Government College of Engineering Jalgaon

"Globally Accepted Engineers with Human Skills"

(An Autonomous Institute of Government of Maharashtra and NAAC Accredited)

Civil Engineering Department

Second Year BTech Syllabus

2019-20

GOVERNMENT COLLEGE OF ENGINEERING, JALGAON

Scheme for Semester I of B. Tech. (Elect/Comp/Civil) with effect from academic year 2018-19

Course Code	Name of the Course	Group	Teaching Scheme* Hrs /Week				Evaluation Scheme					Total	Credits
							Theory			Practical			
			L	T	P	Total	MSE	ISA	ESE	ICA	ESE		
SH100AU	**Induction Program**	**Mandatory audit course of three weeks duration as per AICTE model curriculum**											**AU**
SH101U	Differential Calculus	BS	3	1	--	4	30	10	60	--	--	100	4
SH102U	Engineering Chemistry	BS	3	--	--	3	30	10	60	--	--	100	3
EE101U	Elements of Electrical Engineering	BE	2	--	--	2	30	10	60	--	--	100	2
CO101U	Programming for Problem Solving	BE	3	--	--	3	30	10	60	--	--	100	3
SH104U	Communication Skills	HM	1	--	--	1	15	05	30	--	--	50	1
SH105U	Communication Skills Lab	HM	--	--	2	2	--	--	--	50	--	50	1
ME101U	Mechanical Workshop Practices	BE	--	--	2	2	--	--	--	50	--	50	1
SH103U	Engineering Chemistry Lab	BS	--	--	2	2	--	--	--	50	--	50	1
EE102U	Elements of Electrical Engineering Lab	BE	--	--	2	2	--	--	--	50	--	50	1
CO102U	Programming for Problem Solving Lab	BE	--	--	2	2	--	--	--	50	--	50	1
	Total		**12**	**1**	**10**	**23**	**45**	**135**	**270**	**250**	**--**	**700**	**18**

* Commencement of first semester of UG engineering program is generally delayed by 4 - 5 weeks as compared with higher semesters due to admission procedure. In addition, as per AICTE directives there is Induction Program of three weeks at the beginning of first semester. Thus the effective teaching in first semester may be only for 8 – 9 weeks. Therefore, one hour per week theory / laboratory teaching should be added in the regular load shown in the curriculum structure so that the syllabus can be completed in 8 - 9 weeks available in first semester of UG program.

L: Lecture   T: Tutorial   P: Practical   ISA: Internal Sessional Assessment
MSE: Mid Semester Examination   ESE: End Semester Examination,   ICA: Internal Continuous Assessment

Note: 1. ESE (TH) duration for SH104U is two hours and that for all other theory courses is three hours.
     2. MSE (TH) duration for SH104U is one hours and that for all other theory courses is two hours
     3. Group indicates curriculum component as defined earlier.

GOVERNMENT COLLEGE OF ENGINEERING, JALGAON

Scheme for Semester II of B. Tech. (Elect/Comp/Civil) with effect from academic year 2018-19

Course Code	Name of the Course	Group	Teaching Scheme Hrs /Week				Evaluation Scheme					Total	Credits
							Theory			Practical			
			L	T	P	Total	MSE	ISA	ESE	ICA	ESE		
SH151U	Integral Calculus	BS	3	1	--	4	30	10	60	--	--	100	4
SH152U	Engineering Physics	BS	3	--	--	3	30	10	60	--	--	100	3
ME151U	Engineering Drawing and Drafting	BE	3	--	--	3	30	10	60	--	--	100	3
ET151U	Basic Electronics and Measurement Techniques	BE	3	--	--	3	30	10	60	--	--	100	3
CE151U	Engineering Mechanics	BE	3	1	--	4	30	10	60	--	--	100	4
ME152U	General Workshop Practices	BE	--	--	2	2	--	--	--	50	--	50	1
SH153U	Engineering Physics Lab	BS	--	--	2	2	--	--	--	50	--	50	1
ME153U	Engineering Drawing and Drafting Lab	BE	--	--	2	2	--	--	--	50	--	50	1
ET152U	Basic Electronics and Measurement Techniques Lab	BE	--	--	2	2	--	--	--	50	--	50	1
CE152U	Engineering Mechanics Lab	BE	--	--	2	2	--	--	--	50	--	50	1
SH150AU	**Environment Science**		-	--	--	--	**NA**	**NA**	**60**	**--**	**--**	**60**	**AU**
	Total		15	2	10	27	150	50	400	250	--	810	22

L: Lecture   T: Tutorial   P: Practical   ISA: Internal Sessional Assessment
MSE: Mid Semester Examination   ESE: End Semester Examination,   ICA: Internal Continuous Assessment

Note: 1. ESE (TH) duration for ME151U is four hours and that for all other theory courses is three hours.

    2. MSE (TH) duration for all theory courses is two hours

    3. Group indicates curriculum component as defined earlier.

GOVERNMENT COLLEGE OF ENGINEERING, JALGAON
Scheme for SEM III of B. Tech. (Civil Engineering) 2018-19

Course Code	Name of the Course	Group	Teaching Scheme Hrs /week				Evaluation Scheme					Total	Credit
			L	T	P	Total	Theory			Practical			
							ISA	MSE	ESE	ICA	ESE		
CE201U	Introduction to Civil Engineering	HM	2	--	--	2	10	30	60	--	---	100	2
CE202U	Basic Surveying	PC	3	--	---	3	10	30	60	---	---	100	3
CE203U	Concrete Technology	PC	3	--	---	3	10	30	60	---	---	100	3
CE204U	Building Planning and Construction	PC	3	--	---	3	10	30	60	---	---	100	3
CE205U	Strength of Materials	PC	3	--	---	3	10	30	60	---	---	100	3
CE206U	Engineering Geology	BS	3	--	---	3	10	30	60	---	---	100	3
CE207U	Basic Surveying Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE208U	Concrete Technology Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE209U	Building Planning and Construction Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE210U	Computer Aided Civil Engineering Drawing Lab	PC		--	2	2	--	--	--	50	--	50	1
CE211U	Engineering Geology Lab	BS	--	--	2	2	--	--	--	25	25	50	1
SH200AU	Essence of Indian Traditional Knowledge	HM	--	--	--	--	NA	NA	60	0	0	60	AU
Total			**17**	**--**	**10**	**27**	**60**	**180**	**420**	**150**	**100**	**910**	**22**

L: Lecture **T: Tutorial** **P: Practical** **ISA: Internal Sessional Assessment**
MSE: Mid Semester Examination **ESE: End Semester Examination,** **ICA: Internal Continuous Assessment**

Note: 1.ESE (TH) duration for CE204U is four hours and for all other theory courses is three hours.
2.MSE (TH) duration for all theory courses is two hours
3. Group indicates curriculum component as defined earlier.

