COURSE & EXAMINATION SCHEME
OF
NEP 2020 CURRICULUM

BACHELOR OF TECHNOLOGY (B.TECH.)
IN
CIVIL ENGINEERING (CE)

GONDWANA UNIVERSITY,
GADCHIROLI
(AY 2024-25)

Board of Studies in Civil Engineering

Prof. Lavkesh R. Wankhade	Prof. Sarita S. Borkar	Prof. Rajesh T. Peche
(Member, BoS, Civil Engineering)	(Member, BoS, Civil Engineering)	(Chairman, BoS, Civil Engineering)

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/Development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The Engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal. Health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage inindependent and life-long learning in the broadest context of technological change.

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UG Program Structure of
B. Tech. (Civil Engineering)

List of Abbreviations:

Abbreviation	Title	No of courses	Credits	% of Total Credits
BSC	Basic Science Course	6	17	9.770115
ESC	Engineering Science Course	6	13	7.471264
PCC	Program Core Course	25	55	31.03448
PEC	Program Elective Course	8	20	11.49425
MDM	Multidisciplinary Minor	6	14	8.045977
OE/SE	Open/School Elective (other than particular program)	3	8	4.597701
VSEC	Vocational and Skill Enhancement Course	4	8	4.597701
AEC-01	Ability Enhancement Course	1	2	1.149425
AEC-02	Indian Language	1	2	1.149425
HSSM	Entrepreneurship/Economics/ Management Courses	2	4	2.298851
IKS	Indian Knowledge System	1	2	1.149425
VEC	Value Education Course	2	4	2.298851
RM	Research Methodology	1	4	2.298851
CEP	Community Engagement Activity /Field Project	1	1	0.574713
ELC	Internship/ OJT	1	12	6.896552
ELC	Project	1	4	2.298851
CC	Co-curricular Courses	2	4	2.298851
Total		**71**	**174**	**100 %**

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GONDWANA UNIVERSITY, GADCHIROLI
FACULTY OF ENGINEERING AND TECHNOLOGY
Teaching and Evaluation Scheme w.e.f. Academic Year 2024-2025 as per NEP - 2020
Bachelor of Technology in Civil Engineering (CE) (Full Time)
Semester – I

Course Category	Board of Studies	Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme									Credit
								Theory Marks					Practical Marks				
				L	T	P	Total	MSE (CA)	IE (CA)	ESE (UA)	Total	Min (UA+CA)	CA	UA	Total	Min (UA+CA)	
BSC	Science and Humanities	STBSC101	Engineering Mathematics I	3	1	–	4	10	10	80	100	40	–	–	–	–	4
BSC	Science and Humanities	STBSC102	Engineering Chemistry	3	–	–	3	10	10	80	100	40	–	–	–	–	3
ESC	Civil Engineering	STESC103	Engineering Mechanics	3	–	–	3	10	10	80	100	40	–	–	–	–	3
PCC	Civil Engineering	STPCCCEC 104	Basics of Civil Engineering	2	–	–	2	5	5	40	50	20	–	–	–	–	2
ESC	Computer Science & Engineering	STESC105	Programming for Problem Solving	2	–	–	2	5	5	40	50	20	–	–	–	–	2
AEC-01	Science and Humanities	STAEC106	Business Communication Skill	1	–	2	3	5	5	40	50	20	–	–	–	–	2
BSC	Science and Humanities	STBSC107	Engineering Chemistry Lab	–	–	2	2	–	–	–	–	–	25	25	50	25	1
ESC	Civil Engineering	STESC108	Engineering Mechanics Lab	–	–	2	2	–	–	–	–	–	25	25	50	25	1
VSEC	Mechanical Engineering	STVSEC109	Workshop - I	–	–	4	4	–	–	–	–	–	50	50	100	50	2
CC	Science and Humanities	STCC110	Liberal Learning Course (Yoga and Meditation)	-	–	4	4	–	–	–	–	–	50	–	50	25	2
		Total		**14**	**1**	**14**	**29**				**450**				**250**		**22**
Total Marks				**700**													

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Bachelor of Technology in Civil Engineering (CE) (Full Time)
Semester – II

Course Category	Board of Studies	Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme									Credit
								Theory Marks					Practical Marks				
				L	T	P	Total	MSE (CA)	IE (CA)	ESE (UA)	Total	Min (UA+CA)	CA	UA	Total	Min (UA+CA)	
BSC	Science and Humanities	STBSC201	Engineering Mathematics II	3	1	–	4	10	10	80	100	40	–	–	–	–	4
BSC	Science and Humanities	STBSC202	Engineering Physics	3	1	–	4	10	10	80	100	40	–	–	–	–	4
ESC	Electrical Engineering	STESC203	Basics of Electrical & Electronics Engineering	3	–	–	3	10	10	80	100	40	–	–	–	–	3
ESC	Mechanical Engineering	STESC204	Engineering Graphics & Design	3	–	–	3	10	10	80	100	40	–	–	–	–	3
IKS	Science and Humanities	STIKS205	Indian Knowledge System	2	–	–	2	40	10	–	50	20	–	–	–	–	2
BSC	Science and Humanities	STBSC206	Engineering Physics Lab	–	–	2	2	–	–	–	–	–	25	25	50	25	1
ESC	Mechanical Engineering	STESC207	Engineering Graphics & Design Lab	–	–	2	2	–	–	–	–	–	25	25	50	25	1
VSEC	Civil Engineering	STVSECCEC 208	Workshop - II (Civil)	–	–	4	4	–	–	–	–	–	50	50	100	50	2
CC	Civil Engineering	STCCCEC209	Club Activities (Self learning course)	–	–	–	–	–	–	–	–	–	50	–	50	25	2
			Total	**14**	**2**	**8**	**24**				**450**				**250**		**22**
			Total Marks	**700**													

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FACULTY OF ENGINEERING AND TECHNOLOGY
Teaching and Evaluation Scheme w.e.f. Academic Year 2024-2025 as per NEP - 2020
Programme in Civil Engineering (CE) (Full Time)

Scheme of Instructions: UG Certificate Level

(Exit Course after First Year of Engineering)

Course Category	Board of Studies	Course Code	Name of Course	Teaching scheme				Examination Scheme								
				Hours per week			No. of Credits	Theory					Practical			
				L	T	P		Duration of Paper (Hrs.)	Max. Marks	Max. Marks	Total Marks	Min. passing marks	Max. Marks	Max. Marks	Total Marks	Min. passing marks
									ESE	Sessional MSE			TW	PE		
PCC	Civil Engineering	STEXCEC210	Testing of Civil Engineering Materials	--	-	8	4	--	--	--	--	--	100	--	100	50
OR																
PCC	Civil Engineering	STEXCEC211	Internship / TechnicalProject	--	-	8	4	--	--	--	--	--	100	--	100	50
			Total	--	-	**8**	**4**	--	--	--	--	--	**100**	--	**100**	**50**
			Total	**8**			**4**	**100**								

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Bachelor of Technology in Civil Engineering (CE) (Full Time)
Semester – III

Course Category	Board of Studies	Course Code	Name of Course	Teaching scheme				Examination Scheme									
				Hours per week			No. of Credits	Theory						Practical			
				L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional MSE	Max. Marks Sessional IE	Total Marks	Min. passing marks	Max. Marks TW	Max. Marks PE	Total Marks	Min. passing marks
PCC	Civil Engineering	STPCCCEC301	Strength of Materials	3	1	---	4	3	80	10	10	100	40	---	---	---	---
PCC	Civil Engineering	STPCCCEC302	Fluid Mechanics	3	---	---	3	3	80	10	10	100	40	---	---	---	---
MDM	Civil Engineering	STMDMCEC303	Multidisciplinary Minor-I	3	---	---	3	3	80	10	10	100	40	---	---	---	---
OE	Civil Engineering	STOECEC304	Open Elective-I	4	---	---	4	3	80	10	10	100	40	---	---	---	---
HSSM (VEC)	Science and Humanities	STHSSMVEC305	Introduction to Constitution of India	2	--	---	2	2	40	5	5	50	20	---	---	---	---
PCC	Civil Engineering	STPCCCEC306	Strength of Material Lab	---	---	2	1	---	---	---	---	---	---	25	25	50	25
PCC	Civil Engineering	STPCCCEC307	Fluid Mechanics Lab	---	---	2	1	---	---	---	---	---	---	25	25	50	25
PCC	Civil Engineering	STPCCCEC308	AutoCAD Drawing	---	--	2	1	---	---	---	---	---	---	25	25	50	25
HSSM(EMC)	Civil Engineering	STVECCEC309	Ethical HumanValues	2	---	---	2	---	---	---	---	---	---	50	---	50	25
CEP	Civil Engineering	STCEPCEC310	Innovation, Creativity & Entrepreneurship in Civil Engineering	---	---	2	1	---	---	---	---	---	---	50	---	50	25
			Total	**17**	**1**	**8**	**22**	---	---	---	---	**450**	---	---	---	**250**	---
			Total	**26**			**22**	**700**									

