO4, PO5, PO6	3
CO 4	Design end blocks as per IS 1343 recommendations.	PO1, PO2, PO3, PO4, PO6	3

Introduction, Prestressing Systems and Material Properties

Basic concepts of pre-stressing; Historical development; Advantages and Types of Pre-stressing, Pre-tensioning Systems and Devices, Post-tensioning Systems and Devices, Need for High strength steel and High strength concrete

Losses of Prestress: Nature of losses of pre-stress; Loss due to elastic deformation of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, friction and anchorage slip; Total losses allowed for in design.

Analysis of Prestressed Member

Analysis of Members under Axial Load: Analysis at Transfer, Analysis at Service, Analysis for Ultimate Strength, Analysis of Member under Flexure:, Analysis at Transfer and at Service, Cracking Moment, Kern Point, Pressure Line, Analysis for Ultimate Strength, design loads and strength, Calculation of Crack Width, Variation of Stress in Steel, Analysis of a Rectangular Section, Analysis of a Flanged Section.

Deflections of Prestressed Concrete Members: Importance of control of deflections; Factors influencing deflections; Short term deflections of un-cracked members. Long term deflection of cracked member

Transmission of Pre-Stress: Transmission of Pre-stressing force by bond; Transmission length; Bond stresses; Transverse tensile stresses; End zone reinforcement; Flexural bond stresses in pre tensioned and post-tensioned grouted beams, stress distribution in end block, Anchorage zone reinforcements.

Shear and Torsion Resistance of Prestressed Concrete Member: Shear and Principal stresses; Ultimate shear resistance of pre-stressed concrete members; Design of shear reinforcement, pre-stressed concrete members in torsion, Design of reinforcements for torsion, shear and bending.

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Design of Pre-Stressed Members: Design of sections for flexure, Design of Sections for Axial Tension, Design of Sections for compression and bending, design of pre-stressed section for shear and torsion, design of pre-stressed member for bond. Dimensioning of flexural member, design for pre-tensioning member, design of post-tensioning members.

Composite Construction of Prestressed Concrete: Composite structural member, types of composite construction, analysis of stresses, differential shrinkages, deflection of composite member, flexural strength of composite sections, shear strength of composite section;

Text Books :

1. Prestressed Concrete by N. Krishna Raju; Mc Graw - Hill Publishing Company Limited, New Delhi.6th Edition

Reference Books :

1. Prestressed concrete by N. Rajagopalan; Narosa Publishing House.2nd edition, 2005
2. Design of Prestressed Concrete by A. Nilson; John Willey & Sons.2nd edition, 1987
3. B. S. Taranath, Tall Buildings – Steel, Concrete, and Composite Design of Tall Buildings, TMH publications, 1997. 4. Design of Prestressed Concrete Structures by T.Y. Lin & Ned H. Burns; John Wiley & Sons,3rd edition, 1981.

(New Syllabus)

Advanced Prestressed Concrete

Course Code : 18CE**5104** **L-T-P-S : 3-0-2-0**

Pre-requisite: NIL **Credits: 4**

Mapping of Course Outcome with Program Outcome:

CO	Course Outcome	PO	BTL
CO 1	Understand the concepts of prestressed concrete and analyze the prestressed concrete beams.	PO1, PO6	2
CO 2	Analyze losses in prestressed concrete and deflection of the prestressed concrete members	PO1, PO4, PO6	4
CO 3	Design reinforcement for Ultimate shear, torsion and bending of prestressed concrete members.	PO1, PO4, PO5, PO6	3
CO 4	Design end blocks as per IS 1343 recommendations. Design of Continuous Prestressed Concrete Member.	PO1, PO2, PO3, PO4, PO6	3

Introduction, Prestressing Systems and Material Properties

Basic concepts of pre-stressing; Historical development; Advantages and Types of Pre-stressing, Pre-tensioning Systems and Devices, Post-tensioning Systems and Devices, Need for High strength steel and High strength concrete

Losses of Prestress: Nature of losses of pre-stress; Loss due to elastic deformation of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, friction and anchorage slip; Total losses allowed for in design.

Analysis of Prestressed Member

Analysis of Members under Axial Load: Analysis at Transfer, Analysis at Service, Analysis for Ultimate Strength, Analysis of Member under Flexure:, Analysis at Transfer and at Service, Cracking Moment, Kern Point, Pressure Line, Analysis for Ultimate Strength, design loads and strength, Calculation of Crack Width, Variation of Stress in Steel, Analysis of a Rectangular Section, Analysis of a Flanged Section.

Deflections of Prestressed Concrete Members: Importance of control of deflections; Factors influencing deflections; Short term deflections of un-cracked members. Long term deflection of cracked member

Transmission of Pre-Stress: Transmission of Pre-stressing force by bond; Transmission length; Bond stresses; Transverse tensile stresses; End zone reinforcement; Flexural bond stresses in pre tensioned and post-tensioned grouted beams, stress distribution in end block, Anchorage zone reinforcements.

Shear and Torsion Resistance of Prestressed Concrete Member: Shear and Principal stresses; Ultimate shear resistance of pre-stressed concrete members; Design of shear reinforcement, pre-stressed concrete members in torsion, Design of reinforcements for torsion, shear and bending.

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Design of Pre-Stressed Members: Design of sections for flexure, Design of Sections for Axial Tension, Design of Sections for compression and bending, design of pre-stressed section for shear and torsion, design of pre-stressed member for bond. Dimensioning of flexural member, design for pre-tensioning member, design of post-tensioning members.

Composite Construction of Prestressed Concrete: Composite structural member, types of composite construction, analysis of stresses, differential shrinkages, deflection of composite member, flexural strength of composite sections, shear strength of composite section;

Design of Continuous Prestressed Concrete Member: Advantages of continuous members, ultimate load analysis of continuous pre-stressed member, design of continuous pre-stressed concrete beams.

Text Books :

1. Prestressed Concrete by N. Krishna Raju; Mc Graw - Hill Publishing Company Limited, New Delhi.6th Edition

Reference Books :

1. Prestressed concrete by N. Rajagopalan; Narosa Publishing House.2nd edition, 2005
2. Design of Prestressed Concrete by A. Nilson; John Willey & Sons.2nd edition, 1987

B. S. Taranath, Tall Buildings – Steel, Concrete, and Composite Design of Tall Buildings, TMH publications, 1997. 4. Design of Prestressed Concrete Structures by T.Y. Lin & Ned H. Burns; John Wiley & Sons,3rd edition, 1981.

(Existing)

CONSTRUCTION PLANNING SCHEDULING AND CONTROL

Course Code: 18CE5119 **L-T-P-S : 3-0-2-0**

Prerequisites: - NIL **Credits: 4**

Course Objective:

The main objective of the course is to understand the Project Management, Management functions, Construction planning, Scheduling and controlling of a Project and project Management System.

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO No.	Course Outcomes	PO	BTL
1	Understand the concepts of project management for practical application	3	2
2	Apply mathematical logic in the planning and scheduling of a project	5	3
3	Apply concepts to estimate the project cost by using tools	5	3
4	Apply concepts to maintain the construction documents in the project	2	3
5	Plan, schedule, and control large-scale programs and individual projects by using Primavera/MS Project Tool	5	4

SYLLABUS:

UNDERSTANDING PROJECT MANAGEMENT: Project manager, organization structures, Organizing and staffing the project office and team, stages and phases involved in project management, techniques involved in project management

CONSTRUCTION PLANNING: Project planning, milestone schedules, WBS, Network Techniques, critical path method, project evaluation review technique and Primavera, Resources leveling and smoothing.