GOVERNMENT COLLEGE OF ENGINEERING, JALGAON

Scheme for SEM IV of B. Tech. (Civil Engineering) 2018-19

Course Code	Name of the Course	Group	Teaching Scheme Hrs /week				Evaluation Scheme					Total	Credit
							Theory			Practical			
			L	T	P	Total	ISA	MSE	ESE	ICA	ESE		
SH296U	Advanced Engineering Mathematics	HM	3	--	---	3	10	30	60	---	---	100	3
CE251U	Fluid Mechanics	PC	3	--	---	3	10	30	60	---	---	100	3
CE252U	Water Treatment and Processes	PC	3	--	-	3	10	30	60	---	---	100	3
CE253U	Basic Theory of Structures	PC	3	-	---	3	10	30	60	---	---	100	3
CE254U	Hydrology and Irrigation	PC	3	--	--	3	10	30	60	---	---	100	3
CE255U	Civil Engineering- Societal and Global Impact	HM	2	--	---	2	10	30	60	---	---	100	2
CE256U	Fluid Mechanics Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE257U	Water Treatment and Processes Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE258U	Testing of Materials Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE259U	Hydrology and Irrigation Lab	PC	--	--	2	2	--	--	--	25	25	50	1
SH299U	Effective Technical Communication	HM		--	2	2	--	--	--	25	25	50	1
SH250AU	Introduction to the Constitution of India	CM	--	--	--	--	NA	NA	60	--	--	60	AU
		Total	17	-	10	27	60	180	420	125	125	910	22

L: Lecture **T: Tutorial** **P: Practical** **ISA: Internal Sessional Assessment**
MSE: Mid Semester Examination **ESE: End Semester Examination,** **ICA: Internal Continuous Assessment**

Note: 1.ESE (TH) duration for all theory courses is three hours.
2.MSE (TH) duration for all theory courses is two hours
3. Group indicates curriculum component as defined earlier.
4. Professional Internship of minimum 6 week duration (minimum 2 weeks in one visit) shall be completed during summer and winter vacation
after the IV semester onward and will be asses in VIII semester.

GOVERNMENT COLLEGE OF ENGINEERING, JALGAON
Scheme for SEM V of B. Tech. (Civil Engineering) 2018-19

| Course Code | Name of the Course | Group | Teaching Scheme Hrs /week | | | | Evaluation Scheme | | | | | Total | Credit |
| | | | L | T | P | Total | Theory | | | Practical | | | |
							ISA	MSE	ESE	ICA	ESE		
CE301U	Dams and Hydraulic Structures	PC	3	--	---	3	10	30	60	---	---	100	3
CE302U	Design of RCC Structures	PC	3	--	---	3	10	30	60	---	---	100	3
CE303U	Transportation Engineering	PC	3	--	---	3	10	30	60	---	---	100	3
CE304U	Professional Elective -I	PE	3	--	---	3	10	30	60	---	---	100	3
CE305U	Open Elective-I	OE	3	--	---	3	10	30	60	---	---	100	3
CE306U	Construction Management	PC	3	--	--	3	10	30	60	--	--	100	3
CE307U	Design of RCC Structures Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE308U	Dams and Hydraulic Structures Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE309U	Transportation Engineering Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE310U	Professional Elective I Lab	PE	--	--	2	2	--	--	--	25	25	50	1
	Total		18	--	8	26	60	180	360	100	100	800	22

L: Lecture   **T: Tutorial**   **P: Practical**   **ISA: Internal Sessional Assessment**
MSE: Mid Semester Examination   **ESE: End Semester Examination,**   **ICA: Internal Continuous Assessment**

Professional Elective -I

A. Hydraulic Engineering
B.   Construction Practice
C. Earthquake Engineering
D. Architectural Design

Open Elective I

A. Building Construction Practice
B. Repair and Rehabilitation of Structures

Note: 1. ESE (TH) duration for CE302U is four hours and for all other theory courses is three hours.
   2.MSE (TH) duration for all theory courses is two hours
   3. Group indicates curriculum component as defined earlier.

GOVERNMENT COLLEGE OF ENGINEERING, JALGAON

Scheme for SEM VI of B. Tech. (Civil Engineering) 2018-19

Course Code	Name of the Course	Group	Teaching Scheme Hrs /week				Evaluation Scheme					Total	Credit
							Theory			Practical			
			L	T	P	Total	ISA	MSE	ESE	ICA	ESE		
CE351U	Advance Theory of Structure	PC	3	--	--	3	10	30	60	---	---	100	3
CE352U	Geotechnical Engineering	PC	3	--	---	3	10	30	60	---	---	100	3
CE353U	Design of Steel Structures	PC	3	--	---	3	10	30	60	---	---	100	3
CE354U	Professional Elective -II	PE	3	--	---	3	10	30	60	---	---	100	3
CE355U	Open Elective - II	OE	3	--	---	3	10	30	60	---	---	100	3
CE356U	Disaster Preparedness & Planning Management	HM	3	--	---	3	10	30	60	---	---	100	3
CE357U	Geotechnical Engineering Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE358U	Design of Steel Structures Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE359U	Professional Elective –II Lab	PE	--	--	2	2	--	--	--	25	25	50	1
CE360U	Software Engineering Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE361U	Minor Project	PS	--	--	2	2	--	--	--	50	--	50	1
	Total		18	--	10	28	60	180	360	150	100	850	23

L: Lecture **T: Tutorial** **P: Practical** **ISA: Internal Sessional Assessment**
MSE: Mid Semester Examination **ESE: End Semester Examination,** **ICA: Internal Continuous Assessment**

Professional Elective -II

A. Advanced Surveying,
B. Rehabilitation of Buildings
C. Prestressed Concrete
D. Hydraulic Modeling

Open Elective II

A. Environmental Laws and Policies
B. Safety and Disaster Management

Note: 1. ESE (TH) duration for CE353U is four hours and for all other theory courses is three hours
   2.MSE (TH) duration for all theory courses is two hours
   3. Group indicates curriculum component as defined earlier.