Open Elective Course – I
1. Object Oriented Programming
2. Total Quality Management
3. Building Automation

Multidisciplinary Minor- I
1. Introduction to Civil Engineering
2. Introductionto Data Science
3. Sensors & Transducers

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Teaching and Evaluation Scheme w.e.f. Academic Year 2025-2026 as per NEP - 2020

Bachelor of Technology in Civil Engineering (CE) (Full Time)

Semester – IV

Course Category	Board of Studies	Course Code	Name of Course	Teaching scheme				Examination Scheme									
				Hours per week			No. of Credits	Theory						Practical			
				L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional MSE	Max. Marks Sessional IE	Total Marks	Min. passing marks	Max. Marks TW	Max. Marks PE	Total Marks	Min. passing marks
PCC	Civil Engineering	STPCCCE C401	Concrete Technology	3	---	---	3	3	80	10	10	100	40	---	---	---	---
PCC	Civil Engineering	STPCCCE C402	Surveying	3	---	---	3	3	80	10	10	100	40	---	---	---	---
MDM	Civil Engineering	STMDMC EC403	Multidisciplinary Minor-II	2	---	---	2	2	40	5	5	50	20	---	---	---	---
OE	Civil Engineering	STOECEC 404	Open Elective-II	2	---	---	2	2	40	5	5	50	20	---	---	---	---
PCC	Civil Engineering	STPCCCC4 05	Concrete Technology Lab	---	1	2	2	---	---	---	---	---	---	25	25	50	25
PCC	Civil Engineering	STPCCCE C406	Surveying Lab	---	1	2	2	---	---	---	---	---	---	25	25	50	25
VSEC	Civil Engineering	STVSECE C407	Workshop Practice - III	---	1	2	2	---	---	---	---	---	---	25	25	50	25
HSSM(AEC -02)	Civil Engineering	STAECCE C408	Modern Indian / Foreign language	---	---	4	2	---	---	---	---	---	---	50	---	50	25
HSSM (EMC)	Civil Engineering	STHSSMC EC409	Human Resource Management	---	---	4	2	---	---	---	---	---	---	50	---	50	25
HSSM (VEC)	Civil Engineering	STVECCE C410	Lifestyle for Holistic Health	---	---	4	2	---	---	---	---	---	---	50	---	50	25
			Total	**10**	**3**	**18**	**22**	---	---	---	---	**300**	---	---	---	**300**	---
			Total	**31**			**22**	**600**									

Open elective – II
1. Artificial Intelligence in Civil Engineering
2. Open-Source Technologies
3. Stateline and Remote Sensing

Multidisciplinary Minor II
1. Building Componentsand Construction Processes
2. Operating System Fundamentals
3. Embedded Sensing and Actuators

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GONDWANA UNIVERSITY, GADCHIROLI
FACULTY OF ENGINEERING AND TECHNOLOGY
Teaching and Evaluation Scheme from Academic Year 2025-2026 as per NEP - 2020
Programme Civil Engineering (CE) (Full Time)
Scheme of Instructions: UG Diploma Level
(Exit Course after Second Year of Engineering)

Course Category	Board of Studies	Course Code	Name of Course	Teaching scheme				Examination Scheme								
				Hours per week			No. of Credits	Theory					Practical			
				L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional MSE	Total Marks	Min. passing marks	Max. Marks TW	Max. Marks PE	Total Marks	Min. passing marks
PCC	Civil Engineering	STEXCEC411	Quantity Survey and Estimation	--	-	8	4	--	--	--	--	--	100	--	100	50
OR																
PCC	Civil Engineering	STEXCEC412	Fundamentals of structural Design	--		8	4	--	--	--	--	--	100	--	100	50
OR																
PCC	Civil Engineering	STEXCEC413	Internship / Technical Project	--		8	4	--	--	--	--	--	100	--	100	50
			Total	--				--	--	--	--	--	**100**	--	**100**	**50**
			Total	**8**			**4**	**100**								

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Teaching and Evaluation Scheme w.e.f. Academic Year 2026-2027 as per NEP - 2020
Bachelor of Technology in Civil Engineering (CE) (Full Time)
Semester –V

Category	Board of Studies	Course Code	Name of Course	Teaching scheme				Examination Scheme									
				Hours per week			No. of Credits	Theory						Practical			
				L	T	P		Duration of Paper (Hrs.)	Max. Marks	Max. Marks Sessional		Total Marks	Min. passing marks	Max. Marks		Total Marks	Min. passing marks
									ESE	MSE	IE			TW	PEE		
PCC	Civil Engineering	STPCCC EC501	Theory of Structure	3	--	--	3	3	80	10	10	100	40	---	---	---	---
PCC	Civil Engineering	STPCCC EC502	Geotechnical Engineering	3	---	---	3	3	80	10	10	100	40	---	---	---	---
PCC	Civil Engineering	STPCCC EC503	Water supply Engineering	3	--	--	3	3	80	10	10	100	40	---	---	---	---
PEC	Civil Engineering	STPECC EC504	Program Elective-I	3	---	---	3	3	80	10	10	100	40	---	---	---	---
MDM	Civil Engineering	STMDM CEC505	Multidisciplinary Minor-III	4	---	---	4	3	80	10	10	100	40	---	---	---	---
OE	Civil Engineering	STOECE C506	Open Elective III	2	---	---	2	2	40	5	5	50	20	---	---	---	---
PCC	Civil Engineering	STPCCC EC507	Water Supply Engineering Lab	--	--	2	1	---	---	---	---	---	---	25	25	50	25
PCC	Civil Engineering	STPCCC EC508	Geotechnical Engineering Lab	--	1	4	2	---	---	---	---	---	---	25	25	50	25
PEC	Civil Engineering	STPECC EC509	Program Elective-I Lab		---	2	1	---	---	---	---	---	---	25	25	50	25
			Total	**18**		**8**	**22**	---	---	---	---	**550**	---	---	---	**150**	---
			Total	**26**			**22**	**700**									

Program Elective Course – I
1. Advanced surveying
2. Building Construction and Material

Open Elective – III
1. Operation Research Techniques
2. Entrepreneurship Development
3. Introduction to MATLAB

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Bachelor of Technology in Civil Engineering (CE) (Full Time)
Semester –VI

Category	Board of Studies	Course Code	Name of Course	Teaching scheme				Examination Scheme									
				Hours per week			No. of Credits	Theory						Practical			
				L	T	P		Duration of Paper (Hrs.)	Max. Marks	Max. Marks Sessional		Total Marks	Min. passing marks	Max. Marks		Total Marks	Min. passing marks
									ESE	MSE	IE			TW	PEE		
PCC	Civil Engineering	STPCCCEC601	Design of Steel Structure	3	--	---	3	3	80	10	10	100	40	---	---	---	---
PCC	Civil Engineering	STPCCCEC602	Design of RC Structure	3	--	---	3	3	80	10	10	100	40	---	---	---	---
PCC	Civil Engineering	STPCCCEC603	Estimating & Costing	3	---	---	3	3	80	10	10	100	40	---	---	---	---
PEC	Civil Engineering	STPECCEC604	Program Elective-II	3	---	---	3	3	80	10	10	100	40	---	---	---	---
PEC	Civil Engineering	STPECCEC605	Program Elective-III	3	---	---	3	3	80	10	10	100	40	---	---	---	---
MDM	Civil Engineering	STMDMCEC606	Multidisciplinary Minor IV	2	---	---	2	2	40	5	5	50	20		---	---	---
PCC	Civil Engineering	STPCCCEC607	Estimating & Costing Lab	---	---	2	1	---	---	---	---	---	---	25	25	50	25
PEC	Civil Engineering	STPECCEC608	Program Elective-II Lab	---	---	2	1	---	---	---	---	---	---	25	25	50	25
PEC	Civil Engineering	STPECCEC609	Program Elective - III Lab	--	---	2	1	---	---	---	---	---	---	25	25	50	25
VSEC	Civil Engineering	STVSECCEC610	Design Practice of RC and Steel Structure	--	1	2	2	---	---	---	---	---	---	25	25	50	25
			Total	**17**	**1**	**08**	**22**	---	---	---	---	**550**	---	---	---	**200**	---
			Total	**26**			**22**	**750**									

