MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous Institute affiliated to RGPV, Bhopal)

DEPARTMENT OF CIVIL ENGINEERING

SCHEME OF STUDY B.Tech Civil Engineering

2019 ADMITTED BATCH

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous Institute affiliated to RGPV, Bhopal)

Scheme Structure & Semester-wise credit distribution(under flexible curriculum design)

[For batches admitted in Academic Session 2018-19 & 2019-20]

Semester-Wise Scheme & Guidelines for Flexible Curriculum

Abbreviations used

L	**Lecture**
T	**Tutorial**
P	**Practical**
HSMC	**Humanities and Social Sciences including Management Courses**
BSC	**Basic Science Courses**
ESC	**Engineering Science Courses**
DC	**Departmental Core**
DE	**Departmental Elective**
OC	**Open Category**
DLC	**Departmental Laboratory Courses**
MC	**Mandatory Course**
PD	**Professional Development**
MOOC	**Massive Open Online Courses**

Definition of Credit :

1 Hour Lecture (L) per week	**1 credit**
1 Hour Tutorial (T) per week	**1 credit**
2 Hours Practical (Lab) per week	**1 credit**

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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General Guidelines for Flexible Curriculum

(For batch admitted in 2018-19 & 2019-20)

- For the award of basic Under Graduate (UG) Degree in Engineering/Technology (without Honours/Honours with Minor Specialization), it is required to earn **170 Credits**. For the B. Architecture Degree the total credit requirement is**260.**
- The students can opt up to **34 credits out of these 170 from recognized MOOC** (Massive Open Online Courses) platforms against Departmental & Open elective courses (DE/OC). Each such Course must be of minimum 2credits.
- There is a provision for interested students to opt for **additional 20 credits** to obtain **Honours or Honours with Minor Specialization in chosen field**. These additional courses can be selected and opted from the list of courses approved by the department through their recognizedbodies.
- In the flexible curriculum there is a provision of **03 Mandatory Credit Courses** on **Cyber Security, Disaster Management, & Intellectual Property Rights.**
- In the flexible curriculum presently there is a provision of **02 Audit Courses** on **(i) Biology for Engineers & (ii) Indian Constitution & Traditional Knowledge**. Auditing a course allows a student to take a class without the benefit of a grade or credit, for the sole purposes of self-enrichment and academicexploration.
- The students have to undergo three M**andatory Summer Internship Programme/Projects (SIPs)** after their I, II and III year and their evaluation will reflect in III, V & VII semester examination results,respectively.
- Credit will be given for "**Professional Development**" of students in order to bring their all kinds of personality and skill development activities into the orbit and to encourage student participation in professional chapter activities, club activities, cultural events, sports, technical events, hackethons, personality development activitiesetc.
- The marks for "**Professional Development"** will be awarded to students in VIII semester on the basis of their participation and achievements in extra & co-curricular activities, sports, performance in MOOCs etc. right from Iyear.

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Guidelines for students opting additional courses for (i) B.Tech.Honours degree or (ii) B.Tech.Honours degree with Minor Specialization

- For getting an (i) **B.Tech. Honours**in parent discipline or (ii) **B.Tech. Honours with Minor Specialization** in other interdisciplinary areas/fields of Engineering, Technology, Applied Science, Management etc. **which are offered by the Institute**, the **additional Credit requirement is 20 for Engineering & Technology students** i.e. **Total 170 + 20 = 190** credits needed by the end of VIIIsemester.
- **For students desirous of achieving additional credits for Honours/Honours with Minor Specialization, there is a provision of selecting maximum 02 courses per semester from V semester onwards. Each such Course must be of minimum 2credits.**
- **These additional courses can be selected only from the pool of courses specified by the department from recognized SWAYAM/NPTEL/MOOC platforms.**

Credit Requirements & Guidelines for MOOCs

- **Up to 34 Credits out of total 170 for Engineering/Technology students & 52 credits out of total 260 credits for B. Architecture students** can be earned through **SWAYAM/NPTEL/MOOC** platform based learning for the award of UG degree in Engineering/Technology & Architecture respectively (**without Honours/Honours with MinorSpecialization**).
- To obtain **Honours or Honours with Minor Specialization 20 credits additionally** can be acquired through **SWAYAM/NPTEL/MOOC platform basedlearning.**
- In this manner, students aspiring for **Honours or Honours with Minor Specialization during the tenure of B. Tech programme**can opt for a total of **54 (34+20) Credits** and the students of the **B. Architecture programme**can earn up to **72 (52+20) credits through SWAYAM/NPTEL/MOOC platform basedlearning.**
- For the courses opted under MOOC, the equivalent credit weightage will be given to the students, for the credits earned in online examination on SWAYAM/NPTEL platform and other similar platforms as approved by the authorized bodies (BoS, AC etc.), in the credit plan of theprogram.
- Policy for credit equivalence and transfer for the courses opted from SWAYAM/NPTEL/University of Central Florida (UCF)/RGPV Bhopal/Institutional (MITS) MOOC/other MOOC (Massive Open Online Courses) platforms, is as follows:

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Duration of MOOC	Credit Transfer
04 week course	01*
06 week course	02**
08 week course	03**
12 week course	04**

**** The 01 credit courses can be opted only under seminar/self-study/professional development purposes.***
***** The 02, 03 & 04 credit courses can be opted under DEs/OCs and additional courses (for Honours/Honours with Minor Specialization).***

- The guidelines regarding **"credit transfer from MOOCs"** by **All India Council of Technical Education (AICTE) and the affiliating university, i.e. RGPV Bhopal,** as issued from time to time will be binding on the institute**.**

Guidelines for Departmental Elective (DEs) and Open Category Courses (OCs)

- **The list of Departmental/Open Elective Courses (DEs/OCs) will be prepared well in advance and make the list public among the students, possibly in the previous semester itself for preference based registration process.**
- **The list of courses which the students can opt from the SWAYAM/NPTEL/MOOC platform against DE & OC courses in the scheme will be approved by authorized bodies (BoS, AC etc.) and displayed/communicated to students/on the website well in advance, (in September/October & April/May for even and odd semesters respectively) so that students can select the courses of their choice. Each such Course must be of minimum 2 credits.**
- The Open Category (OC) course will be open for students of departments other than the offering (parent) department. Moreover, there will be no pre-requisite for Open Category Courses.
- **The allotment of DE/OC Courses will be based on First Come First Serve (FCFS) basis.**
- The weightage of continuous assessment (Mid Semester Exam, Quiz, Assignment etc.) for DE/OC courses which are opted from MOOCs will be considered from the score obtained towards assignment work/test etc. conducted by the course offering agency
- For matching the credit requirement with the curricular/scheme requirements, more than one MOOC course can also be selected against an Elective Course, provided that the collective credits are equal to or more than the credit requirement; however each such selected course must be of minimum 2 credits.

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Mandatory Summer Internship Programme

- The students have to undergo three M**andatory Summer Internship Programme/Projects (SIPs)** after the I, II and III year and their evaluation will reflect in III, V, & VII semester examinationresults.
- In case, **a student fails to appear (due to valid cause)/acquire minimum score, the Head of Concerning Department may schedule the re-conduction of internship program** for such students and the same will be monitored and **reviewed by the Dean Student Welfare**. Such students are required to fill the examination form for III/V semester in order to get the marks/credits reflected in their mark-sheet, which will also clearly indicate the year of completion ofInternship.
- Thepromotiontosuccessivesemesters/yearswillnotbeaffectedforstudentswhoarenotabletocompletetheserequirementsintime.However, **they will not be awarded the degree until they complete these mandatory Summer Internship programs (SIPs).**

Provision of Internship/Project

- All the courses offered in VIII semester are DE (Departmental Elective) and OC (Open Category) courses, which will run through online learning platform under the mentorship of facultymembers.
- The students can opt for internship/project in the VIII Semester by either making a project or by doing internship in an industry after formal approval of the Institute as well as the concernedindustry.

Awareness about Ethics & Academic Integrity

Criteria for accepting similarity index for the submission of UG project report/PG dissertation/Thesis

- **The overall similarity index up to 15-20% is acceptable** (using turnitin plagiarism checksoftware).
- The highest similarity percentage from **any one source is not greater than4-6%.**
- In case of self plagiarism, the permissible percentage may be **slightly higher, say at7-10%.**

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Guidelines for evaluating "Professional Development"

PERFORMANCE METRICS		
Categories	**Suggestive Activities**	**Marks Assigned**
Institute Level* **(C1)**	Participation in Institute level technical events such as quizzes, extemporary, debate, student volunteers, seminar, professional society local chapters (IET,IEEE,ISTE,IETE),NCC etc.	(02 Marks for each participation) Marks=Number of activities (C1) x 2 **(Maximum marks in this category 06)**
State Level* **(C2)**	Participation in State level technical events such as Robotics, Coding challenge, Cultural cum technical fest, technical symposium, volunteers, hackathon, sportsetc.	03 marks for each participation Number of Marks=Number of activities (C2) x 3 **(Maximum marks in this category 09)**
National level* **(C3)**	Participate in National level events such as hands on workshop, national level seminar, national conference, Entrepreneurship, model making, techno culture fest, national youth festival, researchconclave, project competition, volunteers, sports festival etc.	05 marks for each participation (Maximum 15) Marks=Number of activities (C3) x 5 **(Maximum marks in this category 15)**
MOOC's** **(C4)**	Successfully completed technical certification course in any MOOC's platform such as (NPTEL/SWAYAM/EdX/Coursera/Class Central etc)	10 marks for each course (Maximum 20) Marks= Number of certificates (C4) x10 **(Maximum marks in this category20)**

Evaluation in VIII Semester	
Formula	**Marks Scored (Out of 50)**
(C1x2 + C2x3 + C3x5 + C4x10) =	

In addition to the above, if a student or group of students win a competition in the above three categories (Institute level/State level/National level etc.) then maximum marks in the respective category will be awarded to such students.

Note: * Student must produce a certificate as a proof for each activity.

**** Courses for which credits are already earned (for DE/OC/Honours or Minor Specialization from I to VIII semester) through MOOCS by the student during academics will not be counted.**

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Structure of Undergraduate Engineering program:

S. No.	Category	Suggested Breakup of Credits (Total 160) (as proposed by AICTE)	Component wise credit allotment	No. of Courses
1	Humanities and Social Sciences including Management Courses(HSMC)	**12****	**12**	**04**
2	Basic Science Courses(BSC)	**26****	**20**	**05**
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.(ESC)	**29****	**20**	**06**
4	Departmental Core Courses(DC)	**47****	**56**	**14**
5	Departmental Elective Courses relevant to specialization/branch(DE)	**23****	**16**	**05**
6	Open Category- Electives from other technical and /or emerging subjects(OC)	**11****	**15**	**05**
7	Project work, seminar and internship in industry or appropriate work place/ academic and research institutions(DLC/SWAYAM/NPTEL/MOOC-Practical Slot)	**12****	**22**	**12**
8	Mandatory Courses (MC) and Professional Development		**9**	**04**
	Total	**160****	**170**	**55**

***Minor variation is allowed as per need of the respective disciplines.**

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Scheme of Examination

GROUP B: I Semester

B. Tech. I Semester (Civil Engineering)

For batches admitted in academic session 2018 – 19 & 2019-20

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per Week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem.	Quiz/Assignment	End Sem.	Lab work / Sessional		L	T	P	
1.	100101	BSC	Engineering Chemistry (BSC-1)	70	20	10	30	20	150	3	-	2	4
2.	100102	BSC	Engineering Mathematics –I (BSC-2)	70	20	10	-	-	100	3	1	-	4
3.	100103	HSMC	Technical English (HSMC-1)	70	20	10	30	20	150	3	-	2	4
4.	100104	ESC	Basic Electrical & Electronics Engineering(ESC-1)	70	20	10	30	20	150	3	-	2	4
5.	100105	ESC	Engineering Graphics(ESC-2)	70	20	10	30	20	150	2	-	2	3
6.	100106	ESC	Manufacturing Practices(ESC-3)	-	-	-	30	20	50	-	-	2	1
			Total	**350**	**100**	**50**	**150**	**100**	**750**	**14**	**1**	**10**	**20**
Induction programme of three weeks (MC):Physical activity, Creative Arts,Universal Human Values,Literary,Proficiency Modules,Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations.													
NSS / NCC				**Qualifier**									

GROUP A: (Electrical, Electronics, Computer Science, Information Technology, Electronics & Telecommunication)

GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

01Theory Period=1 Credit; 01 Tutorial Period = 1 Credit; 02 Practical Periods =1 Credit

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Scheme of Examination

GROUP B: II Semester

B. Tech. II Semester (Civil Engineering)

For batches admitted in academic session 2018 – 19 & 2019-20

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per Week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem.	Quiz/Assignment	End Sem.	Lab work / Sessional		L	T	P	
1.	100201	BSC	Engineering Physics(BSC-3)	70	20	10	30	20	150	2	1	2	4
2.	100202	HSMC	Energy, Environment, Ecology & Society (HSMC-2)	70	20	10	-	-	100	3	-	-	3
3.	100203	ESC	Basic Computer Engineering (ESC-4)	70	20	10	30	20	150	3	-	2	4
4.	100204	ESC	Basic Mechanical Engineering (ESC-5)	70	20	10	30	20	150	3	-	2	4
5.	100205	ESC	Basic Civil Engineering & Mechanics (ESC-6)	70	20	10	30	20	150	3	-	2	4
6.	100206	HSMC	Language Lab. & Seminars (HSMC-3)	-	-	-	30	20	50	-	-	4	2
			Total	**350**	**100**	**50**	**150**	**100**	**750**	**14**	**1**	**12**	**21**
Summer Internship Project – I (Institute Level) (Qualifier): Minimum two-week duration:Evaluation in III Semester.													
NSS / NCC				**Qualifier**									

GROUP A: (Electrical, Electronics, Computer Science, Information Technology, Electronics & Telecommunication)

GROUP B: (Civil,Mechanical, Chemical, Biotech, Automobile)

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Scheme of Examination

B. Tech. III Semester (Civil Engineering)

For batches admitted in academic session 2018 – 19 & *2019-20*

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per Week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem.	Quiz/ Assignment	End Sem.	Lab Work / Sessional		L	T	P	
1.	100001	BSC	Engineering Mathematics-II (BSC-4)	70	20	10	-	-	100	3	1	-	4
2.	110302	DC	Building Planning & Design (DC-1)	70	20	10	-	-	100	3	1	-	4
3.	110303	DC	Building Materials & Construction (DC-2)	70	20	10	30	20	150	3	-	2	4
4.	110304	DC	Surveying (DC-3)	70	20	10	30	20	150	3	-	2	4
5.	110305	DC	Strength of Materials (DC-4)	70	20	10	30	20	150	3	-	2	4
6.	110306	DLC	Software Lab (DLC-1)*	-	-	-	30	20	50	-	-	2	1
7.	110307	Seminar / Self Study	Self Learning/Presentation (Through Swayam/NPTEL/MOOC)#	-	-	-	-	25	25	-	-	2	1
8.	110308	DLC	Summer Internship Project – I (Institute Level) (Evaluation)	-	-	-	25	-	25	-	-	4	2
Total				350	100	50	145	105	750	15	2	14	24
NSS / NCC				Qualifier									

#Compulsory registration for one online course using SWAYAM / NPTEL / MOOC, evaluation through attendance, assignment and presentation.

*Virtual Lab to be conducted along with traditional Lab.