GOVERNMENT COLLEGE OF ENGINEERING, JALGAON
Scheme for SEM VII of B. Tech. (Civil Engineering) 2018-19

Course Code	Name of the Course	Group	Teaching Scheme Hrs /week				Evaluation Scheme					Total	Credit
							Theory			Practical			
			L	T	P	Total	ISA	MSE	ESE	ICA	ESE		
CE401U	Environmental Engineering	PC	3	--	---	3	10	30	60	---	---	100	3
CE402U	Foundation Engineering	PC	3	--	---	3	10	30	60	---	---	100	3
CE403U	Engineering Economics, Estimate and Costing	PC	3	--	--	3	10	30	60	--	--	100	3
CE404U	Professional Elective -III	PE	3	--	---	3	10	30	60	---	---	100	3
CE405U	Open Elective - III	OE	3	--	---	3	10	30	60	---	---	100	3
CE406U	Environmental Engineering Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE407U	Foundation Engineering Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE408U	Engineering Economics, Estimate and Costing Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE409U	Professional Elective-III Lab	PE	--	--	2	2	--	--	--	25	25	50	1
CE410U	Industrial Lectures	PS	1	--	--	1	--	--	--	50	--	50	1
CE411U	Project Phase I	PS	---	--	2	2	--	--	--	25	75	100	3
	Total		16	--	10	26	50	150	300	175	175	850	23

L: Lecture **T: Tutorial** **P: Practical** **ISA: Internal Sessional Assessment**
MSE: Mid Semester Examination **ESE: End Semester Examination,** **ICA: Internal Continuous Assessment**

Professional Elective -III

A. Pavement Design
B. Advanced Reinforced Cement Concrete
C. Air and Noise Pollution
D. Building Systems and Services

Open Elective III

A. Interior Design
B. Metro System and Engineering

Note: 1.ESE (TH) duration for all theory courses is three hours.
  2.MSE (TH) duration for all theory courses is two hours
  3. Group indicates curriculum component as defined earlier.

GOVERNMENT COLLEGE OF ENGINEERING, JALGAON
Scheme for SEM VIII of B. Tech. (Civil Engineering)   2018-19

Course Code	Name of the Course	Group	Teaching Scheme Hrs /week				Evaluation Scheme					Total	Credit
							Theory			Practical			
			L	T	P	Total	ISA	MSE	ESE	ICA	ESE		
SH496U	Organizational Behavior	HM	3	--	---	3	10	30	60	---	---	100	3
CE451U	Professional Elective -IV	PE	3	--	---	3	10	30	60	---	---	100	3
CE452U	Professional Elective -V	PE	3	--	---	3	10	30	60	---	---	100	3
CE453U	Professional Elective -VI	PE	3	--	--	3	10	30	60	--	--	100	3
CE454U	Seminar	PS	---	---	2	2	--	--	--	25	--	25	1
CE455U	Project Phase II	PS	---	--	4	4	--	--	--	75	125	200	5
CE456U	Professional Internship	PS	--	--	--	--	--	--	--	50	--	50	2
	Total		12	--	6	18	40	120	240	150	125	675	20

L: Lecture   **T: Tutorial**   **P: Practical**   **ISA: Internal Sessional Assessment**
MSE: Mid Semester Examination   **ESE: End Semester Examination,**   **ICA: Internal Continuous Assessment**

Professional Elective -IV

A. Railway, Tunnel and Airport

B. Geo-synthetic Engineering

C. Industrial Pollution and Control

D. Construction Equipment and Automation

Professional Elective -V

A. Bridge Engineering

B. Advanced Foundation Engineering

C. Advance Design of Steel Structures

D. Solid and Hazardous Waste Management

Professional Elective -VI

A. Structural Health Monitoring and Auditing

B. Ground Improvement Techniques

C.   Finite Element Analysis

D. Formwork and Support System Design

Note: 1.ESE (TH) duration for all theory courses is three hours.
2. MSE (TH) duration for all theory courses is two hours
3. Group indicates curriculum component as defined earlier.

GOVERNMENT COLLEGE OF ENGINEERING, JALGAON

Scheme for SEM V of B. Tech. (Civil Engineering) 2018-19

Course Code	Name of the Course	Group	Teaching Scheme Hrs /week				Evaluation Scheme					Total	Credit
							Theory			Practical			
			L	T	P	Total	ISA	MSE	ESE	ICA	ESE		
CE301U	Dams and Hydraulic Structures	PC	3	--	---	3	10	30	60	---	---	100	3
CE302U	Design of RCC Structures	PC	3	--	---	3	10	30	60	---	---	100	3
CE303U	Transportation Engineering	PC	3	--	---	3	10	30	60	---	---	100	3
CE304U	Professional Elective -I	PE	3	--	---	3	10	30	60	---	---	100	3
CE305U	Open Elective-I	OE	3	--	---	3	10	30	60	---	---	100	3
CE306U	Construction Management	PC	3	--	--	3	10	30	60	--	--	100	3
CE307U	Design of RCC Structures-Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE308U	Dams and Hydraulic Structures Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE309U	Transportation Engineering Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE310U	Professional Elective –I Lab	PE	--	--	2	2	--	--	--	25	25	50	1
SH496U	**Organizational Behavior /Finance & Accounting / Other equivalent management course**	**HM**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**60**	**3**
	Total		18	--	8	26	60	180	360	100	100	860	25