Program Elective Course – II
1. Industrial Waste Watertreatment
2. Environmental Pollution & Control

Program Elective Course – III
1. Foundation Engineering
2. Geotechnical Investigations and Construction Practices

Multidisciplinary Minor IV
1. Introductionto Database Management Systems
2. Introduction to composite Materials.
3. Industrial Drives

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FACULTY OF ENGINEERING AND TECHNOLOGY
Teaching and Evaluation Scheme from Academic Year 2025-2026 as per NEP - 2020

Programme Civil Engineering (CE) (Full Time)

Scheme of Instructions: B. Voc. Level

(Exit Course after Third Year of Engineering)

Category	Board of Studies	Course Code	Name of Course	Teaching scheme				Examination Scheme								
				Hours per week			No. of Credits	Theory					Practical			
				L	T	P		Duration of Paper (Hrs.)	Max. Marks	Max. Marks	Total Marks	Min. passing marks	Max. Marks	Max. Marks	Total Marks	Min. passing marks
									ESE	Sessional MSE			TW	PEE		
PCC	Civil Engineering	STEXCEC611	Construction Management and Safety	--		8	4	--	--	--	--	--	100	--	100	50
OR																
PCC	Civil Engineering	STEXCEC612	Railways, airport and tunnel engineering	--		8	4	--	--	--	--	--	100	--	100	50
OR																
PCC	Civil Engineering	STEXCEC613	Internship / Technical Project	--		8	4	--	--	--	--	--	100	--	100	50
			Total	--				--	--	--	--	--	**100**	--	**100**	**50**
			Total	**8**			**4**	**100**								

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Bachelor of Technology in Civil Engineering (CE) (Full Time)
Semester – VII

Category	Board of Studies	Course Code	Name of Course	Teaching scheme				Examination Scheme									
				Hours per week			No. of Credits	Theory						Practical			
				L	T	P		Duration of Paper (Hrs.)	Max. Marks	Max. Marks Sessional		Total Marks	Min. passing marks	Max. Marks		Total Marks	Min. passing marks
									ESE	MSE	IE			TW	PEE		
PEC	Civil Engineering	STPCCCE C701	MOOC-I	*4	---	---	3	---	---	---	---	100	40	---	---	---	---
PEC	Civil Engineering	STPCCCE C702	MOOC-II	*4			3	---	---	---	---	100	40	---	---	---	---
MDM	Civil Engineering	STMDMC EC703	Multidisciplinary Minor V Product Design andDevelopment	2	---	---	2	---	---	---	---	50	20	---	---	---	---
ELC	Civil Engineering	STELCCE C704	Internship / OJT	---	---	24	12	---	---	---	---	---	---	100	200	300	150
			Total	**10**	**0**	**24**	**20**	---	---	---	---	**250**	---	---	---	**300**	---
			Total	**34**			**20**	**550**									

MOOC – I (12 week online certificate courses conducted by NPTEL / SWAYAM / MOOC / OTHERS)

1. Geology And Soil Mechanics
2. Geosynthetics and Reinforced Soil Structures
3. Hydraulic Engineering
4. Maintenance And Repair of Concrete Structure

***Courses to be mentored and assessed by faculty members**

MOOC – II (12 week online certificate courses conducted by NPTEL / SWAYAM / MOOC / OTHERS)

1. Mechanics of Solids
2. Retrofitting And Rehabilitation of Civil Infrastructure
3. Rural Water Resources Management
4. Surface Water Hydrology

***Courses to be mentored and assessed by faculty members**

Multidisciplinary Minor V

1. Product Design andDevelopment
2. MachineLearning
3. Energy Managementt

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GONDWANA UNIVERSITY, GADCHIROLI
FACULTY OF ENGINEERING AND TECHNOLOGY
Teaching and Evaluation Scheme w.e.f. Academic Year 2027-2028 as per NEP - 2020

Bachelor of Technology in Civil Engineering (CE) (Full Time)

Semester – VIII

Category	Board of Studies	Course Code	Name of Course	Teaching scheme				Examination Scheme									
				Hours per week			No. of Credits	Theory						Practical			
				L	T	P		Duration of Paper (Hrs.)	Max. Marks	Max. Marks Sessional		Total Marks	Min. passing marks	Max. Marks		Total Marks	Min. passing marks
									ESE	MSE	IE			TW	PEE		
PCC	Civil Engineering	STPCCCEC801	Advanced Design of Water Treatment Plant	3	-	-	3	3	80	10	10	100	40	---	---	---	---
PEC	Civil Engineering	STPECCEC802	Program Elective-IV	3		--	3	3	80	10	10	100	40	---	---	---	---
PEC	Civil Engineering	STPECCEC803	Program Elective-V	3			3	3	80	10	10	100	40	---	---	---	---
MDM	Civil Engineering	STMDMCEC804	Multidisciplinary Minor-VI	2	--	---	2	2	40	5	5	50	20	---	---	---	---
ELC	Civil Engineering	STELCCEC805	Research Methodology and IPR	4		---	4	3	80	10	10	100	40	---	---	---	---
PCC	Civil Engineering	STPCCCEC806	Advanced Design of Water Treatment Plant Lab	-	-	2	1	--	---	---	---	---	---	25	25	50	25
PCC	Civil Engineering	STPCCCEC807	Application of Software in Civil Engineering		1	2	2	--	---	---	---	---	---	25	25	50	25
ELC	Civil Engineering	STELCCEC809	Project	---	---	4	4	---	---	---	---	---	---	100	100	200	100
			Total	**15**	**1**	**8**	**22**	---	---	---	---	**450**	---	---	---	**300**	---
			Total	**24**			**22**	**750**									

Program Elective-IV
1. Advanced Theory of Structure
2. Advanced Design of R.C.C. Structures

Program Elective-V
1. Railway, Tunnels & Airport Engineering
2. Advanced Construction Management

Multidisciplinary Minor VI
1. Power Generation and Systems Planning
2. Big Data Analytics
3. Electrical Circuit Analysis

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I Semester B.Tech. (Civil Engineering) NEP 2020

Course Code : STBSC101

Title of the Course : Engineering Mathematics-I

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	1	0	4	4	3	10	10	80	100

Course Outcome:

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

1. To apply knowledge of mathematics in formulating and solving problems analytically.
2. To deal with function of several variables that is essential in most branches of Engineering.
3. To use the knowledge of Gamma and Beta function to evaluate some definite integrals arising in various branches of engineering.
4. To use various statistical techniques to applied engineering problem.

Unit	Contents	Hours
1	**Differential Calculus** Successive differentiation, Leibnitz's theorem on the n^{th} derivative of a product, Expansion of a function by using Taylor's and Maclaurian's theorem, Indeterminate forms.	09
2	**Partial Differentiation** Partial Derivatives, Euler's theorem on homogeneous functions, Transformation of independent variables (Chain rule).	09
3	**Application of Partial Differentiation** Jacobians, properties of Jacobians, Taylor's and Maclaurin's series for function of two variable, Maxima and Minima of functions of two variables, Lagrange's method of undermined multipliers.	09
4	**Integral Calculus** Gamma and Beta functions, properties of gamma, beta functions, Differentiations of definite integrals under integral sign, (Leibnitz's Rule), Mean and R.M.S. value.	09
5	**Statistics & Finite Differences** Fitting of straight-line, second-degree parabola & exponential curves, Coefficient of Correlation, Regression lines, Rank coefficient of correlation Finite Differences: Operator E & Delta, Fractional polynomial. Lagrange's, interpolation formula for unequal intervals of arguments.	09
		45

Reference Books:

1. A Text book of Engineering Mathematics, Volume I and II by D. T. Deshmukh.
2. A Text book of Applied Mathematics Volume I and II by J. N. Wartikar and P. N. Wartikar.

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3. N. P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi publication, Reprint, 2008.
4. Higher Engineering Mathematics by B. S. Grewal Khanna Publishers.
5. Advanced Engineering Mathematics by H. K. Dass
6. Advanced Engineering Mathematics by Erwins Kreyszig

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I Semester B.Tech. (Civil Engineering) NEP 2020

Course Code : STBSC102

Title of the Course : Engineering Chemistry

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	0	0	3	3	3	10	10	80	100

Course Outcome:

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

1. Demonstrate the types of hardness of water and softening methods.
2. Classify the types of corrosion and write the uses of battery.
3. Illustrate the working of IC engine.
4. Explore the Eco-friendly sustainable developments.
5. Prepare the organic polymers, Resins.