GROUP A: (Electrical, Electronics, Computer Science, Information Technology, Electronics & Telecommunication)

GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

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Scheme of Examination

B. Tech. IV Semester (Civil Engineering)

For batches admitted in academic session 2018 – 19 & *2019-20*

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Periods per Week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem.	Quiz/ Assignment	End Sem.	Lab Work / Sessional		L	T	P	
1.	100003	BSC	Engineering Mathematics – III (BSC-5)	70	20	10	-	-	100	2	2	-	4
2.	110402	DC	Geotechnical Engineering (DC-5)	70	20	10	30	20	150	2	1	2	4
3.	110403	DC	Fluid Mechanics – I (DC-6)	70	20	10	30	20	150	2	1	2	4
4.	110404	DC	Structural Analysis (DC-7)	70	20	10	-	-	100	3	1	-	4
5.	110406	DC	Water Resources Engineering (DC-8)	70	20	10	-	-	100	3	1	-	4
6.	100004	MC	Cyber Security (MC)	70	20	10	-	-	100	2	1	-	3
7.	110407	DLC	Survey Practice Lab (DLC-2)*	-	-	-	30	20	50	-	-	6	3
Total				**420**	**120**	**60**	**90**	**60**	**750**	**14**	**7**	**10**	**26**
8.	100002[$]	MC	Biology for Engineers (Audit Course)(MC)	**70**	**20**	**10**	-	-	**100**	**3**	-	-	-
NSS/NCC				**Qualifier**									
Summer Internship Project – II (Soft Skills Based) for two weeks duration: Evaluation in V Semester													

[$] **This course will run for Group B/A in IV/III semester respectively.(This is a non-credit course and it is optional to appear & pass in the end semester examination. However, a separate mark sheet will be issued to those who will qualify)**

***Virtual Lab to be conducted along with traditional Lab.**

GROUP A: (Electrical, Electronics, Computer Science, Information Technology, Electronics & Telecommunication)

GROUP B: (Civil,Mechanical, Chemical, Biotech, Automobile)

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Scheme of Examination

B. Tech. V Semester (Civil Engineering)

For batches admitted in academic session 2018 – 19 & *2019-20*

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Periods per Week			Total Credits
				Theory Slot			Practical Slot						
				End Sem.	Mid Sem.	Quiz/ Assignment	End Sem.	Lab work / Sessional		L	T	P	
1.	110501	DC	Estimating, Costing & Contracting (DC-9)	70	20	10	-	-	100	3	1	-	4
2.	110502	DC	Structural Design & Drawing (RCC) (DC-10)	70	20	10	-	-	100	3	1	-	4
3.	110503	DC	Fluid Mechanics – II (DC-11)	70	20	10	30	20	150	2	1	2	4
4.	110509	DC	Environmental Engineering (DC-12)	70	20	10	30	20	150	2	1	2	4
5.	110505	DC	Transportation Engineering (DC-13)	70	20	10	30	20	150	2	1	2	4
6.	110506	DLC	Minor Project – I**(DLC-3)	-	-	-	30	20	50	-	-	2	1
7.	110507	DLC	Summer Internship Project – II (Evaluation) (DLC-4)	-	-	-	25	-	25		-	6	3
8.	110508	Seminar / Self Study	Self Learning/ Presentation (Through Swayam/NPTEL/MOOC)#	-	-	-	-	25	25	-	-	2	1
	Total			350	100	50	145	105	750	12	5	16	25
Department Level activity / workshop / awareness programme to be conducted; certificate of compliance to be submitted by HoD to the Exam controller through Dean Academics													
9.		Additional Courses for obtaining Honours or Minor Specialization by desirous students	Permitted to opt for maximum 02 additional courses for the award of Honours or Minor Specialization										

** The Minor Project – I may be evaluated by an internal committee for awarding sessional marks.

#Compulsory registration for one online course using SWAYAM / NPTEL / MOOC, evaluation through attendance, assignment and presentation.

GROUP A: (Electrical, Electronics, Computer Science, Information Technology, Electronics & Telecommunication)

GROUP B: (Civil,Mechanical, Chemical, Biotech, Automobile)

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Scheme of Examination

B. Tech. VI Semester (Civil Engineering)

For batches admitted in academic session 2019 – 20

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Periods per Week			Total Credits
				Theory Slot			Practical Slot		MOOCS						
				End Sem.	Mid Sem.	Quiz / Assignment	End Sem.	Lab Work / Sessional	Assignment	Exam		L	T	P	
1.	100005[#]	HSMC	Ethics, Economics, Entrepreneurship & Management (HSMC-4)	70	20	10	-	-	-	-	100	3	-	-	3
2.	110602	DC	Structural Design & Drawing (Steel) (DC-14)	70	20	10	-	-	-	-	100	3	1	-	4
3.		DE	(DE-1)*	70	20	10	-	-	-	-	100	3	1	-	4
4.		DE	(DE-2)*	-	-	-	-	-	25	75	100	3	1	-	4
5.		OC	(OC-1)*	70	20	10	-	-	-	-	100	2	1	-	3
6.	100007	MC	Disaster Management (MC)	70	20	10	-	-	-	-	100	3	-	-	3
7.	110607	DLC	Minor Project – II (DLC-5)	-	-	-	100	50	-	-	150	-	-	4	2
Total				350	100	50	100	50	25	75	750	17	4	4	23
8.	100006[$]	MC	Indian Constitution & Traditional Knowledge (Audit Course) (MC)	70	20	10	-	-	-	-	100	3	-	-	-
9.		Additional Courses for obtaining Honours or Minor Specialization by desirous students		Permitted to opt for maximum 02 additional courses for the award of Honours or Minor Specialization											
Summer Internship Project – III (On Job Training) for Four Weeks Duration : Evaluation in VII Semester															

[#] This course will run for Group B/A in VI/V semester respectively.

[$] This course will run for Group B/A in VI/V semester respectively. (This is a non-credit course and it is optional to appear & pass in the end semester examination. However, a separate mark sheet will be issued to those who will qualify)

* At least one of these courses must be run through SWAYAM / NPTEL / MOOC.

GROUP A: (Electrical, Electronics, Computer Science, Information Technology, Electronics & Telecommunication)

GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

SEMESTER – VI		
DE – 1	**DE – 2 (Through SWAYAM/NPTEL)**	**OC – 1**
110612. Solid Waste Management	**110652**. Geotechnical Engineering II (Foundation Engineering).	**900120.** Building Services & Maintenance
110613. Construction Planning & Management	**110654**. Concrete Technology	**900121**. Sustainable Materials & Green Buildings
110614. Railways, Airport & Tunnel Engineering	**110655**. Air Pollution & Control **110656**. Disaster Recovery & Build Back Better	

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Scheme of Examination

B. Tech. VII Semester (Civil Engineering)

For batches admitted in academic session 2019 – 2020

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Periods per Week			Total Credits
				Theory Slot			Practical Slot		MOOCS						
				End Sem.	Mid Sem.	Quiz / Assignment	End Sem.	Lab Work / Sessional	Assignment	Exam		L	T	P	
1.		DE	(DE-3)*	70	20	10	-	-			100	3	-	-	3
2.		DE	(DE-4)*	-	-	-	-	-	25	75	100	2	-	-	2
3.		OC	(OC-2)*	70	20	10	-	-			100	2	1	-	3
4.		OC	(OC-3)*	70	20	10	-	-			100	3	-	-	3
5.	100008	MC	Intellectual Property rights (IPR) (MC)	70	20	10	-	-			100	2	-	-	2
6.	110701	DLC	Software Application for Solving Civil Engineering Problems (DLC-6)	-	-	-	50	50			100	-	-	4	2
7.	110702	DLC	Summer Internship Project – III (04 weeks) (Evaluation) (DLC-7)	-	-	-	50	50			100	-	-	4	2
8.	110703	DLC	Creative Problem Solving (Evaluation) (DLC-8)	-	-	-	25	25			50	-	-	2	1
Total				280	80	40	125	125	25	75	750	12	1	10	18
9.		Additional Courses for obtaining Honours or Minor Specialization by desirous students		Permitted to opt for maximum 02 additional courses for the award of Honours or Minor Specialization											

*** At least one of these courses must be run through SWAYAM / NPTEL / MOOC.**

SEMESTER – VII			
DE – 3	**DE – 4 (Through SWAYAM/NPTEL)**	**OC – 2**	**OC – 3**
110713. Advanced Structural Design (RCC)	**110754**. Wastewater Treatment & Recycling	**900201**. Integrated Waste Management for Smart City	**900213**. Urban Planning & Transportation Systems.
110714. Hydraulic Structure	**110757.** Principles of Construction Management	**900202**. Project Planning & Control	**900226** Safety & Quality Management
110715. Advanced Structural Analysis	**110758.** Advanced Geomatics Engineering		

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous Institute affiliated to RGPV, Bhopal)

Scheme of Examination

B. Tech. VIII Semester (Civil Engineering)

For batches admitted in academic session 2019 – 20

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Periods per Week			Total Credits
				Theory Slot			Practical Slot		MOOCS						
				End Sem.	Mid Sem.	Quiz / Assignment	End Sem.	Lab Work / Sessional	Assignment	Exam		L	T	P	
1.		DE	(DE-5)*	-	-	-	-	-	25	75	100	4	-	-	4
2.		OC	(OC-4)*	-	-	-	-	-	25	75	100	2	-	-	2
3.	110801	DLC	Internship / Project (DLC-9)	-	-	-	250	150	-	-	400	-	-	12	6
4.	110802	PD	Professional Development#	-	-	-	-	50	-	-	50	-	-	2	1
Total				-	-	-	250	200	75	225	750	6	-	14	13
5.		Additional Courses for obtaining Honours or Minor Specialization by desirous students		Permitted to opt for maximum 02 additional courses for the award of Honours or Minor Specialization											

*** These courses must be run through SWAYAM / NPTEL / MOOC.**

#Evaluation will be based on participation/laurels brought by the students to the institution in national/state level technical and other events during the complete tenure of the UG program (participation in professional chapter activities, club activities, cultural events, sports, personality development activities, collaborative events, MOOCs and technical events)

DE – 5 (Through SWAYAM/NPTEL)	OC – 4 (Through SWAYAM/NPTEL)
110851. Safety in Construction	**900614.** Natural Hazards
110856. Rock Engineering	**900634.** Safety in Construction
110857. Strategies for Sustainable Design	**900635.** Geographic Information Systems

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Civil Engineering Semester wise Credit Distribution

S.No.	Semesters	Credit Distribution
1	Semester –I	20
2	Semester –II	21
3	Semester –III	24
4	Semester –IV	26
5	Semester –V	25
6	Semester –VI	23
7	Semester –VII	18
8	Semester –VIII	13
Total		170

DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS B.Tech Civil Engineering

2018 ONWARDS ADMITTED BATCHES

SEMESTER-I/II

Course Code: 100205
Course Name: Basic Civil Engineering & Mechanics

L	T	P	Credit
3	0	2	4

Course Objectives:

1. To understand the utility of various types of building materials.
2. To understand the location, construction detail and suitability of various building elements.
3. To determine the location of object on ground surface.
4. To stabilize the position of various object.
5. To understand the effects of system of forces on rigid body in static conditions.
6. Analysis of determinate structure (beam & truss)

Syllabus:

Unit- I

Building Materials: Stones, bricks, cement, timber - types, properties, test & uses, Introduction of concrete properties & Laboratory tests on concrete, curing of concrete and mortar Materials.

Unit- II

Surveying & Positioning: Introduction to surveying, Survey stations, Measurement of distances-conventional and EDM methods, Measurement of directions by different methods, Measurement of elevations by different methods, reciprocal leveling.

Unit- III

Mapping & Sensing: Mapping details and contouring, Plane tables and related devices. Introduction of theodolite.Measurement of areas and volumes, application of measurements in quantity computations, Introduction of remote sensing and its applications.

Unit- IV

Forces and Equilibrium: Graphical and Analytical Treatment of Concurrent and non-concurrent co-planner forces, free body Diagram, Force Diagram and Bow's notations, Application of Equilibrium Concepts: Analysis of plane Trusses, method of joints, method of Sections. Frictional force in equilibrium problems.

Unit -V

Centre of Gravity and moment of Inertia: Centroid and Centre of Gravity, Moment of Inertia of Composite section, Radius of Gyration, Introduction to product of Inertia and Principle Axes.
Support Reactions, Shear force and bending moment diagram for cantilever & simply supported beam with concentrated, distributed load and Couple.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Explain concepts and terminologies of building materials, surveying and mechanics.
CO 2: Apply various methods for surveying and mechanics.
CO 3: Determine the location, area and volume of objects on ground surface.

CO4: Solve the problems of surveying and mechanics by using various methods.
CO5: Analyse the effects of system of forces on rigid bodies in static conditions.

Text Books:

1. Surveying, Vol. – 1, Punmia B.C., Laxmi Publications, 17th edition, 2016
2. Building Material, B. C. Punmia, Laxmi Publications, 2016
3. A textbook of Engineering Mechanics, D. S. Kumar, Katsons Publications, 2013

Reference Books:

1. Basic Civil Engineering, S. Ramamrutam& R. Narayan, DhanpatRai Pub., 3rd edition, 2013
2. Applied Mechanics, Prasad I.B., Khanna Publication 17th edition, 1996
3. Surveying, Duggal, Tata McGraw Hill New Delhi, 4th edition, 2013
4. Engineering Mechanics - Statics &Dynamics, R.C. Hibbler, Pearson Publications, 14th edition, 2015
5. Engineering Mechanics - statics dynamics, A. Boresi & Schmidt, Cengage learning, 1st edition, 2008.
6. Applied Mechanics, R.K. Rajput, Laxmi Publications, 3rd edition, 2016

List of Experiments:

1. Study of various types of chain and tapes.
2. Measurement of distance involving direct and indirect ranging.
3. Chain and tape survey of given area
4. Study of prismatic and surveyors compass
5. Measurement of direction by prismatic compass
6. Calculation of distance between two in accessible points by prismatic compass
7. Study of dumpy level, levelling staff and level field book
8. Exercise of differential levelling and flying levelling
9. Study of various types of a transits theodolite
10. Measurements of horizontal angle by repetition method.
11. Determining the resultants force of coplanar concurrent and non-concurrent system of forces by graphical method
12. Determine forces in members of a perfect frame by graphical method.

Upon completion of the practical course, the students will be ableto:
CO1: Follow the guidelines for field surveying.
CO2: Follow the working principles of survey instruments for measurements.
CO3: Measure the horizontal distances, difference in elevation and angles of various points
CO4: Detect measurement errors and accordingly suggest corrections
CO5: Interpret survey data and compute areas

SEMESTER-III

Course Code: 110302
Course Name: Building Planning & Design

L	T	P	Credit
3	1	0	4

Course Objectives:

1. To make aware the student with sustainability aspects of building.
2. To impart knowledge to students about significance of building bye-laws & rules & regulation regarding building planning.
3. To impact knowledge to students regarding specific consideration required to be considered under Indian condition for planning & designing of building.
4. To appraise students about the rules & consideration to get adequate ventilation, lighting & Sound insulation for improved energy efficiency of building.
5. To make students understand about various essential requirements of different type of building.
6. To make aware students about green building rating for enhanced sustainability.

Syllabus:

Unit I

Natural Environment & Built environment, Ecology, Ecosphere - sustainable development, Dimensions of sustainability. Built Environment &liveability, integrated approach in design, challenges in sustainable development.Green environment, expectations from green building, IGBC, USGBC, LEED- GRIHA, SVA, GRIHA.

Unit II

Building Bye – laws, Functions of local authority, Terminology i.e. (Building line, control line, FAR, light plane etc.) Principles underlying building bye- laws, classification of building, requirements of parts of Buildings, site section of building, orientation, factors affecting orientation, orientation criteria's for Indian conditions. Provisions of NBC.

Unit III

Principles of planning of buildings (Aspects, prospect, Furniture requirement, rooming, grouping, privacy circulation etc.), Principles of architectural composition (Unity, contrast, scale, proportion, balance, Rhythm, character, etc.), Massing, Sun and the Building, Sun path, Sun shading & devices, Design of sun shades.

Unit IV

Thermal insulation, Heat transfer in building, Thermal insulation materials, methods of thermal insulation ventilation: natural & artificial, necessity & functional requirement of ventilation, system of ventilation, types of mechanical ventilation, air conditioning, functional requirement of air conditioning, Essentials of air conditioning, acoustic and sound insulation, Behavior of sound acoustical defects. Sabine formula, acoustical design of various spaces, sound insulation methods & materials, illumination (natural & artificial).

Unit V

Design and planning consideration for various types of building i.e. Residential Building, Education buildings, Hospitals & Dispensaries, Hotels, Commercial building, recreational buildings, government offices & other, standards specified by Bye-laws, various aspects of sustainability & energy efficiency applied to various types of Building, green building concept applied to various types of building.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Explain basics of building planning & design.
CO2: Describe sustainability principle, by laws & characteristics of thermal and sound insulation.
CO3: Apply sustainability concepts & principles in planning & design of buildings.
CO4: Evaluate environmental, sustainable & safety aspects of a building.
CO5: Plan different types of buildings as per by laws &codal provisions.

Text Books:

1. Building Drawing (Built Environment), Sah, Kale and Pathi, Tata McGraw hill, 4th edition, reprint 2007
2. Building Planning, Designing and Scheduling, Gurucharan Singh, Standard Publisher, distribution, 2009
3. Building Design and Drawing, Mallik and Meo, Computech Publication Ltd New Asian; 5th edition 2009

Reference Books:

1. Building Design and drawing, Y.S.Sane, Standard Publisher, 2006
2. National Building Codes (LatestEdition), 2016 by Bureau of Indian Standards (Third Revision)
3. Building Construction, B.C.Punmia, Laxmi Publication, 11th edition, 2016

Course Code: 110303
Course Name: Building Materials & Construction

L	T	P	Credit
3	0	2	4

Course Objectives:

1. To study the properties of concrete ingredients i.e. cement. Sand and coarse aggregate by conducting different tests.
2. To select of different types of admixtures to improve the properties of concrete for different field applications.
3. To conduct the field and laboratory tests on concrete in fresh and hardened state.
4. To provide knowledge about various types of bricks, stones, woods &timber, ferrous&nonferrous construction material & their applications.
5. To provide knowledge on design of foundation, including selection of appropriate foundation.
6. To understand laying & construction of brick & stone masonry and various methods of damp proofing etc.
7. To provide knowledge about stairs, floors & roofs in various types of buildings.

Syllabus:

Unit-I

Types of Foundation& its design: masonry construction, masonry classification, stone v/s brick masonry, joints in stone masonry, brick masonry (bonds in brick masonry, characteristics of bonds, type of bonds), typical structures in brickwork, Damp prevention (causes, effects, control & prevention techniques, material used for damp proofing), Anti termite treatment, water proofing treatment, Arches & lintels, stair & stair case, (types & design of stair case), Types of floor & flooring, Roof & roof covering.