CONSTRUCTION SCHEDULING:scheduling procedures, scheduling tools, construction activities in a project and their relationships, NETWORK ANALYSIS - Critical Path Method and Program Evaluation & Review Technique (PERT) and Range Estimating, The Role of the Scheduler in Construction Management, Technology Applications for Scheduling-Software Applications overview- primavera, MS Project Scheduling

COST CONTROL: Introduction, Understanding Control, The Operating Cycle, Cost Account Codes, Budgets, The Earned Value Measurement System (EVMS)

Tools:Primavera/MS Project: Project Scheduling and Project Management Information System

Textbooks:1.Chitkara, K.K. Construction Project Management: Planning, Scheduling and Control, Tata McGraw-Hill Publishing Company, New Delhi, 1998.

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References:

1. Harold Kerzner Project Management CBS Publisers& Distributors 2nd Edition.
2. Frank Harris & Ronald McCaffer Modern Construction Management Blackwell science 4th Edition.
3. Roy Pilcher Principles of Construction Management McGraw Hill London.
4. Calin M. Popescu, ChotchaiCharoenngam, Project Planning, Scheduling and Control in Construction: An Encyclopedia of terms and Applications, Wiley, New York, 1995.
5. Chris Hendrickson and Tung Au, Project Management for Construction – Fundamental Concepts for Owners, Engineers, Architects and Builders, Prentice Hall, Pittsburgh, 2000.
6. Willis, E. M., Scheduling Construction Projects, John Wiley & Sons, 1986.
7. Halpin, D. W., Financial and Cost Concepts for Construction Management, John Wiley & Sons, New York, 1985

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CONSTRUCTION PLANNING SCHEDULING AND CONTROL

Course Code: 18CE5119 **L-T-P-S : 3-0-2-0**

Prerequisites: - NIL **Credits: 4**

Course Objective:

The main objective of the course is to understand the Project Management, Management functions, Construction planning, Scheduling and controlling of a Project and project Management System.

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO No.	Course Outcomes	PO	BTL
1	Understand the concepts of project management for practical application	3	2
2	Apply mathematical logic in the planning and scheduling of a project	5	3
3	Apply concepts to estimate the project cost by using tools	5	3
4	Apply concepts to maintain the construction documents in the project	2	3
5	Plan, schedule, and control large-scale programs and individual projects by using Primavera/MS Project Tool	5	4

SYLLABUS:

UNDERSTANDING PROJECT MANAGEMENT: Project manager, organization structures, Organizing and staffing the project office and team, stages and phases involved in project management, techniques involved in project management

CONSTRUCTION PLANNING: Project planning, milestone schedules, WBS, Network Techniques, critical path method, project evaluation review technique and Primavera, Resources leveling and smoothing.

CONSTRUCTION SCHEDULING: Scheduling procedures, scheduling tools, construction activities in a project and their relationships, NETWORK ANALYSIS - Critical Path Method and Program Evaluation & Review Technique (PERT) and Range Estimating, The Role of the Scheduler in Construction Management, Technology Applications for Scheduling-Software Applications overview- primavera, MS Project Scheduling

COST CONTROL: Introduction, Understanding Control, The Operating Cycle, Cost Account Codes, Budgets, The Earned Value Measurement System (EVMS)

PROJECT MANAGEMENT INFORMATION SYSTEM: MIS reporting, Daily, Weekly and monthly reporting, Actual vs. Planned cost reports, Planning & Cost control document.

Tools:Primavera/MS Project: Project Scheduling and Project Management Information System

Textbooks:

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1. Chitkara, K.K. Construction Project Management: Planning, Scheduling and Control, Tata McGraw-Hill Publishing Company, New Delhi, 1998.

References:

8. Harold Kerzner Project Management CBS Publisers& Distributors 2nd Edition.
9. Frank Harris & Ronald McCaffer Modern Construction Management Blackwell science 4th Edition.
10. Roy Pilcher Principles of Construction Management McGraw Hill London.
11. Calin M. Popescu, ChotchaiCharoenngam, Project Planning, Scheduling and Control in Construction: An Encyclopedia of terms and Applications, Wiley, New York, 1995.
12. Chris Hendrickson and Tung Au, Project Management for Construction – Fundamental Concepts for Owners, Engineers, Architects and Builders, Prentice Hall, Pittsburgh, 2000.
13. Willis, E. M., Scheduling Construction Projects, John Wiley & Sons, 1986.
14. Halpin, D. W., Financial and Cost Concepts for Construction Management, John Wiley & Sons, New York, 1985

(Existing)

GREEN BUILDINGS

Course Code: 18CE51E2 **L-T-P-S: 3-0-0-0**

Prerequisites: - NIL **Credits: 3**

Course Objective:

The objective of this course is to expose the student to concepts of embodied, operational and life cycle energy, minimizing energy consumption by optimal design. The course also intends to make student aware of ECBC, LEED, GRIHA etc.

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO No.	Course Outcomes	PO	BTL
1	Understand Necessity and importance of Sustainable/ Green Buildings, Grasp the construction practices of a sustainable Buildings.	5,6	2
2	Understanding the Green Building Rating Systems, Water & Energy efficiencies, Reduction in waste material during construction and Building Design	1,2,6	3
3	Understanding Air Conditioning and HVAC system design, Salient features of CII Godrej Green Business Center	5,6	3
4	Understanding Indoor Environment Quality and Occupational Health, Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels,	3	2

Syllabus:

Introduction: What is Green Building, why to go for Green Building, Benefits of Green Buildings, Green Building Materials and Equipment in India, What are key Requisites for Constructing a Green Building, Important Sustainable features for Green Building,

Green Building Concepts and Practices

Indian Green Building Council, Green Building Moment in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation;

Green Building Opportunities and Benefits: Opportunities of Green Building, Green Building Features, Material and Resources, Water Efficiency, Optimum Energy Efficiency, Typical Energy Saving Approach in Buildings, LEED India Rating System and Energy Efficiency,

Green Building Design: Introduction, Reduction in Energy Demand, Onsite Sources and Sinks, Maximize System Efficiency, Use of Renewable Energy Sources. Ecofriendly captive power generation for factory, Building requirement,

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Air Conditioning: Introduction, CII Godrej Green business center, Design philosophy, Design interventions, Energy modeling, HVAC System design, Chiller selection, pump selection, Selection of cooling towers, Selection of air handing units, Precooling of fresh air, Interior lighting system, Key feature of the building. Eco-friendly captive power generation for factory, Building requirement.

Material Conservation

Handling of non-process waste, waste reduction during construction, materials with recycled content, local materials, material reuse, certified wood, Rapidly renewable building materials and furniture;

Tools:Design Builder/OpenBuildings/eQuest : Assessment and optimization of building energy requirements.

Textbooks:

1. Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air conditioning Engineers, 2009.
2. Green Building Handbook by Tomwoolley and Samkimings, 2009.

