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To
The Dean -Academics
K L Deemed University
Vaddeswaram

Dear Sir,

Sub: Minutes of the 17thBOS meeting- Civil Engineering Department held on 28-10-2021 held from 3:00PM to 5:00 PM in M207 - Reg.

This is to inform you that Civil Engineering Department had conducted Board of Studies meeting on 28-10-2021. Enclosing the meeting minutes, Annexures and resolutions passed and Introduction of new courses and syllabus change for few courses.

Thanking You,

Yours sincerely

28/10/2021

Dr. CH. Hanumantha Rao,

Chairman BOS – CE

Head
Department of Civil Engineering
Koneru Lakshmaiah Education Foundation
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VADDESWARAM, Guntur Dist.

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AGENDA ITEMS

The Chairman BOS welcomed the members and explained the members about the Department Academic Committee (DAC) meeting held on 24th October 2021 and highlighted the major resolutions of discussion as brought to the notice of the DAC by the members and the board unanimously resolved to approve the recommendations made by the DAC

No	AGENDA ITEM Description	Resolution Passed
1	Feedback on the curriculum Recommendations-Implementation in BoS for A.Y. 2021-22	The Committee of BoS approved and recommended Feedback on the curriculum.
2	**U.G. (B. Tech - Civil Engineering):** Program structure and Syllabus with industry integration for the AY: 2021-22 admitted students and recommendations to the Academic Council of KLU for approval of the same.	The Committee of BoS approved and recommended the curriculum structure and syllabus of B. Tech Civil Engineering for the admission of A.Y. 2021-22.
3	**Introduction of HONORS & MINORS Degree programs**	The Committee of BoS approved and recommended the courses for HONORS & MINORS Degree requirements and syllabus.

Detailed Description on the discussion happened in meeting for passing the resolution (Annexure number and Point number in the Annexure)

Point No	Resolution Passed	Detailed Description	Annex. No
1	**Data Structures and Algorithms** course is modified as **Design of Data Structures**	Data Structures and Algorithms course is modified as Design of Data Structures by concentrating on basic skills required for the opportunities currently available in Data structures and all members agreed for the same	I
1	**Engineering Graphics for Civil Engineers** course name is replaced as **Engineering Graphics** and LTPS is modified from 1-0-2-0 to 2-0-4-0	Engineering Graphics for Civil Engineers course name is replaced as Engineering Graphics and LTPS is modified from 1-0-2-0 to 2-0-4-0 and it has been decided to deliver the practical component of the	I

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		course as 2 hours for Drawing practice in manual method and 2 hours for drawing in AutoCADD software. The order of Syllabus of Engineering Graphics is interchanged and CO's and PO's were modified according to the syllabus and all members agreed for the same.	
1	**Geology** is introduced as Science Elective	Geology is introduced as Science Elective in the 2nd semester from A.Y.2021-22 batch onwards and all members agreed for the same.	I
1	**Fluid Mechanics is replaced with Fluid Mechanics and Hydraulics**	Fluid Mechanics is replaced with Fluid Mechanics and Hydraulics by concentrating on Gate Exam and syllabus is modified according to it and all members agreed for the same.	I
1	**Probability and Optimization Techniques** course is modified as **Probability, Statistics and Numerical Methods**	Probability and Optimization Techniques course is modified as Probability, Statistics and Numerical Methods by incorporating gate syllabus of Numerical Methods and all members agreed for the same.	I
1	A new professional core course entitled "**Comprehensive Exam**" is introduced	A new professional core course entitled "Comprehensive Exam" is introduced for examinations such as GATE, PSU's, UPSC, State Government Examinations and Industry Expectations and all members agreed for the same.	I
2	**Minors Degree entitled "Infrastructure Management"** is introduced	Minors Degree entitled "Infrastructure Management" is introduced and offered to all engineering branches and list of courses is mentioned in Annexure – I and all members agreed for the same.	IIs
3	B.Tech Civil Engineering students can choose **B.Tech Honors degree**	Introduction of Honors degree course for B.Tech Civil Engineering students for the requirement of specialized degree in	III

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		respective core branch and all members agreed for the same.	
3	Syllabus for Minors courses and Honors courses	Syllabus of Minors courses and Honors courses were prepared considering revised AICTE syllabus, Competencies required for competitive examinations such as GATE, PSU's, UPSC, State Government Examinations and Industry Expectations	III

Members Present:

S.No	Full Name	Designation	Institution/ Organization	Position	Attendance
1.	Dr. Ch. Hanumantha Rao	Professor, Department HoD	K L E F	BoS Chairman	P
2.	Dr. NVK Ramesh	Associate Dean, Academics	K L E F	Dean Academics Nominiee/Member	P
3.	Dr. B. Kameswara Rao	Professor	K L E F	BoS Member	P
4.	Dr. A. Aravindan	Professor	K L E F	BoS Member	P
5.	Dr. A. V. Rao	Professor	K L E F	BoS Member	P
6.	Dr. P. Poluraju	Professor	K L E F	BoS Member	P
7.	Dr. Sanjeet Kumar	Associate Professor	K L E F	BoS Member	A
8.	Dr. Veerendra Kumar Khed	Associate Professor	K L E F	BoS Member	P
9.	Dr. Ashwin Raut	Associate Professor	K L E F	BoS Member	P
10.	Dr. Hamim Syed	Assistant Professor	K L E F	BoS Member	P
11.	Dr. CH.Surya Prakash	Assistant Professor	K L E F	BoS Member	A
12.	Mr. K. Shyam Chamberlin	Assistant Professor	K L E F	BoS Member	P

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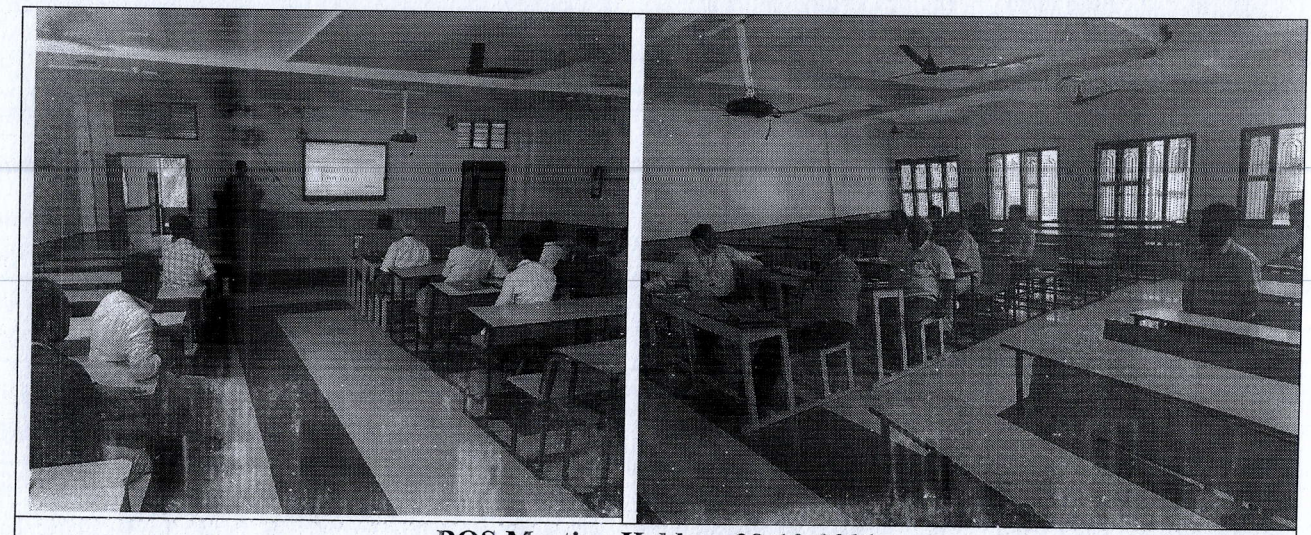
13.	Mr. K. Hemantha Raja	Assistant Professor/ Dy. HoD	K L E F	BoS Member	P
14.	Mr. B. G. Rahul	Assistant Professor	K L E F	Internal Alumni BoS Member	P
15.	Mr. T. Venkat Das	Assistant Professor	K L E F	BoS Member	P
16.	Mr.G.Sri Harsha	Assistant Professor	K L E F	BoS Member	P



BOS Meeting Held on 28-10-2021

CATERGORY WISE COURSES CREDITS & CONTACT HOURS

Sl No	Course Category	Short Name	courses	Minimum Credits	Contact Hours
1	Humanities & Social Sciences	HSS	6	12.0	20
2	Basic Sciences	BS	8	27.5	40
3	Engineering Sciences	ES	5	18.5	34
4	Professional Core	PC	15	56.0	73
5	Flexi Core	FC	0	0.0	0
6	Professional Electives	PE	5	15.0	15
7	Project Courses	PR	10	19.0	76
8	Open Electives	OE	5	14.0	14
9	Mandatory Courses	MC	3	0.0	6
Total			**57**	**162**	**278**