Unit – II

Ingredients of Concrete**:** Portland cement Chemical composition of cement, Hydration of cement, setting of cement, tests on physical properties of cement. Types of Portland cement – Ordinary Portland cement – Rapid Hardening Portland cement – low heat Portland cement- Sulphate Resisting cement – Portland Blast furnace cement- Super Sulphated cement- Portland Pozzolana cement and Pozzolanas: Fly ash; use of pozzolanas, white cement, Expansive cements – High alumina cement.

Aggregates**:** General classification of aggregates, natural and artificial aggregates, particle shape and texture, bond of aggregate, strength of aggregate, Mechanical properties of aggregate, specific gravity, Bulk density, porosity and absorption of aggregate, moisture content of aggregate, Bulking of sand deleterious substances in aggregates, organic impurities. Soundness of aggregates, Alkali-aggregate reaction, Alkali carbonate reaction, sieve analysis – Grading curves, Fineness modulus, Grading requirements, Grading of fine and coarse aggregates and Gap graded aggregates. Thermal properties ofaggregates.

Admixtures**:** Introduction, functions of admixtures, classification of admixtures, Accelerators, Retarders, Water Reducing Agents, Super plasticizers.

Unit-III

Fresh and Hardened Concrete: Fresh Concrete**,** Workability of concrete, factors affecting workability, measurement of workability using slump test, Compaction factor test, Flow test, Vee-Bee Test, Ball penetration test, Nasser's ºK- probe test, Segregation and Bleeding of concrete, Mixing of concrete, Vibration of concrete, Different types of mixers and vibrators. Concreting in Hot weather and Cold weather.

Hardened Concrete**:** Compressive & Flexural strength of concrete, Stress and strain characteristics of concrete, drying shrinkage of concrete, Creep of concrete, Permeability and durability of concrete, Fire resistance of concrete, Thermal properties of concrete. Micro-cracking of concrete, methods of curing, Influence of temperature on strength, Fatigue & Impact strength of concrete.

Unit IV

Bricks (classification, characteristics, manufacturing, testing, and types). Stones (classification, Quarrying, seasoning characteristics, testing, selection & uses, preservation)**,** Wood & Timber (Classification, Structure & characteristics, seasoning and its methods, defects & diseases, preservation & various treatment testing), wood products and their applications

Unit V

Mortar (Classification, characteristics, functions of ingredients). Types of mortar and their uses grout, guniting, ferrous material (Pig iron, CI, Mild steel, wrought iron, stainless steel, compositions & proposition). Reinforced steel bars (classification, types, designation), Aluminium (its alloys & uses). Copper (its alloys & uses), Ceramics (classification, properties, commercial forms), Paint varnishes & enamels (types, composition, method of application, defects)

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Explain the basic elements of buildings, engg. materials & construction.

CO2: Evaluate the properties of various materials like cement, aggregate, concrete, admixture, brick, stone etc.

CO3: Distinguish the suitability of building materials in the construction of elements of buildings.

CO4: Evaluate various types of concrete in building construction accordingly.

CO5: Apply various techniques for finishing & protection works of various elements of building.

Text Books:

1. Concrete Technology, M. L. Gambhir, Tata McGraw Hill education Pvt. Ltd., 5th edition 2013
2. Concrete Technology, M.S. Shetty, S. Chand Publications, 2006
3. Building Materials, M.L. Gambhir, Tata McGraw Hill education Pvt. Ltd., 2017
4. Building Construction, B.C. Punmia, A.K. Jain, Laxmi Publishers New Delhi, 2016

Reference Books:

1. Properties of Concrete, Neville, ELBS, Pearson Education, 5th edition 2012
2. Building Material, S.K. Duggal, New Age Publishers, 4th revised edition 2012

List of Experiments:

1. Determination of properties of cement.
2. Determination of properties of sand.
3. Determination of properties of aggregate.
4. Determination of Fineness of cement.

5. Determination of consistency of cement.
6. Determination of workability of concrete by slump test.
7. Determination of workability of concrete by compacting factor apparatus.
8. Determination of workability by Vee Bee consistometer.
9. Determination of water absorption of bricks.
10. Determination of efflorescence of brick.
11. Field testing on bricks.
12. Determination of crushing strength of bricks.

Upon completion of practical course, the students will be able to:

CO 1: Determine the properties of cement, sand & aggregate as per IS code.

CO 2: Determine the workability of concrete for suitability of concrete mix in different construction works.

CO 3: Evaluate compressive strength of various concrete mixes.

CO 4: Determine physical properties of brick by experiment and practice accordingly.

CO 5: Examine the properties of the cement mortar for various elements of the buildings

Course Code: 110304
Course Name: Surveying

L	T	P	Credit
3	0	2	4

Course Objectives:

1) To understand the working of theodolite.
2) To understand the determination of heights & distances by tacheometry.
3) To understand various types of curves used inpractice.
4) To provide knowledge on setting out civil engineering works & detailed field surveying.
5) To understand the concepts of hydrographic & photographic surveying.

Syllabus:

Unit I

Traversing by theodolite, Fieldwork checks, traverse computations, latitude and departures, computations of co-ordinates, plotting & adjustment of traverse. Omitted measurements. Trigonometrical levelling, precise levelling.

Unit II:Tacheometry

Tacheometric systems and principles, stadia system, uses of anallactic lens, tangential system, substance system, instrument constant, field work reduction, direct reading tacheometers, use of tacheometry, accuracy.

Unit III: Curves:

Classification and use, elements of circular curves, setting out curves by offsets and by theodolites, obstacles and special problems, compound curves, reverse curves, transition curves, cubic spiral and lemineiscate, vertical curves, computation and setting out.

Unit IV: Control Surveys:

Providing frame work of control points, triangulation principle, forms of framework, reconnaissance survey, selection and making of stations, Control line, baseline measurement & corrections, flexible apparatus and corrections, computation of sides, precisetraversing.

Unit V: Photographic & Hydrographic Surveying:

Principles of photographic surveying – aerial photography, tilt and height distortions, uses. Hydrographic Surveying - Methods, Elements of Hydrographic Surveying.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Explain the techniques used for linear & angular measurements in surveying.
CO2: Analyse different geodetic methods of survey such as triangulation, trigonometric levelling, tachometry, photographic & hydrographic surveying.
CO3: Apply methods in control surveys.
CO4: Apply tachometry in traverse computations.
CO5: Apply various methods for setting curves, area & volume computations.

Text Books:

1. Surveying Vol. I, II, III, B.C. Punmia, Laxmi Publications New Delhi, 2016
2. Fundamentals of surveying, S.K. Roy, Prentice Hall of India New Delhi, 2nd edition1999

Reference Books:

1. Surveying theory & Practice, R.E. Devise, McGraw Hill, New York, 4th revised edition 2001
2. Plane & Geodetic surveying Vol. I & II, David Clark & J Clendinning, Constable & C. London, 2017
3. Surveying Vol. I & II, K.R. Arora, Standard book House, New Delhi, 13th edition 2016

List of Experiments:

1. Measurement of horizontal and vertical angle by Vernier Theodolite.
2. Theodolite, traversing.
3. Determination of R.L. of a point whose base is accessible by Trigonometrical levelling.
4. Determination of R.L. of a point whose base is inaccessible by Trigonometrical levelling.
5. Determination of tachometric contents in field.
6. Determination of height & distance by using Tangential tachometry
7. Determination of height & distance by Stadia method of tachometry.
8. Measurement of base line by using Substance Bar.
9. Setting out of a simple circular curve by using Rankine's method.
10. Setting out of a simple circular curve by using Offset from the chord produced or deflection distance.
11. Determination of horizontal &vertical position of a point by Total Station.
12. Traversing by Total Station.

Upon completion of practical course, the students will be able to:

CO 1: Follow the guidelines for field surveying.
CO 2: Follow the working principles of survey instruments for measurements.
CO 3: Measure horizontal & vertical angle by theodolite for traversing and levelling.
CO 4: Determine tachometric constants for linear measurements by tacheometry.
CO 5: Create a simple circular curve by using Rankine's method for alignment

Course Code: 110305
Course Name: Strength of Materials

L	T	P	Credit
3	0	2	4

Course Objectives:

1) To understand the concepts of simple and compound stresses and strains.
2) To understand the behaviour of elastic materials in bending, shear and torsion.
3) To understand the stability behaviour of long columns under axial load.
4) To understand the power transmission by shift.
5) To understand stresses & strain developed in storage vessels
6) To calculate stresses / strain in statically indeterminate structures.

Syllabus:

Unit-I

Stress and Strains: Concept of Elastic body, stress and strain. Hooke's law various types of stress and strains. Elastic constants and their relation Stresses in compound bars, composite and tapering bars, temperature stresses.

Two-dimensional stress system.Normal and tangential stresses, Principal Planes, Principal Stresses and strains. Mohr's circle of stresses. Strain energy and theories of failure.

Unit - II

Theory of simple bending: Concept of pure bending and bending stress, equation of bending, Neutral axis, Section-Modulus, Bending stress distribution across a section, Shear Stresses in Beams, beams of uniform strength, shear centre.

Unit-III

Torsion of Shafts: Concept of pure torsion, Torsion equation, Determination of shear stress and angle of twist of shafts of circular section, Hollow circular shafts. Combined bending and torsion. Open and closed springs, leaf spring and spiral spring.

Pressure Vessels: Thin cylinders and spheres. Stress due to internal pressure. Change in diameter and volumes.

Unit-IV

Columns and Struts: Euler's buckling load for uniform section, various end conditions. Slenderness Ratio.Merchant Ranking formulae, Eccentric loading on columns.

Unit-V

Deflection of statically determinate structure by Geometrical methods & Introduction of method of virtual work.

Course Outcomes:

Upon completion of the course, the students will be able to:

- **CO1: Explain** the concepts of stress, strains, bending, deflection, buckling & torsion.
- **CO 2: Explain** various theories for determining stress, buckling of columns & deflections of structures.
- **CO 3: Apply** various theories for determining stress, buckling of columns & deflections of structures.

CO4: Evaluate the stresses in bending, shear and torsion.
CO5: Analyse various sections for stresses, strain, bending, torsion, buckling & deflections.

Text Books:

1. Strength of Materials, Sadhu Singh, Khanna Publishing, 1st edition 2016
2. Strength of Materials, S. Ramamrutham, R. Narayanan, Dhanpat Rai Publishing Company, 18th edition 2014
3. Strength of Materials, R. K. Bansal, Laxmi Publication; 6th edition 2018

Reference Books:

1. Strength of Materials, Timoshenko, Publisher CBS, 3rd edition 2004
2. Strength of Materials, HigdonStyle, Publisher Wiley, 3rd edition 1978
3. Strength of Materials Vol. I& II, B.C. Punmia, Laxmi Publication, 10th edition 2018
4. Mechanics of Materials, R.C. Hibbler, Pearson Publication, 2016
5. Mechanics of Materials, J. M. Gere & B.J. Goodno, Cengage Publisher, 8th edition 2014

List of Experiments:

1. Impact Test
2. Brinell Hardness Test
3. Behaviour of columns with Different End Conditions
4. Tensile test
5. Compression test
6. Flexure test
7. Shear test
8. Spring test
9. Torsion test
10. Verification of Maxwell's Reciprocal Theorem.
11. Bending of Beam (One Point loading only).
12. Bending of Beam (Two Point loading only).

Upon completion of practical course, the students will be able to:

CO1: Evaluate properties of material by impact test.
CO2: Evaluate properties of material by hardness test.
CO3: Evaluate properties of material by tensile test.
CO4: Determine compressive & flexural strength of materials.

Course Code: 110306
Course Name: Software Lab

L	T	P	Credit
0	0	2	1

Course Objectives:

1) To draw plan, elevation & section of various components of a building.
2) To prepare sketches of various components of building like doors, windows etc.
3) To expose students to use software's like AutoCAD in civil engineering drawing.

Syllabus:

List of Experiments:

1. One drawing sheet containing Foundations and Footing using AutoCAD
2. One drawing sheet containing Doors, Windows, Ventilators using AutoCAD
3. One drawing sheet containing Lintels, Trusses and Arches etc. using AutoCAD
4. One drawing sheet containing detailed planning of one room residential building
5. One drawing sheet containing detailed planning of multi rooms residential building
6. Drawing sheets one each of residential building using AutoCAD
7. One Drawing sheet of Institutional building using AutoCAD
8. One Drawing sheet of Commercial building using AutoCAD
9. One Drawing sheet of Hospital building using AutoCAD
10. Sketches of various building components i.e. masonry, brick / stone
11. Sketches of various building components i.e. floors, roof & roof covering
12. Sketches of various building components i.e. staircase

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Attempt to draw different components of a building.

CO2: Produce plan, elevation & section of various components of a residential and institutional building.

CO3: Use AutoCAD software in civil engineering drawing.

CO4: Prepare drawing sheets of various types of buildings like residential, institutional, commercial etc

Course Code: 110307
Course Name: Self Learning / Presentation

L	T	P	Credit
0	0	2	1

Course Objectives:

1) To encourage students to read, study & understand different topics of civil engineering published in articles,literatures.
2) To help in presenting different topics of civil engineering and related subjects to supplement theoretical knowledge gained in class.
3) To make student acquire good oral & written communication skills.
4) To promote the habit of lifelong learning.
5) To prepare students develop adequate soft skills to be able to present their topic effectively to listeners.

Syllabus:

1. Any relevant topic related to civil engineering from within or beyond the syllabus through Swayam / NPTEL /MOOC.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Analyze contemporary issues in civil engineering & its allied areas through literature survey.
CO2: Distinguish state of art & relevance of the topic in national & international arena.
CO3: Demonstrate good oral & written communication skills.
CO4: Develop poster and power point presentations for effective communication.
CO5: Display lifelong learning.

Course Code: 110308
Course Name: Summer Internship Project - I

L	T	P	Credit
0	0	4	2

Course Objectives:

1) To encourage students to read, study & understand different topics of civil engineering published in articles,literatures.
2) To make student acquire good oral & written communication skills.
3) To promote the habit of lifelong learning.

Syllabus:

Each candidate shall have to undergo 15 days in-house summer internship at the institute after the completion of their 2nd Semester exams (in summer vacations). Candidate can choose from various modules which are offered by the institute and after successful completion of internship they have to submit detailed report.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Observe various activities in field.
CO2: Examine the utility of general and specific equipments for construction.
CO3: Differentiate the construction projects individually and in team.
CO4: Develop the writing and communication skills for various engineering problems.
CO5: Adapt lifelong learning for benefit of society.

SEMESTER-IV

Course Code: 110402
Course Name: Geotechnical Engineering

L	T	P	Credit
2	1	2	4

Course Objectives:

1) To inculcate the basic knowledge of soil such as its identification and classification, determination of various engineering properties and its suitability as a foundation/ subgrade material.
2) To develop an understanding of the relationships between physical characteristics and mechanical properties of soils by experimentally measuring them.
3) To explain role of water in soil behaviour and how soil stresses, permeability and quantity of seepage including flow net are estimated.
4) To determine shear parameters and stress changes in soil due to foundation loads & estimate the magnitude and time-rate of settlement due to consolidation.
5) To apply the principles of soil mechanics in stability analysis of slopes and settlement calculations.
6) To explain various types of foundations.

Syllabus:

Unit-I Basic Definitions & Index Properties:

Introduction–Types of soils, their formation and deposition, Definitions: soil mechanics, soil engineering, rock mechanics, geotechnical engineering. Scope of soil engineering. Basic Definitions and their relationships - Soil as three-phase system, Index properties and their determination. Consistency limits. Classification systems based on particle size and consistency limits.
Clay mineralogy & their Influence on engineering behavior, Expansive soils, their Characteristics & Challenges.

Unit-II Permeability, Seepage and Consolidation:

Darcy's law & its validity, Determination of coefficient of permeability: Laboratory methods: constant-head & falling-head method. Effective and total stresses, Effect of water table & capillary action. Seepage pressure, Quick sand condition.
Compressibility and consolidation, Relationship between pressure and void ratio, Theory of one-dimensional consolidation. Consolidation tests, Fitting of curves. Normally and over consolidated clays.Determination of consolidation pressure settlement analysis.Calculation of total settlement.

Unit-III Stress Distribution in Soils and Shear Strength of Soils:

Stress distribution beneath loaded areas by Boussinesq and Westerguard's analysis. Newmark's influence chart. Contract pressure distribution.
Mohr – Coulomb's theory of shear failure of soils, Mohr's stress circle, Measurement of shear strength, Shear box test, Triaxial compression test, unconfined compression test, Value shear test, Measurement of pore pressure, pore pressure parameters, critical void ratio, Liquefaction.

Unit – IV Stability of Slopes & Earth Pressure:

Infinite and finite slopes.Types of slope failure, Stress path. Stability curves. Effect of ground water, Analytical and graphical methods of stability analysis.
Earth Pressure at active, passive and at rest conditions. Rankine, Coulomb, Terzaghi and Culmann's

theories. Analytical and graphical methods of determination of earth pressures on cohesionless and cohesive soils. Effect of surcharge, water table etc

Unit – V Soil Foundations

Shallow Foundation - Types of foundations. Bearing capacity of foundation on cohesionless and cohesive soils.General & local shear failures.Factors affecting bearing capacity.Theories of bearing capacity – Terzaghi, Vesic, Skempton, Meyerhof and I.S. code on bearing capacity.

Deep Foundation - Pile foundation, Types of piles, estimation of individual and group capacity of piles in cohesionless and cohesive soils. Static and dynamic formulae. Settlement of pile group, Negative skin friction. Under Ream Piles, Plate load test

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Evaluate different properties of soil, types of foundations and its classification.