Reference Books:

1. Complete Guide to Green Buildings by Trish riley
2. Standard for the design for High Performance Green Buildings by Kent Peterson, 2009

Case Study

Students must visit minimum of 5 construction Sites practicing green building principles and shall submit the reports on various green building materials and green building practices that are being implemented with respect to building rating systems by IGBC and LEED.

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(NEW SYLLABUS)

GREEN BUILDINGS

Course Code: 18CE51E2 **L-T-P-S: 3-0-0-0**

Prerequisites: - NIL **Credits: 3**

Course Objective:

The objective of this course is to expose the student to concepts of embodied, operational and life cycle energy, minimizing energy consumption by optimal design. The course also intends to make student aware of ECBC, LEED, GRIHA etc.

Mapping of Course Outcomes to Program Outcomes: The students will be able to

CO No.	Course Outcomes	PO	BTL
1	Understand Necessity and importance of Sustainable/ Green Buildings, Grasp the construction practices of a sustainable Buildings.	5,6	2
2	Understanding the Green Building Rating Systems, Water & Energy efficiencies, Reduction in waste material during construction and Building Design	1,2,6	3
3	Understanding Air Conditioning and HVAC system design, Salient features of CII Godrej Green Business Center	5,6	3
4	Understanding Indoor Environment Quality and Occupational Health, Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels,	3	2

Syllabus:

Introduction: What is Green Building, why to go for Green Building, Benefits of Green Buildings, Green Building Materials and Equipment in India, What are key Requisites for Constructing a Green Building, Important Sustainable features for Green Building,

Green Building Concepts and Practices: Indian Green Building Council, Green Building Moment in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation;

Green Building Opportunities and Benefits: Opportunities of Green Building, Green Building Features, Material and Resources, Water Efficiency, Optimum Energy Efficiency, Typical Energy Saving Approach in Buildings, LEED India Rating System and Energy Efficiency,

Green Building Design: Introduction, Reduction in Energy Demand, Onsite Sources and Sinks, Maximize System Efficiency, Use of Renewable Energy Sources. Ecofriendly captive power generation for factory, Building requirement,

Air Conditioning: Introduction, CII Godrej Green business center, Design philosophy, Design interventions, Energy modeling, HVAC System design, Chiller selection, pump selection, Selection of cooling towers, Selection of air handing units, Precooling of fresh

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air, Interior lighting system, Key feature of the building, Eco-friendly captive power generation for factory, Building requirement.

Material Conservation: Handling of non-process waste, waste reduction during construction, materials with recycled content, local materials, material reuse, certified wood, Rapidly renewable building materials and furniture;

Indoor Environment Quality and Occupational Health: Air conditioning, Indore air quality, Sick building syndrome, Tobacco smoke control, Minimum fresh air requirements avoid use of asbestos in the building, improved fresh air ventilation, Measure of IAQ, Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels,

Tools:Design Builder/OpenBuildings/eQuest : Assessment and optimization of building energy requirements.

Textbooks:

1. Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air conditioning Engineers, 2009.
3. Green Building Handbook by Tomwoolley and Samkimings, 2009.

Reference Books:

1. Complete Guide to Green Buildings by Trish riley
2. Standard for the design for High Performance Green Buildings by Kent Peterson, 2009

Case Study

Students must visit minimum of 5 construction Sites practicing green building principles and shall submit the reports on various green building materials and green building practices that are being implemented with respect to building rating systems by IGBC and LEED.

(EXISTING)

MECHANIZED CONSTRUCTION AND MACHINERY

Course Code: 18CE5225 **L-T-P-S: 3-0-2-0**

Prerequisites: - NIL **Credits: 4**

Course Objective: To develop the skills to understand about the mechanized construction machinery, through standard types of equipment, earthmoving equipment, pumping equipment, pumping equipment and all certain construction handling equipment. Every project has one specific purpose, it starts at some specific moment and it is finished when its objectives have been fulfilled. Similarly management increases the productivity through equipment and skill.

CO No:	Course Outcome CO	PO	BTL
CO1	Understanding the basic concepts of Equipment Management and tools	1,4	2
CO2	Understand various construction equipment and study the efficient utilization of the same using scientific principles	1,4	2
CO3	Apply the knowledge for the selection of appropriate equipment	4	3
CO4	Understand the operation of Earthwork and various functions of machinery used for Earth moving, compaction, etc.	1	2
CO5	Write field report on machinery operation, cost and productivity by using project management tools like primavera/Candy/SAP etc	2	3

Syllabus:

Equipment Management:

Equipment Management, Costing, Optimum utilization and Equipment selection, depreciation, interest on capital, Manpower, Spare parts etc., Documentation, Logbooks, History Books, Periodical MIS Report

Construction Equipment:

Understanding basics, Capacity, Function & Efficiency of All Machinery, involving all machinery data, power use, fuel consumption and labor utilization. Special equipment, cost of owning and operating equipment, Work cycle time of any machine with corrective factors, depreciation of equipment, operative cost, inventory cost control, higher/rental- a) Average Investment value, b) Annual Ownership Cost, factors affecting selection of construction equipment, balancing of equipment. Study of equipment with reference to available types and their types and their capacities, factors affecting their performance

Fundamentals of Earth Work Operations - Earth Moving Operations-Types of Earthwork Equipment - Tractors, Motor Graders, Scrapers, Front end Loaders, Earth Movers – capacity calculations.

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Equipment for compaction - Types of pumps used in Construction - Equipment for Grouting - Pile Driving Equipment- Equipment of Erection and demolition.

Equipment for Earthmoving Machinery, Concreting Equipment, Material Handling Equipment such as cranes, boom, lift and maintenance transportation Equipment's.

Textbooks:

1. Construction planning, Equipments and methods. R.L.Peurify, TMH, 1996

Reference:

1. "Construction Equipment and its Planning and Applications", Mahesh Varma, Metropolitan Book Co.(P) Ltd., New Delhi. India.
2. Construction Machinery and Equipment in India". (A compilation of articles Published in Civil Engineering and Construction Review) Published by Civil Engineering and Construction Review, New Delhi, 1991

List of Experiments supposed to finish in Open Lab Sessions:

Lab session no	List of Experiments
1	Introduction to the construction phases and equipment's specially used in construction sites
2	Tractors and Attachments in construction
3	Forklift in construction and utilization of equipment
4	Bulldozers in construction
5	Clamshell as Construction equipment
6	Drilling Equipment in construction
7	Roller Compactors as Construction equipment
8	Concreting Equipment's for Construction
9	Dragline as Construction equipment
10	Road construction & special equipment
11	Hydraulic excavators in construction sites
12	Trenching machines in construction

(NEW SYLLABUS

MECHANIZED CONSTRUCTION AND MACHINERY

Course Code: 18CE5225 **L-T-P-S: 3-0-2-0**

Prerequisites: - NIL **Credits: 4**

Course Objective: To develop the skills to understand about the mechanized construction machinery, through standard types of equipment, earthmoving equipment, pumping equipment, pumping equipment and all certain construction handling equipment. Every project has one specific purpose, it starts at some specific moment and it is finished when its objectives have been fulfilled. Similarly management increases the productivity through equipment and skill.