L: Lecture **T: Tutorial** **P: Practical** **ISA: Internal Sessional Assessment**
MSE: Mid Semester Examination **ESE: End Semester Examination,** **ICA: Internal Continuous Assessment**

Professional Elective -I **Open Elective I**

A. Hydraulic Engineering A. Building Construction Practice
B.   Construction Practice B. Repair and Rehabilitation of Structure
C. Earthquake Engineering
D. Architectural Design

Note: 1. ESE (TH) duration for CE302U is four hours and for all other theory courses is three hours.
   2.MSE (TH) duration for all theory courses is two hours
   3. Group indicates curriculum component as defined earlier.
   4. SH 496U - Credit transferred from Online NPTEL / SWAYAM /MOOC advance course offered by Indian institute and approved by BoS
      (Civil) Chairman

GOVERNMENT COLLEGE OF ENGINEERING, JALGAON

Scheme for SEM VI of B. Tech. (Civil Engineering) 2018-19

Course Code	Name of the Course	Group	Teaching Scheme Hrs /week				Evaluation Scheme					Total	Credit
							Theory			Practical			
			L	T	P	Total	ISA	MSE	ESE	ICA	ESE		
CE351U	Advance Theory of Structure	PC	3	--	--	3	10	30	60	---	---	100	3
CE352U	Geotechnical Engineering	PC	3	--	---	3	10	30	60	---	---	100	3
CE353U	Design of Steel Structures	PC	3	--	---	3	10	30	60	---	---	100	3
CE354U	Professional Elective -II	PE	3	--	---	3	10	30	60	---	---	100	3
CE355U	Open Elective - II	OE	3	--	---	3	10	30	60	---	---	100	3
CE356U	Disaster Preparedness & Planning Management	HM	3	--	---	3	10	30	60	---	---	100	3
CE357U	Geotechnical Engineering-Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE358U	Design of Steel Structures Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE359U	Professional Elective –II-Lab	PE	--	--	2	2	--	--	--	25	25	50	1
CE360U	Software Engineering -Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE361U	Minor Project	PS	--	--	2	2	--	--	--	50		50	1
CE451U	**Professional Elective -IV**	**PE**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**60***	**60***	**3**
		Total	**18**	**--**	**10**	**28**	**60**	**180**	**360**	**150**	**100**	**850**	**26**

L: Lecture   **T: Tutorial**   **P: Practical**   **ISA: Internal Sessional Assessment**
MSE: Mid Semester Examination   **ESE: End Semester Examination,**   **ICA: Internal Continuous Assessment**

Professional Elective -II	Professional Elective -IV	Open Elective II
A. Advanced Surveying,	A. Railway, Tunnel and Airport	A. Environmental Laws and Policies
B. Rehabilitation of Buildings	B. Geo-synthetic Engineering	B. Safety and Disaster Management
C. Prestressed Concrete	C. Industrial Pollution and Control	
D. Hydraulic Modeling	D .Construction Equipment and Automation	
	E. Other course offered by NPTL/MOOC/SWAYAM and approved by Department	

Note: 1. ESE (TH) duration for CE353U is four hours and for all other theory courses is three hours.
      2.MSE (TH) duration for all theory courses is two hours.
      3. Group indicates curriculum component as defined earlier.
      4. CE451U - Credit transferred from Online NPTEL / SWAYAM /MOOC advance course offered by Indian institute and approved by BoS (Civil) Chairman
      * If students fail in online exam, then ESE will be conducted.

GOVERNMENT COLLEGE OF ENGINEERING, JALGAON

Scheme for SEM VII of B. Tech. (Civil Engineering) 2018-19

Course Code	Name of the Course	Group	Teaching Scheme Hrs /week				Evaluation Scheme					Total	Credit
			L	T	P	Total	Theory			Practical			
							ISA	MSE	ESE	ICA	ESE		
CE401U	Environmental Engineering	PC	3	--	---	3	10	30	60	---	---	100	3
CE402U	Foundation Engineering	PC	3	--	---	3	10	30	60	---	---	100	3
CE403U	Engineering Economics, Estimate and Costing	PC	3	--	--	3	10	30	60	--	--	100	3
CE404U	Professional Elective -III	PE	3	--	---	3	10	30	60	---	---	100	3
CE405U	Open Elective - III	OE	3	--	---	3	10	30	60	---	---	100	3
CE406U	Environmental Engineering -Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE407U	Foundation Engineering-Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE408U	Engineering Economics, Estimate and Costing -Lab	PC	--	--	2	2	--	--	--	25	25	50	1
CE409U	Professional Elective-III-Lab	PE	--	--	2	2	--	--	--	25	25	50	1
CE410U	Industrial Lectures	PS	1	--	--	1	--	--	--	50	--	50	1
CE452U	**Professional Elective -V**	**PE**	**--**	**--**	**--**	**--**	**--**	**--**	**60***		**--**	**60***	**3**
CE453U	**Professional Elective - VI**	**PE**	**--**	**--**	**--**	**--**	**--**	**--**	**60***		**--**	**60***	**3**
		Total	16	--	8	24	50	180	420	150	100	870	26

L: Lecture   **T: Tutorial**   **P: Practical**   **ISA: Internal Sessional Assessment**
MSE: Mid Semester Examination   **ESE: End Semester Examination,**   **ICA: Internal Continuous Assessment**

Professional Elective -III	Professional Elective -V	Professional Elective -VI	Open Elective III
A. Pavement Design	A. Bridge Engineering	A. Structural Health Monitoring and Auditing	A. Interior Design
B. Advanced R.C.C	B. Advanced Foundation Engineering	B. Ground Improvement Techniques	B. Metro System and Engineering
C. Air and Noise Pollution	C. Advance Design of Steel Structures	C. Finite Element Analysis	
D. Building System and Services	D. Solid and Hazardous Waste Management	D. Formwork and Support System Design	
	E. The advance course offered by /SWAYAM and approved by BoS Chairman	E. The advance course offered by /SWAYAM and approved by BoS Chairman	

Note: 1.ESE (TH) duration for all theory courses is three hours.
    2.MSE (TH) duration for all theory courses is two hours
    3. Group indicates curriculum component as defined earlier.
    4. CE452U and CE453U - Credit transferred from Online NPTEL / SWAYAM /MOOC advance course offered by Indian institute and
        approved by BoS (Civil) Chairman
    * If students fail in online exam, then ESE will be conducted.