Unit	Contents	Hours
1	**Water treatment and Analysis** Definition of hardness of water, Types of hardness and water softening methods like (External treatment methods) 1-Lime-Soda method 2-Zeolite/Permutt method and 3- Ion exchange methods with advantages and limitations. Units of hardness, Numerical problems on Lime-soda and Zeolite process. Boiler troubles: Boiler corrosion, Caustic embrittlement, Priming and Foaming, Scale and Sludge. Internal treatment for Boiler feed water such as Calgon, Colloidal, and Phosphate conditioning. Desalination of Brackish water/Purification of water by Reverse osmosis and Electrodialysis.	9
2	**Corrosion of metals and Battery science** Definition, Cause and Consequences, mechanism of Dry/Direct chemical and Wet/Electrochemical corrosion. Corrosion Prevention methods- Design and Material selection, Anodic & cathodic protection. Types of corrosion- Pitting corrosion, Intergranular corrosion, Stress corrosion and Waterline corrosion Battery science- Primary and Secondary battery, Nickel-Cadmium Battery, Alkaline Fuel cell, Phosphoric acid fuel cell Applications, Advantages and limitations	9
3	**Fuels and Combustion** Classification, Definition of Calorific value, Gross calorific value (HCV) & Net calorific value (NCV) Determination of calorific value by Bomb calorimeter & Boy's calorimeter, Solid Fuel-Proximate & Ultimate Analysis of coal & its significance, Liquid Fuel- Working of IC engine, Knocking,	9

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	Antiknocking agents, their properties with chemical constitution, Octane number and Cetane number. Gaseous fuel-Composition, Properties and Applications of CNG and LPG, Combustion numerical for Air required	
4	**Green Chemistry** Definition, Goals of Green chemistry, Efficiency parameters a need of green chemistry, Major uses traditional and green pathways of synthesis of Adipic acid, indigo dye, Concept of carbon credits.	9
5	**Synthetic Organic Polymer** Introduction, Functionality of monomer, Polymerization, Free radical mechanism and step growth polymerization concept. Thermoplastic and Thermosetting polymers. Preparation, properties and uses of- Polyethylene (LDPE and HDPE), Resins-Urea formaldehyde, Phenol formaldehyde (Bakelite), Synthetic rubber-(SBR), Styrene butadiene rubber, Polymer composites-Fiber Reinforced plastic (FRP}	9

Text Books:

1. Engineering chemistry, S.S. Dara Chand publication, New Delhi
2. Engineering chemistry Jain and Jain, Dhanpat Rai and sons, New Delhi

Reference Books:

1. Textbook of Engineering Chemistry, Shashi Chawla, Dhanpat Rai & Sons, New Delhi.
2. Applied Chemistry by N. Krishnamurthy, P.Vallinavagam., K.Jeysubramanian, TMH.
3. Applied Chemistry for Engineers, T. S. Gyngell.
4. Introduction to polymers, by Robert J. Young
5. Chemistry of Advanced Materials:CNR Rao, Rsc Publication.
6. Corrosion Engineering by Mars G. Fontanaand Norbert D. Green McGraw Hill Book Co. Tokyo
7. Fuels and Combustion by Amir Circar, Orient Longmans
8. Fundamentals of Corrosion: Michael Henthorne, Chemical Engineering.
9. Water Treatment: F.I. Bilane, Mirpublisher

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I Semester B.Tech. (Civil Engineering) NEP 2020

Course Code : STESC103

Title of the Course : Engineering Mechanics

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	0	0	3	3	3	10	10	80	100

Course Outcomes:

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

1. Apply the principles of mechanics for solving the structures like trusses, cables and beams.
2. Equipped with problem solving ability for rigid body mechanics.
3. Exhibit various applications of Newtonian Mechanics in their respective engineering discipline.
4. Understand fundamentals before going for higher level courses such as Strength of Materials, Electrical Machines, Engineering Thermodynamics, Structural Analysis, Design of Structures, Machine Designs etc.

Units	Contents	Hours
1	Basic principles of mechanics, Types of force system, Moment of a force about a point and about an axis, Couple, Equivalent force systems: Resultant of a co-planner and spatial force system. Analytical and graphical methods. Equilibrium of co-planner force system. Applications to beams and frames	09
2	Analysis of structures. Theory and Laws of friction and its application like Cone friction wedges, belt friction and band brakes.	09
3	Centroid of composite areas, Moment of inertia and products of inertia of plane areas, Transfer theorems for moment of inertia and Product of inertia. Mhor's circle method.	09
4	Kinematics of Particles: rectilinear motion, Motion curve, Relative motion, Fixed axis rotation. Kinetics of particles: D'Alembert's principle,Principal of Impulse Momentum and their applications to particles. Direct central Impact.	09
5	Vibrations: Equations of motion for single degree-of-freedom systems and rigid body assemblies, free vibration (simple harmonic oscillator), concepts of damping and critical damping, damped free vibration: equations of motion for harmonic excitation.	09
		45

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Text Books:

1. Vector Mechanics for Engineers, Vol. 1 – Statics and Vol. 2 – Dynamics, Beer and Johnston, 8th edition, Tata McGraw Hill International Edition, 2010.
2. Engineering Mechanics, Vol. 1 – Statics 4/e, 1998 and Vol. 2 – Dynamics, Merriam, 5/e, Wiley International, 2001.
3. Engineering Mechanics, by Dr. K. L. Kumar, Tata McGraw Hill Publications, 2011

References Books:

1. Engineering Mechanics, Irving H. Shames, & Rao, Prentice Hall, New Delhi 2010.
2. Engineering Mechanics, Vol. 1–Statics and Vol. 2–Dynamics, Mokoshi, V.S., Tata MGH Books, 1996.
3. Engineering Mechanics, F.L.Singer, HarperCollins Publishers India, 2001
4. Engineering Mechanics, McLean, 3rd Edition, SCHAUM Series, 1995.
5. Engineering Mechanics, Timoshenko and Young, McGraw Hill Publication.
6. Engineering Mechnaics, R. C. Hibbeler, Pearson Publishers, 2010

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I Semester B.Tech. (Civil Engineering) NEP 2020

Course Code : STPCCCEC104

Title of the Course : Basics of Civil Engineering

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
2	0	0	2	2	2	5	5	40	50

Course Outcomes:

After Completion of the course, students will be able to

1. Familiarize with the concepts Civil Engineering and related applications.
2. Understand the basics terminologies related to Civil Engineering

Unit	CONTENTS	Hours
Unit 1	Introduction to Civil Engineering, Importance of Civil engineering, Building construction- Building Planning, Elements of a Building, Basic Requirements of a Building. Foundations, classification, Bearing Capacity of Soil and related terms. Types of Super Structures Based on the Method of Load Transfer, Masonry works. Dampness and its prevention	5 Hrs
Unit 2	Building Materials – Traditional Materials, Mortars, Concrete, Metals as Building Materials, Miscellaneous Building Materials, Material IS code for specification and testing.	4 Hrs
Unit 3	Surveying – Object and Uses of Surveying, Fundamental Principles of Surveying, Classification of Surveying, Plans and Maps, Scales, Types of Graphical Scales, Units of Measurements. Modern tools of surveying, Theodolite, Total Station, Differential global positioning system, Drone Survey.	5 Hrs
Unit 4	Disaster Management of Building- Earthquakes Resistant Buildings, Disaster Prevention Strategy, Early Warning System, Disaster Preparedness, Disaster Mitigation Disaster Rescue and Relief Measures, Disaster Resettlement, Rehabilitation and Reconstruction.	4 Hrs
Unit 5	Introduction to planning and design aspects of transportation engineering, Transportation modes, Highway engineering –highway planning, classification of highway, Railway Engineering – cross section of rail track, basic terminology, geometric design parameter (brief discussion only).	4 Hrs

Text Books:

1 Basic Civil engineering, Gopi, S., Pearson Publication

2 Basic Civil Engineering, Bhavikatti, S. S., New Age.

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Reference Books:

1 Construction Technology, Chudley, R., Longman Group, England

2 Basic Civil and Environmental Engineering, C.P. Kausik, New A

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I Semester B.Tech. (Civil Engineering) NEP 2020

Course Code: STESC105

Title of the Course: Programming for Problem Solving

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
2	0	0	2	2	2	5	5	40	50

Course Outcome:

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

1. Write, compile, and execute C programs based on simple constructs like arrays, loops, structures, conditional statements etc.
2. Apply the concepts of arrays and functions to solve problems.
3. Develop simple C program for small applications.