CO 2: Examine the flow and shear parameters & their effects on various types of soil.

CO 3: Determine the stress distribution & shear strength parameters of soil by various methods.

CO4: Analyse the stability of slopes, earth pressures & retaining walls using analytical methods.

CO 5: Evaluate suitable foundation system for various siteconditions.

Text Books:

1. Soil Mech. & Found. Engg., Dr. K. R. Arora, Std. Publishers Delhi, 7th edition 2014
2. Soil Mech. & Foundation, Dr. B. C. Punmia, Laxmi Publications, Delhi, 16th edition 2017
3. Soil Mech. & Found Engg., S. K. Garg, Khanna Publishers, Delhi, 1st edition, 2003
4. Basic & Applied Soil Mechanics, GopalRanjan, New Age International Publisher, 2016

Reference Books:

1. Modern Geotech Engg., Dr. Aram Singh, IBT Publishers, Delhi, 8th edition, 2016
2. Geotech Engg., C. Venkatramaiah, New Age International Publishers, Delhi, 16th edition, 2018
3. Soil Testing for Engg.,T.W. Lambe, John Wiley & Sons. Inc., 1969

List of Experiments:

1. Moisture Content Determination. Oven Drying Method.
2. Grain Size Analysis – Mechanical Method.
3. Grain Size Analysis – Hydrometer Method.
4. Liquid & Plastic Limit Tests.
5. In-Place Density tests – Core Cutter Method, Sand Replacement Method.
6. Specific Gravity Tests.
7. Permeability Tests, Variable Head Method.
8. Compaction Test.
9. Unconfined Compression Test.
10. Direct Shear Test.
11. Triaxial Shear Test (Demonstration)
12. Vane Shear Test.

Upon completion of practical course, the students will be able to:

CO 1: Check physical properties ofsoil.

CO 2: Check strength properties ofsoil.

CO 3: Differentiate the flow properties and stresses of soil.

CO 4: Check shear strength of soil.

Course Code: 110403
Course Name: Fluid Mechanics - I

L	T	P	Credit
2	1	2	4

Course Objectives:

1) To understand fluid properties and concept of fluidcontinuum.
2) To understand the concepts of kinematics & dynamics of fluidflow.
3) To apply fluid flow principles to various fluid flowproblems.
4) To understand the mechanism of fluidmeasurement.
5) To understand the method of simulation & dimensionalanalysis.
6) To understand the concepts of laminarflow.

Syllabus:

Unit I

Review of Fluid Properties: Engineering units of measurement, density, specific weight, specific volume, specific gravity, surface tension, capillary, viscosity, bulk modulus of elasticity, pressure and vapour pressure.

Fluid Statics: Pressure at a point, pressure variation in static fluid, Absolute and gauge pressure, manometers, Forces on plane and curved surfaces (Problems – gravity dams and Tainter gates), buoyant force, Stability of floating and submerged bodies, Relative equilibrium.

Unit II

Kinematics of Flow: Types of flow-ideal & real, steady and unsteady, uniform & non-uniform, one, two and three dimensional flow, path lines, streamlines, streamlines and stream tubes, continuity equation for one and three dimensional flow, rotational &irrotational flow, circulation, stagnation point, separation of flow, sources & sinks, velocity potential, stream function, flownets-their utility & method of drawing flownets.

Unit III

Dynamics of Flow: Euler's equation of motion along a streamline and derivation of Bernoulli's equation, application of Bernoulli's equation, energy correction factor, linear momentum equation for steady flow, momentum equation, forces of fixed and moving vanes, velocity triangles.

Fluid Measurements: Velocity measurement, flow measurement (Orifices, nozzles, mouth pieces, orifice meter, Nozzle meter, venturimeter, weirs and notches).

Unit IV

Dimensional Analysis and Hydraulic Similitude: Dimensional analysis, dimensional homogeneity, use of Buckingham-pie theorem, calculation of dimensionless numbers, similarity laws, specific model investigations (submerged bodies, partially submerged bodies, weirs, spillways, etc.)

Unit V

Laminar Flow: Introduction to laminar, transition & turbulent flow, Reynolds experiment & Reynolds number, relation between shear & pressure gradient, laminar flow through circular pipes, laminar flow between parallel plates, laminar flow through porous media, stokes law, Bach wash processing, Instability of laminar flow to turbulent flow.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Define various fluid properties & states of fluid.
CO 2: Apply principles of fluid flow & dimensional analysis.
CO 3: Solve fluid flow problems.
CO 4: Analyze characteristics of fluid at rest, fluid at motion & dimensionless numbers.
CO 5: Discriminate different types of fluid flow, measurement techniques & principles.
CO 6: Apply the concepts of laminar flow in solving various fluid flowproblems.

Text Books:

1. Fluid Mechanics, Modi& Seth, Standard Book House, Delhi, 21st edition, 2018.
2. Fluid mechanics, Girde & Mirazgaonkar, SCI Tech Publishers, 2019
3. Fluid Mechanics, R.K. Bansal, Laxmi Publishers, 2015

Reference Books:

1. Fluid Mechanics, A.K. Jain, Khanna Publishers, Delhi,2014
2. Fluid Mechanics, Streeter, McGraw Hill Publishers, 9th edition,2017

List of Experiments:

1. Determination of viscosity of fluid by redwood viscometer
2. Determination of metacentric height of floating body
3. Calibration of Venturimeter
4. Determination of Cc, Cd, Cv of Circular Orifice
5. Calibration of Mouthpiece
6. Calibration of Orifice Meter
7. Reynolds experiment for demonstration of stream lined & turbulent flow
8. Determination of Friction Factor for apipe
9. Verification of Stoke's law.

Upon completion of practical course, the students will be able to:

CO 1: Differentiate between different flow measurements devices.
CO 2: Notice flow through pipes & fall velocity of particle.
CO 3: Correct the instrumental errors.
CO 4: Apply Stoke's law to calculate terminal velocity.

Course Code: 110404
Course Name: Structural Analysis

L	T	P	Credit
3	1	0	4

Course Objectives:

1) To develop an understanding of the behavior of structure under serviceability load.
2) To understand the mechanics of the material behavior of different type of structures.
3) To understand the concepts of analysis of indeterminate structures by various classical methods.
4) To make student aware of different methods of structural analysis.

Syllabus:

Unit-I

Deflection of beams: Double Integration method. Area Moment Method and Slope - Deflection Method. Beam of variable cross section, M/EI diagram, Conjugate Beam Method.

Unit-II

Virtual work and Energy Principles: Principles of Virtual work applied to deformable bodies. Maxwell's Reciprocal theorems, Energy theorems, Application to pin jointed frames only.

Unit – III

Indeterminate Structures –I: Static and Kinematics indeterminacy, Analysis of Fixed and continuous beams by Theorem of three moments, Effect of sinking and rotation of supports**.**

Unit-IV

Indeterminate Structures – II**:** Analysis of beams and analysis of frames (with and without sway) by slope Deflection method.

Unit-V

Moment Distribution Method: Moment distribution method for analysis of beams and analysis of frames (without sway) Three hinged arches of different shapes, Eddy's Theorem. Two Hinged and Fixed Arches.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Classify different type of structures based on support conditions.
CO 2: Explain various methods & principles for analysis of structures.
CO 3: Apply various methods & principles for structuralanalysis.
CO 4: Analyse various structures using various methods, principles & theorems.
CO 5: Evaluate different methods of structural analysis.

Text Books:

1. Basic Structural Analysis, Reddy C. S., Tata McGraw Hill Publishing Company, 2017
2. Theory of Structures, S. Ramamrutham, R. Narayanan, Dhanpat Rai Publications, 9th edition, 2014
3. Theory of Structures, B.C. Punmia, Laxmi Publications, 2017

Reference Books:

1. Structural Analysis – A Unified classical and matrix Approach, Ghali A & Neville M, Chapman and Hall, New York, 6th edition, 2009

2. Intermediate structural analysis, Wang C.K., McGraw Hill, New York, 1984
3. Structural Analysis, Aslam Kassimali, C. L. Publisher, 2014
4. Structural Analysis, R. C. Hibbler, Pearson Publication, 2017

Course Code: 110406
Course Name: Water Resources Engineering

L	T	P	Credit
3	1	0	4

Course Objectives:

1) To understand the water requirements of various types of crops.
2) To understand the different types of irrigation systems.
3) To plan the reservoir systems as per the requirements.
4) To understand the concepts of Khosla's and Bligh's theory & its applications.
5) To understand the concepts of Lacey's and Kennedy theory for design of canal systems.
6) To develop an understanding of various components of hydrological cycle, their behaviors & factors affecting it & solve problems on measurement on rainfall, infiltration, evaporation.
7) To understand concepts of Hydrometry & ground water hydrology.
8) To discuss the importance of estimation of runoff, analysis of rainfall data and various hydrographs and analyze various problems off runoff using various hydrograph theories.
9) To develop an understanding of various methods of flood estimation in general & flood frequency.

Syllabus:

Unit-I Irrigation Water Requirement and Soil Water Crop Relationship:

Irrigation, Definition, Necessity, Advantages and disadvantages, Type and methods, Irrigation development.

Soil: Types and their occurrence, Suitability for irrigation purposes, Wilting, Coefficient and field capacity, Optimum water supply, Consumptive use and its determination. Irrigation methods - surface and subsurface, Sprinkler and drip irrigation.

Duty of water, factors affecting duty and methods to improve duty, Suitability of water for irrigation, Crops and crop seasons, Principal crops and their water requirement, Crop ratio and crop rotation, Intensity of irrigation, Water logging-causes, effects & its prevention.

Unit – II Reservoir Planning and Canal Irrigation

Types of reservoir, Reservoir planning, Estimation of storage capacity by mass curve analyses, Economical height of dam, Reservoir sedimentation, Canal systems, Planning and layout of canal systems, Regime concept and tractive force method of channel design, Channel losses, Design of unlined and lined canals, Kennedy's and Lacey's silt theories, Typical canal section, Water-logging: Causes and effects, Remedial measures, Salinity, Land reclamation and Drainage.

Unit – III Diversion works and Canal Regulation Structures

Elements of diversion works, Type of weirs and barrages, Weir design for surface and sub-surface flow, Bligh's, Lane's and Khosla's theories, Silt excluders and Silt ejectors.

Canal regulation structure like Head & Cross regulations, falls, Escapes, Outlets, Their Need, Functions sketches.

Unit – IV

Hydrology: Definition, Hydrological Cycle, Precipitation, Evaporation, Infiltration, Runoff, Estimation of Runoff, Empirical Formulae, Rainfall-Runoff relationships, Hydrometry, Methods of Stream Gauging, Rating Curves, Ground Water: Elements of Ground water Hydrology, Well Hydraulics, Equations of Ground Water flow, Solutions and applications.

Unit - V

Hydrographs & Hyetographs, Hydrographs analysis, Unit Hydrographs, Methods of constructing, Unit Hydrographs, S-curve Hydrograph, Synthetic unit Hydrograph, Flood and its estimation by different methods.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Analyse various requirements for an efficient irrigation project.
CO 2: Design different components of irrigation system using different theories.
CO 3: Plan an efficient, economical & safe irrigation system.
CO 4: Explain the concept of hydrology and hydrograph
CO 5: Apply basic principles for measurement & forecasting of rainfall & runoff.
CO 6: Analyse runoff hydrograph by various methods.

Text Books:

1. Engineering. Hydrology, K. Subhramanya, Tata McGraw Hill Publ. Co. 4th edition, 2013
2. Hydrology & Water Resources Engineering, S. K. Garg, Khanna Publishers, 2016
3. Irrigation Engineering & Hydraulic Structures, Santosh Kumar Garg, Khanna Publishers, 2017
4. Irrigation, Water Power & Water Resources Engg., K.R. Arora, Standard Publishers Distributors, 2010

Reference Books:

1. Engineering. Hydrology, J. NEMEC, Prentice Hall, 1972
2. Hydrology for Engineers, Linsley, Kohler, Paulnus, Tata Mc GrawHill, 2014
3. Engineering Hydrology, H. M. Raghunath, New Age International Publishers, 5th edition, 2015.
4. Irrigation, Water Resources & Water Power, Dr. P.N. Modi, Standard Book House, 9th edition, 2014
5. Irrigation Engineering by Varshney & Gupta, Vol I & II, Nemchand Publishers, 2007.

Course Code: 110407

Course Name: Survey Practice Lab

L	T	P	Credit
0	0	6	3

Syllabus:

Field Work:

1. Profile leveling & cross sectioning of road.
2. Method of Reciprocal Levelling
3. Prepare contour map by Grid Pattern Method
4. Prepare contour map by using Tachometric method
5. Locating details by Plane Table surveying
6. Resection by Two point problem
7. Resection by Three point problem
8. Setting out of simple circular curves by Rankine's Method
9. Setting out of simple curves by offset from chord procedure.
10. Triangulation – Adjustment of quadrilateral by least square method
11. Determination of coordinates of a location using Total Station
12. Levelling using Total Station

Upon completion of the course, the students will be able to:

CO 1: Observe topographical characteristics.
CO 2: Differentiate methods to perform ground survey.
CO 3: Prepare longitudinal & cross section profiles
CO 4: Develop contour map by using tachometer & total station.
CO 5: Prepare the details of features using Plane table surveying.
CO 6: Produce a simple circular curve by using Rankine's method for alignment.

Reference Books:

1. Surveying Vol. I, II, III, B.C. Punmia, Laxmi Publications New Delhi, 2015
2. Surveying Vol. I & II, K.R. Arora, Standard book House, New Delhi, 2015
3. Surveying theory & Practice, R.E. Devise, McGrawHill, NewYork, 1997
4. Fundamentals of surveying, S.K. Roy, Prentice Hall of India New Delhi, 2nd edition, 2010

SEMESTER-V

Course Code: 110501
Course Name: Estimating Costing & Contracting

L	T	P	Credit
3	1	0	4

Course Objectives:

1) To work out the quantities of various items of civil works like buildings, culverts including steel girders etc.
2) To compute earthwork.
3) To understand detailed specifications and carry out analysis of rates.
4) To understand various methods of carrying out estimation.
5) To understand valuation process &fixation of rent.
6) To understand contracting procedures.

Syllabus:

Unit I Introduction of Estimating:

Purpose and importance of estimates, principles of estimating, methods of taking out quantities of items of work.Mode of measurement, measurement sheet and abstract sheet, bill of quantities. Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.

Unit II: Details of Items:

Specifications of materials and works: Types of Specifications, General specifications for Class A, B & C type of building, Detailed specifications of important items of work.

Rate Analysis: Task for average artisan, various factors involved in the rate of item, material and labour requirement for various trades, preparation for rates of important items of work, current schedule of rates (C.S.R)

Unit III: Estimates

Preparing detailed estimates of various types of buildings, R.C.C Works, Culverts, earth work calculations for roads and Canals, contingencies and work charge establishment, use of computational tools for preparing estimates.

Unit IV: Valuation

Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate of interest, methods of valuation, rent fixation of buildings

Unit V: Contracting

Contract, Types of engineering contract, essentials documents of engineering Contract, Conditions of contract, Earnest Money Deposit, Security Deposit, Responsibility of Engineer, Contractor & Client.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the fundamentals of quantity estimation, costing & contracting.

CO 2: Apply methods to estimate area, volume & cost.

CO 3: Evaluate mathematical & numerical models for rate & quantity estimation.

CO 4: Determine rates & value.

CO 5: Classify different rates of items, contracts & measurement techniques.

Text Books:

1. Estimating & costing in civil engineering, B.N. Dutta, UBS Publishers, 28th revised edition 2016
2. Estimating & Costing, S.C. Rangwala, Charotar Publishing House, 17thedition 2017

Reference Books:

1. Estimating & Costing for Civil Engg., G.S. Birdie, Dhanpat Rai Publications, 6thedition 2014
2. Estimating & Costing specification & valuation in civil engineering, M. Chakraborti, 2006

Course Code: 110502 (For 2019 admitted Batch)

Course Name: Structural Design & Drawing (R.C.C.)

L	T	P	Credit
3	1	0	4

Course Objectives:

1) To understand various design philosophies for RC components.
2) To study the desired properties of steel and concrete for use in Reinforced concrete.
3) To learn design of RC elements for flexure and deflection.
4) To learn design of RC elements for shear and bond as per relevant IS codes.
5) To learn design of RC elements subjected to compression.

Syllabus:

Unit-I

Design principles: Materials; Introduction to IS 456; Design philosophies: Working stress, Ultimate load and Limit state design

Singly reinforced beam sections: Analysis and design of singly reinforced rectangular beams: Lintel, Cantilever, Simply supported beams; Design for deflection.

Unit-II Design of Beams:

Design for Shear; Design for bond; Doubly-reinforced and Flanged sections; Design of Continuous beams

Unit-III Design of Slabs:

Slabs spanning in one direction: Cantilever, Simply supported and Continuous slabs; Slabs spanning in two directions; Circular slabs.

Unit-IV Columns & Footing:

Design of short columns subjected to axial loads, axial load and bending moments (section with no tension); Design of long columns; Introduction to IS 13920; Design of isolated and combined footings.