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CATERGROY WISE STRUCTURE

Sl No	Course Code	Course Title	Category	L	T	P	S	Cr	CH	Pre-requisite
1	20UC1101	Integrated Professional English	HSS	0	0	4	0	2	4	Nil
2	20UC1202	English Proficiency	HSS	0	0	4	0	2	4	Nil
3	21UC2103	Essential Skills for Employability	HSS	0	0	4	0	2	4	Nil
4	21UC2204	Corporate Readiness Skills	HSS	0	0	4	0	2	4	Nil
5	21UC0010	Universal Human Values & Professional Ethics	HSS	2	0	0	0	2	2	Nil
6	20UC0007	Indian Heritage and Culture	MC	2	0	0	0	0	2	Nil
7	20UC0008	Indian Constitution	MC	2	0	0	0	0	2	Nil
8	20UC0009	Ecology & Environment	MC	2	0	0	0	0	2	Nil
9	21UC0011	Gender Sensitization	HSS	2	0	0	0	2	2	Nil
10	20MT1101	Mathematics for Computing	BS	2	2	0	2	4.5	6	Nil
11	21MT2102	Mathematics for Engineers	BS	2	1	0	0	3	3	Nil
12	21MT2007	Probability and Optimization Techniques	BS	3	1	0	0	4	4	Nil
13	21PH1010	Mechanics (SE 1)	BS	3	1	0	0	4	4	Nil
14	21UC1203	Design Thinking and Innovation	BS	0	0	4	0	2	4	Nil
15	21CY1001	Engineering Chemistry (SE-2)	BS	3	0	2	0	4	5	Nil
17	21UC3105	Problem Solving Skills-I	BS	0	0	2	2	1.5	4	Nil
18	21UC3206	Problem Solving Skills-II	BS	0	0	2	2	1.5	4	Nil
19	21SC1101	Computational Thinking for Structured Design	ES	3	0	2	6	5.5	11	Nil
20	20ME1103	Design Tools Workshop – I	ES	0	0	4	0	2	4	Nil
21	21SC1209	Design Tools Workshop – II	ES	0	0	4	0	2	4	Nil
22	21SC1202	Design of Data Structures	ES	3	0	2	4	5	9	20SC1101
23	21CE1002	Engineering Graphics	ES	2	0	4	0	4	6	Nil
	21CE2205	Geology	PC	3	0	2	0	4	5	Nil
26	21CE2101	Solid Mechanics	PC	3	0	2	0	4	5	Nil
27	21CE2102	Fluid Mechanics & Hydraulics	PC	3	0	2	0	4	5	Nil
28	21CE2103	Surveying	PC	3	0	2	0	4	5	Nil
29	21CE2201	Structural Analysis	PC	3	1	0	0	4	4	Nil
30	21CE2203	Construction Materials & Concrete Technology	PC	3	0	2	0	4	5	Nil
31	21CE2204	Environmental Engineering	PC	3	0	2	0	4	5	Nil
32	21CE2202	Building Planning, Drawing & Construction Management	PC	3	0	2	0	4	5	Nil
33	21CE2206	Geotechnical Engineering	PC	3	0	2	0	4	5	Nil
34	21CE3101	Design Of Reinforced Concrete Structures	PC	3	0	2	0	4	5	21CE2101
35	21CE3103	Transportation Engineering	PC	3	0	2	0	4	5	Nil
36	21CE3102	Water Resources Engineering	PC	3	1	0	0	4	4	Nil
37	21CE3201	Design Of Steel Structures	PC	3	1	0	0	4	4	Nil

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38	21CE3202	Quantity Surveying and Estimation	PC	3	0	2	0	4	5	Nil
39	21CE4101	Comprehensive Exam	PC	0	0	6	0	3	6	Nil
43	PE-1	Professional Elective – 1	PE	3	0	0	0	3	3	Nil
44	PE-2	Professional Elective – 2	PE	3	0	0	0	3	3	Nil
45	PE-3	Professional Elective – 3	PE	3	0	0	0	3	3	Nil
46	PE-4	Professional Elective – 4	PE	3	0	0	0	3	3	Nil
47	PE-5	Professional Elective – 5	PE	3	0	0	0	3	3	Nil
48	OE	Open Elective – 1	OE	3	0	0	0	3	3	Nil
49	OE	Open Elective – 2	OE	3	0	0	0	3	3	Nil
50	OE	Open Elective – 3	OE	3	0	0	0	3	3	Nil
51	OE	Management Elective(OE-4)	OE	3	0	0	0	3	3	Nil
52	OE	Foreign Language Elective(OE-5)	OE	2	0	0	0	2	2	Nil
53	21IE2040	Social Internship	PR	0	0	0	4	1	4	Nil
54	21IE3041	Technical Internship	PR	0	0	0	4	1	4	Nil
55	21IE4042	Industry Internship	PR	0	0	0	4	1	4	Nil
56	21IE2046	Project Based Learning -1	PR	0	0	0	6	1.5	6	Nil
57	21IE2047	Project based learning -2	PR	0	0	0	6	1.5	6	Nil
58	21IE3043	Term paper	PR	0	0	0	4	1	4	Nil
59	21IE3044	Mid Grad Capstone Project – I	PR	0	0	0	8	2	8	Nil
60	21IE3045	Mid Grad Capstone Project – II	PR	0	0	0	8	2	8	Nil
61	21IE4048/21IE4051/21IE4050	Project / Internship -1/Practice School	PR	0	0	0	16	4	16	Nil
62	21IE4049/21IE4052/21IE4050	Project / Internship 2/Practice School	PR	0	0	0	16	4	16	Nil
							Total Credits	162		

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SEM WISE CURRICULUM STRUCTURE

Sl No	Course Code	Course Title	Type	L	T	P	S	Cr	CH
SEMESTER-1									
1	20UC1101	Integrated Professional English	HSS	0	0	4	0	2	4
2	20MT1101	Mathematics for Computing	BS	2	2	0	2	4.5	6
3	21SC1101	Computational Thinking for Structured Design	ES	3	0	2	6	5.5	11
4	20ME1103	Design Tools Workshop - I	ES	0	0	4	0	2	4
5	21PH1010	Mechanics	BS	3	1	0	0	4	4
Total				**8**	**3**	**10**	**8**	**18**	**29**
SEMESTER-2									
1	20UC1202	English Proficiency	HSS	0	0	4	0	2	4
2	21SC1202	Design of Data Structures	ES	3	0	2	4	5	9
3	21MT2102	Mathematics for Engineers	BS	2	1	0	0	3	3
4	21SC1209	Design Tools Workshop – II	ES	0	0	4	0	2	4
5	21UC1203	Design Thinking and Innovation	BS	0	0	4	0	2	4
6	21CE1002	Engineering Graphics	ES	2	0	4	0	4	6
7	21CE2205	Geology	PC	3	0	2	0	4	5
Total				**10**	**1**	**20**	**4**	**22**	**35**
Summer Break									
1	21IE2040	Social Internship	PR	0	0	0	4	1	4
SEMESTER-3									
1	21CE2101	Solid Mechanics	PC	3	0	2	0	4	5
2	21CE2102	Fluid Mechanics & Hydraulics	PC	3	0	2	0	4	5
3	21CE2103	Surveying	PC	3	0	2	0	4	5
4	21UC2103	Essential Skills for Employability	HSS	0	0	4	0	2	4
5	21MT2007	Probability, statistics and Numerical Methods	BS	3	1	0	0	4	4
6	21CY1001	Engineering Chemistry	BS	3	0	2	0	4	5
7	OE	Foreign Language Elective - OE-1	OE	2	0	0	0	2	2