Unit	Contents	Hours
1	**Fundamentals of C** History & Features of C language, structure of C Program, algorithm, flowchart, keywords, data types, constants and variables, operators, precedence and associativity.	8
2	**Control structure in C** Decision making statements: simple if statement, if else statement, if else if ladder, nested if, switch case, Looping statements: while do while, for, break and continue statement.	8
3	**Arrays and Functions** Concepts of array, declaration, and initialization of arrays, one- and two-dimensional arrays, Concepts of user defined functions, definition of function, call by value, call by reference, recursion.	8
		24

Text Books:

1. Programming in ANSI C – Balaguruswami 8th Edition (Mc Graw Hill Publications)
2. C Programming: A Modern Approach - K. N. King.
3. Programming in C - Stephen Kochan.
4. Let us C –Yashwant Kanetkar (BPB Publications)

Reference Books:

1. C: The Complete Reference - by Kernighan Brian W. and Ritchie Dennis
2. Computer Fundamentals and Programming in C - by Reema Thareja

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I Semester B.Tech. (Civil Engineering) NEP 2020

Course Code : **STAEC106**
Title of the Course : **Business Communication Skill**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
1	0	2	3	2	2	5	-5	40	50

Course Outcome:

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

1. Basic proficiency in writingandspeaking English.
2. Essential business communication skills.
3. Presentation and organizing skills.
4. Correspondence skills and etiquettes.
5. Oral communication skills.

Units	Contents	Hours
1	Identifying Common Errors in Writing 1.1 Sentence Structures 1.2 Use of phrases and clauses in sentences 1.3 Subject-verb agreement. 1.4 Noun-pronoun agreement 1.5 Articles 1.6 Prepositions 1.7 Misplaced modifiers 1.8 Importance of proper punctuation	6
2	Introduction to the essentials of Business Communication 2.1 Meaning and types of communication. 2.2 Channels of communication 2.3 Levels of communication 2.4 Direction of communication 2.5 Barriers to communication 2.6 Use of visual aids in communication	6
3	Presentation and Organizing Skills Organizing meetings 3.1 How to call meeting and design the agenda. 3.2 Prepare minutes of the meeting. Presentation skills 3.3 Preparation, audience, and their requirements 3.4 Effective ways to deliver the presentation. 3.5 Multimedia presentation Time Management 3.6 Goal setting 3.7 Importance of time 3.8 Prepare time schedule	6

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4	Business and E- Correspondence 4.1 Need and importance of business letters 4.2 Office memorandum, circulars 4.3 Notices and orders 4.4 Electronic mail: advantages, safety and smartness 4.5 Email etiquettes	6
5	Oral Communication 5.1 Listening Comprehension 5.2 Pronunciation, Intonation, Stress and Rhythm 5.3 Common Everyday Situations: Conversations and Dialogues 5.4 Communication at Workplace 5.5 Interviews 5.6 Group Discussions 5.7 Telephonic Conversation	6

Reference Books:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007 (iii)On Writing Well. William Zinsser. Harper Resource Book. 2001
3. Study Writing. Liz Hamp-Lyons and Ben Heasly, Cambridge University Press. 2006.
4. Communication Skills. Sanjay Kumar and PushpLata, Oxford University Press. 2011.
5. Exercises in Spoken English. Parts, I-III, CIEFL, Hyderabad, Oxford University Press
6. Grammar for all. N. Ramalingam, Himalaya publishing house

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I Semester B.Tech. (Civil Engineering) NEP 2020

Course Code : STBSC107

Title of the Course : Engineering Chemistry Laboratory

Course Scheme					Evaluation Scheme (Theory)			
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	CA	UA	Total
0	0	2	2	1	---	25	25	50

Course Outcome:

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

1. Illustrate the chemical analysis of water and access the quality of water.
2. Estimation of various property by pH meter and conductivity meter.
3. Perform experiments based on syllabus adopting the proper methodology.
4. Derive scientific conclusions on the basis of experimental data.
5. The process of polymer synthesis.

Minimum eight (8) experiments are to be performed from the list given below.

List of Experiments:

1. Determination of temporary and permanent hardness of water by complexometric method.
2. Estimation of free chlorine in water sample.
3. Estimation of dissolved oxygen in water sample.
4. Determination of chloride content of water
5. Determination of capacity of anion/cation exchange resin.
6. Determination of the copper by-Iodometry.
7. Synthesis of a polymer
8. To estimate the amount of ferrous and ferric ions present in the given solution.
9. Determination of moisture content in coal sample.
10. Determination of the partition coefficient of a substance between two immiscible
11. Liquids Adsorption of acetic acid by charcoal.
12. Determination of cell constant and conductance of solutions
13. Determination of pH of wastewater.
14. Determination of COD in wastewater.
15. Determination of hardness of water due to calcium and magnesium ions separately.
16. Determination of alkalinity of water sample

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Semester B.Tech. (Civil Engineering) NEP 2020

Course Code : **STESC108**

Title of the Course : **Engineering Mechanics Laboratory**

Course Scheme					Evaluation Scheme (Theory)			
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	CA	UA	Total
0	0	2	2	1	---	25	25	50

Course Outcome: After completion of the course, the student will be able to:

1. To know when theory applies and when theory is limited by simplifying assumptions.
2. Identify reasons why actual measurements will differ from theoretical calculations.
3. Use the laboratory equipment correctly and safely to perform all experiments.
4. Verify the wide field of engineering mechanics in various engineering applications.

Minimum eight (8) experiments are to be performed from the list given below.

List of Experiments:

1. Study of simple lifting machines
2. Determination mechanical advantage, velocity ratio and efficiency of Differential axel and wheel and verification of law of machine.
3. Determination mechanical advantage, velocity ratio and efficiency of single purchase crab winch and verification of law of machine.
4. Determination mechanical advantage, velocity ratio and efficiency of double purchase crab winch and verification of law of machine.
5. Determination mechanical advantage, velocity ratio and efficiency of worm and worm wheel and verification of law of machine.
6. Determination mechanical advantage, velocity ratio and efficiency of simple screw jack and verification of law of machine.
7. Determination of tensile and compressive forces in Jib-Crane apparatus and verification of Law of triangle.
8. Determination of reactions at the support of simply supported beam.
9. Determination of limiting friction, angle of friction and coefficient of friction between two bodies in contact by friction plane apparatus.
10. Determination of belt or coil friction between two bodies in contact by coil friction apparatus.
11. Determination of mass moment of inertia of Fly Wheel.

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12. Determination of value of "acceleration due to gravity" and verification of Newton's Second law of Motion by Fleture'strolly equipment.

13. Graphical Methods:
    i. Determination of resultant.
    ii. Determination of support reactions.
    iii. Determination of forces in the members of truss by Maxwell's Diagram Method.
    iv. Determination of frictional forces

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I Semester B.Tech. (Civil Engineering) NEP 2020

Course Code : STVSEC109
Title of the Course : Workshop - I

Course Scheme					Evaluation Scheme (Theory)			
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	CA	UA	Total
0	0	4	4	2	---	50	50	100

Course Outcomes:

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

1. Upon completion of this laboratory course, students will be able to fabricate components with their own hands
2. They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes
3. By assembling different components, they will be able to produce small devices of their interest.
4. The students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials.

Units	Contents (Theory and Practical)	Hours
1	**Welding Shop** Concept of accidents, causes of accidents, safety precautions while working in shop, safety equipments and their use. One job on Arc welding-Lap/Butt/Tee Joint etc.	12
2	**Plumbing Shop** Demonstration on plumbing tools, pipes, types of pipe joints, threading dies, pipe fittings filments, valves etc. One job on plumbing including pipe cutting, threading and other related operations.	12
3	**Foundry Shop** Principles of molding methods, core and core boxes, preparation of foundry sand for casting.	12
4	**Machining Shop** Measuring and Gauging, Semi – Precision Tools – Calipers, depth Gauge, Feeler Gauge Precision Tools – Micrometers, Vernier Calipers, Vernier Height Gauge, etc, General Safety Considerations, Engine Lathes, Introduction to lathe, Physical Construction, Types of Lathe, and Lathe Operations – Facing, Turning, Threading, Introduction to drilling machine, milling machine, grinding machine and operations performed.	12

Text Books:

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1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.