Unit-V Staircases:

Design of Staircases with waist slab: straight flight, dog legged, and open well staircase with different support conditions; Design of Tread-riser (without waist slab) staircase.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Apply the concepts of different design philosophies for deriving basic expressions used in RC design.

CO2: Determine the capacity of RC elements using IS456 guidelines.

CO3: Analyze the RC elements for determining design variables as per IS456 & IS 875 recommendations.

CO4: Design the RC elements as per IS 456 provisions.

CO5: **Develop** the design sketches for RC elements as per IS456; IS13920 and SP34 provisions.

Text Books:

1. Reinforced Concerete Limit State Design, A.K. Jain, Nem Chand Pub.,7th edition, 2012
2. Reinforced Concrete, Pillai & Menon, Tata McGraw Hill, New Delhi, 3rd edition, 2017
3. Limit State Design, P.C. Varghese, Prentice Hall of India, New Delhi, 2nd edition, 2008
4. RCC Design, Neelam Sharma, Katson Publishers, 2014

Reference Books:

1. Reinforced Cement Concrete, P. Dayaratnam, Medtech Publishers, 5th edition, 2017.
2. Reinforced Concrete Design, S.N. Sinha, Tata McGraw Hill, 3rd edition, 2017
3. Plain and Reinforced Concrete, O.P. Jain and Jai Krishna, Nem Chand Pub.,8th edition, 2008
4. Reinforced Cement Concrete, Winter & Nelson, McGraw Hill, 11th edition, 1991

Course Code: 110502 (For 2018 Admitted Batch)

Course Name: Structural Design & Drawing (R.C.C.)

L	T	P	Credit
3	1	0	4

Course Objectives:

1) To understand the behavior of reinforced concrete components & systems subjected to gravity loads.
2) To study the stress strain behavior of steel and concrete.
3) To understand the concept of working stress & limit state method.
4) To provide knowledge on limit state design of beams, design for flexure, shear, torsion, bond & anchorage as per relevant IScodes.
5) To provide knowledge on design of slabs, columns, footings & staircases as per relevant IScodes.

Syllabus:

Unit-I Basic Principles of Structural Design:

Mechanism of load transfer, Introduction to working stress limit state and ultimate load methods of design. Introduction of IS Codes 456, 13920.

Design of Beams: Analysis and design of singly reinforced rectangular beams, Lintel, Cantilever, Simply supported and continuous beams.

Unit-II Design of Beams:

Doubly reinforced and Flanged Beam. Design for Shear and design for bond.

Unit-III Design of Slabs:

Slabs spanning in one direction, (Cantilever, Simply supported and Continuous slabs); Slabs spanning in two directions, Circular slabs.

Unit-IV Columns & Footing:

Short and long columns. Columns subjected to axial loads and bending moments (section with no tension). Isolated and combined footings, Strap footing. Raft foundation.

Unit-V Staircases:

Staircases with waist slab having equal and unequal flights with different support conditions, Tread-riser staircase.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Compare various design principles as applicable for design of RCC structures.

CO 2: Apply the concepts of working stress method & limit state method on RCC structures.

CO 3: Apply recommendations of SP 34 for detailing

CO 4: Analyse a given section of RCC structural elements using limit state method.

CO 5: Design different elements of RCC structures like beam, slab, column, footing, staircase using IS codes.

Text Books:

1. Reinforced Concerete Limit State Design, A.K. Jain, Nem Chand Pub.,7th edition, 2012
2. Reinforced Concrete, Pillai & Menon, Tata McGraw Hill, New Delhi, 3rd edition, 2017
3. Limit State Design, P.C. Varghese, Prentice Hall of India, New Delhi, 2nd edition, 2008
4. RCC Design, Neelam Sharma, Katson Publishers, 2014

Reference Books:

1. Reinforced Cement Concrete, P. Dayaratnam, Medtech Publishers, 5th edition, 2017.
2. Reinforced Concrete Design, S.N. Sinha, Tata McGraw Hill, 3rd edition, 2017
3. Plain and Reinforced Concrete, O.P. Jain and Jai Krishna, Nem Chand Pub.,8th edition, 2008
4. Reinforced Cement Concrete, Winter & Nelson, McGraw Hill, 11th edition, 1991

Course Code: 110503

Course Name: Fluid Mechanics - II

L	T	P	Credit
2	1	2	4

Course Objectives:

1) To develop an understanding of fluid flows patterns and learnto use boundary layer theory anddrag.
2) To apply theories of laminar & turbulent flow to solve typical pipe flow problems in thefield.
3) To apply boundary layer theory to estimate drag &lift for various shapes of theobjects.
4) To classify the types of flows in open channel and also to design open channel sections in a most economical fashion with minimum wetted perimeter and learn about criticalflows.
5) To study about non uniform flows in open channel and longitudinal slopes in open channel and also to learn about the characteristics of hydraulicjump.
6) To understand design philosophy of various types of pumps &turbines.

Syllabus:

Unit-I

Turbulent Flow: Laminar and turbulent boundary layers and laminar sub layer, hydro dynamically rough boundaries, velocity distribution in turbulent flow, Resistance of smooth and artificially roughened pipes, Commercial pipes, aging of pipes.

Pipe Flow Problems: Losses due to sudden expansion and contraction, losses in pipe fittings and valves, Concepts of equivalent length, Hydraulic and energy gradient lines, Siphon, Pipes in series, in parallel, Branching of pipes.(Hardy Cross method)

Pipe Network: Water hammer (only quick closure case) transmission of power.

Unit - II Forces on immersed bodies:

Introduction, Force Exerted by a flowing fluid on a stationary body, Expression for Drag & Lift, Drag on a sphere, Terminal velocity of a Body, Drag on a cylinder. Introduction to Development of Lift on a Circular Cylinder and an Airfoil

Unit – III Uniform Flow in open Channels:

Channel geometry and elements of channel section, Velocity distribution, Energy in open channel flow, Specific energy, Types of flow, Critical flow and its computations, Uniform flow and its computations, Chezy's and Manning's formulae, Determination of normal depth and velocity, Normal and critical slopes, Economical sections.

Unit - IV Gradually varied flow

Basic assumptions and dynamic equations of gradually varied flow, characteristics analysis and computations of flow profiles, rapidly varied flow-hydraulic jump in rectangular channels and its basic characteristics, Surges in open channels, Energy Dissipators.

Unit - V Introduction to Fluid Machinery: Turbines & Pumps

Turbines: Classifications, definitions, Similarity laws, Specific speed and unit quantities, Pelton turbine – their construction and settings, Speed regulation, Dimensions of various elements. Action of jet, Torque, Power and efficiency for ideal case, Characteristics curves. Reaction turbines construction & setting, Draft tube theory, Runaway speed, Simple theory of design and characteristic curves, Cavitation.

Pumps: Principle of working & criteria for selection of different types of pump, viz. Centrifugal, Reciprocating.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Differentiate different types of fluid flow & fluid machinery.

CO 2: Describe principles of analysis of fluid flow problem.

CO 3: Explain basic principles for measurement of different forces acting on fluid body.

CO 4: Analyse pipe flow, open channel flow problems & various characteristics of hydraulic machines.

CO 5: Design open & closed conduit systems.

Text Books:

1. Fluid Mechanics, Modi & Seth, Standard Book house, Delhi, 21st edition, 2017
2. Open Chanel Flow, K. Subramanya, Tata McGraw Hill, New Delhi, 5th edition, 2019

Reference Books:

1. Open Channel Flow, Rangaraju, Tata Mc Graw Hill Publishing Comp. Ltd., New Delhi, 1st edition, 2001
2. Fluid Mechanics, A.K. Jain, Khanna Publishers, Delhi, 1988
3. Fluid Mechanics, Hydraulics & Hydraulic Mechanics, K.R. Arora, Standard Publishers, 2009
4. Open Channel Hydraulics, Chow V.T., McGraw Hill, New York, 57th edition, 2009

List of Experiments:

1. To determine the performance characteristics of Pelton Wheel.
2. To determine the performance characteristics of Francis Turbine.
3. To determine the performance characteristics of Kaplan Turbine.
4. Calibration of multistage (Two) Pump & Study of characteristics of variable speed pump.
5. To determine the coefficient of discharge for rectangular notches.
6. To determine the coefficient of discharge for triangular notches.
7. To determine the characteristics of the Reciprocating pump at variable speed.
8. To prepare the calibration curve for rotameter.

Upon completion of the course, the students will be able to:

CO 1: Differentiate between turbines & pumps.

CO 2: Select the efficient turbines by studying the performance characteristics of various turbines.

CO 3: Distinguish the performance characteristics of various pumps.

Course Code: 110509
Course Name: Environmental Engineering

L	T	P	Credit
2	1	2	4

Courses Objectives:

Students will be able to understand

1) The structure of drinking water supply systems, including water transport, treatment and distribution.
2) Water quantity and water quality criteria and standards, and their relation to public health.
3) Operation and maintenance of water supply system components.
4) How to estimate water requirement of a city.
5) How to design water treatment plant for urban & rural areas.
6) How to design water distribution network including pipe appurtenances.
7) To impart basic knowledge on sewerage system including estimation of sewage quantity and design of sewer.
8) To provide a broad knowledge on sewage composition and its characteristics.
9) To provide information on disposal standard of effluents and also about various methods of sewage disposal.
10) To provide broad knowledge on various techniques of sewage treatment including and advanced treatment process.

Syllabus:

Unit-I

Water demand (types, variation, factors affecting it), Design period, Population forecasting methods, Intake structures (location, types), Characteristics of water, Water borne diseases, IS Standard of drinking water.

Unit-II

Water treatment plant flow diagram, Design, construction and working of Screens, Plain sedimentation tank, Clariflocculator, Filters (Slow sand filters, Rapid sand gravity filters and Pressure filters), Methods of disinfection, Hardness (causes and types), Methods of water softening, Removal of colour, odour and taste from water, Removal of iron and manganese, Algae removal, Fluoridation and De-fluoridation.

Unit-III

Distribution system (requirements, layout and methods of distribution), Distribution reservoir (types and its capacity determination), Fixing size of pipes, Analysis of pipe networks (Hardy cross method and Equivalent pipe method), Appurtenances used in distribution networks, Water supply & plumping system used in buildings, Rural water supply.

Unit – IV

Sewerage schemes & sewerage system and their importance, Collection & conveyance of sewage, Fluctuation in sewage flow, Design of sewer, Sewer appurtenances, Pumps & pumping stations,

Characteristics and analysis of sewage (physical, chemical, biological parameters), BOD & COD, Methods of sewage disposal i.e. on land or by dilution, Self-purification capacity of river/stream.

Unit-V

Treatment of sewage (preliminary, primary, secondary and tertiary treatment), Design and working principles of screens, Grit chamber, Primary settling tank, Sewage filtration, Activated Sludge Process, Oxidation pond, Aerated lagoon, Anaerobic lagoon, Septic tank &Imhoff tank, Rotating Biological Contactor, Removal of Nitrogen and Phosphorus, Source and treatment of sludge, Sludge thickening and digestion, Sludge drying beds, Sludge disposal, Sewage treatment plants using MBBR and SBR technology.

Courses Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the concepts of water supply and waste water engineering.

CO 2: Determine the requirements for safe supply of water and safe disposal of sewage.

CO 3: Apply suitable techniques for water & waste water treatment.

CO 4: Analyse a given water supply scheme and a given sewerage system.

CO 5: Design a water supply system based upon the needs of society and sewage system for safe disposal of sewage.

Text Books:

1. Water Supply Engg., B. C. Punmia, Laxmi Publication (P) Ltd. New Delhi, 2016
2. Water Supply Engg. (Vol. I), S. K. Garg, Khanna Publishers, New Delhi, 2017
3. Sewage disposal and pollution Engg. (Vol. II). S.K. Garg, Khanna Publishers, New Delhi, 2017

Reference Books:

1. Water Supply & Sanitary Engg., G.S. Birdie, Dhanpat Rai Publishing Company,2014
2. Water & Waste Water Technology, Mark J Hammer, Prentice Hall of India, 6thedition,2008
3. Environmental Engineering, Peavy, Rowe & Tchobanoglous, McGraw Hill Publication,2017
4. Manual of Water Supply and Treatment by CPHEEO, GOI, 2009
5. Manual on Sewerage & Sewerage Treatment by CPHEEO, GOI, 2013.

List of Experiments:

1. Determination of pH of a given water sample and waste water sample.
2. Determination of Total Solids, Dissolved Solids and Suspended Solids of water and waste water sample.
3. Determination of Chloride concentration in water and waste water sample.
4. Determination of turbidity of water and waste water sample using turbidity meter.
5. Determination of acidity and alkalinity of the water and waste water sample.
6. Determination of Hardness of the water sample and waste water sample.
7. Determination of D.O. of the water and waste water sample.
8. Determination of optimum dose of coagulants required for the treatment of a given water sample.
9. Determination of MPN of the given water sample and waste water sample.

10. Determination of BOD of a given water and waste water sample.
11. Determination of COD of a given waste water sample.
12. Determination of sulfate and nitrate of given water and waste water sample.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Follow sampling procedure & other guidelines for sampling & analysis of water and wastewater samples.

CO 2: Check various water and waste water quality parameters.

CO 3: Improve the water and waste water quality by suggesting suitable corrective measures.

CO 4: Train others on various ways of improving the quality of water and waste water.

Course Code: 110505

Course Name: Transportation Engineering

L	T	P	Credit
2	1	2	4

Course Objectives:

1) To study the planning aspects of roads & highway.
2) To study the geometric design aspects of highway and road.
3) To know about pavement material and design.
4) To understand the construction process and methods of roads & highway.
5) To study about traffic characteristics and design of intersections.

Syllabus:

Unit – I Highway Development and Planning

Highway Development in India — Necessity for Highway Planning – Different Road Development Plans; Classification of Roads. Road Network Patterns — Highway Alignment- Factors affecting Alignment- Engineering Surveys.

Unit – II Highway Geometric Design

Importance of Geometric Design – Design controls and Criteria – Highway Cross Section Elements – Sight Distance Elements – Stopping Sight Distance, Overtaking Sight Distance and Intermediate Sight Distance – Design of Horizontal Alignment – Design of Super elevation and Extra widening – Design of Transition Curves – Design of Vertical alignment - Gradients- Vertical curves.

Unit – III Traffic Studies

Spot Speed Studies and Volume Studies, Speed and Delay Studies purpose, causes of delay, methods of conducting speed and delay studies, Origin and destination Studies (O & D): Various methods, collection and interpretation of data, Traffic Capacity Studies: Volume, density, basic practical and possible capacities, level of service, Parking Studies: Methods of parking studies, design of intersections at grade & grade separated.

Unit -IV

Highway Construction Materials: Aggregates and their types, physical and engineering properties, Fillers, Bitumen, Characteristics, Emulsions and cutbacks, Basic tests on all materials.

Design of Flexible & Rigid Pavements: Introduction, flexible pavement, factors affecting design and performance, stress in flexible pavement, design of flexible pavement as per IRC, rigid pavements – components & functions, factors affecting design & performance of CC pavements, stress in rigid pavement, type of joints, dowel bar, tie bar and its functionalities.

Unit – V Evaluation and Maintenance of Pavements

Pavement distress in flexible and rigid pavements, Pavement evaluation, structural evaluation, evaluation by deflection measurements, Strengthening of pavements, Types of maintenance, Importance of highway drainage, Surface and sub-surface drainage arrangements.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the principles of highway planning & their geometrical design.

CO 2: Evaluate physical properties of suitable highway engineering materials with drainage provisions.

CO 3: Apply the concepts of traffic engineering in transportation planning.

CO 4: Design pavements as per regulations.

CO 5: Formulate the layers of pavement along with provisions of its drainage & maintenance.

Text Books:

1. Highway Engineering, S.K. Khanna & C.E.G. Justo, Nemchand Pub., 10th edition, 2018
2. Highway Engineering, Gurucharan Singh, Standard Publishers, 5th edition, 2006
3. Principles & Practices of Highway Engineering, L R Kadiyali, N B Lal, Khanna Publishers, 2016

Reference Books:

1. Principles of Pavement Design, E.J. Yoder & M.W. Witzech, Wiley India, 2ndedition, 2011
2. Highway Engineering, O' Flaherty, Butterworth-Heinemann, 4thedition, 2002
3. Principles of Practice of Highway Engg., Sharma & Sharma, Asia Publishing House, 1965
4. Analysis and Design of Pavements, Haung, Pearson, 2nd edition, 2004

List of Experiments:

1. Aggregate Crushing Value Test
2. Determination of Aggregate Impact Value
3. Determination of Los Angeles Abrasion Value
4. Determination of flakiness index and elongation index of aggregates.
5. Determination of California Bearing Ratio Value
6. Determination of Penetration Value of Bitumen
7. Determination of Viscosity of Bituminous Material
8. Determination of Softening Point of Bituminous Material
9. Determination of Ductility of the Bitumen
10. Determination of Flash Point and Fire Point of Bituminous Material
11. Determination of Bitumen Content by Centrifuge Extractor
12. Determination of Stripping Value of Road Aggregate
13. Determination of Marshall Stability Value for Bitumen.

Upon completion of the course, the students will be able to:

CO 1: Select suitable aggregate material by testing the physical properties.

CO 2: Determine properties of bitumen and its grade.

CO 3: Determine CBR value of material for subgrade and subsequent layers of pavement.