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8	21IE2046	Project Based Learning -1	PR	0	0	0	6	1.5	6
Total				**17**	**1**	**12**	**6**	**25.5**	**36**
SEMESTER-4									
1	21CE2201	Structural Analysis	PC	3	1	0	0	4	4
2	21CE2203	Construction Materials & Concrete Technology	PC	3	0	2	0	4	5
3	21CE2204	Environmental Engineering	PC	3	0	2	0	4	5
4	21CE2202	Building Planning, Drawing & Construction Management	PC	3	0	2	0	4	5
5	21CE2206	Geotechnical Engineering	PC	3	0	2	0	4	5
6	21UC2204	Corporate Readiness Skills	HSS	0	0	4	0	2	4
7	21IE2047	Project based learning -2	PR	0	0	0	6	1.5	6
Total				**15**	**1**	**12**	**6**	**23.5**	**34**
Summer Break									
1	21IE3041	Technical Internship	PR	0	0	0	4	1	4
SEMESTER-5									
1	21UC3105	Problem Solving Skills-I	BS	0	0	2	2	1.5	4
2	21CE3101	Design Of Reinforced Concrete Structures	PC	3	0	2	0	4	5
3	21CE3103	Transportation Engineering	PC	3	0	2	0	4	5
4	21CE3102	Water Resources Engineering	PC	3	1	0	0	4	4
5	PE	PE-1	PE	3	0	0	0	3	3
6	PE	PE-2	PE	3	0	0	0	3	3
7	21UC0011	Gender Sensitization	HSS	2	0	0	0	2	2
8	21IE3044	Mid Grade Capstone Project – I	PR	0	0	0	8	2	8
Total				**17**	**1**	**6**	**10**	**24**	**34**
SEMESTER-6									
1	21UC3206	Problem Solving Skills-II	BS	0	0	2	2	1.5	4
2	21CE3201	Design Of Steel Structures	PC	3	1	0	0	4	4
3	21CE3202	Quantity Surveying and Estimation	PC	3	0	2	0	4	5
4	PE	PE-3	PE	3	0	0	0	3	3
5	PE	PE-4	PE	3	0	0	0	3	3

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6	PE	PE-5	PE	3	0	0	0	3	3
7	21UC0010	Universal Human Values & Professional Ethics	HSS	2	0	0	0	2	2
8	20UC0008	Indian Constitution	MC	2	0	0	0	0	2
9	21IE3043	Term paper	PR	0	0	0	4	1	4
10	21IE3045	Mid Grade Capstone Project – II	PR	0	0	0	8	2	8
Total				**19**	**1**	**4**	**14**	**23.5**	**38**
Summer Break									
1	21IE4042	Industry Internship	PR	0	0	0	4	1	4
SEMESTER-7									
1	ME	Managegment Elective	OE	3	0	0	0	3	3
2	OE	Open Elective 1	OE	3	0	0	0	3	3
3	20UC0007	Indian Heritage and Culture	MC	2	0	0	0	0	2
	21CE4101	Comprehensive Exam	PC	0	0	6	0	3	6
4	21IE4048 /21IE4051 /21IE4050	Project / Internship -1/Practice School	PR	0	0	0	16	4	16
Total				**8**	**0**	**6**	**16**	**13**	**30**
SEMESTER-8									
1	OE	Open Elective 2	OE	3	0	0	0	3	3
2	OE	Open Elective 3	OE	3	0	0	0	3	3
3	20UC0009	Ecology & Environment	MC	2	0	0	0	0	2
4	21IE4049 21IE4052 /21IE4050	Project / Internship 2/Practice School	PR	0	0	0	16	4	16
Total				**8**	**0**	**0**	**16**	**10**	**24**
GRAND TOTAL				**102**	**7**	**70**	**100**	**162**	**260**

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MINORS DEGREE IN INFRASTRUCTURE MANAGEMENT

Sl No	Course Title	Type	L	T	P	S	Cr	CH
1	Environment Management	PC	3	0	0	0	3	3
2	Water Resources Management	PC	3	0	0	0	3	3
3	Transportation Management	PC	3	0	0	0	3	3
4	Construction Management Elective	ME-1	3	0	0	0	3	3
5	Smart Infrastructure	ME-2	3	0	0	0	3	3
6	CRT1		3	0	0	0	3	3
7	CRT2		2	0	0	0	2	2
							20	20

HONORS DEGREEE COURSES

Sl No	Course Title	Type	L	T	P	S	Cr	CH
1	Emerging Construction Technologies	PC	3	0	0	0	3	3
2	Building Information Modelling	PC	0	0	4	0	2	4
3	Integrated Waste Management for Smart Cities	PC	3	0	0	0	3	3
4	Design of Irrigation Structures	PC	2	0	2	0	3	4
5	CRT1		2	0	0	0	2	2
6	CRT2		2	0	0	0	2	2
7	COMPUTATIONAL THINKING FOR OBJECT ORIENTED DESIGN (CTOD)	PC	3	0	2	4	5	9
							20	27

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List of Courses focussing on Employability/ Entrepreneurship / Skill Development

Sl No	Course Code	Course Title	Category	L	T	P	S	Cr	New Course /Revised Course / Retained Course	Changes Proposed by	Focused on Employability /Entrepreneurship /Skill Development	Justification
1.	21UC1203	Design Thinking and Innovation	BS	0	0	4	0	2	Retained	No Changes	Entrepreneurship	
2.	21CY1001	Engineering Chemistry (SE-2)	BS	3	0	2	0	4	Retained	No Changes	Employability	
3.	20MT1101	Mathematics for Computing	BS	2	2	0	2	4.5	Retained	No Changes	Skill Development	
4.	21MT2102	Mathematics for Engineers	BS	2	1	0	0	3	Retained	No Changes	Skill Development	
5.	21PH1010	Mechanics (SE 1)	BS	3	1	0	0	4	Retained	No Changes	Employability	
6.	21MT2007	Probability and Optimization Techniques	BS	3	1	0	0	4	Retained	No Changes	Skill Development	
7.	21UC3105	Problem Solving Skills-I	BS	0	0	2	2	1.5	New	BOS Chairman	Skill Development	Introduced as per AICTE Norms
8.	21UC3206	Problem Solving Skills-II	BS	0	0	2	2	1.5	New	BOS Chairman	Skill Development	Introduced as per AICTE Norms
9.	21SC1101	Computational Thinking for Structured Design	ES	3	0	2	6	5.5	Retained	No Changes	Skill Development	
10.	21SC1202	Design of Data Structures	ES	3	0	2	4	5	Revised	BOS Chairman	Skill Development	Algorithms are added to meet the design requirements
11.	20ME1103	Design Tools Workshop – I	ES	0	0	4	0	2	Retained	No Changes	Skill Development	

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12.	21SC1209	Design Tools Workshop – II	ES	0	0	4	0	2	Retained	No Changes	Skill Development	
13.	21CE1002	Engineering Graphics	ES	2	0	4	0	4	Revised	BOS Chairman	Employability	More concentration is given to practical with 4 hours and AutoCADD is introduced
14.	21UC2204	Corporate Readiness Skills	HSS	0	0	4	0	2	Retained	No Changes	Skill Development	
15.	20UC1202	English Proficiency	HSS	0	0	4	0	2	Retained	No Changes	Employability	
16.	21UC2103	Essential Skills for Employability	HSS	0	0	4	0	2	Retained	No Changes	Employability	
17.	21UC0011	Gender Sensitization	HSS	2	0	0	0	2	Retained	No Changes	Entrepreneurship	
18.	20UC1101	Integrated Professional English	HSS	0	0	4	0	2	Retained	No Changes	Entrepreneurship	
19.	21UC0010	Universal Human Values & Professional Ethics	HSS	2	0	0	0	2	Retained	No Changes	Entrepreneurship	
20.	20UC0009	Ecology & Environment	MC	2	0	0	0	0	Retained	No Changes	entrepreneurship	
21.	20UC0008	Indian Constitution	MC	2	0	0	0	0	Retained	No Changes	Entrepreneurship	
22.	20UC0007	Indian Heritage and Culture	MC	2	0	0	0	0	Retained	No Changes	Entrepreneurship	
23.	21CE2102	Fluid Mechanics & Hydraulics	PC	3	0	2	0	4	Revised	Dr.Umesh Kumar Singh	Employability	Gate syllabus is added as per latest
24.	21CE2202	Building Planning, Drawing & Construction Management	PC	3	0	2	0	4	Retained	No Changes	Employability	