GOVERNMENT COLLEGE OF ENGINEERING, JALGAON

Scheme for SEM VIII of B. Tech. (Civil Engineering)   2018-19

Course Code	Name of the Course	Group	Teaching Scheme Hrs /week				Evaluation Scheme					Total	Credit
							Theory			Practical			
			L	T	P	Total	ISA	MSE	ESE	ICA	ESE		
CE454U	Seminar	PS	---	---	2	2	--	--	--	25	--	25	1
CE456U	Professional Internship	PS	--	--	--	--	--	--	--	50	--	50	2
CE457U	Project#	PS	---	--	6	6	--	--	--	100	200	300	8
	Total		---	--	8	8	--	--	--	175	200	375	11

L: Lecture   **T: Tutorial**   **P: Practical**   **ISA: Internal Sessional Assessment**
MSE: Mid Semester Examination   **ESE: End Semester Examination,**   **ICA: Internal Continuous Assessment**

Note: 1.ESE (TH) duration for all theory courses is three hours.
   2. MSE (TH) duration for all theory courses is two hours
   3. Group indicates curriculum component as defined earlier.
   # - Preferably industry/ field based

CE201U INTRODUCTION TO CIVIL ENGINEERING

Teaching Scheme: 2L Total: 2 Hr   **Credit: 02**

Evaluation Scheme: 30MSE + 10 ISA + 60 ESE   **Total Marks: 100**

Duration of ESE: 03 Hr

COURSE DESCRIPTION

The students admitting in Civil Engineering discipline is not conversant with width and breadth of its scope. Even though everyone understand role of civil engineer in general, its prime duty to introduce these students engineering aspect and role of civil engineer in the development of society. The Civil Engineering student should understand different discipline involved and principles. This course will introduce students all courses he / she will undertake during all four years.

COURSE OBJECTIVES

1. To give an understanding to the students overall field of Civil Engineering
2. To motivate the student to pursue a career Civil Engineering with deep interest and keenness.
3. To expose the students to the various avenues
4. Improve creativity and innovative work ability by showcasing the many monuments.
5. Under stranding inspiring projects of public utility.

COURSE OUTCOMES

After successful completion of this course; student shall be able to

1. understand the scope of civil engineering education.
2. know the fundamentals of town planning and building materials.
3. understand basics of management, environmental engineering.
4. demonstrate his / her enrichment in the depth of civil engineering courses.
5. understand computational methods / software's used in the course.

Relevance of Program Outcomes (Pos)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3		2										3		
2	3					2								2	2
3				1	1		2								2
4	3		2			1							2	1	
5				2	2									2	

1-Weakly correlated   2 – Moderately correlated   3 – Strongly correlated

COURSE CONTENT

Following curriculum is at elementary and basic level without numericals

Basic and History: Basics of engineering and civil engineering ,broad disciplines of civil engineering, importance of civil engineering, possible scopes for a career, early constructions and developments over time, ancient monuments &modern marvels, works of eminent civil engineers, position of construction industry, five year plan outlays for construction, current budgets for infrastructure works.

Fundamentals of Architecture, Town Planning and Building Materials: Aesthetics in civil engineering, examples of great architecture, fundamentals of architectural design & town planning, development of smart cities, fundamentals of stones, bricks, mortars, plain, reinforced & prestressed concrete, construction chemicals, structural steel, high tensile steel, carbon composites, plastics in construction, 3d printing, recycling of construction & demolition wastes.

Basics of Construction Management and Contracts Management: Construction methods for various types of structures, major construction equipment, automation & robotics in construction, modern project management systems.

Structural Engineering: Types of buildings, tall structures, various types of bridges, water retaining structures, experimental stress analysis, wind tunnel studies.

Basics of Geotechnical Engineering: Importance soil mechanics, rock mechanics and geology, various types of foundations, basics of tunneling.

Basics of Hydraulics, Hydrology and Water Resources Engineering: Importance and application of hydraulics, hydrological cycle, rainfall measurement and runoff, underground structures, multipurpose reservoir projects.

Surveying and Geomatics: Traditional surveying techniques, total Stations, development of Digital Terrain Models, GPS, LIDAR.

Basics of Environmental Engineering and Sustainability: Water treatment systems, effluent treatment systems, solid waste management, sustainability in construction.

Basics of Traffic and Transportation Engineering: Transport infrastructure development in India, challenges in integrated transport development in India, introduction to road, rail, port and harbour and airport sector, PPP in transport sector

Basics of Power Plant Structures: Chimneys, natural & induced draught cooling towers, coal handling systems, ash handling systems. hydro power projects.

Basics of Repairs and Rehabilitation of Structures: Basics of corrosion phenomena and other structural distress mechanisms, some simple systems of rehabilitation of structures, non-destructive testing systems.

Computational Methods, IT, IoT in Civil Engineering: Typical software used in civil engineering- finite element method, computational fluid dynamics, computational geotechnical methods, highway design (MX), building information modeling.

