

**B.Tech. (Civil Engineering)
Component wise distribution**

Main Curriculum Components	Sub Components	Approved Credits for B.Tech.	Approved Credits Range	Proposed Credits for B.Tech. by Department	Proposed Credits Range
Institute Core Course	HSSC	5	52-58	5	53
	HSSEC	6		6	
	MC	3		3	
	BSC	12-20		12	
	ESC	8-20		16	
	DSC	4		4	
	ESSC	3		3	
	TM	4		4	
Program Core Course	CCCC	40-48	87-91	48	90
	AI/ML	2		2	
	Engg. Analysis and design (design thinking based project)/Industry Oriented Problem Solving/ Lab based Project/ Practical Problem/ Case study	4		4	
	Technical Communication	2		2	
	BTP/Entrepreneurship/ Project-based internship/PEC	6-10		6	
	PEC	22-26		22	
	TEB	6-8		6	
	OEC	9-12		9-12	
	CORE	2	2	2	2
	Total	150-160		154/157	
	MSC/DHC	18/20		18/20	
	Grand Total			172/177	

**DEPARTMENT OF CIVIL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code : 113 **B.Tech. (Civil Engineering)**
Department : CE **Civil Engineering**

Teaching Scheme

Year	Credits in Autumn Semester	Credits in Spring Semester	Credits (Year – wise)
1	23	19	42
2	24/25	23/24	47/49
3	24/25	19	43-44
4	14	8	22
Grand Total			154/157
Total with MSC/DHC	With addition 18-20 credits		172/177

Non-Credit Elements (NCE)	Components	Maximum Units	Minimum Units	Comments
	Discipline (DIS)	16	8	To be evaluated by DoSW
	NCC/NSS/NSO	8	4	To be evaluated by DoSW
	Internship (INT)	24	8	1-week internship= 1 unit (to be coordinated by the deptt. /Centres/School)
	Participation in professional development programs by Industry experts/ field experts (PPD-1 & PPD-2)	8	4	To be coordinated by the departments/Centres/school (2 nd & 3 rd Years)
Minimum non-credit units to be earned: 24				

DEPARTMENT OF CIVIL ENGINEERING

Program Code : 113 - B.Tech. (Civil Engineering)
Department : Department of Civil Engineering
Year : II

Teaching Scheme					Contact Hours/Week			Exam Duration (Hrs.)		Relative Weights (%)				
S. No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical	CWS	PRS	MTE	ETE	PRE
(Autumn)														
1	HSSEC-I	HSS Elective Course-I	HSSEC	3										
2	OEC-I	Open Elective Course-I	OEC	3/4										
3	MSI-101	Fundamentals of Management	MC	3	3	0	0	3	0	20-35	-	20-30	40-50	-
4	CEC-201	Geospatial Engineering -II	PCC	5	2	0	6*	3	2	10-25	10-25	15-25	30-40	10-25
5	CEC-203	Structural Analysis-I	PCC	3	3	0	2/2	3	2	15-30	20	15-25	30-40	-
6	CEC-205	Channel Hydraulics	PCC	3	3	0	2/2	3	0	15-30	20	15-25	30-40	-
7	ESE-101	Geology for Engineers	ESC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
		Total		24/25										
(Spring)														
1	DAI-101	Data Science	DSC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
2	OEC-II	Open Elective Course-II	OEC	3/4										
3	CEC-202	Water Supply Engineering	PCC	3	3	0	0	3	0	20-35	-	20-30	40-50	-
4	CEC-204	Structural Analysis -II	PCC	3	3	0	2/2	3	0	15-30	20	15-25	30-40	-
5	CEC-206	Design of Reinforced Concrete Elements	PCC	3	3	0	2/2	3	0	15-30	20	15-25	30-40	-
6	HYE-101	Engineering Hydrology	ESC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
7	CEL-I	Program Elective Course - I	PEC	3										
		Total		23/24										

*Includes field survey camp

List of Program Elective Courses

Second Year Spring (3 credits each)

Teaching Scheme					Contact Hours/Week			Exam. Duration		Relative Weight (%)				
S. No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical	CWS	PRS	MTE	ETE	PRE
1.	CEL-201	Building Materials	PEC	3	3	0	0	3	-	20-35	-	20-30	40-50	-
2.	CEL-202	Engineering Graphics	PEC	3	2	0	2	3	-	10-25	25	15-25	30-40	-
3.	CEL-203	Intelligent Transportation System	PEC	3	2	1	0	3	-	20-35	-	20-30	40-50	-

Third Year Spring (3 credits each)

Teaching Scheme					Contact Hours/Week			Exam. Duration		Relative Weight (%)				
S. No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical	CWS	PRS	MTE	ETE	PRE
1.	CEL-301	Construction Planning And Management	PEC	3	3	0	0	3	-	20-35	-	20-30	40-50	-
2.	CEL-302	System Analysis	PEC	3	3	0	2/2	3	-	15-30	20	15-25	30-40	-
3.	CEL-303	Airport Planning And Design	PEC	3	3	0	0	3	-	20-35	-	20-30	40-50	0
4.	CEL-304	Foundations Of Industrial Machines	PEC	3	2	1	0	3	-	20-35	-	20-30	40-50	0