CO No:	Course Outcome CO	PO	BTL
CO1	Understanding the basic concepts of Equipment Management and tools	1,4	2
CO2	Understand various construction equipment and study the efficient utilization of the same using scientific principles	1,4	2
CO3	Apply the knowledge for the selection of appropriate equipment	4	3
CO4	Understand the operation of Earthwork and various functions of machinery used for Earth moving, compaction, etc.	1	2
CO5	Write field report on machinery operation, cost and productivity by using project management tools like primavera/Candy/SAP etc	2	3

Syllabus:

Equipment Management: Equipment Management, Costing, Optimum utilization and Equipment selection, depreciation, interest on capital, Manpower, Spare parts etc., Documentation, Logbooks, History Books, Periodical MIS Report

Construction Equipment: Understanding basics, Capacity, Function & Efficiency of All Machinery, involving all machinery data, power use, fuel consumption and labor utilization. Special equipment, cost of owning and operating equipment, Work cycle time of any machine with corrective factors, depreciation of equipment, operative cost, inventory cost control, higher/rental- a) Average Investment value, b) Annual Ownership Cost, factors affecting selection of construction equipment, balancing of equipment. Study of equipment with reference to available types and their types and their capacities, factors affecting their performance

Fundamentals of Earth Work Operations - Earth Moving Operations-Types of Earthwork Equipment - Tractors, Motor Graders, Scrapers, Front end Loaders, Earth Movers – capacity calculations.

Equipment for compaction - Types of pumps used in Construction - Equipment for Grouting - Pile Driving Equipment- Equipment of Erection and demolition.

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Equipment for Earthmoving Machinery, Concreting Equipment, Material Handling Equipment such as cranes, boom, lift and maintenance transportation Equipment's.

Screening equipment: Crushers – Feeders - Screening Equipment - Batching and Mixing Equipment – Hauling equipment - Pouring and Pumping Equipment – Ready mixed concrete carriers.

Textbooks:

2. Construction planning, Equipments and methods. R.L.Peurify, TMH, 1996

Reference:

3. "Construction Equipment and its Planning and Applications", Mahesh Varma, Metropolitan Book Co.(P) Ltd., New Delhi. India.
4. Construction Machinery and Equipment in India". (A compilation of articles Published in Civil Engineering and Construction Review) Published by Civil Engineering and Construction Review, New Delhi, 1991

List of Experiments supposed to finish in Open Lab Sessions:

Lab session no	List of Experiments
1	Introduction to the construction phases and equipment's specially used in construction sites
2	Tractors and Attachments in construction
3	Forklift in construction and utilization of equipment
4	Bulldozers in construction
5	Clamshell as Construction equipment
6	Drilling Equipment in construction
7	Roller Compactors as Construction equipment
8	Concreting Equipment's for Construction
9	Dragline as Construction equipment
10	Road construction & special equipment
11	Hydraulic excavators in construction sites
12	Trenching machines in construction

(EXISTING)

QUALITY MANAGEMENT AND SAFETY MANAGEMENT SYSTEMS IN CONSTRUCTION

Course Code: 18CE5224 **L-T-P-S: 3-0-2-0**

Prerequisites: - NIL **Credits: 4**

Course Objective: This course provides complete understanding on quality planning, quality assurance, quality control and safety management. The fundamental reason for the course is to impart knowledge and skill for the construction students to achieve success in quality management system (QMS) by understanding and evaluating quality management principles as a formalized system that has documents, processes, procedures, and authorities, responsibilities and for achieving quality policies and objectives

Course Outcomes (CO): students will be able to

CO No:	CO	PO	BTL
1	Understand the concepts of quality management and the factors influencing construction quality	1,3,4	2
2	Understand quality planning and programs in construction industry	3,4	2
3	Acquire knowledge of quality management systems and ISO 9000 family of standards.	1,3,4	2
4	Understand and analyses quality circle (QC) concepts for possible implementation to solve construction productivity and quality problems	1,3,4	3
5	Understand and evaluate safety management principles in construction	2,4	5

Syllabus:

Quality Management: Introduction – Definitions and objectives – Factors influencing construction quality –Responsibilities and authority – Quality plan – Quality Management Guidelines – Quality circles.

Quality Systems: Introduction - Quality system standard – ISO 9000 family of standards – Requirements – Preparing Quality System Documents – Quality related training – Implementing a Quality system – Third party Certification.

Quality Planning: Quality Policy, Objectives and methods in Construction industry - Consumers satisfaction, Ergonomics - Time of Completion - Statistical tolerance – Taguchi's concept of quality – Codes and Standards – Documents – Contract and construction programming – Inspection procedures -Processes and products – Total QA / QC programmed and cost implication.

Quality Assurance And Quality Improvement Techniques: Objectives – Regularity agent, owner, design, contract and construction oriented objectives, methods – Techniques and

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needs of QA/QC – Different aspects of quality – Appraisals, Factors influencing construction quality – Critical, major failure aspects and failure mode analysis, –Stability methods and tools, optimum design – Reliability testing, Reliability coefficient and reliability prediction - Life cycle costing – Value engineering and value analysis. Quality Improvement Tools and Techniques.

References:

1. Hutchins.G, ISO 9000: A Comprehensive Guide to Registration, Audit Guidelines and
   Successful Certification, Viva Books Pvt. Ltd., 1994.
2. James, J.O' Brian, Construction Inspection Handbook – Total Quality Management, Van
   Nostrand, 1997.
3. John L. Ashford, The Management of Quality in Construction, E &F.N.Spon, 1989.
4. Juran Frank, J.M. and Gryna, F.M. Quality Planning and Analysis, McGraw Hill, 2001.
5. Kwaku.A., Tena, Jose, M. Guevara, Fundamentals of Construction Management and Organisation, Reston Publishing Co., Inc., 1985.
6. Steven McCabe, Quality Improvement Techniques in Construction, Addison Wesley Longm.

(NEW SYLLABUS)

QUALITY MANAGEMENT AND SAFETY MANAGEMENT SYSTEMS IN CONSTRUCTION

Course Code: 18CE5224 **L-T-P-S: 3-0-2-0**

Prerequisites: - NIL **Credits: 4**

Course Objective: This course provides complete understanding on quality planning, quality assurance, quality control and safety management. The fundamental reason for the course is to impart knowledge and skill for the construction students to achieve success in quality management system (QMS) by understanding and evaluating quality management principles as a formalized system that has documents, processes, procedures, and authorities, responsibilities and for achieving quality policies and objectives

Course Outcomes (CO): students will be able to

CO No:	CO	PO	BTL
1	Understand the concepts of quality management and the factors influencing construction quality	1,3,4	2
2	Understand quality planning and programs in construction industry	3,4	2
3	Acquire knowledge of quality management systems and ISO 9000 family of standards.	1,3,4	2
4	Understand and analyses quality circle (QC) concepts for possible implementation to solve construction productivity and quality problems	1,3,4	3
5	Understand and evaluate safety management principles in construction	2,4	5

Syllabus:

Quality Management: Introduction – Definitions and objectives – Factors influencing construction quality –Responsibilities and authority – Quality plan – Quality Management Guidelines – Quality circles.

Quality Systems: Introduction - Quality system standard – ISO 9000 family of standards – Requirements – Preparing Quality System Documents – Quality related training – Implementing a Quality system – Third party Certification.

Quality Planning: Quality Policy, Objectives and methods in Construction industry - Consumers satisfaction, Ergonomics - Time of Completion - Statistical tolerance – Taguchi's concept of quality – Codes and Standards – Documents – Contract and construction programming – Inspection procedures -Processes and products – Total QA / QC programmed and cost implication.