Text books
1. A Basic Concept of Civil Engineering, Narayan Sunder, Atlantic Publisher & Distributors (P) Ltd, 1st edition, 2018
2. An Introduction to Civil Engineering, Valdengrave Okumu, Create Space Independent Publishing Platform, 2014
3. Introduction to Civil Engineering: A Student's Guide to Academic and Professional Success, Sheng-Taur Mau and Sami Maalouf, Cognella, Incorporated, 2014.
4. Civil Engineering: A Very Short Introduction, David Muir Wood, Oxford University Press, 2014
5. Introduction to Civil Engineering: A Student's Guide to Academic and Professional Success Sheng-Taur Mau and Sami Maalouf, Cognella, Incorporated, 2014

Reference books
1. The National Building Code, BIS, (2017)
2. Introduction to Civil Engineering Systems: A Systems Perspective to the Development of Civil Engineering Facilities Samuel Labi, John Wiley & Sons, 1st edition, 2014
3. Introduction to Infrastructure: An Introduction to Civil and Environmental Engineering ,Michael R. Penn and Philip J. Parker, Wiley, 1st edition, 2011

CE202U BASIC SURVEYING

Teaching Scheme: 03L**Total:3Hr**   **Credit:** 03
Evaluation Scheme:30 MSE + 10 ISA + 60 ESE   **Total Marks:**100
Duration of ESE: 03Hrs

COURSE DESCRIPTION

This course provides the fundamental knowledge of surveying and levelling. Basic principles of surveying and certain general topics such as bench marks, reduced levels and important aspect of levelling. Measurements of angles, traverse computation, tachometric surveying, study of curves and remote sensing.

COURSE OBJECTIVES

1. To introduce basic concepts of surveying
2. To study methods and equipment's for linear and angular measurements
3. To compute area and volume from given map

COURSE OUTCOMES

After successful completion of this course; student shall be able to

1. identify suitable equipment for linear and angular measurement
2. gain the knowledge of recording the field information and necessary plot
3. use different types of surveying and levelling equipment's
4. apply the knowledge of surveying and levelling on field

Relevance of Program Outcomes (Pos)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2						2						2		
2	3	2				1			1			3	3		
3	2		1	1									2	3	
4	2	2	2			3								2	

1-Weakly correlated   2 – Moderately correlated   3 – Strongly correlated

COURSE CONTENT

Surveying: object, definition, principle of surveying, various types of surveying.

Linear Measurements: methods of distance measurements, instruments for measurement of distance, chaining a line, chaining along slope, offsets, instruments for laying offsets, triangulation, chain and cross staff survey, errors.

Angular Measurements: Types of compass, bearings, local attraction and correction to bearings, chain and compass traversing, graphical method of adjustment, errors. Study and use of Abney level, Box sextant, Digital planimeter.

Levelling: Instruments used in levelling, dumpy level, automatic level, types of levelling staff. Principal axes of dumpy level, reciprocal levelling, profile levelling, curvature and refraction correction, distance to the visible horizon. Bench mark and its types, reduced level, rise and fall method, height of instrument method.

Theodolite: Principal axes and temporary adjustments of transit theodolite. Measurement of horizontal angles, vertical angles, magnetic bearings, measuring deflection angles. Computation of consecutive and independent co-ordinates, adjustments of closed traverse, Gale's traverse by co-ordinate method.

Geodetic Surveying: Objects, methods in geodetic surveying, triangulation figure, strength of figure, classification of triangulation system, selection of stations, inter visibility of height of station towers, signal and their classification, phase of signals, satellite station and reduction to centre eccentricity of signals, base line measurement, apparatus used, base net equipment used for base line measurement, extension of a base line.

Tacheometry: Principle of stadia method, fixed hair method with vertical staff to determine horizontal distances and elevations of the points. Use of tacheometry in surveying, contour characteristics and uses, methods of interpolation, tacheometric contour survey.

Curves: Horizontal and vertical curves and their purposes. Simple circular curves, elements and setting out by linear and angular methods. Compound curves, elements and setting out of compound curves. Transition curves - types and uses, length of transition curves.

Plane Table Survey: Objective and equipment required for plane table survey. Methods of plane table - radiation, intersection, traversing and resection. Advantages, disadvantages, limitations and errors of plane table surveying.

Remote Sensing: Basic principles, importance, scope, sensors used in remote sensing, platforms, applications of remote sensing to Civil Engineering.

Use of Advance Instruments in Surveys: Study and use of various electronics equipment's like EDM and Total Station.

Text Books
1. Surveying and Levelling (Vol-I & II) , T.P. Kanetkar & S.V. Kulkarni, Pune Vidyarthi Griha Prakashan, Pune 23rd edition,1990
2. Surveying Vol. I and Vol .II, B. C. Punmia, Laxmi Publication (P) New Delhi,17th edition, 2008

Reference Books
1. Plane Surveying, A. M. Chandra, , New Age International Publishers New Delhi, 2ndedition,   2012
2. Surveying and Levelling, R. Subramanian Oxford University Press, New Delhi, 1stedition,   2014
3. Advance Surveying, Vol I & II, Handbook, P.B. Shahani, New Delhi Oxford and IBH   Publication, 2012
4. A handbook of accurate surveying methods, S. P. Collins, PITMAN, 1972

CE203U CONCRETE TECHNOLOGY

Teaching Scheme: 03L, Total: 03**Hr**   **Credit:** 03
Evaluation Scheme: 30 MSE + 10 ISA + 60 ESE   **Total Marks:** 100
Duration of ESE: 03Hrs

COURSE DESCRIPTION

The course "Concrete Technology" focuses on concrete making materials including supplementary cementitious materials. Concrete production process also forms a part of the discussion. Going through the course one would develop first-hand knowledge on concrete production process and properties and uses of concrete as a modern material of construction. The course will enable one to make appropriate decision regarding ingredient selection, uses and types of concrete and designing concrete mix.

COURSE OBJECTIVES

1. To make students to understand fundamental concepts and understanding of the behavioral aspects of various materials in concrete making and special concretes.
2. To obtain knowledge on hardened concrete properties and their testing procedures.
3. To study about the concrete design mix.