Reference Books:

1. Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.
2. Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGrawHill House, 2017.
3. Parmar, R. S., Welding Processes and Technology, Khanna Publishers. 2003.

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I Semester B.Tech. (Civil Engineering) NEP 2020

Course Code : **STCC110**
Title of the Course : **Liberal Learning Course (Yoga and Meditation)**

Course Scheme					Evaluation Scheme (Theory)			
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	CA	UA	Total
0	0	4	4	2	---	50	0	50

Course Outcomes:

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

1. Perform warming up exercises to prepare the body from head to toe for Yoga.
2. Perform all the postures of Surya Namaskar one by one in a very slow pace, after warming up.
3. Follow healthy diet and hygienic practices for maintaining good health.

Contents	Hours
Introduction to Yoga, its history and health benefits. Students will be taught to perform and practice. 1. warming up exercises to prepare the body from head to toe for Yoga. 2. all the postures of Surya Namaskar one by one in a very slow pace after warming up 3. Shavasana for self-relaxation 4. Sarvangasna, Halasana, Kandharasana 5. Bhujangasana, Naukasana, Mandukasana 6. Bhastrika, AnulomVilom Pranayam Kriya 7. Kapalbhati Pranayam Kriya 8. Practice Bhramary Pranayam 9. sitting in Dhyan Mudra and meditating. (Trainer will explain the benefits of Meditation before practice) Trainers can add similar asanas in sessions. Students are to be instructed to practice at least twice a week as part of self-learning practices. Live demonstration by the trainer needs to be carried out during teaching hours. Yogic Videos can be used as well.	20

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II Semester B.Tech. (Civil Engineering) NEP 2020

Course Code : **STBSC201**
Title of the Course : **Engineering Mathematics-II**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	1	0	4	4	3	10	10	80	100

Course Outcome:

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

1. To apply knowledge of mathematics in formulating and solving problems analytically.
2. To develop mathematical models for various engineering system and their solution using Differential equation.
3. Use of multiple integrations for calculation of area, mass, volume, centre of gravity.
4. To calculate gradient and directional derivatives of scalar point function.
5. To use Green's theorem to evaluate line integrals along simple close contours on the plane, Stoke's theorem to give physical interpretation of the curl of a vector field and the Divergence theorem to give physical interpretation of the divergence of a vector field.

Unit	Contents	Hours
1	Ordinary differential equation I : Solution of first order and first-degree differential equations, (Exact, Linear and reducible to Linear Bernoulli's equation) & Higher order linear differential equations with constant coefficients.	09
2	Ordinary differential equation II: Method of variation of parameters, Cauchy's and Legendre's differential equations, Differential equation of the form, Application of differential equation to electrical circuits, Kinematics and Vibrations (Up to second order)	09
3	Multiple Integrals and their Applications: Elementary double integral, change of order of integration (Cartesian), Elementary Tripple Integral, Applications to Area, Volume, Mass and Centre of gravity.	09
4	Vector Calculus: Vector differentiation, Velocity and Acceleration, Tangential and Normal acceleration, Vector operator Del, Gradient, Directional Derivative of scalar point function.	09
5	Vector Calculus - II: Vector point functions, Divergence and Curl, Solenoidal and Irrotational vector fields. Scalar potential, work done and conservative vector field, Line, Surface and volume integrals. Statements without proof of Gauss Divergence theorem, Greens theorem, Stoke's theorem.	09

Reference Books:

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Prof. Sarita S. Borkar
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1. A text book of Engineering Mathematics, Volume I and II by D. T. Deshmukh.
2. A text book of Applied Mathematics Volume I and II by J. N. Wartikar and P. N. Wartikar
3. Higher Engineering Mathematics by Dr. B. S. Grewal
4. Advanced Engineering Mathematics by H. K. Dass.
5. Advance Engineering Mathematics by Erwins kreyszig

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II Semester B.Tech. (Civil Engineering) NEP 2020

Course Code : **STBSC202**

Title of the Course : **Engineering Physics**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	1	0	4	4	3	10	10	80	100

Course Outcomes:

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

1. Apply engineering physics concepts, which form the basis of modern engineering.
2. Elaborate the general nature of concepts learnt and possibility of their cross-disciplinary application.
3. Gain fundamental knowledge in areas like quantum mechanics, semiconductors, crystals, and optics.
4. Solve numerical problems on areas covered.
5. Implement concepts of elementary physics in understanding of engineering applications.

Units	Contents	Hours
1	**Quantum Physics** Dual nature of matter, De-Broglie's concept of matter waves , Davisson-Germer experiment, wave packet concept, wave function interpretation, Heisenberg's uncertainty principle and its experimental illustrations, Schrodinger's wave equations, application: electron in infinite potential well.	09
2	**Semiconductor Physics** Formation of energy bands in solids, classification of solids based on band theory, energy band diagram of germanium & silicon, probability distribution functions, Fermi energy-its dependence on temp and doping concentration, conductivity of semiconductors, energy band structure of p-n junction diode, junction voltage equation.	09
3	**Structure of solids** Crystal structure, Unit cell and its characteristics, Bravais lattices and crystal systems, Unit cell characteristics of cubic lattices, Crystallographic planes and Miller indices, Inter-planar distance in a cubic crystal, Bragg's law.	09
4	**Wave optics & Electron ballistics** Interference due to thin films of uniform and non uniform thickness, Newton's ring, antireflection coating, applications, Motion of electron in uniform electric and magnetic fields, concept of crossed fields. Electric field focussing-electrostatic lens, magnetic field focussing-magnetic lens	09
5	**Lasers and fibre optics**	09

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	Interaction of radiation with matter, population inversion and pumping, optical resonator, types of laser; Gas laser (He-Ne), solid state laser (Ruby) and semiconductor laser, characteristics and applications. Introduction to optical fibre structure, principle, acceptance angle, Numerical aperture, fractional refractive index, modes of propagation, types and classifications of optical fibre, V – number, attenuation, dispersion, advantages of optical fibre in communication	
		45

Text Book:

1. Avadhanulu & Kshirsagar, Engineering Physics, S. Chand Prakashan.

Reference Books:

1. A. Beiser, Concept of modern Physics, TMH Edition
2. S. L. Gupta & S. Gupta, Concept of modern Physics,
3. David Halliday, Robert Resnik And Jerle Walker, Fundamentals of Physics, John Wiley & Sons
4. Ajay Ghatak, Optics, Mc Grow Hill Publication
5. B. B. Laud, Lasers and Non Linear Optics, New Age Publications
6. John Allison, Electronic Engineering Material & Devices, TMH Edition
7. K. C. Nandi, Applied Physics, Tech. Max. Pune

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II Semester B.Tech. (Civil Engineering) NEP 2020

Course Code : STESC203

Title of the Course : Basics of Electrical and Electronics Engineering

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	0	0	3	3	3	10	10	80	100

Course Outcomes:

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

1. To Comprehend the essential elements of an electrical circuit and circuit solving techniques.
2. To Learn the basics of single-phase AC Circuits and Three Phase AC Circuits
3. To Understand the Principles of Different Electrical Machines.
4. To Know the operations Different Rectifiers and Applications of Op-Amp.
5. To Understand the Different Number Systems and Logic Gates

Units	Contents	Hours
1	**DC Circuits** Electrical circuit elements (R, L and C), voltage and current sources, Source Transformation, Star Delta Transformation, Kirchhoff laws, analysis of simple circuits with dc independent excitation with Mesh and Analysis(Excluding Super mesh) ,Superposition, Thevenin and Norton Theorems.	09
2	**AC Circuits** Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), Three phase balanced circuits, voltage and current relations in star and delta connections.	09
3	**Electrical Machines** Types of Machines (D.C. Machines, A.C. Machines introduction only) **Single Phase Transformers** Construction, working Principle, EMF Equation, Transformation Ratio(K),Rating of Transformer, Losses in Transformer, Ideal and Practical Transformers, Phasor Diagram of a Transformers on No Load, Phasor Diagram of Transformer on Load, Equivalent Circuit, Voltage Regulation, Efficiency, Open Circuit(OC) Test, Short Circuit (S.C.)Test	09
4	**Semiconductor theory** Intrinsic and Extrinsic Semiconductors - N type and P type materials - majority and minority carriers - Semiconductor diode - PN junction - V I characteristics of P N Junction diode **Rectifiers** Working and Waveforms of Half wave - Full wave - Bridge rectifiers (without filters) – Differences **OP Amp** Introduction, Concept of Virtual ground, Different Configurations, Op Amp applications - Adder, Subtractor - Integrator- differentiator	09

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5	**Number representation** Decimal, Binary, Octal and Hexa decimal number systems - Conversion of number from one number system to another without decimal points - BCD Codes and limitations – Conversion of BCD to decimal and vice versa. **Logic gates** Symbolic representation - Definition, truth table, symbol, and logical equations of logic gates: AND – OR - NOT- NAND - NOR - EXOR – EXNOR (Only 2-inputs) – Universal gates.	09
		45

Text &Reference Books:

1. D.C. Kulshrehtha, "Basic Electrical Engineering", Tata McGraw Hill, 2012
2. B.L.Theraja,"Electrical Technology",S.Chand
3. Millman Halkias , "Electronic Devices and Circuits",Tata McGraw Hill, 2000
4. R. P. Jain "Modern Digital Electronics" McGraw Hill Education, 2009.