CO 4: Design job mix formula for bituminous surface using Marshal Stability test.

Course Code: 110506

Course Name: Minor Project - I

L	T	P	Credit
0	0	2	1

Course Objectives:

1) To develop an appreciation of civil engineering problems & have a feel of real life situations in planning & execution of projects.
2) To impart training of handling various types of civil engineering problems by use of conventional methods as well as software's.
3) To utilize the expertise in engineering to solve industry's technological problems.
4) To become innovative and professional in technology development, and system implementation.
5) To be able to function in their profession with social awareness and responsibility.
6) To be able to interact with their peers in industry and society as engineering professionals and leaders & inculcate a habit of working in a group.
7) Enable students to prepare professional reports for design projects and data presentation skill and to use computers and some computergraphics.

Syllabus:

Each candidate shall work on an approved project of a public building or any other civil engineering work and shall submit design and a set of drawings.

OR

Shall submit a detailed report of experimental work / software package on any specific problem of importance.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Recognize various engineering problems and techniques to solve them.

CO 2: Reproduce the solution of the problems upon the need of society.

CO 3: Cooperate to work within group.

CO 4: Develop the writing and communication skills for various engineering problems.

CO 5: Display lifelong learning.

Course Code: 110507

Course Name: Summer Internship Project - II

L	T	P	Credit
0	0	6	3

Course Objectives:

1) To make student acquire good oral & written communication skills.
2) To promote the habit of lifelong learning.
3) To prepare students develop adequate soft skills to be able to present their topic effectively to listeners.

Syllabus:

Each candidate shall have to undergo 15 days in house summer internship related to soft skills at the institute after the completion of their 4^{th} Semester exams (in summer vacations) and after successful completion of internship they have to submit detailed report.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Develop the writing and communication skills for various engineering problems.

CO 2: Adapt lifelong learning for benefit of society.

Course Code: 110508

Course Name: Self Learning / Presentation

L	T	P	Credit
0	0	2	1

Course Objectives:

1) To encourage students to read, study & understand different topics of civil engineering published in articles,literatures.
2) To help in presenting different topics of civil engineering and related subjects to supplement theoretical knowledge gained inclass.
3) To make student acquire good oral & written communicationskills.
4) To promote the habit of lifelonglearning.
5) To prepare students develop adequate soft skills to be able to present their topic effectively to listeners.

Syllabus:

Any relevant topic related to civil engineering from within or beyond the syllabus through Swayam / NPTEL/MOOC.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Analyze contemporary issues in civil engineering & its allied areas through literature survey.

CO 2: Distinguish state of art & relevance of the topic in national & international arena.

CO 3: Demonstrate good oral & written communication skills.

CO 4: Develop poster and power point presentations for effective communication.

CO 5: Display lifelong learning.

SEMESTER-VI

Course Code: 110602
Course Name: Structural Design & Drawing (Steel)

L	T	P	Credit
3	1	0	4

Course Objectives:

1) To learn IS 800-2007 code of practice for the design of Compression, Tension and Flexural members using various cross-sections.
2) To understand the behavior of steel structural components subjected to gravityloads.
3) To study the design of bolted and welded connections.
4) To study the behaviour and design of compression and tension members using simple and built-up sections.
5) To understand behaviour of flexural members and the design laterally restrained & unrestrained beams.
6) To design plate girders &stiffeners.

Syllabus:

Unit-I

Various loads, Partial Load factors, Structural properties of steel, Design of structural connections – Bolted and Welded connections, eccentric connection. Round tubular sections, grades, uses and sectional properties, connections in tubular structures, Codal provision.

Unit-II

Design of Tension members. Codal provision. Lug angles & Tension splices.

Unit-III

Design of Compression member, Design of columns-simple and compound, Lacings & Battens. Design of footings for steel structures, Slab base, gusseted base. Codal provision.

Unit-IV

Design of built up beams, web buckling and crippling, curtailment of flanges. Design of Laterally supported and unsupported beams, web buckling and crippling.Codal provision.

Unit-V

Design of plate girder.Curtailment of flanges, Design of stiffeners (bearing, Vertical and horizontal), Codal provision.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the principles of steel structural design using relevant IS Codes.
CO 2: Evaluate structural behaviour of different steel structural elements.
CO 3: Analyse a given section of steel structural element using IS codes.
CO 4: Design different elements of steel structure under various loading conditions using relevant IS codes.
CO 5: Design a structure/ component to meet desired needs within realistic constraints such as economy, safety, viable construction & its sustainability as per codal provisions.

Text Books:

1. Limit State Design of Steel Structures, S. K. Duggal, McGraw Hill Publication, 3rd edition, 2017

Reference Books:

1. Design of Steel Structures, S. S. Bhavikatti, International Publishing House,2014
2. Design of Steel Structures, N. Subramanian, Oxford University Press India,2008

Course Code: 110612
Course Name: Solid Waste Management

L	T	P	Credit
3	1	0	4

Course Objectives:

1) To provide broad knowledge on various aspects of planning & implementation of a solid waste management system in a city/town.
2) To understand the principles applied in solid waste management.
3) To understand various ways to collect, treat & disposal of waste.
4) To understand various ways of energy recovery from waste.
5) To provide an insight into the principles of hazardous & other forms of waste management

Syllabus:

Unit I:

Introduction to Waste Management, Objective of Solid Waste Management, Principle of Municipal Solid Waste Management, Functional Elements of Solid Waste Management, Salient features of various Indian legislations for waste management (SWM rules, HWM rules, BMW rules etc), Current Scenario of Waste Management in India – Introduction to SBM, Classification of solid waste, composition, Physical, chemical & biological properties of municipal solid waste, Quantity of solid waste, Sampling & analysis of solid waste.

Unit II:

Handling of waste at source, source segregation, Collection, conveyance, separation & recycling of solid waste: Types of collection system, Collection routes, equipment's, transfer station, transport methods, material separation & recycling of MSW.

Unit III:

Disposal of solid waste by Land fill method; Classification, type, method, site consideration composition and control of gases, Leachate control inland fills, surface water management, landfill operation & care. Remediation of old landfill sites.

Unit IV:

Processing of solid waste: Thermal conversion technologies, Incineration, Pyrolysis gasification, environmental control system. Biological & Chemical conversion technologies, aerobic composting, anaerobic digestion, other biological and chemical transformation.

Unit V:

Introduction to hazardous waste, handling, treatment & disposal of hazardous waste. Introduction to Biomedical waste management process - disposal of Biomedical waste with special focus on current scenario of covid-19 waste, E-Waste & Plastic Waste management.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the principles & concepts of waste management.
CO 2: Apply various techniques in collecting the waste.
CO 3: Apply various techniques of reducing the waste.
CO 4: Apply various techniques in disposal of waste.
CO 5: Plan an effective & efficient waste management system

Text Books:

1. Text Book of Solid Wastes Management, Iqbal H. Khan and Naved Ahsan, CBS Publishers, 1st edition 2012
2. Integrated Solid Waste Management, Hilary Theisen and Samuel A, Vigil, George Tchobanoglous, McGraw Hill Yew York, 1993

Reference Books:

1. Environmental Engineering, Rowe, Peavy & Tchobanogolous, Tata McGraw Hill Publications, 2017
2. CPHEEO, Manual on Municipal Solid Waste management, Central Public Health and Environmental Engineering organization, Government of India, New Delhi,2016
3. Solid waste Engineering, Vesilind P.A., Worrel H. W. and Reinhard, Thomson Learning Inc, 2003

Course Code: 110613
Course Name: Construction Planning & Management

L	T	P	Credit
3	1	0	4

Course Objectives:

1) To make student conversant with the concepts and importance of the subject of construction planning & management.
2) To provide a broad knowledge on how to make bar chart, work break structure of a project, schedules.
3) To provide a broad knowledge on how to analyze a problem using various techniques of project management like CPM, PERT & optimization of time & cost of a project.
4) To provide an insight into various types of machinery used in construction works & various concepts of man & material management.

Syllabus:

Unit I

Modern management techniques: An overview of planning process, planning through Bar Charts and Milestone charts, Network techniques, Basic concept of network preparations, CPM and PERT techniques with network analysis.

Unit II

Construction management: Principles of construction management, Planning for Job Layout, Advantages of Job Layout, Scheduling Techniques of Construction Project.

Unit III

Construction equipment's: Factors affecting selection, investment and operating cost, Efficiency and capacity rating of various equipment's, study of equipment's required for various jobs such as earthwork, dredging, conveyance, concreting, hoisting, pile driving, compaction and grouting. Equipment Management.

Unit IV

Time & Cost Optimization using Network Techniques: Time computations using CPM & PERT, Probability of achieving completion time, Project cost, Direct & Indirect cost, Cost vs. Time curves, Total project cost & optimum duration, Contracting the network for cost optimization, Time cost optimization

Unit V

Site Organization & Manpower management: Introduction of site organization, types of organization, organization chart & manuals, Manpower Management, Labour laws (Compensation Act etc.) & Human relations, Welfare facilities, Safety Management.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the concepts of construction planning & management process.

CO 2: Describe various techniques used in construction planning & management.

CO 3: Apply techniques of project planning & management.

CO 4: Analyze various problems of time & cost optimization using network techniques like CPM & PERT.

CO 5: Plan effectively for manpower & material management in a project along with suitable safety measures.

Text Books:

1) K. K. Chitkara, Construction Project Management, McGraw Hill International Publishers.

2) B. C. Punmia & K. K. Khandelwal, Project Planning & Control with PERT & CPM, Laxmi Publishers.

3) U.K. Shrivastava, Construction Planning & Management.

4) Neeraj Kumar Jha, Construction Project Management, Pearson Publishers.

Reference Books:

1) Gahlot & Dhir, Construction Management, New Age International Publishers.

2) L.S. Srinath, PERT & CPM – Principles & Applications, East West Press.

3) Sengupta & Guha, Construction Management & Planning, McGraw Hill Publishers.

4) Peurify, Construction Equipment.

Course Code: 110614
Course Name: Railway, Airport & Tunnel Engineering

L	T	P	Credit
3	1	0	4

Course Objectives:

1) To understand the requirements of airport, runway & taxi – way.
2) To understand the requirement of lighting & signal & traffic control at airports.
3) To understand the geometrical elements of railway track.
4) To understand the properties of good ballast.
5) To understand the track alignment, super elevation, turnout, yards.
6) To understand the principles of signalling & interlocking.
7) To understand the construction of tunnels.

Syllabus:

Unit-I Introduction to Railway Engineering

Tractive resistance & Permanent way, Principles of Transportation, Transportation by Road, Railways, Airways, Waterways, their importance and limitations. Route surveys and alignment, railway track, development and gauges. Hauling capacity and tractive effort.

(i) Rails- types, welding of rails, wear & tear of rails, rail creep ultrasonic Testing of Rails.
(ii) Rail fastenings- types – Fishplates, spikes bearing plates, chairs, keys, check and guard rails, Elastic Rail Clips (ERC), Vossloh fastening.
(iii) Sleepers, types & comparison, requirement of a good sleeper, sleeper density, Turnouts.
(iv) Ballast –Requirement of good ballast, various materials used as ballast, quantity of ballast, Ballast Cleaning.

Different methods of plate laying, material trains, calculation of materials required, relaying of track.

Unit-II

Track alignment, Geometrical Design, Gradient & gray compensation, Super Elevation, Equilibrium, Cant and Cant deficiency, relationship of super elevation, gauge, speed & radius of curves, speed on curves, Limits of super elevation, Cant deficiency, Negative super elevation, curves , transition curves, necessity of points and crossing. Turnouts, Points of switches, Types of switches, crossing, calculation of turnouts, sleepers at points &crossing, Types of Track junctions. Types, locations, general equipments, layouts, marshalling yards. Definition, layout details, designs of simple turnouts.

Stations and Yards: Site selection for a Railway stations, Requirements of railway stations, junction station &terminals, location, layout & details, Types of signals in stations and yards, principles of signaling and inter-locking, Modern development in railways, Modernization of track for high speed, Maintenance of track, Track drainage.

Unit – III Airport Planning, Runway & Taxiway

Airport site selection. air craft characteristic and their effects on runway alignments, wind rose diagrams, basic runway length and corrections, classification of airports. Geometrical elements: taxi ways and runways, pattern of runway capacity.

Unit – IV Airport, Obstructions, Lightning & Traffic control

Zoning regulations, approach area, approach surface-imaginary, conical, horizontal. Rotating beacon, boundary lights, approach lights, runway and taxiway lighting etc. instrumental landing system, precision approach radar.

Unit-V Tunnels

Selection of route, Engineering surveys, alignment, shape and size of tunnel, bridge action, pressure relief phenomenon, Tunnel approaches, Shafts, pilot shafts , Construction of tunnels in soft soil, hard soil and rock, Different types of lining, methods of lining, Mucking operation, Drainage and ventilation, Examples of existing important tunnels in India and abroad**.**

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the elements of airport planning, bridges & tunnels.
CO 2: Design runway & taxiway system as per regulations.
CO 3: Explain various elements of railway tracks, signalling, yards, bridges & tunnels.
CO 4: Illustrate various gauge, signals, fasteners, turnouts, crossing etc.
CO 5: Apply construction methods of railway tunnels.

Text Books:

1. Airport Planning & Design, S. K. Khanna & M. G. Arora, Nem chand Publishers, 6th edition, 1999
2. Railway Engineering, Arora & Saxena, Dhanpat Rai & Sons, 2010

Reference Books:

1. Airport Planning, Froesch, Charles, Andesite Press, 2017
2. The Planning & Design of Airports, Horonjeff Robert, MHE, 5th edition, 2010
3. Railway Engineering, S.C. Rangwala, Charotar Publication House, Anand, 2012
4. Railway Tack, K.F. Antia, New Book Company, 5th edition, 1960

Course Code: 900121

Course Name: Sustainable Materials & Green Buildings

L	T	P	C
2	1	-	3

Course Objectives:

1. To expose the students to the concepts of sustainability in the context of building and conventional engineered building materials, such as Concrete, Bricks, and achieving the same through lower Carbon cements, Superior brick kilns and Recycled aggregate minimizing consumption of natural resources including water
2. To study the concepts of VOC and indoor air quality.
3. Exposing the student to concepts of embodied, Operational and Life Cycle Energy, Minimizing Energy consumption by optimal design, use of BIPV.
4. The course also intends to make student aware of ECBC, LEED, GRIHA etc.

Syllabus:

Unit-I

Embodied energy, Operational energy in Building and Life cycle energy. Ecological foot print, Bio-capacity and calculation of planet equivalent.

Unit-II

Role of Material: Carbon from Cement, alternative cements and cementitious material, Alternative fuel for cements for reduction in carbon emission. Sustainability issues for concrete. Role of quality, minimization of natural resource utilization, High volume fly ash concrete, geo-polymer concrete etc. concrete with alternative material for sustainability.

Unit-III

Reduction in water consumption in concrete, Recycled aggregate, Energy for grinding crushing of cement aggregate etc. and reduction. Operational energy in building role of materials and thermal conductivity. Clay Bricks, Types kilns, Comparative energy performance emission performance and financial performance, Indoor air quality.

Unit-IV

Paints, Adhesive and sealants for use in building, Volatile organic content (VOC) emission issues and indoor air quality for Sustainability and Health hazard. Operational energy reduction and net zero building, Optimization for design of building for energy efficiency and example of optimization through use of Evolutionary genetic algorithm.

Unit-V

Radiation budget, Surface water balance, Effects of trees and microclimatic modification through greening, Use of Building Integrated Photo Voltaic (BIPV) and other renewable energy in buildings, basic concepts and efficiency. Energy codes ECBC requirement, Concepts of OTTV etc, Green Performance rating, requirements of LEED, GRIHA.

Course Outcome:

Upon completion of the course, the students will be able to:

CO1: **Apply** the concepts of sustainability in the context of building and conventional engineered building materials.

CO2: **Explain** the Concepts of VOC and indoor air quality.

CO3: **Apply** the concepts of embodied, Operational and Life Cycle Energy, Minimizing Energy consumption by optimal design, use of BIPV.

CO4: **Apply** the guidelines of ECBC, LEED, GRIHA while planning a building.

CO5: **Use** renewable energy sources in buildings.

Text Book:

1. Sustainable Construction: Green Building Design and Delivery, John wiley & sons, 2005.

2. Building Reuse: Sustainability, Preservation, and the Value of Design by Kathryn Rogers Merlino, University of Washington Press, 2018.

Reference Books:

1. Natural Design, Organic Architecture: Lessons for Building Green by Frank Lloyd Wright, Rizzoli; Illustrated edition

Course Code: 900120

Course Name: Building Services & Maintenance

L	T	P	C
2	1	-	3

Course Objectives:

1. To learn about building services required in a building.
2. To learn about fire fighting systems in buildings.
3. To understand planning and maintenance requirements of lifts in high rise buildings.
4. To understand water management and planning system in a building.
5. To learn maintenance of building services and management of related tasks.

Syllabus:

Unit I

Introduction: Introduction to primary services in a building, Type of services required to keep facility usable, planning of services. Organization structures of services management. Role and administrative functions of supervisors. Outline of the concept of carbon trading and self sustainable zero carbon building. Importance

Unit II

Fire Fighting: Standard fire, fire resistance, classification of buildings. Basic requirement of the works for fighting system, various components of the fire fighting system. Maintenance required of the system, fire fighting in high-rise buildings, commercial/industrial complexes. Public buildings, checklist for fire safety. Provision of NBC.