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25.	21CE4101	Comprehensive Exam	PC	0	0	6	0	3	New	BOS Chairman	Skill Development	Includes all topics related to GATE Oriented competetive exams
26.	21CE2203	Construction Materials & Concrete Technology	PC	3	0	2	0	4	Retained	No Changes	Employability	
27.	21CE3101	Design Of Reinforced Concrete Structures	PC	3	0	2	0	4	Retained	No Changes	Employability	
28.	21CE3201	Design Of Steel Structures	PC	3	1	0	0	4	Retained	No Changes	Employability	
29.	21CE2204	Environmental Engineering	PC	3	0	2	0	4	Retained	No Changes	Employability	
30.	21CE2205	Geology	PC	3	0	2	0	4	Revised	BOS Chairman	Employability	
31.	21CE2206	Geotechnical Engineering	PC	3	0	2	0	4	Retained	No Changes	Employability	
32.	21CE3202	Quantity Surveying and Estimation	PC	3	0	2	0	4	Retained	No Changes	Employability	
33.	21CE2101	Solid Mechanics	PC	3	0	2	0	4	Retained	No Changes	Employability	
34.	21CE2201	Structural Analysis	PC	3	1	0	0	4	Retained	No Changes	Employability	
35.	21CE2103	Surveying	PC	3	0	2	0	4	Retained	No Changes	Employability	
36.	21CE3103	Transportation Engineering	PC	3	0	2	0	4	Retained	No Changes	Employability	
37.	21CE3102	Water Resources Engineering	PC	3	1	0	0	4	Retained	No Changes	Employability	
38.	21CE3221	Advanced Design of Reinforced Concrete Structures	PE	3	0	0	0	3	Retained	No Changes	Employability	
39.	21CE3211	Advanced Structural Analysis	PE	3	0	0	0	3	Retained	No Changes	Employability	
40.	21CE4141	Bridge engineering	PE	3	0	0	0	3	Retained	No Changes	Employability	
41.	21CE4146	Construction Economics	PE	3	0	0	0	3	Retained	No Changes	Employability	

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42.	21CE3232	Design of earth retaining structures	PE	3	0	0	0	3	Retained	No Changes	Employability	
43.	21CE3223	Environmental impact assessment and life cycle analyses	PE	3	0	0	0	3	Retained	No Changes	Employability	
44.	21CE4153	Forensics in Civil Engineering	PE	3	0	0	0	3	New	Mr.B.G. Rahul Alumni Member	Entrepreneurship	Rock Mechanics course is replaced with Forensics in Civil Engineering
45.	21CE3236	Form Work	PE	3	0	0	0	3	Retained	No Changes	Employability	
46.	21CE3212	Foundation engineering	PE	3	0	0	0	3	Retained	No Changes	Employability	
47.	21CE4142	Geotechnical earthquake engineering	PE	3	0	0	0	3	Retained	No Changes	Employability	
48.	21CE3222	Ground improvement techniques	PE	3	0	0	0	3	Retained	No Changes	Employability	
49.	21CE3215	Intelligent transportation systems	PE	3	0	0	0	3	Retained	No Changes	Entrepreneurship	
50.	21CE3225	Pavement materials &design	PE	3	0	0	0	3	Retained	No Changes	Employability	
51.	21CE4151	Precast and Prefabricated structures	PE	3	0	0	0	3	Retained	No Changes	Employability	
52.	21CE3231	Prestressed concrete	PE	3	0	0	0	3	Retained	No Changes	Employability	
53.	21CE3216	Projects& Contract management	PE	3	0	0	0	3	Revised	Dr.Ashwin Raut	Entrepreneurship	Construction Contracts is modified as Projects & Contract management

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54.	21CE3226	Quality and Safety Management	PE	3	0	0	0	3	Revised	Dr.Ashwin Raut	Entrepreneurship	Resource Safety and Quality Management is modified as Quality and Safety Management
55.	21CE4155	Railway engineering airport planning and design	PE	3	0	0	0	3	Retained	No Changes	Employability	
56.	21CE3214	River engineering	PE	3	0	0	0	3	Retained	No Changes	Employability	
57.	21CE3233	Solid Waste Management and Landfills	PE	3	0	0	0	3	Retained	No Changes	Entrepreneurship	
58.	21CE4156	Sustainable Construction Technology	PE	3	0	0	0	3	Retained	No Changes	Employability	
59.	21CE3213	Sustainable engineering & technology	PE	3	0	0	0	3	Retained	No Changes	Employability	
60.	21CE3235	Traffic engineering and management	PE	3	0	0	0	3	Retained	No Changes	Entrepreneurship	
61.	21CE4145	Urban transportation systems planning.	PE	3	0	0	0	3	Retained	No Changes	Employability	
62.	21CE3224	Urban water hydrology and hydraulics	PE	3	0	0	0	3	Retained	No Changes	Employability	
63.	21IE4042	Industry Internship	PR	0	0	0	4	1	Retained	No Changes	Skill Development	
64.	21IE3044	Mid Grad Capstone Project – I	PR	0	0	0	8	2	New	BOS Chairman	Skill Development	Introduced as per AICTE Norms
65.	21IE3045	Mid Grad Capstone Project – II	PR	0	0	0	8	2	New	BOS Chairman	Skill Development	Introduced as per AICTE Norms
66.	21IE4048/ 21IE4051/	Project / Internship - 1/Practice School	PR	0	0	0	16	4	Retained	No Changes	Skill Development	

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	21IE4050											
67.	21IE4049/ 21IE4052/ 21IE4050	Project / Internship 2/Practice School	PR	0	0	0	16	4	Retained	No Changes	Skill Development	
68.	21IE2046	Project Based Learning -1	PR	0	0	0	6	1.5	New	BOS Chairman	Skill Development	Introduced as per AICTE Norms
69.	21IE2047	Project based learning -2	PR	0	0	0	6	1.5	New	BOS Chairman	Skill Development	Introduced as per AICTE Norms
70.	21IE2040	Social Internship	PR	0	0	0	4	1	Retained	No Changes	Skill Development	
71.	21IE3041	Technical Internship	PR	0	0	0	4	1	Retained	No Changes	Skill Development	
72.	21IE3043	Term paper	PR	0	0	0	4	1	Retained	No Changes	Skill Development	

Percentage of Syllabus Revision = **30%**

Percentage of Courses focusing on Employability = **52.71%**

Percentage of Courses focusing on Entrepreneurship = **18.56%**

Percentage of Courses focusing on Skill Development = **30.01%**

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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.

Course wise Syllabus revision of approved structure as mentioned in point 1

S.No	Course Code	Course Title	Existing Syllabus	New Syllabus	Topics added /removed /replaced	Changes in Course Outcome(s)	Justification for the modifications	Revision(%)
1	21CE4141	Bridge Engineering	Syllabus links\Bridge Engineering_O.docx	Syllabus links\Bridge Engineering_N.docx	Added	C02 Changed	Segmental Construction is included in the Bridge Engineering Elective	5%
2	20CE5122	Construction Contracts			Replaced		Construction Contracts is modified as Projects & Contract management	25%
3	21MB4056	Quality and Safety Management	Syllabus links\RSQM.docx	QSM	Replaced		Resource Safety and Quality Management is modified as Quality and Safety Management	100%
4	21SC1202	Design of Data Structures	Syllabus links\Data Structures_O.docx	Syllabus links\Design of Data Structures.docx	Added		Algorithms are added to meet the design requirements	10%

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5	21CE1002	Engineering Graphics	Syllabus links\ENGINEERING GRAPHICS FOR CIVIL ENGINEERS _O.docx	Syllabus links\ENGINEERING GRAPHICS _N.docx	Added	CO1,CO3,CO4 Changed	More concentration is given to practical with 4 hours and AutoCADD is introduced	25%
6	21CE2102	Fluid Mechanics and Hydraulics	Syllabus links\FM_O.docx	Syllabus links\FMHM_N.docx	Added	CO3,CO4 Changed	Gate syllabus is added as per latest	25%
7	21MT2007	Probability, Statistics and Numerical Methods	Syllabus links\POT_O.docx	Syllabus links\POT_N.docx	Added	CO3,CO4 Changed	Numerical methods were added	25%
8	21CE4101	Comprehensive Exam		comprehensive exam			Includes all topics related to GATE Oriented competetive exams	100%
9		Environment Management		Syllabus links\EM.docx			B.Tech Minors in Civil Engineers program is introducted	100%
10		Water Resources Management		Syllabus links\WRM.docx				100%
11		Transportation Management		Syllabus links\TM.docx				100%
13		Smart Infrastructure		Syllabus links\SI.docx				100%
14		Emerging Construction Technologies		Syllabus links\ECT.docx				100%

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15		Building Information Modelling		Syllabus links\BIM.docx			B.Tech Honors in Civil Engineers program is introducted	100%
16		Pre-Engineered Structures		Syllabus links\PES.docx				100%
17		Integrated Waste Management for Smart Cities		Syllabus links\IWMSC.docx				100%
18		Design of Irrigation Structures		Syllabus links\DIS.docx				100%
4	21CE4153	Forensics in Civil Engineering	Syllabus links\ROCK MECHANICS.docx	Syllabus links\FORENSICS IN CIVIL ENGINEERING.docx	Replaced		Rock Mechanics course is replaced with Forensics in Civil Engineering	100%
5	21 CE 201	Sustainable Construction Materials and Methods	-	CED Pre PhD modified course codes & syllabus	New Course		All Ph.D Courses are revised accroding to the current industry requirements	100%
6	21 CE 202	Finite Element Analysis			New Course			100%
7	21 CE 203	Optimization Techniques			New Course			100%
8	21 CE 204	Structural Dynamics			New Course			100%
9	21 CE 205	Advanced Wastewater Treatment			New Course			100%