Quality Assurance And Quality Improvement Techniques: Objectives – Regularity agent, owner, design, contract and construction oriented objectives, methods – Techniques and

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needs of QA/QC – Different aspects of quality – Appraisals, Factors influencing construction quality – Critical, major failure aspects and failure mode analysis, –Stability methods and tools, optimum design – Reliability testing, Reliability coefficient and reliability prediction - Life cycle costing – Value engineering and value analysis. Quality Improvement Tools and Techniques.

Safety Management Systems: Fundamental of safety management, construction safety, safety in scaffolding and working platform, welding and handling, excavation work, concreting and cementing work. Building construction, TAC and NBC rules, High rise building. Evolution of modern safety concept- Safety policy - Safety Organization. Safety survey, safety inspection, safety sampling, Safety Audit. Concept of an accident, Reportable and non reportable accidents, unsafe act and condition principles of accident prevention, Overall accident investigation process. Risk management

References:

1. Hutchins.G, ISO 9000: A Comprehensive Guide to Registration, Audit Guidelines and
   Successful Certification, Viva Books Pvt. Ltd., 1994.
2. James, J.O' Brian, Construction Inspection Handbook – Total Quality Management, Van
   Nostrand, 1997.
3. John L. Ashford, The Management of Quality in Construction, E &F.N.Spon, 1989.
4. Juran Frank, J.M. and Gryna, F.M. Quality Planning and Analysis, McGraw Hill, 2001.
5. Kwaku.A., Tena, Jose, M. Guevara, Fundamentals of Construction Management and Organisation, Reston Publishing Co., Inc., 1985.
6. Steven McCabe, Quality Improvement Techniques in Construction, Addison Wesley Longm.

Annexure 3:

M.Tech Structural Engineering Curriculum

SEMESTER-1								
S.No	**Course Code**	**Course Title**	**L**	**T**	**P**	**S**	**Cr**	**CH**
1	18CE5101	Applied Mathematics	3	1	0	0	4	4
2	18CE5102	Theory of Elasticity	3	1	0	0	4	4
3	18CE5103	Structural Dynamics	3	0	2	0	4	5
4	18CE5104	Advanced Pre stressed Concrete	3	0	2	0	4	5
5	18CE51A1	Repair and Rehabilitation of Structures	3	0	0	0	3	3
	18CE51A2	Design of Offshore Structures						
6	18CE51B1	Geotechnical Earthquake Engineering	3	0	0	0	3	0
	18CE51B2	Stability of Structures						
7	18IE5149	SEMINAR	0	0	4	0	2	4
Total			**18**	**2**	**8**	**0**	**24**	**25**

SEMESTER-2								
S.No	**Course Code**	**Course Title**	**L**	**T**	**P**	**S**	**Cr**	**CH**
1	18CE5205	Finite Element Analysis	3	0	2	0	4	5
2	18CE5206	Bridge Engineering	3	1	0	0	4	4
3	18CE5207	Earthaquak Resistant Design of Structures	3	0	2	0	4	5
4	18CE5208	Theory of Plates and Shells	3	1	0	0	4	4
5	18CE52C1	Industrial Structures	3	0	0	0	3	3
	18CE52C2	Design of Tall Structures						
6	18CE52D1	Advanced Design of Structures	3	0	0	0	3	3
	18CE52D3	Green Buildings						
7	18IE5250	Term Paper	0	0	4	0	2	4
Total			**18**	**2**	**8**	**0**	**24**	**28**

SEMESTER-3								
S.No	**Course Code**	**Course Title**	**L**	**T**	**P**	**S**	**Cr**	**CH**
1		Project	0	0	36	0	18	36

SEMESTER-4								
S.No	**Course Code**	**Course Title**	**L**	**T**	**P**	**S**	**Cr**	**CH**
1		Project	0	0	36	0	18	36
GRAND TOTAL			**36**	**4**	**88**	**0**	**84**	**125**

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M.Tech Construction Technology and Management

SEMESTER-1								
S.No	**Course Code**	**Course Title**	**L**	**T**	**P**	**S**	**Cr**	**CH**
1	18CE5119	Construction Planning Scheduling and Management	3	0	2	0	4	5
2	18CE5120	Statistical Methods for Management	3	1	0	0	4	4
3	18CE5121	Green Buildings	3	0	2	0	4	5
4	18CE5122	Construction Materials & Concrete Technology	3	1	0	0	4	4
5	18CE51I3	Special Concretes	3	0	0	0	3	3
6	18CE51J1	Construction Personnel Management	3	0	0	0	3	3
7	18IE5149	SEMINAR	0	0	4	0	2	4
Total			**18**	**2**	**8**	**0**	**24**	**28**
SEMESTER-2								
S.No	**Course Code**	**Course Title**	**L**	**T**	**P**	**S**	**Cr**	**CH**
1	18CE5221	Mechanized Construction and Machinery	3	0	2	0	4	5
2	18CE5222	Project Formulation Appraisal	3	1	0	0	4	4
3	18CE5223	Construction Law and Regulations	3	1	0	0	4	4
4	18CE5224	Quality Management and Safety Managemnt System in Construction	3	0	2	0	4	5
5	18CE52K4	Form Work for Construction Structures	3	0	0	0	3	3
6	18CE52L4	Resource Management and Control in Construction	3	0	0	0	3	3
7	18IE5250	Architectural Thesis	0	0	4	0	2	4
Total			**18**	**2**	**8**	**0**	**24**	**28**
SEMESTER-3								
S.No	**Course Code**	**Course Title**	**L**	**T**	**P**	**S**	**Cr**	**CH**
1	18IE6050	Dissertation	0	0	36	0	18	36
SEMESTER-4								
S.No	**Course Code**	**Course Title**	**L**	**T**	**P**	**S**	**Cr**	**CH**
1	18IE6050	Dissertation	0	0	36	0	18	36
GRAND TOTAL			**36**	**4**	**88**	**0**	**84**	**128**

Annexure -4: M.Tech Curriculum structure for Energy and Environmental Management

SEMESTER-1								
S.No	**Course Code**	**Course Title**	**L**	**T**	**P**	**S**	**Cr**	**CH**
1	19CE5141	Environmental Quality Monitoring	3	0	2	0	4	5
2	19CE5142	Renewable Energy Technologies	2	1	2	0	4	5
3	19CE5143	Technical English	0	0	4	0	2	4
4	19CE5144	Physicochemical, Biological Principles and Processes	3	1	0	0	4	4
5	19CE5145	Advanced Statistical Methods	2	0	2	0	3	4
6	19CE51R2	Solid & Hazardous Waste Management	3	0	0	0	3	3
7	19IE5149	Seminar	0	0	2	0	1	2
Total			**13**	**2**	**12**	**0**	**21**	**27**
SEMESTER-2								
S.No	**Course Code**	**Course Title**	**L**	**T**	**P**	**S**	**Cr**	**CH**
1	19CE5246	Energy Auditing and Conservation Techniques	3	0	2	0	4	5
2	19CE5247	Design of Water and Wastewater Treatment Systems	3	0	2	0	4	5
3	19CE5248	Environmental Impact Assessment	3	1	0	0	4	4
4	19CE52Q6	Energy in built Environment	3	0	0	0	3	3
5	19CE52Q8	Waste to Energy conversion	3	0	0	0	3	3
6	19ce52R4	Energy, Environment and Climate Change	3	0	0	0	3	3
	19ce52R6	Mathematical Modeling in Environmental Engineering	3	0	0	0	3	3
7	19IE5250	Term Paper	0	0	4	0	2	4
Total			**21**	**1**	**8**	**0**	**26**	**30**
SEMESTER-3								
S.No	**Course Code**	**Course Title**	**L**	**T**	**P**	**S**	**Cr**	**CH**
1	18IE6050	Dissertation	0	0	36	0	18	36
SEMESTER-4								
S.No	**Course Code**	**Course Title**	**L**	**T**	**P**	**S**	**Cr**	**CH**
1	18IE6050	Dissertation	0	0	36	0	18	36
GRAND TOTAL			**34**	**3**	**92**	**0**	**83**	**129**

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ANNEXURE-5: VALUE ADDED COURSES

The following value added courses are identified for the academic year2019 and approved by all DAC members and recommended to BOS.