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II Semester B.Tech. (Civil Engineering) NEP 2020

Course Code : STESC204
Title of the Course : Engineering Graphics and Design

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	--	0	3	3	4	10	10	80	100

Course Outcomes:

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

1. Select and Interpret appropriate Scale, dimensioning methods, types of lines, various Engineering Curves. Create 2d and 3D drawings using computer aided software.
2. Apply knowledge of projections and draw the projections of lines, Planes.
3. Draw the projection of solids and interpret the sections of solids.
4. Prepare simple machine/ engineering parts/buildings plan, elevation, and side elevation.
5. Convert the orthographic views in pictorial views.

Units	Contents	Hours
1	General drawing principles for all technological drawings, usage of drawing instruments, geometrical constructions, lettering, different types of lines used in drawing practices, dimensioning, Introduction to scale i.e. full size, reducing scale and enlarging scale. Introduction to computer aided drafting (CAD); using FreeCAD, Google Sketch, introduction of the drafting and modeling tools and demonstration of its application in latest machines Engineering Curves; Ellipse, Parabola, Hyperbola, Cycloid, and Involute	09
2	Principles of orthographic projections, concepts of four quadrants, difference between first and third angle projection, conventions used to represent methods of orthographic projection. Projections of points; in all four quadrants. Projection of straight line; parallel to both reference planes, perpendicular to reference plane, parallel to one and inclined to other reference plane, inclined to both reference planes. Projections of planes: Parallel to reference plane, lying in reference plane, inclined to one & perpendicular to other reference plane, inclined to both reference planes. Concept of auxiliary plane method for projection of planes.	09
3	Projections of Solids: projections of cube, tetrahedron, prism, pyramid, cylinder and cone when axis perpendicular to one of the reference planes, axis inclined to one & parallel to other reference plane, axis inclined to both the reference planes. Sections and sectional views of right angular solids; Section planes, true shape of sections sectional views of geometrical solids like Cube, Tetrahedron, Prism, Cylinder, Pyramid, Cone cut by different section planes (axis of solid is perpendicular to reference plane, axis is parallel to one & inclined to other reference plane only)	09

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4	Orthographic Projections; Projections from pictorial view of the object on the principle planes for view from front, top and side using first angle of projection method	09
5	Isometric Projections: Principles of Isometric projection – Isometric scale, isometric projection and views, Isometric axes, conversion of orthographic projections of simple solids, machine parts and mechanical components to isometric projections/views.	09
		45

Text Book:

1. Bhatt N.D. & Panchal V.M., Engineering Drawing, Charotar Publishing House Private Limited.
2. Shah, M. B. & Rana B.C., Engineering Drawing, Pearson Education India
3. D. A. Jolhe, Engineering Drawing, Tata McGraw education private limited.
4. Arunoday Kumar, Engineering Graphics – I, Tech-Max Publications

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II Semester B.Tech. (Civil Engineering) NEP 2020

Course Code : STIKS205
Title of the Course : Indian Knowledge System

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
2	0	0	2	2	--	40	10	0	50

Course Outcomes:

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

1. Explain the history of Indian Knowledge System and the broad classification of Indian philosophical systems.
2. Describe the characteristics of the Indian number system and how it has helped improve science and technology.
3. Describe historical development of astronomy in India.
4. Illustrate the basic elements of the Indian calendar.

Units	Contents (Theory)	Hours
1	**An overview of Indian Knowledge System (IKS)** Importance of Ancient Knowledge -Definition of IKS - Classification framework of IKS - Unique aspects of IKS. The Vediccorpus: Vedas and Vedangas - Distinctive features of Vedic life. Indian philosophical systems:Different schools of philosophy.The knowledge triangle: Prameya, Pramana, Samsaya - Framework for establishing validknowledge - Potential fallacies in the reasoning process.	6
2	**Salient features of the Indian numeral system** Importance of decimal representation – Thediscovery of zero and its importance - Unique approaches to represent numbers. Unique aspectsof Indian mathematics - Great mathematicians and their significant contributions inarithmetic, algebra, geometry, trigonometry, combinatorial problems in Chandah-sastra ofPingala, binary mathematics and Magic squares in India.	6
3	**Historical development of astronomy in India** The CelestialCoordinate System - Astronomical terminologies - Equinoctial points, precession of equinoxes,movable and fixed zodiac - Elements of the Indian Calendar - Panchanga	6
4	**Yoga a holistic approach to health and fitness** History and development of yoga, traditional schools of yoga, Yoga and holistic health, Yoga and its human values, Importance and objectives of yoga practices, guidelines for yoga practices, common yoga practices, Asanas for health and physical fitness, benefits and limitations of asanas.	6
5	**Scientist of Ancient India and their notable works** Baudhayana (800 BCE- 740 BCE), Sushrutha , Kanada , Charaka, Aryabhatta (476-550 CE), Aryabhata II , Brahmagupta (598-668 CE),	6

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	Bhaskara I, Varahamihiri (505–587 CE), Bhaskara II/ Bhaskaracharya, Nagarjuna.	

Reference Books:

1. A. K. Bag, History of Technology in India, Vol. I, Indian National Science Academy, New Delhi, 1997.
2. D.N. Bose, S.N. Sen and B. V. Subbarayappa, A Concise History of Science in India, Indian National Science Academy, New Delhi, 2009.
3. B. Datta and A. N. Singh, History of Hindu Mathematics: Parts I and II, Asia Publishing House, Bombay, 1962.
4. M. Hiriyanna, M., Outlines of Indian Philosophy, Motilal Banarsidass, New Delhi, 1994
5. B. Mahadevan, Vinayak Rajat Bhat, and R.N. Nagendra Pavana, Introduction to Indian Knowledge System: Concepts and Applications, PHI Learning Private Limited, New Delhi, 2022.
6. S. N. Sen and K. S. Shukla, History of Astronomy in India, Indian National Science Academy, 2nd edition, New Delhi, 2000.
7. Yoga: A healthy way of living, published by NCERT
8. Knowledge tradition and practices of India vol. 1 and 2, published by NCERT.

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II Semester B.Tech. (Civil Engineering) NEP 2020

Course Code : STBSC206

Title of the Course : Engineering Physics Laboratory

Course Scheme					Evaluation Scheme (Theory)			
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	CA	UA	Total
0	0	2	2	1	---	25	25	50

Course Outcome: After completion of the course, the student will be able to:

1. Understand and analyse the theoretical concepts in physics through experimentation
2. Learn and use the proper methods while gathering experimental data.
3. Get familiar with the proper use of basic instruments in physics laboratories.

Minimum eight (8) experiments are to be performed from the list given below.

List of Experiments:

1. Determination of resistivity of a semiconductor by four probe method.
2. A study of transistor characteristics in common base configuration.
3. Determination of the radius of curvature of a plano-convex lens using Newton's rings.
4. Determination of thickness of a thin foil using air wedge.
5. A study of the static characteristics of diodes.
6. A study of the static characteristics of Zener Diode.
7. A study of transistor characteristics in common emitter configuration.
8. Determination of activation energy of a thermistor.
9. Determination of wavelength of Laser light using plane transmission grating.
10. To measure the divergence of laser beam.
11. Determination of numerical aperture and acceptance angle, attenuation in optical fiber.
12. Determination of refractive index of glass prism.
13. Determination of refractive index of quartz/calcite prism.
14. Determination of wavelength of light using reflection grating.