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10	21 CE 206	Water Quality and Environment			New Course			100%
11	21 CE 207	Hydrologic Elements and Analysis			New Course			100%
12	21 CE 208	Geosynthetics			New Course			100%
13	21 CE 209	Geotechnical Earthquake Engineering			New Course			100%
14	21 CE 210	Traffic Engineering			New Course			100%
15	21 CE 301	Advanced Concrete Technology			New Course			100%
16	21 CE 302	Advanced Design of Structures			New Course			100%
17	21 CE 303	Advanced Structural Mechanics			New Course			100%
18	21 CE 304	Remote Sensing and Geographic Information System			New Course			100%
19	21 CE 305	Surfaces Hydrologic Systems			New Course			100%
20	21 CE 306	River Hydraulics			New			100%

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					Course			
21	21 CE 307	Watershed and Wetland Management			New Course			100%
22	21 CE 308	Ground Improvement Techniques			New Course			100%
23	21 CE 309	Pavement Construction and Management			New Course			100%
24	21 CE 310	Environmental Impact Assessment			New Course			100%

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Annnexure – I

Revised Syllabus for Modified Courses

Design of Data Structures

Course code: 21SC1202 L-T-P-S: 3-0-2-0
Pre-Requisite: NIL Credits: 4

Mapping of Course Outcomes to Program outcomes:

CO#	Course Outcome	PO/PSO	BTL
CO1	Apply measures of efficiency on algorithms and Analyse different Sorting Algorithms.	PO1, PO2, PSO1, PSO2	4
CO2	Analyse and compare stack ADT and queue ADT implementations using linked list and applications.	PO1, PO4, PSO1, PSO2	4
CO3	Analyse the linked implementation of Binary, Balanced Trees and different Hashing techniques.	PO1, PO4, PSO1, PSO2	4
CO4	Analyse different representations, traversals, applications of Graphs and Heap organization.	PO2, PO4, PSO1, PSO2	4
CO5	Develop and Evaluate common practical applications for linear and non-linear data structures.	PO1, PO2, PSO1, PSO2	5

Syllabus

Algorithm Analysis: Mathematical Background, Model, Analyse, Running Time Calculations, Lists.

Stacks and Queues: Abstract Data Types (ADTs), The List ADT, The Stack ADT, The Queue ADT.

Trees: Preliminaries, Binary Trees, The Search Tree ADT—Binary Search Trees, AVL Trees, Splay Trees, Tree Traversals (Revisited), B-Trees, Red black trees

Hashing: General Idea, Hash Function, Separate Chaining, Hash Tables without Linked Lists, Rehashing, Hash Tables in the Standard Library, Extendible Hashing.

Priority Queues (Heaps): Model, Simple Implementations, Binary Heap, Applications of Priority Queues.

Sorting: Preliminaries, Insertion Sort, A Lower Bound for Simple Sorting Algorithms, Shell sort, Heap sort, Merge sort, Quick sort, Indirect Sorting, A General Lower Bound for Sorting, Bucket Sort, External Sorting.

Graph Algorithms: Definitions, Topological Sort, Shortest-Path Algorithms, Minimum Spanning Tree.

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Text books

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C, 2010, Second Edition, Pearson Education.
2. Ellis Horowitz, Fundamentals of Data Structures in C: Second Edition, 2015

Reference books

1. A.V.Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", Pearson Education, First Edition Reprint 2003.
2. Horowitz, Sahni, Anderson Freed, "Fundamentals of data structures in C", Second Edition-2007.
3. R. F. Gilberg, B. A. Forouzan, "Data Structures", Second Edition, Thomson India Edition, 2005.
4. Robert Kruse, C.L. Tondo, Bruce Leung, Shashi Mogalla, "Data Structures& Program Design in C", Fourth Edition-2007.

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List of Lab Experiments:

1. Develop a set of programs to implement Linear and Binary searching techniques (both iterative and recursive)
2. Develop a set of programs to find the solution for the maximum subsequence sum problem with different time complexity solutions.
3. Develop a set of programs to implement below sorting techniques
   a. Insertion Sort
   b. Shell sort
   c. Selection Sort
4. Develop a set of programs to implement below sorting techniques (Divide and conquer method)
   a. Quick sort with median of three.
   b. Merge Sort
5. Develop a Program to implement operations of doubly linked list
   a. Create
   b. Insert
   c. Display
   d. Delete
   e. Search
6. Develop a program to perform operation on stack using linked list
7. Develop a program to perform operations on queue using linked list
8. Develop a program to implement Circular Queue using Array
9. Develop a program to implement Binary Search Tree with Traversal Operations
10. Develop a program to perform following operations on AVL tree
    a. Insertion
    b. Deletion
11. Develop a program to implement the following
    a. Separate chaining for collision handling
    b. Open Addressing Technique
12. Develop a program to implement Heap sort
13. Develop a program to implement
    a. Breadth First Search
    b. Depth First Search
    c. Dijkstra's Algorithm
14. Program to implement Minimal Spanning by
    a. Prim's algorithm
    b. Kruskal's algorithm

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ENGINEERING GRAPHICS

Course Code: 21CE1002 L-T-P-S:2-0-4-0

Prerequisite: NIL Credits: 4

CO No.	Course Outcomes	PO	B T L
1	Understand the principles of drawing and use of drafting instruments and AutoCADD and Draw engineering curves, Geometrical Constructions	1,5,10	2
2	Apply orthographic views for the given objects	1,5,10	3
3	Apply Isometric views for the given orthographic views	1,5,10	3
4	Apply the projections of points, lines, planes and solids	1,5,10	3
5	Apply the total surface of solids by development of surfaces and the sections of Solids	1,5,10	3

Syllabus:

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance-Drawing Instruments and their Use - Conventions in Drawing -Lettering - BIS Conventions, Basics of AutoCADD

Geometrical Constructions-Division of Lines, Angles, Polygons

Engineering Curves used in Engineering Practice & their Constructions:

Conic Sections: Ellipse, Parabola, Hyperbola and Rectangular Hyperbola – General and other methods.

Special Curves: Cycloid, Epicycloid, Hypocycloid and Involute.

Orthographic Projection in Third Angle Projection: Principles of Orthographic Projections - Conventions - First and Third Angle, Projections of Points and Lines inclined to both planes, True lengths, traces. Transformation of Projections: Conversion of Isometric Views to Orthographic Views

Isometric Projections: Principles of Isometric Projection - Isometric Scale - Isometric Views Conventions - Isometric Views of Lines, Plane Figures, Simple and Compound Solids - Isometric

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Projection of objects having non- isometric lines, Isometric Projection of Spherical Parts, Transformation of Projections: Conversion of Orthographic Views to Isometric Views

Projections of Planes & Solids: Projections of regular Planes, auxiliary planes and Auxiliary projection inclined to both planes. Projections of Regular Solids inclined to both planes - Auxiliary Views

Section of solids and Sectional Views: -Right Regular Solids - Prism, Cylinder, Pyramid, Cone – Auxiliary views.

Development of Solids: Development of Surfaces of Right, Regular Solids -Prisms, Cylinder, Pyramid Cone and their parts.

Text Books:

1. N.D. Bhatt "Engineering Drawing" Charotar publishing House
2. Introduction to AutoCAD 2021 for Civil Engineering Applications: Learning to use AutoCAD by Nighat Yasmin, SDC Publications

Reference Books:

1. Engineering Drawing and Graphics, Venugopal / New age.
2. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication.
3. Engineering Drawing, K L Narayana and Kannaiah / Scitech publishers.

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GEOLOGY

(Science Elective)

Course Code: 21CE2205 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	Apply the geological conditions to identify suitable site for civil engineering projects.	1,8	3
4	Apply the geological conditions to identify potential sites for groundwater, sites for dam and reservoir and tunnels	1,8	3
5	Apply the geological conditions for suitability of the site for a major civil engineering project	2,8	3

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,

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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.

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;

Text books:

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:

1. Engineering Geology and Geo techniques by Krynine and Judd, Mc Graw – Hill Book Company.
2. Engineering geology by Subinoy Gangopadhyay: Oxford University Press
3. Principles of Engineering Geology by K.M. Bangar, Standard Publications, Distributors, 1705-B, Nai sarak, New Delhi.
4. A text Book of Engineering Geology by N. Chennakesavulu; Macmillan India Ltd., Delhi.
5. Rock Mechanics for Engineers by Dr. B.P.Varma, Khana Publishers, Delhi-6.
6. Principles of Engineering Geology by KVGK Gokhale, B.S. Publications, Hyderabad

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FLUID MECHANICS & HYDRAULIC MACHINES

Course Code: 21CE2102 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	Analyze the properties of fluid	PO1, PO2	4
2	Analyze fluid kinematic states	PO1, PO2	4
3	Analyze fluid dynamic states	PO1, PO2	4
4	Analyze dimensional analysis and model simulations	PO1, PO2	4
5	Analyze the flow through notches and pipes	PO1, PO2	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.:

Hydraulics

Forces on immersed bodies; Flow measurement in channels and pipes; Dimensional analysis and hydraulic similitude; Channel Hydraulics - Energy-depth relationships, specific energy, critical flow, hydraulic jump, uniform flow, gradually varied flow and water surface profiles.