Unit III

Lifts/Elevators, Escalators: Legal formalities for elevators, various types of lifts, working mechanisms of lift and escalators. Indian standard codes for planning & installations of elevator, inspection & maintenance of lifts.

Unit IV

Plumbing Services Water Supply System: Basics of Plumbing systems. Requirement of Plumbing works, Agency, Activity flow chart for plumbing work. Quality checking of materials. Water supply and distribution system is high-rise building & other complexes, pumps and pumping mechanisms. Operation & maintenance of fittings & fixtures of water supply & sanitary. Do's & Don'ts for water pipe networks.

Unit V

Maintenance and management of services: Telecommunication network, computer network LAN, Electrical network & appliances. Basics of single phase & three phase electrification, precautions and safety measures during electrification. Indian standard codes for electrical appliances & wiring operations & maintenance of network & appliances. Landscaping & Horticulture. Building maintenance management, applications of computer in service management. Flowcharts of air conditioning & heating. Centralised systems, monitoring and working of the equipments, Checklist of inspection, Performance testing. Water proofing. Damp proofing & Termite proofing. Working procedure & stages of work of water proofing for W.C., Bathrooms, Terrace, sloping roof, Basements, tanks. Use of chemicals for water proofing treatment.

Course Outcome:

Upon completion of the course, the students will be able to:

CO1: Identify various services required in a building.

CO2: **Carry** out planning of fire fighting system for a building.

CO3: Develop a management strategy for maintenance of building services in a building.

CO4: **Design** a sustainable building services plan for a building.

Reference Books:

1.Building services Design and Management by Jakie Partman, Willey Blackwell 2014.

2. Building Services Engineering by David V .Chadderton, Routledge 2013.

Course Code: 100007

Course Name: Disaster Management

L	T	P	C
3	-	-	3

Course Objectives:

i) To understand basic concepts in Disaster Management
ii) To understand Definitions and Terminologies used in Disaster Management
iii) To understand Types and Categories of Disasters
iv) To understand the Challenges posed by Disaster
v) To understand Impact of Disasters key skills

Syllabus:

Unit 1: Introduction to disaster management, concepts and definitions: disaster, vulnerability, risk severity, frequency and details, capacity impact, prevention, mitigation.

Unit 2: Disasters – Disasters classification, demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends, hazard and vulnerability profile of India.

Unit 3: Disaster Impacts – Disaster impact (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues, impact of natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides etc.), impact of manmade disasters (industrial pollution, artificial flooding in urban areas, urban disasters, transportation accidents etc.).

Unit 4: Disaster Risk Reduction (DRR)- Disaster management cycle- its phases; prevention, mitigation, preparedness, relief and recovery; structural and non- structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post disaster environmental response. Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders: Policies and legislation for disaster management. DRR programmes in India and the activities of National Disaster Management Authority.

Unit 5: Disasters, Environment and Development – Factors affecting vulnerability such as impact of development projects and environmental modifications (including of dams, land use changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction and development methods.

Course Outcomes:

After successful completion of the course, the students will be able to

CO1: Identify disaster prevention and mitigation approaches.
CO2: Classify global and national disasters, their trends and profiles.
CO3: Determine the impacts of various disasters.
CO4: Apply Disaster Risk Reduction in management.
CO5: Infer the linkage between disasters, environment and development.

Text Books:

1. Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.

2. Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation
3. Srivastava H.H. & Gupta G.D., Management of Natural Disasters in developing countries, Daya Publishers Delhi, 2006.

Reference Books:

1. http://ndma.gov.in (Home page of National Disaster Management Authority)
2. http://www.ndmindia.nic.in / (National Disaster Management in India)
3. Singh B.K., 2008, Handbook of Disaster Management: Techniques & Guidelines, Rajat Publication.
4. National Disaster Management Policy, 2009, GOI.
5. Inter Agency Standing Committee (IASC) (Feb. 2007), IASC Guidelines on Mental Health and Psychosocial Support in Emergency Setting. Geneva: IASC

Course Code: 110607

Course Name: Minor Project - II

L	T	P	Credit
0	0	4	2

Course Objectives:

1) To develop an appreciation of civil engineering problems & have a feel ofreal life situations in planning & execution of projects.
2) To impart training of handling various types of civil engineering problems by use of conventional methods as well as software's.
3) To utilize the expertise in engineering to solve industry's technological problems.
4) To become innovative and professional in technology development, and system implementation.
5) To be able to function in their profession with social awareness and responsibility.
6) To be able to interact with their peers in industry and society as engineering professionals and leaders & inculcate a habit of working in a group.
7) Enable students to prepare professional reports for design projects and data presentation skill and to use computers and some computer graphics.

Syllabus:

Each candidate shall work on an approved project of a public building or any other civil engineering work and shall submit design and a set of drawings.

OR

Shall submit a detailed report of experimental work / software package on any specific problem of importance.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Recognize various engineering problems and techniques to solve them.
CO 2: Reproduce the solution of the problems upon the need of society.
CO 3: Cooperate to work within group.
CO 4: Develop the writing and communication skills for various engineering problems.
CO 5: Display lifelong learning.

SEMESTER-VII

Course Code: 110713

Course Name: Advanced Structural Design (R.C.C.)

L	T	P	Credit
3	0	0	3

Course Objectives:

1) To understand the behavior of RC structures like Retaining wall, Water tanks, Highway Bridges and prestressed concrete beams.
2) To apply the codal provision for estimation of loads on Retaining wall, Water tanks, Highway Bridges and prestressed concrete beams sections
3) To know analysis of Retaining walls, Water tanks, Highway Bridges and prestressed concrete beam sections subjected to realistic loads.
4) To learn design of Retaining walls, Water tanks, Highway Bridges and prestressed concrete beam sections using Codal provisions.

Syllabus:

Unit-I

Design of Water Tanks:

General design requirements; Design of circular tanks resting on ground; Design of rectangular tanks resting on ground; Design of under ground tanks.

Unit-II

Over Head Water tanks and Flat Slabs:

Overhead Tank: Intze type (Membrane analysis only), Design of Staging

Design of Flat slabs: (i) Direct design method and (ii) Equivalent frame method; Design Shear.

Unit-III

Earth Retaining Structures:

Types of retaining walls, Stability of retaining walls, Design of Cantilever type retaining wall; Design of Counterfort type retaining walls.

Unit-IV

Design of Bridges:

IRC loading for highway bridges, Design of Slab bridges for IRC Loads; Design of T-beams bridges for IRC Loads.

Unit-V

Prestressed Concrete:

Prestressing concepts, materials; systems of prestressing; prestress losses. Introduction to working & limit state design method for prestress beam sections.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Explain the structural behaviour of water retaining structures; earth retaining structures; bridges and Prestressed concrete structures.

CO2: Determine design forces in water retaining structures; earth retaining structures; highway bridges; and Prestressed sections.

CO3: Analyse the water retaining structures; earth retaining structures; highway bridges and Prestressed sections for realistic loadings.

CO4: Design economic and safe water retaining structures; earth retaining structures; highway bridges and Prestressed sections as per Codal provisions.

Reference Books:

1. Plain and Reinforced Concrete by O.P. Jain and Jai Krishna Vol. I & II, Nem Chand & Bros, Roorkee
2. Reinforced Concrete Limit State Design by Ashok K. Jain, Nem Chand & Bros, Roorkee.
3. Reinforced Concrete Design by S. U. Pillai and D. Menon, Tata McGraw-Hill Publishing Company Limited, New Delhi.
4. Essentials of Bridge Engineering by D.J. Victor, Oxford and IBH publishers.
5. Design of Bridges by N.K. Raju, CBS Publishers
6. Prestressed Concrete by N.K. Raju, CBS Publishers
7. Advanced Reinforced Concrete Design by P. C. Varghese, Prentice Hall of India publisher
8. Prestressed concrete by T.Y. Lin & N.H. Burns, Wiley publisher

Course Code: 110714
Course Name: Hydraulic Structure

L	T	P	Credit
3	0	0	3

Course Objectives:

1) To study the different aspects of design of hydraulic structures.
2) To build the necessary theoretical background for the selection of a suitable site for a dam and a suitable dam for a given site location.
3) To emphasize on the basic design principle of the gravity dam & earthen dam
4) To carry out the stability & seepage analysis of various types of dams.
5) To provide knowledge on various hydraulic structures such as energy dissipaters, spillways &gates & understand their designs.
6) To understand the design of cross drainage structures for uninterrupted water supply in naturalchannels and manmade canals.
7) To provide a basic knowledge on various types of hydropower plants and their components.

Syllabus:

Unit-I Gravity dams:
Design Criteria, forces acting on gravity dams, elementary profile, low and high gravity dams, stability analysis, evaluation of profile by method of zoning, practical profile, foundation treatment, construction joints, galleries in gravity dams.

Unit-II Earth and Rock fill dams:
Earth Dams: Types, causes of failure and design criteria, soils suitable for earth dam construction, construction methods, foundation requirements, typical earth dam sections, estimation of seepage through and below the dam, seepage control, stability of slopes by slip circle method, pore pressures, sudden draw down, steady seepage and construction pore pressure condition.
Rock fill dams: Types, merits and demerits, conditions favourable for their adoption

Unit-III Cross drainage works:
Types, selection of suitable type, design criteria, fluming of canal- Mitra & Chaturvedi methods. Design of Different types of CD works.

Unit-IV Spillways, Energy dissipators and gates:
Ogee spillway and its design, details of syphon, shaft, chute and side channel spillways, emergency spillways. Principles of energy dissipation, Energy dissipators based on tail water rating curve and jump height curves, Spillway crest gates – vertical lift and radial gates, their design principles and details.

Unit-V Hydropower Plants:
Hydropower development, assessment of power potential, types of hydropower plants, general features of hydro-electric schemes, selection of turbines, draft tubes, surge tanks, penstocks, power house dimensions, development of micro hydel stations, tidal plants, pumped storage plants and their details.

Course Outcomes:

Upon completion of the course, the students will be able to:
CO1: Identify different components of hydro project.
CO2: Explain basic principles of designing hydropower plant & cross drainage works.
CO3: Solve problems of dam analysis, energy dissipators & cross drainage works.
CO4: Evaluate suitability of types of hydraulic structures.
CO5: Design various elements of hydraulic structures.

Reference Books:

1. Engineering for Dams (Volumes I, II & III) by Creager, Justin & Hinds
2. Hydroelectric Hand Book by Creager
3. Hydraulic Structures by Varshney
4. Irrigation & Water Power Engg. By Punmia& Pandey
5. Water Power Engineering by Dandekar
6. Irrigation Engineering & Hydraulic Structure by S.K. Garg.

Course Code: 110715
Course Name: Advanced Structural Analysis

L	T	P	Credit
3	0	0	3

Course Objectives:

1) To understand the analytical procedure related to the analysis of building frame by some classical methods viz. Kani's methods and approximate methods of analysis.
2) To study the multi storey frames subjected to gravity loads and lateral loads
3) To understand matrix method and its application for computer based analysis of structure.
4) To understand the influence line concepts for indeterminate structures
5) To develop the skill to deals with the problems of moving loads in the structures & their analysistechniques.
6) To understand the concepts of plastic analysis of structures.

Syllabus:

Unit-I

Moment distribution method in analysis of frames with sway, Analysis of box frames, analysis of beams and frames by Kani's methods.

Unit-II

Analysis of tall frames, Calculation of various loads including wind and earthquake loads, Introduction to Code provisions for lateral loads. Approximate analysis of multistorey frames for vertical and lateral loads.

Unit-III

Force method of structural analysis: Application of force method in analysis of rigid connected and pin connected structures

Unit-IV

Rolling Loads and Influence Lines: Influence Lines for Statically determinate and indeterminate structures, Muller Breslau Principle

Unit-V

Displacement method of structural analysis. Introduction to use of softwares for analysis: Modeling, analysis and post processing.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Determine response of structures by classical methods
CO 2: Use approximate methods for analysis of statically indeterminate structures
CO 3: Determine response of structures by matrix force method
CO 4: Evaluate and draw the influence lines for reactions, shears, and bending moments in beams and girders due to moving loads
CO 5: Model and analyze structural systems (building) with the aid of softwares

Reference Books:

1. Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Company, New Delhi.
2. Structural Analysis 5ed. (2015) by Aslam Kassimali, Cengage.
3. Structural Analysis, 10th Edition by Russell C. Hibbeler, 2018, Pearson.
4. Matrix Analysis of Structures, SI Edition, by Aslam Kassimali, 2021 CL Engineering
5. Weaver W & Gere J.M. Matrix Methods of Framed Structures, CBS Publishers & Distributors, Delhi

Course Code: 900201

Course Name: Integrated Waste Management for Smart City

L	T	P	Credit
2	1	0	3

Course Objectives:

1) To provide broad knowledge on various aspects of planning & implementation of waste management system in a smart city/town.
2) To understand the principles applied in waste management.
3) To understand various ways to collect, treat & disposal of waste.
4) To understand various methods of energy recovery from waste.
5) To understand various aspects of hazardous waste management, E-waste management, biomedical waste management etc.

Syllabus:

Unit I:

Introduction to waste management, classification of solid waste, objective of solid waste management, principles of integrated waste management, 3R policy, various laws & rules of waste management (MSW Rules, hazardous waste management rules, E-waste rules etc.), role of various agencies in planning of waste management system, swachh bharat mission and smart cities program – implementation, current status, challenges and future trend of waste management.

Unit II:

Municipal solid waste – generation, composition, characterization, handling of waste at source, collection of waste – collection system, collection routes, collection equipments, transportation of waste, transfer stations, segregation and recycling of waste, disposal of waste through landfills – types of landfills, planning & operation of landfills, leachate management & control of gases in landfills, environmental monitoring of landfills.

Unit III:

Energy recovery from municipal solid waste - thermal conversion technologies, incineration, pyrolysis, gasification, environmental control system, biological & chemical conversion technologies, aerobic composting, anaerobic digestion, refuse derived fuels, other biological and chemical transformation methods.

Unit IV:

Hazardous waste management – characteristics, source, health effects, physiochemical treatment methods of hazardous waste, disposal of hazardous waste, Biomedical waste management – sources, health effects, issues in India, challenges, handling of biomedical waste.

Unit V:

E-waste management – sources, heath effects, issues in India, challenges, handling of E-waste. Plastic waste management – types of plastics, sources of plastic waste, impacts of plastic waste,

plastic waste management practices. Management of construction & demolition wastes.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the principles & concepts of waste management.

CO 2: Apply various techniques of handling the waste.

CO 3: Apply various techniques of energy recovery from waste.

CO 4: Plan an effective & efficient waste management system.

Text Books:

1. Text Book of Solid Wastes Management, Iqbal H. Khan and Naved Ahsan, CBS Publishers, 1st edition 2012
2. Integrated Solid Waste Management, Hilary Theisen and Samuel A, Vigil, George Tchobanoglous, McGraw Hill Yew York, 1993

Reference Books:

1. Environmental Engineering, Rowe, Peavy & Tchobanogolous, Tata McGraw Hill Publications, 2017
2. CPHEEO, Manual on Municipal Solid Waste management, Central Public Health and Environmental Engineering organization, Government of India, New Delhi, 2016
3. Solid Waste Engineering, Vesilind P.A., Worrel H. W. and Reinhard, Thomson Learning Inc, 2003

Course Code: 900202
Course Name: Project Planning & Control

L	T	P	Credit
2	1	0	3

Course Objectives:

1) To know about techniques of project planning.
2) To develop the network of project's activities.
3) To understand the precedence network technique.
4) To discuss the resource utilization in project.
5) To understand the project cost control.

Syllabus:

Unit I:

Project Planning:

Introduction to Project Planning Process. Types of Project Plans-Project feasibility plan, Project preliminary plan. Introduction to network techniques – CPM, PERT and Precedence network.

Project Work Breakdown – Levels of Project work breakdown. Identification of construction activities by work breakdown structure. Activity duration and methods of estimating activity duration – One time estimate three time estimates, trapezoidal distribution estimate. Duration estimation procedure.

Unit - II

Project Network Analysis:

Elements of Network, development of network, Numbering of events, Event times – Earliest events time and latest event time.Slack, critical events. Activity times – Earliest start time, Latest finish time, Float and critical activities. Network critical path and its significance. Network analysis by CPM – Defining scope of work, determining activities, establishing work package logic, preparation of network logic program and draft network. Numerical problems.

Unit-III

Precedence Network Analysis:

Precedence Network Analysis – Modeling procedure analysis of time in PN. Use of PN in repetitive works network.Difference between PN and CPM. Application of Network techniques and their limitations.

Unit-IV

Resource Planning:

Resources, Types of resources – renewable and non-renewable resources, Resource Histogram, Method of Resource allocation – resource smoothing and resource levelling.

Unit-V

Project Cost Control:

Direct and indirect cost, slope of direct cost curve, Total project cost and optimum duration, contracting the network for cost optimization. Escalate & Variation in prices.

Course Outcomes

Upon completion of the course, the students will be able to:

CO 1: Know the project planning and project network.
CO 2: Analyze the network by CPM & PERT.
CO 3: Analyze the project using precedence network.
CO 4: Analyze the effect of resource planning on project.
CO 5: Evaluate the cost of project during planning.