COURSE OUTCOMES

After successful completion of this course; student shall be able to

1. understand concrete materials and their properties
2. determine the properties of various ingredients of concrete.
3. understand the properties of fresh concrete fresh and hardened concrete
4. design mix proportion concrete mix for field applications as per IS and IRC codes

Relevance of Program Outcomes (Pos)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2		1									2	3		
2	3		2		2								2		
3	2		2	2									3		
4	3				2	3		2						2	

1-Weakly correlated   2 – Moderately correlated   3 – Strongly correlated

COURSE CONTENT

Cement: Production, chemical composition, setting and hydration of cement, types of cement, introduction to supplementary cementitious materials, testing of cement, IS Specifications.

Aggregates: Classification, mineralogy, properties, grading, impurities in aggregates, bulking of sand, tests and standards, its effect on strength of concrete, production of artificial aggregates, water**,** its quality and recommendations.

Admixtures: Types and classification, actions and interactions, usage, effects on properties of concrete.
Fly ash, ground granulated blast furnace slag, metakaolin, rice-husk ash and silica fume, chemical composition, physical characteristics, effects on properties of concrete, advantages and disadvantages.

Concrete: Definition and its ingredients, grades of concrete, significance of water cement ratio, concreting process, quality control during concreting, properties of fresh concrete, properties of hardened concrete, time dependent behavior of concrete -creep, shrinkage and fatigue, factors affecting various properties, micro cracking, and stress - strain relation, testing of fresh and hardened concrete, durability of concrete.

Concrete Mix Design: Proportioning of concrete mixes, basic considerations, factors in the choice of mix proportion, introduction to different methods of mix design, mix design by I.S. method and IRC:44-2017 method.

Special Concretes: Light weight concrete, polymer concrete, fiber reinforced concrete, ready mixed concrete, self compacting and high performance concrete, recycled aggregate concrete, shotcrete, vacuum concrete, special concrete -transparent concrete, cellular light weight concrete, under water concreting, concreting in extreme weather conditions.

Non-destructive Tests on Concrete: Introduction to non-destructive testing of concrete, rebound hammer, ultrasonic pulse velocity, pull out test, impact echo test, chemical attack, carbonation of concrete, corrosion of reinforcement.

Text books
1. Concrete Technology Theory and Practice, M. S. Shetty, S. Chand Publication, Revised edition 2008
2. Concrete Technology, M. L. Gambhir, McGraw Hill Education (India) Private limited, 5th edition, 2013

Reference books
1. Concrete Technology, A.N. Neville and J.J. Brooks, Addison Wesley Longman, 2nd edition, 2010
2. Concrete: Microstructure, Properties, and Materials, P. Kumar Mehta, Paulo J.M Monteiro, McGraw Hill Professional, reprint 2013.
3. Advanced Concrete Technology, Zongjin Li, Wiley, 1st edition 2011.
4. Hand book of Advanced Concrete Technology, N. V. Nayak and A. K. Jain, Alpha Science International, 1st edition 2012

CE204U BUILDING PLANNING AND CONSTRUCTION

Teaching Scheme: 03L Total: 03**Hr**   **Credit:** 03
Evaluation Scheme: 30 MSE + 10 ISA + 60 ESE   **Total Marks:** 100
Duration of ESE: 04Hrs

COURSE DESCRIPTION
This course provides an over-view of the basics of building planning. Besides this students also learn about construction of brick masonry, its requirements and methods of construction. Students will also learn different components of building.

COURSE OBJECTIVES
1. To make students to understand basic concepts in planning of buildings
2. To make students to understand different types of structures and components of buildings.

COURSE OUTCOMES
After successful completion of this course; student shall be able to
1. plan buildings as per bye laws.
2. gain knowledge on building components.
3. draw plan, elevation and section of load bearing and framed structures

Relevance of Program Outcomes (Pos)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	**3**					**1**	**2**	**3**					3		
2	**1**													2	
3	**3**					**1**	**2**	**2**							3

1-Weakly correlated   **2 – Moderately correlated**   **3 – Strongly correlated**

COURSE CONTENT

Planning and Designing of Buildings: Planning and designing of residential buildings (load bearing / frame Structure) working drawings, importance and use of all types of working drawings at site. Planning and designing of apartment houses, educational buildings, hostel buildings, library buildings, restaurants, hotels/lodging-boarding buildings, and primary health centers / hospitals. Planning and designing of bus stand buildings, commercial complex buildings, bank buildings, post office buildings, community / marriage halls, factory buildings. (frame structure only)

Types of Structures
Load bearing, framed structure, steel structure, timber structure, composite structure, parts of building, sub structure and super structure, plinth, sill, floor, and roof level, plinth height, plinth protection, cornice, coping and their function.

Foundation
Purpose and classification, advantages and disadvantages of each and circumstances under which each is used, factor considered for selection of foundation.

Masonry: Principle of masonry construction, types of masonry, types of walls (load bearing, partition, timber partition, glass partition etc.

Brick Masonry: Various types of bond in brick masonry, reinforced brick masonry, precautions to be taken in masonry construction, composite masonry, solid and hollow blocks used for masonry, cavity wall.

Formwork: Function of form work, types, formwork erection, oiling and stripping of form, requirements of formwork, material used for formwork.

Lintel: Types of lintel, detailing of R.C.C. lintel, precast lintel.

Doors and Windows: Type of each and circumstances under which each is used, minimum area of window opening for different climatic conditions, material used for doors and window, fixtures and fastening used, I.S. notations for doors and windows.

Circulation: Type of circulation, horizontal and vertical, types of staircase, staircase planning and design.

Floor and Roof: Ground floor, upper floor, mezzanine floor, types of floor finishes used.