Hydrology

Hydrologic cycle, precipitation, evaporation, evapo-transpiration, watershed, infiltration, unit hydrographs, hydrograph analysis, reservoir capacity, flood estimation and routing, surface run-off models, ground water hydrology - steady state well hydraulics and aquifers; Application of Darcy's Law.

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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,
   a. Oxford University Press, 2010
3. Fluid Mechanics by A. K. Jain; Khanna Publishers, Delhi

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.
3. Hydraulics & Fluid Mechanics by P. N. Modi & S. N. Seth; Standard Book house, New Delhi.
4. Fluid Mechanics by G. S Sawhney, IK International Publishing house (P) Ltd. New Delhi
5. Fluid Mechanics by Edward J. Shaughnessy, Oxford University Press, USA.

Lab Experiments

1. Determination of coefficient of discharge of Rectangular notch.
2. Determination of coefficient of discharge of Triangular notch.
3. Determination of coefficient of discharge of Orifice.
4. Determination of coefficient of discharge of Mouth piece.
5. Determination of Meta-Centric height.
6. Determination of coefficient of discharge of Venturi meter.
7. Determination of coefficient of discharge of Orifice-meter.
8. Fluid flow analogy using Reynolds apparatus.
9. Verification of Bernoulli's theorem.
10. Determination of Darcy friction factor due to friction in a pipe flow.
11. Determination of minor losses due to sudden expansion and contraction in a pipe flow.

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PROBABILITY STATISTICS & NUMERICAL METHODS

Course code : 21MT2007 L-T-P-S: 2-1-0-0
Pre-requisite : NIL Credits: 3

Syllabus:

Probability and Statistics

Sampling theorems; Conditional probability; Descriptive statistics - Mean, median, mode and standard deviation; Random Variables – Discrete and Continuous, Poisson and Normal Distribution; Linear regression

Standard discrete and continuous distributions: Definitions and simple properties of Binomial, Poisson, Geometric, Hyper-Geometric, Uniform, Exponential, Weibull, and Normal distributions, Applications of the above distributions.

Correlation and Regression: Correlation coefficient for grouped and ungrouped data, Rank correlation. Linear and Non-Linear regression.

Linear Programming: Formulation of LPPs, Graphical solution of LPP, Simplex method, Big-M method, duality in LPP and dual simplex method.

Nonlinear programming: Convex sets and convex functions, Kuhn-Tucker conditions. Convex quadratic programming: Wolfe's and Pivot complementary algorithms. Separable programming.

Numerical Methods

Error analysis. Numerical solutions of linear and non-linear algebraic equations; Newton's and Lagrange polynomials; numerical differentiation; Integration by trapezoidal and Simpson's rule; Single and multi-step methods for first order differential equations.

TEXT BOOKS:

1. Ronald E. Walpole, Sharon L. Myers and Keying Ye, "Probability and Statistics for Engineers and Scientists", 8th Edition, Pearson.
2. H A Taha, Operations Research: An Introduction, Prentice Hall Pub.

REFERENCE BOOKS:

1. Richard A. Johnson, Miller & Freund's Probability & Statistics for Engineers, 11th Edition PHI, New Delhi.
2. Jay L. Devore, Probability and Statistics for Engineers, CENEAGE learning.
3. S. C. Gupta and V. K. Kapoor,"Fundamental of Mathematical Statistics" Sultan Chand & Sons Publication, 11th Edition.
4. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, Wiley Pub.
5. S D Sharma, Operations Research, Kedar Nath Ram Nath & Co

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Comprehensive Exam

Course code : 21CE4101 L-T-P-S: 0-0-6-0

Pre-requisite : NIL Credits : 3

Syllabus:

Mechanics

System of forces, free-body diagrams, equilibrium equations; Internal forces in structures; Frictions and its applications; Centre of mass; Free Vibrations of undamped SDOF system.

Bending moment and shear force in statically determinate beams; Simple stress and strain relationships; Simple bending theory, flexural and shear stresses, shear centre; Uniform torsion, Transformation of stress; buckling of column, combined and direct bending stresses

Structural Analysis

Statically determinate and indeterminate structures by force/ energy methods; Method of superposition; Analysis of trusses, arches, beams, cables and frames; Displacement methods: Slope deflection and moment distribution methods; Influence lines; Stiffness and flexibility methods of structural analysis

Concrete Structures

Working stress and Limit state design concepts; Design of beams, slabs, columns; Bond and development length; Prestressed concrete beams

Steel Structures

Working stress and Limit state design concepts; Design of tension and compression members, beams and beam- columns, column bases; Connections - simple and eccentric, beam-column connections, plate girders and trusses; Concept of plastic analysis - beams and frames.

Construction Materials and management

Construction Materials: Structural Steel - Composition, material properties and behaviour; Concrete - Constituents, mix design, short-term and long-term properties. Construction Management: Types of construction projects; Project planning and network analysis - PERT and CPM; Cost estimation.

Soil Mechanics

Three-phase system and phase relationships, index properties; Unified and Indian standard soil classification system; Permeability - one dimensional flow, Seepage through soils – two - dimensional flow, flow nets, uplift pressure, piping, capillarity, seepage force; Principle of effective stress and quicksand condition; Compaction of soils; One- dimensional consolidation, time rate of consolidation; Shear Strength, Mohr's circle, effective and total shear strength parameters, Stress-Strain characteristics of clays and sand; Stress paths.

Foundation Engineering

Sub-surface investigations - Drilling bore holes, sampling, plate load test, standard penetration and cone penetration tests; Earth pressure theories - Rankine and Coulomb; Stability of slopes – Finite and infinite slopes, Bishop's method; Stress distribution in soils – Boussinesq's theory; Pressure bulbs, Shallow foundations – Terzaghi's and Meyerhoff's bearing capacity theories, effect of water table; Combined footing and raft foundation; Contact pressure; Settlement analysis in sands and clays; Deep foundations - dynamic and static formulae, Axial load capacity of piles in sands and clays, pile load test, pile under lateral loading, pile group efficiency, negative skin friction.

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Fluid Mechanics

Properties of fluids, fluid statics; Continuity, momentum and energy equations and their applications; Potential flow, Laminar and turbulent flow; Flow in pipes, pipe networks; Concept of boundary layer and its growth; Concept of lift and drag

Irrigation

Types of irrigation systems and methods; Crop water requirements - Duty, delta, evapo-transpiration; Gravity Dams and Spillways; Lined and unlined canals, Design of weirs on permeable foundation; cross drainage structure

Water and Waste Water

Basics of water quality standards – Physical, chemical and biological parameters; Water quality index; Unit processes and operations; Water requirement; Water distribution system; Drinking water treatment. Sewerage system design, quantity of domestic wastewater, primary and secondary treatment. Effluent discharge standards; Sludge disposal; Reuse of treated sewage for different applications.

Transportation Engineering

Geometric design of highways - cross-sectional elements, sight distances, horizontal and vertical alignments. Geometric design of railway Track – Speed and Cant. Concept of airport runway length, calculations and corrections; taxiway and exit taxiway design.

Traffic Engineering

Traffic studies on flow and speed, peak hour factor, accident study, statistical analysis of traffic data; Microscopic and macroscopic parameters of traffic flow, fundamental relationships; Traffic signs; Signal design by Webster's method; Types of intersections; Highway capacity

Surveying

Principles of surveying; Errors and their adjustment; Maps - scale, coordinate system Distance and angle measurement - Levelling and trigonometric levelling; Traversing and triangulation survey Total station; Horizontal and vertical curves. Photogrammetry - scale, flying height; Remote sensing - basics, platform and sensors, visual image interpretation; Basics of Geographical information system (GIS) and Geographical Positioning system (GPS).