List of Program Elective Courses

Fourth Year Autumn (4 credits each)

Teaching Scheme					Contact Hours/Week			Exam. Duration		Relative Weight (%)				
S. No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical	CWS	PRS	MTE	ETE	PRE
1.	CEL-4XX	Rock Engineering	PEC	4	3	1	0	3	0	20-35	-	20-35	40-50	-
2.	CEL-531	Advanced Hydrology	PEC	4	3	1	0	3	0	20-35	-	20-35	40-50	-
3.	CEL-534	Modeling, Simulation & Optimization	PEC	4	3	1	0	3	0	20-35	-	20-35	40-50	-
4.	CEL-501	Environmental Modeling& Simulation	PEC	4	3	1	2/2	3	0	15-30	20	15-25	30-40	-
5.	CEL-502	Environmental Seperation Process	PEC	4	3	1	0	3	0	20-35	-	20-35	40-50	-
6.	CEL-503	Waste Water Treatment	PEC	4	3	1	0	3	0	20-35	-	20-35	40-50	-
7.	CEL-505	Statistics & Instrumentation For Environmental Engineers	PEC	4	3	1	2	3	0	15-30	20	15-25	30-40	-
8.	CEL-524	Soil Dynamics And Machine Foundations	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
9.	CEL-542	Continuum Mechanics	PEC	4	3	1	0	3	0	20-35	-	20-35	40-50	-
10.	CEL-543	Advanced Concrete Design	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
11.	CEL-544	Structural Dynamics	PEC	4	3	1	0	3	0	20-35	-	20-35	40-50	-
12.	CEL-641	Behaviour & Design of Steel Structures	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
13.	CEL-561	Traffic Analysis And Design	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
14.	CEL-563	Urban Mass Transit Systems	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
15.	CEL-564	Geometric Design	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
16.	CEL-565	Planning, Design And Construction of Rural Roads	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
17.	CEL-567	Transportation Systems Analysis	PEC	4	3	1	0	3	-	20-35	-	20-30	40-50	-
18.	CEL-568	Advanced Highway Material Characterisation	PEC	4	3	1	2/2	3	-	15-30	20	15-25	30-40	-
19.	CEL-5XX	Advanced Highway Construction And Maintenance	PEC	4	3	1	2/2	3	-	15-30	20	15-25	30-40	-
20.	CEN-511	Surveying Measurements And Adjustments	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
21.	CEN-512	Principles of Photogrammetry	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
22.	CEN-513	Remote Sensing And Image Processing	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-

23.	CEN-514	Geodesy And Gps Surveying	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
24.	CEN-614	Theory And Applications of GIS	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
25.	CEL-5XX	Programming For Geospatial Data Analysis	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-

Fourth Year Spring (4 credits each)

1.	CEN-4XX	Ground Water Engineering	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
2.	CEL-602	Water Quality Management	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
3.	CEL-603	Industrial & Hazard Waste Management	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
4.	CEL-604	Environmental Impact & Risk Assessment	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
5.	CEN-605	Solid Waste Management	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
6.	CEL-606	Environmental Remediation of Contaminated Sites	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
7.	CEL-636	Hydropower Engineering	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
8.	CEL-625	Ground Improvement Engineering	PEC	4	2	1	0	3	0	20-35	-	20-30	40-50	-
9.	CEL-545	Finite Element Analysis	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
10.	CEL-642	Analysis And Design of Bridges	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
11.	CEL-643	Analysis And Design of High-rise Buildings	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
12.	CEL-644	Analysis And Design of Plates And Shells	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
13.	CEL-645	Mechanics of Composites	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
14.	CEL-646	Engineering Design Optimization And Reliability	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
15.	CEL-647	Condition Assessment And Retrofitting Of Structures	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
16.	CEL-648	Concrete Technology	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
17.	CEL-649	Fracture Mechanics In Quasi-Brittle Materials	PEC	4	3	1	0	3	0	20-35	-	20-30	40-50	-
18.	CEL-650	Design of Bridge Sub-Structure	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
19.	CEL-651	Wind Engineering	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
20.	CEL-653	Introduction To Theories of Inelasticity	PEC	4	3	1	0	3	0	20-25	-	25-35	40-50	-
21.	CEL-6XX	Pavement Analysis And Design	PEC	4	3	1	-	3	-	20-35	-	20-30	40-50	-
22.	CEL-662	Intersection Design And Control	PEC	4	3	1	-	3	-	20-35	-	20-30	40-50	-
23.	CEL-663	Pavement Evaluation And Management	PEC	4	3	1	-	3	-	20-35	-	20-30	40-50	-
24.	CEL-664	Transportation Planning	PEC	4	3	1	-	3	-	20-35	-	20-30	40-50	-