Value Added Courses

S.No	Name of the course	Credits
1	Exploration of Structural Elements	Non-Credited
2	Field Survey	Non-Credited
3	BIM Application for Engineers	Non-Credited
4	Bim fundamentals for Engineers	Non-Credited

Annexure –6: DAC MINUTES

DAC Agenda Items

Item No.	Agenda Item	Resolution
CE_DAC_01	Proposal of B.Tech 2019 batch structure along with Employability, Entrepreneurship and skill development categorizations.	Recommended to BoS
CE_DAC_02	Addition of new courses and revisions to existing curriculum and syllabi for Y19 admitted batches.	Recommended to BoS
CE_DAC_03	Proposal of M.Tech program entitled **"Energy and Environmental Management"** is introduced from A.Y.2019-20	Recommended to BoS
CE_DAC_04	To consider the approval of proposal for launching certificate courses for 2019-20 admitted batch	Recommended to 11th BoS
CE_DAC_05	Proposal of MSC Geology program from A.Y.2019-20	Recommended to 11th BoS
CE_DAC_06	Any other points with the permission of chair.	Recommended to 11th BoS

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Description of resolutions made:

Agenda Point CE_DAC_01

DAC has approved the revised course structure for 2019-20 admitted students as attached in **Annexure-I.**

CE_DAC_02: Restructuring of existing curriculum and syllabi for Y19 admitted batches.

The following changes have been made in the courses/ Lab Experiments for Y21 batch and approved by all members and recommended to BOS.

- A new course "AI & ML Applications in Civil Engineering (19CE2105)" is introduced in B.Tech 2-1 semester to meet the technology and industry requirements.
- Syllabus for Building Planning and Construction is very old and need modifications.
- Stair cases and its design to be added in Design of Reinforced Concrete Structures
- Augmented Reality topic is to be added to Design tools workshop.
- Syllabus for Engineering chemistry is to be updated with respect to latest trends
- Addition of the topic "Engineering properties of Rocks" in Engineering Geology.
- Sectional views are not available in Engineering graphics for civil Engineers course and only isometric views are there.
- Water distribution systems topic should be added in environmental engineering course and this topic will be help for students applying for jobs in public water works
- Flow through pipes topic is missing when compared to GATE syllabus
- Lateral Earth Pressure topic gives additional weightage to foundation engineering course, and it is very important
- Open channel flow topic is missing when compared to GATE syllabus
- Suggestion to add Engineering drawing practice and various methods of drawings in Skilling for Engineers – I course
- Soil mechanics course is to be replaced with Geotechnical Engineering with updated syllabus
- Include "Theories of failure topic" in solid mechanics solid mechanics course
- Add topics related to Levelling and contouring in surveying course

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- Basic soil properties relevant to pavement applications is required in transportation engineering
- Ductile Design and Detailing is required in Earthquake Resistant Design of structures course
- Analysis of Frames and Trusses is required in Finite Element Analysis course
- Include "Free Vibrations for MDOF systems topic in Structural Dynamics course
- The following courses are modified in CTM curriculum structure
    - Advanced Prestressed Concrete
    - Construction Planning Scheduling and Control
    - Green Buildings
    - Mechanized Construction and Machinery
    - Quality Management and Safety Management Systems in Construction

The changes and revised syllabus is attached in **Annexure-2**

CE_DAC_03: Proposal of M.Tech program entitled **"Energy and Environmental Management"** is introduced from A.Y.2019-20 to civil engineering Students. List of courses and syllabus attached in **Annexure-4** - is approved by all DAC members and recommended to BOS.

CE_DAC_04: The following value added courses are identified for Y19 admitted students for and approved by all DAC members and recommended to BOS.

CE_DAC_05: Proposal of MSC Geology Program from A.Y.2019-20. List of courses and syllabus attached in **Annexure-8** - is approved by all DAC members and recommended to BOS.

CE_DAC_06: Any other Points with the permission of chair

No Other points were raised by DAC Members

Value Added Courses

S.No	Name of the course	Credits
1	Exploration of Structural Elements	Non-Credited
2	Field Survey	Non-Credited
3	BIM Application for Engineers	Non-Credited

4	Bim fundamentals for Engineers	Non-Credited

Annexure-07: Stakeholders feedback summary and Action Report

S.No	Recommendations	Action taken
1. Students		
1	Syllabus for Building Planning and Construction is very old and need modifications.	The course is changed to Building Planning, Drawing & Construction Management (19CE2202) with introduction of construction management and latest application tools.
2	Stair cases and its design to be added in Design of Reinforced Concrete Structures	Added in Co4 in the course "Design of Reinforced Concrete Structures"
3	Extra class needed for slow learners	Remedial class added for secured marks less than 60%
4	More hours to be provided for skill course	Extra Hours added in the time table
5	Workshop for civil engineers is not sufficient to cover all topics in one course and syllabus is vast	New courses Design Tools Workshop –I & II to the curriculum
6	Need site visit atleast once in a week	Skilling course faculty will take care.
7	Publications of paper not mandatory for B.Tech	Its uptoo the guide suggestion there is no extra marks for that
8	In lab hours need interval some faculty teaching continously	Committee framed to identify the faculty and informed to give interval
9	Doctoral faculty need for project hours	Imformed to Time table Incharge to keep weekly one hour for them.
2. Parents		
1	Councelling activities - Including progress card need messages to the phone via watsapp	Councellor will send as message & watsapp also
2	Various design softwares needed for future carrier	Implemented in Skilling courses
3	Checking the attendance in ERP parents need training	Recorded video how to check in ERP was sent
4	Monthly One HOD meeting needed	instructed to Councellor Incharge to make arrangment
5	Keep the designs like practical oriented	Its added in the skilling courses
3. Alumni		
1	Syllabus should be formed based on research oriented	Syllabus like skilling course added some research oriented topics
2	Take students to outside for ongoing activities	Meeting discussed and appointed departmental committee to look in this issue
4. Faculty		

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Annexure – 8: Curriculum Structure for M.Sc Geology