Text Books

1. Gate 2022 -Pearsons Publications 5th Edition
2. Gate Civil Engineering – IES Masters – 4th edition

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ANNEXURE – II

MINORS DEGREE Courses and Syllabus

Environmental Management

Course code :
Pre-requisite : NIL

L-T-P-S: 3-0-0-0
Credits : 3

Co No	Course Outcomes	PO/PSO	BTL
1	Understand the rocks and minerals and their exploration , energy and environment	PO3,PO6	2
2	Understand the types of agriculture cause and impact and sustainable agriculture, water management	PO3, PO6	2
3	Understand the natural disaster and Atmospheric pollution	PO3, PO6	2
4	Understand the Human population distribution and density, Natural ecosystems and human activities	PO3, PO6	2

Syllabus

Rocks and minerals and their exploitation: Formation of rocks, extraction of rocks and minerals from the Earth, impact of rock and mineral extraction, Managing the impact of rock and mineral extraction, Sustainable use of rocks and minerals

Energy and the environment: Fossil fuel formation, Energy resources and the generation of electricity, Energy demand, Conservation and management of energy resources, Impact of oil pollution, Management of oil pollution

Agriculture and the environment: Soil composition, Soils for plant growth, Agriculture types, increasing agricultural yields, Impact of agriculture, Causes and impacts of soil erosion, Managing soil erosion, Sustainable agriculture

Water and its management: Global water distribution, the water cycle, Water supply, Water usage, Water quality and availability, Multipurpose dam projects, Water pollution and its sources, Impact of water pollution, Managing pollution of fresh water, Managing water-related disease

Managing natural hazards: Earthquakes and volcanoes, Tropical cyclones, Flooding, Drought, he impacts of natural hazards, Managing the impacts of natural hazards, Opportunities presented by natural hazards

The atmosphere and human activities: The atmosphere, Atmospheric pollution and its causes, Impact of atmospheric pollution, Managing atmospheric pollution

Human population: Human population distribution and density, Changes in population size, Population structure, Managing human population size.

Natural ecosystems and human activities: Ecosystems, Ecosystems under threat, Deforestation, Managing forests, Measuring and managing biodiversity

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Text Book

1. Environmental Management, Talwar Prakash, Isha Books Publication
2. Environmental Management Peter R Mulvihill, Routledge Publication
3. Environmental Management Systems 1 ED by Stephen Tinsley

REFERENCES

1. Scoot, R..M. 1997.Basic concepts of industrial hygiene, Lewis Publisher, New York

2. Diberardins L.J. , 1998.Hand book of occupational safety and health, John Willey, New York

3. Park J.E. and Park, Preventive and social medicine.

4. Schilling R.S.E. 1973.Occupational health practice, Buffer Worth, London,

5. Khan M.A.O., John.P, Bederka.S. , 1974. Survival in toxic environment, Academic Press, New York .

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Water Resources Management

Course code : L-T-P-S: 3-0-0-0
Pre-requisite : NIL Credits: 3

Syllabus:

Hydrological cycle, Flood, Type of flood

Drought, Type of drought and their management, Climate and weather

Water harvesting definition and different types

Groundwater management

Reservoir planning and management, Water logging and Drainage

Text Book:

1. Irrigation engineering and Hydraulic structures by S. K. Garg, Standard Book House
2. Engineering hydrology by K. Subramanyam, TataMcGrawHill, New Delhi.

References:

1. Irrigation and Water Resources Engineering, New Age International Ltd. Asawa, G.L. (2005).
2. Irrigation Water Resources and Water Power Engineering by, P. N. Modi, Standard book house, New Delhi.

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Transportation Management

Course code : L-T-P-S: 3-0-0-0
Pre-requisite : NIL Credits: 3

Syllabus

Introduction To Project Management

Introduction-Meaning, Features ,Need, Types, History, Project Management knowledge areas-deliverables typically aprovided for each knowledge areas, Project Management-Project Life cycle, Phases of project management life cycle, Project Management Process, Project Stakeholders and Project Interface, Project champions, roles and responsibilities of various stakeholders in project management.

Organization Structure and Project Manager

Organization Structure- Types, forms, Work breakdown structure, master production scheduling, system integration, strategic business unit, change management. How to select a good project team, role and responsibilities of stakeholders. Project Manager- Role (especially in planning), Importance, Selecting criteria of project manager, project and project manager, project manager and organization, location of project manager in organization, managing conflict by project manager, relationship of line- staff- project manager.

Project Planning and Budgeting

Project Planning (Detailed project plan, cost), Project Selection (dealing with risk and uncertainty), Project Feasibility Study (feasibility, technical, marketing, operational),SWOT Analysis, Project Selection Models (Numeric and Non numeric), budget and cost estimation (leverages, profitability statement, valuation of shares),scheduling, resource allocation, project communication and documentation, project monitoring and controlling, project close out, termination and follow up, project auditing.

New Dimensions in Project Management

Contract Management, Managing crisis in project, Modern development in project management-PMIS, Project Management Methodology, Continuous improvement, capacity planning, project management maturity model, managing multiple projects, competency models. • Live case studies:- dedicated freight corridor, bullet trains, monorails, pod taxis, metro projects.

TEXT BOOK:

1. Transportation Management: A Practical Handbook by Jim Hendrickson
2. The Handbook of Logistics and Distribution Management by Alan Rushton, Peter Baker, and Phil Croucher

REFERENCE BOOK:

1. Transportation management system by, Blokdyk Gerardus
2. Supply Chain Management: A Logistics Perspective by John J. Coyle, C. John Langley, Brian Gibson and Robert A. Novack

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ANNEXURE – III

HONORS DEGREE COURSES & SYLLABUS

SMART INFRASTRUCTURE

Introduction to Smart cities

Introduction to city planning Concept, Principle stakeholders, key trends in smart cities developments

Smart Cities Planning and Development

Understanding smart cities ,Dimension of smart cities ,Global Standards and performance benchmarks, Practice codes ,Smart city planning and development ,Financing smart cities development ,Governance of smart cities

Project management in Smart Cities

Phases, Stages of project and work break down Structure , Project organization structure, Planning, Scheduling and CPM , Project cost analysis, resource allocation & leveling, Line of balancing technique , Project monitoring and control, Project risk management .

Green building in smart cities

Introduction to green buildings, Rating system, Energy saving system

TEXT BOOK:

1. Smart Infrastructure and Applications by Rashed mahmood,simon see-iyad katib

2. UN-Habitat; "Inclusive and sustainable urban planning: a guide for municipalities"; Volume 3: Urban Development Planning

Reference books:

1. Jo Beall (1997); "A city for all: valuing differences and working with diversity"; Zed books limited, London

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EMERGING CONSTRUCTION TECHNOLOGIES

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

Prerequisites: - Nil - **Credits: 3**

Course Objective:

This course covers the complete understanding of advanced construction techniques in sub structure super structure and repair construction Course will create awareness on tall structure construction elements and techniques used for large span structures. Course also covers about the recent and advancement in construction techniques. The course also covers the recent advancement in concrete manufacturing and its application.

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

CO No.	Course Outcomes	PO	BTL
1	Understand the modern construction techniques used in the sub structure construction	3	2
2	Understand the concepts used in the construction of special structures	3	2
3	Apply mechanism/technique for strengthening and repair methods for different cases.	3,5	3
4	Demonstrate knowledge and understanding of the principles and concepts relevant to super structure construction for buildings	3,5	3

Syllabus:

GFRC Facade Panels System, Prefabricated Building, Vertical ICF Wall, Mechanical Concrete, Filterpave systems, FRP Rebar, FRP Deck: Rehabilitation of a Steel Truss Bridge, Concrete Lumber, Bone-shaped Short Fiber Composite, Slurry Infiltrated Mat Concrete, Alternative Material Dowel Bars for Rigid Pavement Joints, Snap Joint Technology for Composite Structures, Superpave System,

Modular FRP Composite Bridge Deck, Composite Column Reinforcement, Rapid In situ Load Testing, Carbon Fiber Reinforced Polymer (CFRP), Polymer Concrete Pipes, Use of Composite Piping Offshore, Recycled Plastic Composite Railroad Ties. High Performance Steel (HPS), Embedded Galvanic Anodes, DIS Seismic Isolator, Hydraulic Vibratory Pile Driver, Soft Trencher, Deep Mixing Method for Ground Improvement, Mortar less Concrete Block System, Post-tensioned Steel Structure

Attachment of Steel Decking using Mechanical Fasteners and Powder Actuated or Pneumatic Tools, Seismic Isolation Bearings, Bridge Lock-up Device System, Adjustable Steelwork Connectors, Precast Hybrid Moment Resistant Frames, Precast Concrete Beam to Column System (BSF)

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Low Temperature Concrete Admixture, Use of Recycled Tire Rubber in Concrete, Steel Free Concrete Bridge Deck, Rapid Repair Products, Concrete Restoration & Protection System, Precast Inverted T Beam, Conductive Concrete, Smart Concrete.