25.	CEL-665	Road Traffic Safety	PEC	4	3	1	-	3	-	20-35	-	20-30	40-50	-
26.	CEL-666	Transport Economics	PEC	4	3	1	-	3	-	20-35	-	20-30	40-50	-
27.	CEL-614	Theory And Applications Of GIS	PEC	4	3	0	2	3	0	10-25	25	15-25	30-40	-
28.	CEL-XXX	Transportation Data Analysis Techniques	PEC	4	3	1	0	3	0	25-35	-	20-30	40-50	0

Basket of Talent Enhancement Course

Teaching Scheme					Contact Hours/Week			Exam Duration		Relative Weight (%)				
S. No.	Course Code	Course Title	Area	Cr.	L	T	P	Th.	Pr.	C W S	P R S	MTE	E T E	PRE
TEB-I (Computer Aided Design)														
1	CET-101	CAD in Structural Analysis	TEB	2	1	0	2	2	-	10-20	20-30	15-25	30-40	0
2	CET-102	CAD in Geotechnical Engg.	TEB	4	2	1	2	2	-	10-20	20-30	15-25	30-40	0
TEB-II (Material Testing)														
1	CET-103	Highway Material Characterization	TEB	2	1	0	2	2	-	10-20	20-30	15-25	30-40	0
2	CET-104	Structural Materials and Testing	TEB	4	2	1	2	2	-	10-20	20-30	15-25	30-40	0

List of Open Elective Courses

Teaching Scheme					Contact Hours/Week			Exam. Duration		Relative Weight (%)				
S. No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical	CWS	PRS	MTE	ETE	PRE
1.	CEO-101	Probability Methods In Engineering Problems	OEC	3	3	0	0	3	0	20-35	0	20-30	40-50	0
2.	CEO-102	Simulation of Behavior-Induced Mobility	OEC	3	2	1	0	3	0	20-35	-	20-30	40-50	0
3.	CEO-103	Water Resources Engineering	OEC	3	3	0	2/2	3	0	15-30	20	15-25	30-40	-

Minor Specialization Courses (20 credits)

S.No.	Subject Code	Course Title	Semester	Credits
1	CEC-202	Water Supply Engineering	Spring	3
2	CEC-102	Geospatial Engineering-I	Spring	3
3	CEC-104	Fluid Mechanics	Spring	3
4	CEC-203	Structural Analysis-I	Autumn	3
5	CEC-307	Highway & Traffic Engg	Autumn	3
6	CEC-301	Soil Mechanics	Autumn	3
7	CEL-301	Construction Planning and Management	Spring	3
8	CEL-201	Building Materials	Spring	3

Departmental Honours Courses (20 credits)

S.No.	Subject Code	Course Title	Credits
1.	CEL-521	Advanced Numerical Analysis	4
2.	CEL-523	Engineering Behaviour Of Rocks	4
3.	CEL-525	Fem In Geotechnical Engineering	4
4.	CEL-542	Continuum Mechanics	4
5.	CEL-543	Advanced Concrete Design	4
6.	CEL-544	Structural Dynamics	4
7.	CEL-545	Finite Element Analysis	4
8.	CEL-623	Stability Analysis Of Slopes	4
9.	CEL-624	Design Of Under-Ground Excavations	4
10.	CEL-628	Constitutive Modelling Of Geological Materials	4
11.	CEL-629	Earthquake Resistant Design Of Geotechnical Structures	4
12.	CEL-501	Environmental Modelling& Simulation	4
13.	CEL-502	Environmental Separation Process	4
14.	CEL-504	Environmental Chemistry	4
15.	CEL-505	Statistics & Instrumentation For Environmental Engineers	4
16.	CEL-603	Industrial& Hazard Waste Management	4
17.	CEL-606	Environmental Remediation Of Contaminated Sites	4
18.	CEL-611	Analytical And Digital Photogrammetry	4
19.	CEL-612	Advanced Digital Image Processing	4
20.	CEL-613	Thermal, Microwave And Hyperspectral Remote Sensing	4
21.	CEL-615	Geoinformatics For Natural Disasters	4

22.	CEL-616	Geoinformatics For Landuse Surveys	4
23.	CEL-617	Satellite Geodesy	4
24.	CEL-618	Modelling And Analysis Of Geospatial Data	4
25.	CEL-534	Modeling, Simulation & Optimization	4
26.	CEL-638	Climate Change And Its Impact On Water Resources	4
27.	CEL-561	Traffic Analysis And Design	4
28.	CEL-563	Urban Mass Transit Systems	4
29.	CEL-564	Geometric Design	4
30.	CEL-565	Planning, Design And Construction Of Rural Roads	4
31.	CEL-567	Transportation Systems Analysis	4
32.	CEL-568	Advanced Highway Material Characterization	4
33.	CEL-5XX	Advanced Highway Construction And Maintenance	4
34.	CEL-6XX	Pavement Analysis And Design	4
35.	CEL-662	Intersection Design And Control	4
36.	CEL-663	Pavement Evaluation And Management	4
37.	CEN-664	Transportation Planning	4
38.	CEL-665	Road Traffic Safety	4
39.	CEL-666	Transport Economics	4
40.	CEL-632	Hydraulic Structures	4
41.	CEL-XXX	Transportation Data Analysis Techniques	4