S.No	Course Code	Course Titles	Category	L	T	P	S	Cr	Pre-Req
1	19GE5101	Crystallography	PC	3	0	0	0	3	Nil
2	19GE5102	Mineralogy	PC	3	0	2	0	4	Nil
3	19GE5103	Palaeontology	PC	2	0	2	0	3	Nil
4	19GE5104	Stratigraphy	PC	3	0	0	0	3	Nil
5	19GE5105	Structural Geology & Geo tectonics	PC	3	0	2	0	4	Nil
6	19GE5106	Geomorphology	PC	2	0	2	0	3	Nil
7	19GE5107	Surveying	PC	2	0	2	0	3	Nil
8	19GE5108	Seminar	PR	0	0	0	4	2	Nil
9	19GE5109	Geological Field Survey	PR	0	0	0	2	1	Nil
10	19GE5201	Igneous Petrology	PC	3	0	2	0	4	Nil
11	19GE5202	Metamorphic Petrology & Processes	PC	3	0	2	0	4	Nil
12	19GE5203	Sedimentology & Petroleum Geology	PC	3	0	4	0	5	Nil
13	19GE5204	Ore Genesis	PC	2	0	2	0	3	Nil
14	19GE5205	Indian Mineral Deposits	PC	2	0	2	0	3	Nil
15	19GE5206	Engineering Geology	PC	2	0	2	0	3	Nil
16	19GE6101	Mineral Exploration	PC	3	0	2	0	4	Nil
17	19GE6102	Hydrogeology	PC	3	0	2	0	4	Nil
18	19GE6103	Geochemistry & Isotopic Geology	PC	3	0	2	0	4	Nil
19	19GE61A1	Mineral Economics & Fuel Geology	PE	2	0	2	0	3	Nil
20	19GE61B1	Mining Geology	PE	2	0	2		3	Nil
21	19UC2204	Aptitude Builder - 1	HSS	0	0	0	4	2	Nil
22	19GE6105	Internship	PR	0	0	0	2	1	Nil
23	19GE6201	Remote Sensing and GIS	PC	3	0	0	0	3	Nil
24	19GE62A1	Mateorolgy and Oceonography	PE	3	0	0	0	3	Nil
25	19GE6203	Dissertation	PR	0	0	20	0	10	Nil
			TOTAL CREDITS					85	

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B.Tech Courses Focused on Employability/Entrepreneurship/Skill Development

S.No	Course Code	Course Title	Category	L	T	P	S	Cr	CH	New Course /Revised Course / Retained Course	Changes Proposed by	Focused on Employability /Entrepreneurship /Skill Development
1	19PH1010	Mechanics	BS	3	1	0	0	4	4	Revised	Academic Peers	Employability
2	19MT1101	Mathematics For Computing	BS	3	1	0	4	5	8	Retained	No Changes	Employability
3	19SC1101	Problem Solving And Computer Programming	BS	3	0	2	0	4	5	Retained	No Changes	Skill Development
4	19MT2102	Mathematics For Engineers	BS	3	0	0	0	3	3	Retained	No Changes	Employability
5	19MT2007	Probability and Optimization Techniques	BS	2	1	0	0	3	3	Retained	No Changes	Skill Development
6	20UC1102	Design Thinking And Innovation-1	BS	1	0	0	4	2	5	New	Faculty	Entrepreneurship
7	20UC1203	Design Thinking And Innovation-2	BS	1	0	0	4	2	5	New	Faculty	Entrepreneurship
8	19ME1103	Design Tools Workshop - I	ES	0	0	4	0	2	4	Retained	Students	Employability
9	19CE1002	Engineering Graphics For Civil Engineers	ES	0	0	2	0	1	2	Retained	Academic Peers	Employability
10	19SC1202	Data Structures	ES	3	0	2	3	4.75	8	Retained	No Changes	Skill Development
11	19CS1203	Object Oriented Programming	ES	3	0	2	3	4.75	8	Retained	No Changes	Skill Development
12	19SC1209	Design Tools Workshop - II	ES	0	0	4	0	2	4	Retained	Students	Employability
13	19UC1101	Basic English	HSS	0	0	4	0	2	4	Retained	No Changes	Employability
14	19UC1202	English Proficiency	HSS	0	0	4	0	2	4	Retained	No Changes	Employability
15	19UC2103	Professional Communication Skills	HSS	0	0	4	0	2	4	Retained	No Changes	Employability
16	19UC0010	Universal Human Values & Professional Ethics	HSS	2	0	0	0	2	2	Retained	No Changes	Employability
17	19UC2204	Aptitude Builder-I	HSS	0	0	4	0	2	4	Retained	No Changes	Employability
18	19UC3105	Aptitude Builder-II	HSS	0	0	4	0	2	4	Retained	No Changes	Employability
19	19UC3206	Campus to Corporate	HSS	0	0	4	0	2	4	Retained	No Changes	Employability
20	19UC0009	Ecology & Environment	MC	2	0	0	0	2	2	Retained	No Changes	Employability
21	19UC0008	Indian Constitution	MC	2	0	0	0	2	2	Retained	No Changes	Skill Development
22	19UC0007	Indian Heritage and Culture	MC	2	0	0	0	2	2	Retained	No Changes	Skill Development
23	OE	Foreign Language Elective	OE	2	0	0	0	2	2	Retained	No Changes	Skill Development

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24	19MB4056	Resources Safety and Quality Management	OE-M	3	0	0	0	3	3	Retained	No Changes	Employability
25	19CE2101	Solid Mechanics	PC	3	0	2	0	4	5	Retained	No Changes	Employability
26	19CE2102	Fluid Mechanics	PC	3	0	2	0	4	5	Revised	Academic Peers	Employability
27	19CE2103	Surveying	PC	3	0	2	0	4	5	Revised	Industry	Employability
28	19CE2104	Construction Materials & Concrete Technology	PC	3	0	2	0	4	5	Retained	No Changes	Employability
29	19CE2105	AI & ML Applications in Civil Engineering	PC	2	0	0	4	3	6	New	Industry	Entrepreneurship
30	19CE2201	Structural Analysis	PC	3	1	0	0	4	4	Retained	No Changes	Employability
31	19CE2202	Building Planning, Drawing & Construction Management	PC	3	0	2	0	4	5	Revised	Students	Entrepreneurship
32	19CE2203	Hydraulics and Hydraulic Machines	PC	3	0	2	0	4	5	Revised	Academic Peers	Employability
33	19CE2204	Environmental Engineering	PC	3	0	2	0	4	5	Revised	No Changes	Employability
34	19CE2205	Engineering Geology	PC	3	0	2	0	4	5	Revised	Faculty	Employability
35	19CE3101	Design of Reinforced Concrete Structures	PC	3	0	2	0	4	5	Revised	Students	Entrepreneurship
36	19BT1001	Biology for Engineers	PC	2	0	0	0	2	2	Retained	No Changes	Skill Development
37	19CE3102	Water Resources Engineering	PC	3	1	0	0	4	4	Retained	Academic Peers	Employability
38	19CE3103	Transportation Engineering	PC	3	0	2	0	4	5	Revised	Academic Peers	Employability
39	19CE2206	Geo technical Engineering	PC	3	0	2	0	4	5	New	Faculty	Entrepreneurship
40	19CE3201	Quantity Surveying Estimation	PC	3	0	2	0	4	5	Retained	No Changes	Entrepreneurship
41	19CE3203	Design of Steel Structures	PC	3	1	0	0	4	4	Retained	No Changes	Entrepreneurship
42	19CE3211	Advanced Structural Analysis	PE1	3	0	0	0	3	3	Retained	No Changes	Employability
43	19CE3212	Foundation engineering	PE1	3	0	0	0	3	3	Revised	Academic Peers	Employability
44	19CE3213	Sustainable engineering & technology	PE1	3	0	0	0	3	3	Retained	No Changes	Employability
45	19CE3216	Construction Contracts	PE1	3	0	0	0	3	3	Retained	No Changes	Entrepreneurship
46	19CE3215	Intelligent transportation systems	PE1	3	0	0	0	3	3	Retained	No Changes	Entrepreneurship
47	19CE3221	Advanced Design of Reinforced Concrete Structures	PE2	3	0	0	0	3	3	Retained	No Changes	Employability
48	19CE3222	Ground improvement techniques	PE2	3	0	0	0	3	3	Retained	No Changes	Employability
49	19CE3223	Environmental impact assessment and life cycle analyses	PE2	3	0	0	0	3	3	Retained	No Changes	Employability