Recommended Books:

1. Project planning and Control with PERT and CPM by Dr. B.C. Punmia, K.K. Khandelawal
2. CPM & PERT by L.S. Srinath
3. Construction Management by Sen & Gupta
4. CPM & PERT by Weist & Levy

Course Code: 900213
Course Name: Urban Planning &Transportation Systems

L	T	P	Credit
3	0	0	3

Course Objectives:

1) To introduce the scope and nature of Urban Planning and Transportation Systems as disciplines.
2) To understand the objectives, domains and principles of town planning.
3) To study the urbanization trends in India - Issues, concerns and experiences; City planning process and implementation framework in Indian context
4) To differentiate between types of plans and concepts in planning.
5) To understand how urbanization and why migration takes place in an urban region.
6) To understand the traditional and current planning processes and techniques involved in the urban and transportation planning.
7) To understand the urban governance, policies and strategies of the government to tackle issues of an urban environment.
8) To understand the impact of technology in both urban and transportation planning.

Syllabus:

Unit-I Introduction to planning discipline

Defining planning as a discipline, it's multidisciplinary nature, role of a planner, Objectives and Principles of Urban planning.

Fields of planning - Urban, regional, environmental, transport and infrastructure.

Evolution of settlements- Settlement size, pattern and structure as a function of sociocultural, economic, military and religious factors in historical cities.

Concepts of different types of cities like garden city, linear city etc.

Contributions of eminent planners: Lewis Mumford, Ebenezer Howard, Patrick Geddes, Sir Arthur Clarence Perry, Charles Correa, Le-Corbusier.

Unit-II Urbanization

Definition of urbanization, rural-urban migration, various definitions of town and country planning, goals and objectives of planning, socio-economic impacts of growth of urban areas, significance of Census and Demographics, impacts of urbanization, impact of Government Policies on urbanization, urban structure and form - land use distribution, different Land use planning norms.

Overview of Urban Governance Definition, concepts, components, government and governance, hierarchy and structure, forms of governance, process of inclusion and exclusion, 73rd and 74th Constitution Amendment Acts.

Unit-III Transportation Systems

Evaluation of urban structure: Transport system, infrastructure and management, transport systems and their types, urban road hierarchy, planning, and management criteria for road and junction improvements, arterial improvement techniques.

Transport survey and studies: study area definitions, survey and their types, sampling methods,

survey techniques.
Transportation Planning Process and analytical techniques: Techniques for urban structures analysis, Urban travel characteristics,
Transport and environment: Traffic noise, factor affecting noise statement measures, standards, air pollution standards, traffic safety, accident reporting and recording systems, factors affecting road safety, transport planning for different target groups.

Unit-IV Planning in Indian Context
Introduction to types of plans with choice of appropriate scale- development plans, master plan, city development plan, structure plan, district plan, action area plan, subject plan, comprehensive planning, zonal plans etc., hierarchy of plans: regional plan, sub-regional plan, sector plans and spatial plans, town planning schemes, contents of base maps at various scales, notations, measurement of areas.
Database for planning and socio - economic surveys: data requirements for urban and regional planning, sources of primary and secondary data, questionnaire design, measurement scale and their application, sampling techniques; Objectives, types, and significance of planning surveys.
Role of URDPFI guidelines in Town planning, Urban Development Policies and Programmes at various levels.
Graphic presentation of statistical and spatial data.

Unit-V Current trends in urban planning and transportation systems
Indian scenario - Issues and Policies, Global scenario, Future trends of urbanization.
Review of existing traffic management schemes in Indian cities.
Impact of technology on urban forms and planning, role of disruptive innovations and disaster mitigation in urban planning, advanced transportation systems with their merits and demerits, Intelligent transport system (ITS) its types and applications.

Course Outcomes:
Upon completion of the course, the students will be able to:
CO1: Explain the concepts for planning a city and land-use patterns.
CO2: Differentiate various theories used in urban planning.
CO3: Analyse various requirements for transportation systems.
CO4: Design approaches in addressing the issues and concerns of urban environment through planning.
CO5: Plan strategies for any project with an urban planning perspective as a member and/or leader in a team of planning projects.

Text Books:

1. A.B. Gillion and Simon Eisner, “The Urban Pattern”, CBS Publishers and Distributors, Delhi.
2. Rishma A., “Town Planning in Hot Cities”, Mir Publishers, Moscow.
3. Ward S (2002), “Planning the 20th Century City” John Wiler & Sons.
4. R. Ramachandran, “Urbanisation and Urban Systems in India”, Oxford Publications.
5. K. C. Shivrama Krishnan, “Revisioning Indian Cities”, Sage Publications.

6. ITPI reader
7. Bruton, M.J., “Introduction to Transportation Planning,” Hutchinson Publication, London.
8. Kadiali, L.R., “Traffic and Transportation Planning”, Khanna Publishers, Delhi.

Reference Books:

1. Broadbent, Geoffery: “Emerging Concepts in Urban Space Design”, Van Nostand Reinhold, 1990.
2. Edmund Bacon, “Design of Cities”, Penguin, 1976.
3. Francis Tibbalds, “Making people-friendly towns: improving the public environment in towns and cities”, Longman, 1992.
4. Rob Krier, “Urban Space”, Random House Incorporated, 1979.
5. Jonathan Barnett, “Urban design as public policy: practical methods for improving cities”, Architectural Record Books, 1974.
6. Papacoster, C.S.And Prevendons,“Transportation Engineering and Planning” Prentice Hall of India.
7. Introduction to transport planning by Michael J Bruton
8. Principal of Urban transport system planning by Hutchinson

Course Code: 900226

Course Name: Safety & Quality Management

L	T	P	Credit
3	0	0	3

Course Objectives:

1. To study the basics of quality and safety management.
2. To learn the code of practice in design and construction for quality standards.
3. To understand and evaluate quality and safety management principles and best practicesin construction.
4. To understand and evaluate safety management principles in construction;
5. To acquire good basic practices for quality system and progress for quality assuranceand quality improvement for construction companies.

Syllabus:

Unit – I

Quality Management: Introduction – Definitions and objectives, Factors influencing construction quality; Responsibilities and authority; Quality plan; Quality Management Guidelines; Quality circles; cost of quality and safety; Quality transition - quality control and inspection; quality assurance; total quality management-principles, tools and techniques; Planning and control of quality during design of structures; Tools and techniques for quality management.

Unit – II

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; Concepts of quality control- Objectives, definitions, and systems.

Unit – III

Quality Planning: Quality Policy, Objectives and methods in Construction industry; Consumers satisfaction, Ergonomics, Time of Completion, Statistical tolerance, Taguchi's concept of quality; Inspection procedures-Processes and products (materials and machinery); Total cost implication.

Quality Assurance and Quality Improvement Techniques:

Evolution of quality assurance, Objectives of quality assurance; Methods, Techniques and needs of quality assurance; Different aspects of quality Appraisals; Quality assurance in construction. Role of quality assurance in TQM process, Quality assurance standards. Developing and implementing quality assurance system, Quality Improvement Tools and Techniques, work study, method study and time study.

Unit – IV

Safety management : Planning for safety provisions, budgeting for safety, safety policy, Safety audit, safety management practices, safety survey, safety inspection, safety sampling, evaluation of performance of supervisors on safety; Construction hazards and safety guidelines; Overall accident investigation process; Risk management; Prevention techniques for construction accidents; Site management with regard to safety recommendations; Training for safety awareness and implementation; Construction safety and health manual.

Unit-V

Recent trends and Case studies: Quality and safety issues in steel construction, concrete construction (including pre-cast, and pre-stressed); computer aided hazard analysis.

Course Outcomes:

After this course, students will be able to:

CO 1: Explain the quality management systems and utilize the ISO 9000 family of standards.

CO 2: Improve the quality of the project through tools and techniques.

CO 3: Perform the environmental impact assessment (EIA) for construction projects towardsquality.

CO 4: Analyse the quality assurance and quality control, quality improvement tools andtechniques;

CO 5: Evaluate the contract and inspection procedures.

CO 6: Identify the safety management practices in construction industry.

Reference Books:

1. B. G. Dale, Managing quality, 4th ed., Blackwell Publishing, Oxford, 2003.
2. D. Reese and J. V. Eidson, Handbook of OSHA construction safety and health, 2 n d ed.,CRC Press, Bocaaton, 2006.
3. F. Harris, R. McCaffer and F. Edum-Fotwe, Modern construction management, 6 t h ed., Blackwell Publishing, Oxford, 2006
4. K. Knutson, C. J. Schexnayder, C. M. Fiori and R. Mayo, Construction managementfundamentals, 2 nd ed., McGraw Hill, New York, 2008.
5. S. J. Holt, Principles of construction safety, Blackwell Publishing, Oxford, 2008.
6. The Management and Control of Quality: Sixth edition: James R.Evans, William M.Lindsay.
7. Safety management by John V.Grimaldi Rollin H.Simonds.
8. ISO 9000 family of standard

Course Code: 110701

Course Name: Software Application for Solving Civil Engineering Problems

L	T	P	Credit
0	0	4	2

Course Objectives:

1) To practice various software's used in civil engineering design & analysis.
2) To practice MATLAB & QGIS.
3) To practice various other software's and its applications in civil engineering works.

List of Experiments:

1. Design and analysis of reinforced concrete beam using STADD software.
2. Design and analysis of reinforced concrete slab using STADD software.
3. Design MATLAB code to develop load-response curve for different load conditions for a beam designed of experiment 1.
4. Application of QGIS in preparation of vector map of major city and preparation of land use and land cover maps.
5. Determination of critical network for a construction project using PRIMEVERA/ MS-Project.
6. To prepare an estimation of Multi-storey building and Road using MS-Excel.
7. Design water supply networks through Hardy Cross method. (Loops, EPANET and other software's).
8. Design Sewer networks using Hidra software.
9. Development of Geo-contor map by total station.
10. Estimation of axel load (msa) through IRC 37: 2015 using MS Excel.
11. Design and analysis of multi-storey building using E-tabs software.

In addition to above, various available open source software's will be used.

Course Outcomes

Upon completion of the course, the students will be able to:

CO 1: Design various beams, slabs & multistorey building's using various software's.
CO 2: Design water supply & sewer networks using various software's.
CO 3: Practice MS Excel in estimation works.
CO 4: Produce land use land cover maps and geo contour maps using various software's.
CO 5: Practice Primavera and MS-Project softwares.

Course Code: 110702
Course Name: Summer Internship Project - III

L	T	P	Credit
0	0	4	2

Course Objectives:

1) To develop an appreciation and importance of civil Engineering in developing the infra structure.
2) To develop an understanding regarding the various engineering principals to be used in the field Construction activities.
3) To emphasize on the use of the modern tools and plants used in the construction industry.
4) To build the necessary practical background and exposure to the field problems.
5) To develop a technical skill to prepare project documents.

Syllabus:

1. Each candidate shall go for 1 month (4 week) on field training at different organizations / sites of his / her choice after completion of their 6^{th} Semester exams (in summer vacations) and shall submit a detailed report after completion of training.

2) Candidates will be taken to nearby places where civil engineering works are being carried out during the semester and they shall have to submit a detailed report of their visit.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Observe various activities of civil construction works.

CO2: Examine the utility of general and specific equipments for construction.

CO3: Differentiate the construction projects individually and in team.

CO4: Develop the writing and communication skills for various engineering problems.

CO5: Adapt lifelong learning for benefit of society.

Course Code: 110703
Course Name: Creative Problem Solving

L	T	P	Credit
0	0	2	1

Course Objectives:

1) To create an interest in students to provide solutions to various on field problems of civil engineering.
2) To provide solutions to various on field problems of civil engineering.

List of Experiments

1. Traffic Survey of Major Road's in the city.
2. Design of Traffic Signal.
3. Performance evaluation of new building materials.
4. Determination of residual life of structure.
5. Identification of occupational diseases.
6. Identification of solid waste collection problems in a locality and subsequent proposal of the solutions to those problems.
7. Determination of surface roughness index of road.
8. Use of waste materials for construction of pavement layers.
9. Creation of data bank of water resources in the city.
10. Industrial visit and joint solution of problems in industry.

Course Outcomes

Upon completion of the course, the students will be able to:

CO 1: Identify various on field problems.
CO 2: Practice various methods to solve problems.
CO 3: Produce solutions to various problems.
CO 4: Demonstrate various problems solving skills.

Course Code: 100008

Course Name: Intellectual Property Rights

L	T	P	Credit
2	0	0	2

Course Objectives:

1. To acquaint the learners with the basic concepts of Intellectual Property Rights.

2. To develop expertise in the learners in IPR related issues and sensitize the learners with emerging issues in IPR and the rationale for the protection of IPR.

Syllabus:

UNIT I: Introduction: Introduction to IPRs, Basic concepts and need for Intellectual Property – Meaning and practical aspects of Patents, Copyrights, Geographical Indications, IPR in India and Abroad. Nature of Intellectual Property, Industrial Property, technological Research, Inventions and Innovations – Important examples of IPR.

UNIT II: Intellectual Property Rights: The IPR tool kit, Patents, the patenting process, Patent cooperation treaties: International Treaties and conventions on IPRs, TRIPS Agreement, PCT Agreement, Patent Act of India, Patent Amendment Act, Design Act, Trademark Act, Geographical Indication Act.

UNIT III: Intellectual Property Protections: IPR of Living Species, protecting inventions in biotechnology, protections of traditional knowledge, biopiracy and documenting traditional knowledge, Digital Innovations and Developments as Knowledge Assets – IP Laws, Cyber Law and Digital Content Protection. Case studies: The basmati rice issue, revocations of turmeric patent, revocation of neem patent.

UNIT IV: Exercising and Enforcing of Intellectual Property Rights: Rights of an IPR owner, licensing agreements, criteria for patent infringement. Case studies of patent infringement, IPR – a contract, unfair competitions and control, provisions in TRIPs.

UNIT V: Role of Patents in Product Development &amp: Commercialization, Recent changes in IPR laws impacting patents and copy rights, intellectual cooperation in the science and allied industry. Patentable and non-patentable research. Case studies

Reference Books:

1. P.B. Ganguli, Intellectual Property Rights: Unleashing the Knowledge Economy. Tata Mc Graw Hill, 2001.

2. Steve Smith, The Quality Revolution.1st ed., Jaico Publishing House, 2002.

3. Kompal Bansal and Praishit Bansal. Fundamentals of IPR for Engineers, 1st Edition, BS Publications, 2012.

4. Prabhuddha Ganguli. Intellectual Property Rights. 1st Edition, TMH, 2012.

5. R Radha Krishnan & S Balasubramanian. Intellectual Property Rights. 1st Edition, Excel Books, 2012.

6. M Ashok Kumar & Mohd. Iqbal Ali. Intellectual Property Rights. 2nd Edition, Serial Publications, 2011.

7. Vinod V. Scople, Managing Intellectual Property. Prentice Hall of India PvtLtd, 2012.

8. Deborah E. Bouchoux. Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets. Cengage Learning, 3rd ed. Edition, 2012.

9. Prabuddha Ganguli. Intellectual Property Rights: Unleashing the Knowledge Economy. McGraw Hill Education, 2011. Edited by Derek Bosworth and Elizabeth Webster.

10. The Management of Intellectual Property. Edward Elgar Publishing Ltd.,2013.

11. B.S. Patil, Legal Aspects of Building and Engineering Contracts, 1974.

12. Wadhera (2004), Intellectual Property Rights, Universal Law Publishing Co.

13. Ramappa (2010), Intellectual Property Rights Law in India, Asia Law House.

Course Outcomes:

At the end of this course, the student will be able to

CO1. Imbibe the knowledge of Intellectual Property and its protection through various laws

CO2. Apply the knowledge of IPR for professional development

CO3. Develop a platform for protection and compliance of Intellectual Property Rights & knowledge

CO4. Create awareness amidst academia and industry of IPR and Copyright compliance

CO5. Deliver the purpose and function of IPR and patenting.

SEMESTER-VIII

Course Code: 110801

Course Name: Internship/ Project

L	T	P	Credit
0	0	6	3

Course Objectives:

1) To develop an appreciation of civil engineering problems & have a feel ofreal life situations in planning & execution of projects.
2) To impart training of handling various types of civil engineering problems by use of conventional methods as well as software's.
3) To utilize the expertise in engineering to solve industry's technological problems.
4) To become innovative and professional in technology development, and system implementation.
5) To be able to function in their profession with social awareness and responsibility.
6) To be able to interact with their peers in industry and society as engineering professionals and leaders & inculcate a habit of working in a group.
7) Enable students to prepare professional reports for design projects and data presentation skill and to use computers and some computer graphics.

Syllabus:

Each candidate shall work on an approved project of a public building or any other civil engineering work / experimental work / software package on any specific problem of importance and shall submit a detailed report of the same

OR

Each candidate shall go for internship at different organizations / sites of his /her choice and shall submit a detailed report after completion of internship. (kindly check with the detailed internship policy & guidelines of the institute)

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Observe various activities of civil engineering works.
CO 2: Recognize various engineering problems and techniques to solve them.
CO 3: Reproduce to solution of the problems upon the need of society.
CO 4: Develop the writing and communication skills for various engineering problems.
CO 5: Adapt lifelong learning for benefit of society.