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II Semester B.Tech. (Civil Engineering) NEP 2020

Course Code : STESC207

Title of the Course : Engineering Graphics and Design Laboratory

Course Scheme					Evaluation Scheme (Theory)			
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	CA	UA	Total
0	0	2	2	1	---	25	25	50

Course Outcome: After completion of the course, the student will be able to:

1. Select and Interpret appropriate Scale, dimensioning methods, types of lines as per B.I.S and Draw various Engineering Curves.
2. Apply knowledge of Projections and Draw the projections of Lines, Planes, and Solids.
3. Interpret Sections of solids and develop the surfaces of solids.
4. Convert the Pictorial views in orthographic views and Isometric views from Orthographic Views
5. Create and modify two-dimensional orthographic drawings and three dimensional Isometric drawing using software

In Practical minimum 8 half imperial (A2-594 mm X 420mm) sheets based onabove Syllabus are to be drawn. In each sheet **minimum** 4 problems are to be drawn. Drawing sheets may include

1. Lettering, different types of lines, dimensioning and conventions used to represent first and third angle projection method.
2. Problems on engineering curves
3. Problems on projection of straight line
4. Problems on projection of planes
5. Problems on projection of solids (Two problem on sheet and two problems using CAD)
6. Problems on Sections of solids (Two problem on sheet and two problems using CAD)
7. Problems on Isometric projections (Two problem on sheet and two problems using CAD)
8. Problems on Orthographic Projections (Two problem on sheet and two problems using CAD)

Note:
During End semester examination (external practical examination) of 25 marks,
Students are expected tosolve one/two problems on drawing sheetor using the CAD software on the system or15 Objective type Questions for 15 marks performance examination out of 25 and viva voce examinationfor remaining 10 marks.

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II Semester B.Tech. (Civil Engineering) NEP 2020

Course Code : STVSECMEC208

Title of the Course : Workshop-II

Course Scheme					Evaluation Scheme (Theory)			
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	CA	UA	Total
0	0	4	4	2	---	50	50	100

Course Outcomes:

After Completion of Course, the student will be able to

1. prepare a mould and jobs using casting operation
2. operate various machines like Lathe, shaper, milling, Drilling machines etc.
3. prepare a job using various machining operations
4. explain the operation of CNC machine
5. make the students well versed with basic electronic components and PCB designing rules
6. learn processes etching, printing, drilling, soldering, testing soldering of electronic components
7. set, operate and use survey instruments for Civil Engineering layout.
8. get acquainted with procedure of bar bending, detailing of reinforcements for various structural element
9. introduce students with different type of masonry works

Part I

Fitting: Introduction to types of Fits, concepts of interchangeability, different fitting tools & their use, different measuring tools, datum selection, location layout, marking, cutting, shearing, chipping, sizing of metals,drilling and tapping. One job involving fitting to size, male-female fitting with drilling and tapping.

Moulding & Casting: Introduction to moulding tools and equipments; One job on preparation of mould,Demonstration of casting process

Pipe fitting & joints: Introduction to different types of pipefitting and joints; Demonstration of pipe threadingand pipe fitting; one job on pipe threading

Part B

Civil workshop: Introduction to auto level and theodolite for simple layouts, reinforcement bar bending and tieing, different bonds for brick masonry; preparation of concrete; layout of simple plan, pipe joints making, use of total station, various reinforcement detailing; one job on above

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II Semester B.Tech. (Civil Engineering) NEP 2020

Course Code : STCCCEC209
Title of the Course : Club Activities (Self Learning Course)

Course Scheme					Evaluation Scheme (Theory)			
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	CA	UA	Total
0	0	0	0	2	---	50	0	50

The various clubs and student chapters of the institute provide the students the much-cherished opportunity to come together to discuss and exchange ideas with like-minded people.

- Under the Robo club students participates in the annual events organized throughout the nation. The club conducts workshops for students and also organizes the events.
- The environment club inspires students to participate various activities in and outside of the campus.
- The student chapter MESA, organizes various events and activities round the year for overall development of the students.

Under club activities the student is expected to participate in at least five co curricular and extracurricular activities in and outside of the institute, and submit the report to the allotted guide for the evaluation.

Following activities are expected to be coordinated, participated and assisted by the students voluntarily:

- Cultural activities
- Sports activities
- Technical events
- Socio-environmental activities
- Tree Plantation
- Blood donation camps
- Expert Talks by eminent persons from Industry, academic Institutes, Health experts etc.
- Yogic and meditation activities
- Alumni and Parent meets
- Programs in tribute to great leaders and freedom fighters.

Under this head, students are expected to participate in at least five extra-curricular and co-curricular activities in and outside of the Institute and submit the reports/certificates to the allotted guide/supervisor for evaluation.

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Civil Engineering: UG Certificate Level NEP 2020

(Exit Course after First Year of Engineering)

Course Code: STEXCEC210
Title of the Course: Testing of Civil Engineering Materials

Course Outcomes:

After Completion of Course, the student will be able to

1. Conduct the experiments using standard experimental procedure as per IS/ IRCon aggregates and bitumen
2. Conduct the experiments using standard experimental procedure as per IS oncement, concrete and steel reinforcement
3. Conduct the experiments using standard experimental procedure as per IS on soil

Course Scheme				Evaluation Scheme (Theory)		
Tutorial	Practical	Periods/Week	Credits	TW	PE	Total
0	8	-	4	100	--	100

List of Practicals:

Any four groups from following

1. **To determine the suitability of Aggregate for Road construction byconducting the following test:**
   i. Crushing Value test,
   ii. Los Angeles abrasion test,
   iii. Aggregate impact test,
   iv. Aggregate shape test - Flakiness index and elongation index determination.
   v. Determination of specific Gravity of coarse Aggregates

2. **To determine the suitability of Bitumen for Road construction by conductingthe following tests:**
   i. Determination of Bitumen Content by Centrifuge Extractor
   ii. Penetration test,
   iii. Ductility test,
   iv. Viscosity test,
   v. Softening point test,

3. **To determine the suitability of cement for construction by conducting the following tests:**
   i. Fineness test on cement
   ii. Soundness test on cement
   iii. Standard consistency of cement
   iv. Setting time (initial and final) of cement

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v. compressive strength of cement ,

4. **To determine the suitability of cement concrete for construction byconducting the following tests:**
   i. Workability tests i.e. slump test and compaction factor test,
   ii. Compressive strength and flexural strength of concrete,

5. **To determine the suitability of steel reinforcement construction by conducting the following tests:**
   i. Weight per meter of steel bars
   ii. Tensile tests on various grades of steel

6. **To determine the suitability of soil for construction by conducting thefollowing tests:**
   i. Classification of coarse grained soil by conducting sieve analysis
   ii. Classification of fine grained soil by conducting liquid limit and plastic limit tests
   iii. Determination of OMC and MDD by conducting standard Proctor test,
   iv. Determination of CBR value,
   v. Determination of permeability
   vi. Determination of shear strength parameters by conducting UCS and direct shear test

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Civil Engineering: UG Certificate Level NEP 2020

(Exit Course after First Year of Engineering)

Course Code: STEXCEC211

Title of the Course: Internship / Technical Project

Course Outcomes:

After Completion of Course, the student will be able to

1. Prepare report based on Industry internship
2. Give presentation on Industry internship

Course Scheme				Evaluation Scheme (Theory)		
Tutorial	Practical	Periods/Week	Credits	TW	PE	Total
0	8	--	4	100	00	100

Course Contents:

Industry internship

Students must complete Internship for a duration of minimum six weeks, after completion of second semester of first year. All the official formalities to be completed by the student. The students should undergo related trainings and perform tasks assigned to him in the industry, underthe guidance of Industry personnel. The students shall submit the report based on the Industry Internship along with the Completion Certificate given by Industry.

Industry internship / apprenticeship may be carried out in any one of the following construction industry:

i) Central Government Department related to construction of Civil Engineering Structures e.g. Central P.W.D.

ii) State Government Department related to construction of Civil Engineering Structures e.g. P.W.D., Irrigation Dept

iii) Public Sector Department related to construction of Civil Engineering Structures e.g Jeevan Pradhikaran, Municipal Corporations Private Limited Company related to construction of Civil Engineering Structures

At the end of internship / apprenticeship, student should submit the report based on training received during internship / apprenticeship and also give presentation for the same to the panel of examiners / Evaluation Committee comprising of Experts appointed by the Program head.

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