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50	19CE3226	Resource Safety And Quality Management	PE2	3	0	0	0	3	3	Retained	No Changes	Employability
51	19CE3225	Pavement materials &design	PE2	3	0	0	0	3	3	Retained	No Changes	Entrepreneurship
52	19CE3231	Prestressed concrete	PE3	3	0	0	0	3	3	Retained	No Changes	Employability
53	19CE3232	Design of earth retaining structures	PE3	3	0	0	0	3	3	Retained	No Changes	Employability
54	19CE3233	Solid Waste Management and Landfills	PE3	3	0	0	0	3	3	Retained	No Changes	Employability
55	19CE3236	Form Work	PE3	3	0	0	0	3	3	Retained	No Changes	Employability
56	19CE3235	Traffic engineering and management	PE3	3	0	0	0	3	3	Retained	No Changes	Employability
57	19CE4141	Bridge engineering	PE4	3	0	0	0	3	3	Retained	No Changes	Employability
58	19CE4142	Geotechnical earthquake engineering	PE4	3	0	0	0	3	3	Retained	No Changes	Employability
59	19CE3214	River engineering	PE4	3	0	0	0	3	3	Retained	No Changes	Employability
60	19CE4146	Engineering Economy	PE4	3	0	0	0	3	3	Retained	No Changes	Employability
61	19CE4145	Urban transportation systems planning.	PE4	3	0	0	0	3	3	Retained	No Changes	Employability
62	19CE4151	Sustainable construction technologies	PE5	3	0	0	0	3	3	Retained	No Changes	Employability
63	19CE4152	Forensics in Civil Engineering	PE5	3	0	0	0	3	3	Retained	No Changes	Employability
64	19CE3224	Urban water hydrology and hydraulics	PE5	3	0	0	0	3	3	Retained	No Changes	Employability
65	19CE4156	Advanced Construction Technology	PE5	3	0	0	0	3	3	Retained	No Changes	Employability
66	19CE4155	Railway engineering airport planning and design	PE5	3	0	0	0	3	3	Retained	No Changes	Employability
67	19IE2246	Industrial Training (Summer Break)	PR	0	0	4	0	2	4	Retained	No Changes	Employability
68	19IE3247	Term Paper	PR	0	0	4	0	2	4	Retained	No Changes	Entrepreneurship
69	19IE4048	Project (Part I)	PR	0	0	0	24	6	24	Retained	No Changes	Entrepreneurship
70	19IE4049/ 19IE4050/ 19IE4051	Project (Part II)/ Practice School/ ICP	PR	0	0	0	24	6	24	Retained	No Changes	Entrepreneurship
71	19SC1106	Technical Skills - 1 (Coding)	SKILL	0	0	0	6	1.5	6	Retained	No Changes	Skill Development
72	19TS2001	Skilling for Engineers-1	SKILL	0	0	0	4	1	4	Revised	Industry	Skill Development
73	19TS2002	Skilling for Engineers-2	SKILL	0	0	0	4	1	4	Retained	No Changes	Skill Development
74	19TS2003	Skilling for Engineers-3	SKILL	0	0	0	4	1	4	Retained	No Changes	Skill Development
75	19TS2004	Skilling for Engineers-4	SKILL	0	0	0	4	1	4	Retained	No Changes	Skill Development

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3	18CE5121	Green Buildings	3	0	2	0	4	5	Revised	Industry Person	Employability
4	18CE5122	Construction Materials & Concrete Technology	3	1	0	0	4	4	Retained	No Changes	Employability
5	18CE51I3	Special Concretes	3	0	0	0	3	3	Retained	No Changes	Entrepreneurship
6	18CE51J1	Construction Personnel Management	3	0	0	0	3	3	Retained	No Changes	Entrepreneurship
7	18IE5149	SEMINAR	0	0	4	0	2	4	Retained	No Changes	Skill Development
8	18CE5221	Mechanized Construction and Machinery	3	0	2	0	4	5	Revised	Industry Person	Employability
9	18CE5222	Project Formulation Appraisal	3	1	0	0	4	4	Retained	No Changes	Employability
10	18CE5223	Construction Law and Regulations	3	1	0	0	4	4	Retained	Industry Person	Entrepreneurship
11	18CE5224	Quality Management and Safety Management System in Construction	3	0	2	0	4	5	Revised	Industry Person	Entrepreneurship
12	18CE52K4	Form Work for Construction Structures	3	0	0	0	3	3	Retained	No Changes	Employability
13	18CE52L4	Resource Management and Control in Construction		0	0	0	3	3	Retained	No Changes	Entrepreneurship
14	18IE5250	Architectural Thesis		0	4	0	2	4	Retained	No Changes	Skill Development
15	18IE6050	Dissertation		0	36	0	18	36	Retained	No Changes	Skill Development

Overall % change in syllabus = **((15/77)*100) = 12%**

% of Courses focused on Employability= **46.67%**
% of Courses focused on Entrepreneurship=**33.33%**
% of Courses focused on Skill Development = **20%**

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ANNEXURE - % CHANGE IN SYLLABUS

S.No	Course Code	Course Title	Existing Syllabus	New Syllabus	Topics added /removed /replaced	Changes in Course Outcome(s)	Revision (%)
1	19CE2105	AI & ML Applications in civil engineering	-	AIML	New Course		100%
2	19CE2206	Geotechnical Engineering		GTE	New Course		100%
3	20UC1102	Design Thinking & Innovation I		DTI-I	New Course		100%
4	20UC1203	Design Thinking & Innovation II		DTI-II	New Course		100%
5	19CE5143	Technical English	-	M.TECH EET	New Course		100%
6	19CE5143	Physicochemical, Biological Principles and Processes			New Course		100%
7	19CE5144	Advanced Statistical Methods			New Course		100%
8	19CE51R2	Solid Waste Management and Landfills			New Course		100%
9	19CE5246	Energy Auditing and Conservation Techniques			New Course		100%
10	19CE5247	Design Of Water &Wastewater Treatment Systems			New Course		100%
11	19CE5248	Environmental Impact Assessment			New Course		100%
12	19CE52Q6	Energy In Built Environment			New Course		100%
13	19CE52Q8	Waste To Energy Conversion			New Course		100%
14	19CE52R4	Energy, Environment & Climate Change			New Course		100%
15	19CE52R6	Mathematical Modelling In Environmental			New Course		100%
16	MSC	Geology		MSC Geology	New Program		100%

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