Rapid Drying Concrete, Rapid-1 Hardening Accelerator Concrete Admixture, Reactive Powder Concrete, Mellose non-dispersible Underwater Concrete, Segment Precast Floating Draw Span, Self-Placing Concrete, Shrinkage Reducing Admixture for Concrete, Corrosion Inhibitors for Reinforced Concrete, High Performance Concrete(HPC).

Text Books:

1. Levitt. M., Precast concrete - Materials, Manufacture Properties and Usage, Applied Science Publs. 1982,
2. Konex.T., Handbook of Pre-cast Construction, Vol.1.2&3.

References:

1. Richardson,J.G., Pre-cast concrete Production, Cement and Concrete Association, London, 1973.
2. MadhavaRao.A-G., Modern Trends in Housing in Developing Countries, Oxford & UBH Publishing co., 1985. -
3. Lewicki.B., Building with Large Pre-fabrications, Elsevier Publishers.
4. Large Panel Prefabricated Constructions, Proc. of Advance Course conducted by SERC, Madras.
5. Bruggeling, A.S.G., &Huyghe.G.F., Prefabrication with Concrete, A.s.A., Balkema Publishers, Netherland, 1991.

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BUILDING INFORMATION MODELING

Course Code: **L-T-P-S: 0-0-4-0**

Prerequisite: NIL **Credits: 2**

Course Objective:

This course covers the essential knowledge a project manager should have to manage projects that are designed, delivered and constructed using Building Information Modeling tools, including Autodesk Revit. A project manager must know the differences between CAD and BIM and how to harness the power of BIM and the opportunities it creates for better design, collaboration, coordination and delivery.

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

CO No.	Course Outcomes	PO	BTL
1	Become familiar with the trends, concepts of Building Information Modeling	1,4	2
2	Learn about Project BIM Execution Planning	4	2
3	Design the BIM execution process by creating process maps	4,5	4
4	Develop BIM information exchanges	4,5	4
5	Developing BIM Model using Revit Software and submission of project report	4,5	4

Syllabus:

Basics of BIM

Fundamentals of Building Information Modeling, BIM, Project Delivery Methods & Trends BIM Adoption & Perceived ROI BIM for FM Concept BIM Proficiency Project Execution Planning

The Uses of BIM

BIM use classification system and structure, the purposes and objectives of BIM, elaborating on the BIM use characteristics, level of development, selection of BIM uses

Project BIM Execution Planning

Overview of the project execution planning procedure for BIM, identifying BIM goals and uses for a project, designing the BIM project execution process

Developing information exchanges

Pulling the information through the project, information exchange worksheet

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Define supporting infrastructure for BIM implementation

Project information, project BIM goals / BIM uses, organizational roles and staffing BIM and facility data requirements, delivery strategy / contract

Implementing the BIM project execution planning procedure

Meeting Structure for Developing a BIM Project Execution Plan, Planning Meeting Schedule, Monitoring Progress against the BIM Execution Plan

Tools:

AUTO DESK REVIT SOFTWARE

BIM Engineer Structural RCC

Rivet 3D Modelling with following hands on practice with creation of families for elements and extraction of BOQ, BIM Engineer Architecture

1. Rivet Architecture
2. Preparation of plans,
3. Coordinated Drawings,
4. Clash Reduction,
5. 3D Modelling,
6. Elevations,
7. Extraction of Sections and BOQ.

Reference Books:

1. Eastman, C., Teicholz, P., Sacks, R., & Liston, C. (2011). BIM handbook: A guide to building information modeling for owners, managers, designers, engineers and contractors. John Wiley & Sons.
2. Hardin, B., & McCool, D. (2015). BIM and construction management: proven tools, methods, and workflows. John Wiley & Sons.
3. Krygiel, E., & Nies, B. (2008). Green BIM: successful sustainable design with building information modeling. John Wiley & Sons.
4. Issa, R. R., & Olbina, S. (Eds.). (2015, May). Building Information Modeling: Applications and Practices. American Society of Civil Engineers. •Teicholz, P. (Ed.). (2013). BIM for facility managers. John Wiley & Sons.
5. Kymmell, W. (2007). Building Information Modeling: Planning and Managing Construction Projects with 4D CAD and Simulations (McGraw-Hill Construction Series). McGraw Hill Professional.
6. Eynon, J. (2016). Construction Manager's BIM Handbook. John Wiley & Sons.
7. Pittard, S., & Sell, P. (Eds.). (2016). BIM and Quantity Surveying. Routledge.
8. Duell, R., Hathorn, T, and Hathorn, T.R. (2015), Autodesk Revit Architecture 2016 Essentials, Wiley and Sons, Inc.

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INTEGRATED WASTE MANAGEMENT FOR SMART CITIES

LTPS:3-0-0-0

Co No	Course Outcomes	PO/PSO	BTL
1	Understand the Understand the Introduction of Solid Waste, Current Issues in Solid Waste Management	PO3,PO6	2
2	Understand the Solid Waste Management, disposal methods of solid waste	PO3, PO6	2
3	Understand the Construction and demolition waste management, E waste management	PO3, PO6	2
4	Understand the Information and Communication Technology In Smart Management	PO3, PO6	2

INTRODUCTION TO SOLID WASTE MANAGEMENT: Municipal Solid Waste Sources; composition; generation rates Swachh Bharat Mission and Smart Cities Program, Current Issues in Solid Waste Management and Review of MSW Management Status in First List of 20 Smart Cities in the Country.

MUNICIPAL SOLID WASTE MANAGEMENT – FUNDAMENTALS: Municipal Solid Waste, Characteristics and Quantities, Collection, Transportation, Segregation and Processing

DISPOSAL OF MUNICIPAL SOLID WASTE: Landfill, Biochemical Processes and Composting, Energy Recovery from Municipal Solid Waste. Municipal Solid Waste (MSW) Rules 2016

CONSTRUCTION AND DEMOLITION (C&D) WASTE MANAGEMENT: Overview of C&D Waste – Sources, Effects, and Regulations, Beneficial Reuse of C&D Waste Materials.

ELECTRONIC WASTE (E-WASTE) MANAGEMENT: Sources, Effects, Issues and Status in India and globally, controlling measures, E-Waste Management Rules 2016 and Management Challenges.

INFORMATION AND COMMUNICATION TECHNOLOGY IN SMART MANAGEMENT

Information Technology and Infrastructure, Comprehensive Mobility Plan, Onsite and Offsite Environmental Monitoring System, Application of GIS Technology, Automated Waste Collection and Transportation, Online Platforms, Use of Electronic/Radio Frequency Tags, Crowd-Sourcing, GPS Devices and Sensors, Sensor-Based Sorting, Pollution Sensors, Spatial Technologies-Networking, Identification Technologies, Data Acquisition, and Communication Technologies, Internet of Things, Smart Pneumatic Waste Conveyance System, Water Quality Meters, Use of Ultrasonic Sensors and GSM Technology, Intelligent Management of Water and Sewer System, Flow Management Technology, Real-Time Awareness, and Control

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TEXT BOOKS

1. William A Worrell and P. AarneVeslind, "Solid Waste Engineering", 2nd Edition Cengage Learning, 2012 (ISBN-13: 978-1-4390-6217-3)

2. George Tchobanoglous, Hilary Theisen and Samuel A Vigil, "Integrated Solid Waste Management", Tata McGraw Hill, 1993.

3. The Central Public Health and Environmental Engineering Organization (CPHEEO), "Manual on Solid Waste Management", India, 2016.

REFERENCES

1. "Municipal Solid Waste Management Rules 2016", Central Pollution Control Board, Govt. of India, 2016.

2. "Electronic Waste Management Rules 2016", Central Pollution Control Board, Govt. of India, 2016.

3. "Construction and Demolition Waste Management Rules 2016", Ministry of Environment and Forest and Climate Change, Govt. of India, 2016

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Design and Drawing of Irrigation Structures

LTPS:2-0-2-0

Desgin and drawing: Irrigation canal: Lined canal,

Canal regulator: Head and Cross regulators,

Cross drainage work: types of cross drainage works, Aqueducts and syphon Ogee spillway, Vertical drop weir, Earth Dam design

Text Book:

1. Design of Minor Irrigation and Canal Structures by C. Satyanarayana Murthy; Wiley Eastern Ltd., New Delhi.
2. Irrigation engineering and Hydraulic structures by S. K. Garg, Standard Book House

References:

1. Water Resources Engineering Principles and Practice by C. Satyanarayana Murthy; New Age International Publishers.
2. Irrigation and Water Power Engineering by Dr. B.C. Punmia & Dr. Pande B.B. Lal; Laxmi Publications pvt. Ltd., New Delhi

Dr. Ch. Hanumantharao

Chairman, BOS

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Department of Civil Engineering
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