Text Books
1. Building Construction, S. C. Rangwala, Charotar Publishing House , 27th edition 2009
2. Building Construction, Sushil Kumar, Standard Publishers Distributors, 16th edition 2006
3. Building Drawing with an integrated Apprach to built environment, M.G. Shah, C.M. Kale, S.Y. Patki - Tata McGraw Hills Pvt. Ltd. New Delhi,5th edition 2012.
4. Planning & Designing Building, Y.S. Sane-Allies Book Stall, 2010

Reference books
1. Building Construction, S.P. Arora and S.P. Bindra, Dhanpat Rai Publications, 5th edition 2010
2. Building Construction, Ashok K. Jain, B. C. Punmia, Arun Kr. Jain, Laxmi Publications,11th edition 2015
3. Building Planning and Drawing, N. Kumara Swamy and. A. Kameswara Rao, Charotar Publications, 8th edition 2015.
4. Building Science and Planning,. S.V. Deodhar, Khanna Publishers, New Delhi, 5th edition 2014
5. National building Code, 2016, New Delhi.
6. IS: 962: 1989- Code of practice for Architectural and building drawing.

CE205U STRENGTH OF MATERIALS

Teaching Scheme: 03L**Total: 03Hr**   **Credit**: 03
Evaluation Scheme: 30 MSE + 10 ISA + 60 ESE   **Total Marks**: 100
Duration of ESE :03Hrs

COURSE DESCRIPTION

This course provides the basic infra structure for various activities. All the structural members are subjected to load. The role of an engineer is to provide the geometric section to sustain the load. For this, the engineer must know the behavior of the material under given load. This is studied and verified under this subject

COURSE OBJECTIVES

To introduce engineering materials based on energy principles. Deformation and strain, stress and stress states, elasticity and elasticity bounds. This subject involves analytical methods for determining the strength, stiffness (deformation characteristics), and stability of the various members in a structural system. The 22evellin of a member depends not only on the fundamental laws that govern the equilibrium of forces, but also on the mechanical characteristics of the material. These mechanical characteristics come from the laboratory, where materials are tested under accurately known forces and their 22evellin is carefully observed and measured.

COURSE OUTCOMES

After successful completion of this course; student shall be able to
1. analyze the response of elastic body for external actions.
2. compare the different engineering properties and behavior of the materials
3. determine the design forces.
4. analyze the stress, strain and deformation of elastic bodies under external actions
5. evaluate variety of deformations in the determinate structural components.
6. determine the deflection at any point on a beam subjected to a combination of loads, solve for stresses and deflections of beams under unsymmetrical loading.

Relevance of Program Outcomes (Pos)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	1	2	2							1		3		
2			2				1				2			2	
3	2	2		3					2				2	2	
4	2	3	2						2			1	3		
5		2		2							2		2		
6	2	2	3	2	1							1	2		

COURSE CONTENT:

Simple Stresses and Strains: Concept of stress and strain, stress and strain diagram, elasticity and plasticity. Types of stresses and strains, Hooke's law stress strain diagram for mild steel working stress, factor of safety, lateral strain, Poisson's ratio and volumetric strain, elastic moduli and the relationship between them, bars of varying section composite bars, temperature stresses. Strain energy resilience, gradual, sudden, impact and shock loadings simple applications.

Compound Stresses and Strains: Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress, ellipse of stress and their applications. Two dimensional stress-strain system, principle strains and principle axis of strain, relationship between elastic constants.

Bending Moment and Shear Force Diagrams: Bending moment (BM) and shear force (SF) diagrams. BM and SF diagrams for cantilevers simply supported with or without overhangs. Calculation of maximum BM and SF and the point of contra flexure under concentrated loads, uniformly distributed loads over the whole span or part of span, combination of concentrated loads and uniformly distributed loads, uniformly varying loads, application of moments.

Flexural Stresses: Theory of simple bending, assumptions, derivation of bending equation: $M/I = f/y = E/R$ – Neutral axis, determination of bending stresses, section modulus of rectangular and circular sections (Solid and Hollow), I,T, angle and channel sections, design of simple beam sections.

Shear Stresses: Derivation of formula, shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections.

Torsion: Derivation of torsion equation and its assumptions. Applications of the equation of the hollow and solid circular shafts, torsional rigidity, combined torsion and bending of circular shafts, principal stress and maximum shear stresses under combined loading of bending and torsion. Analysis of close- coiled helical springs.

Text Books
1. Strength of materials, S.S. Ratan, Tata McGraw Hill Delhi, 3rd edition, 2017
2. Strength of Material, S. Rammurthum, Dhanpat Rai & Sons. 2014

Reference Books
1. Strength of material, D. S. Prakash Rao, University Press, reprint 2017
2. Elements of Strength of Materials, Timoshenko S. and Young D.H.,Tata McGraw Hill, 5th edition, 2013.
3. Strength of Materials, Pytel and Singer, Harper and Row publication, 4th edition, 1987
4. **Strength of Materials, R.C. Hibbeler, Prentice Hall, 8th edition 2009**

Useful Link
1. **NPTEL, www.nptel.ac.in**

CE206U ENGINEERING GEOLOGY

Teaching Scheme: 3L **Total:** 3 Hr   **Credit:0**3

Evaluation Scheme: 30MSE + 10 ISA + 60 ESE   **Total Marks:**100

Duration of ESE: 03 Hrs

COURSE DESCRIPTION

The course is to focus on the core activities of engineering geologists – site characterization and geologic hazard identification and mitigation. The student will learn the engineering properties of rock and unconsolidated materials in the characterization of geologic sites for civil work projects. Engineering geology also includes the assessment and mitigation of geologic hazards such earthquakes, landslides and groundwater remediation and resource evaluation.

COURSE OBJECTIVES

1. To study basic of engineering geology and introductory part of the earth science.
2. To understand the utility and application of geological principles in various phases of civil engineering activities.
3. To learn the basic aspects occur due to structural features like folds and faults.
4. To explain various natural hazards and their implications on structures and effects on society.
5. To describe the sources, and characterization of rock.

COURSE OUTCOMES

After successful completion of this course; student shall be able to

1. understand earth process and geological formations
2. identify the geological structures and properties of rock.
3. understand physical properties, mechanical properties of the minerals and their application in civil engineering.
4. know about ground water availability zones and ground water management.
5. identify favorable and unfavorable conditions for the dam through the rocks

Relevance of Program Outcomes (Pos)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1			1										2		
2			1										2		
3	1					2	1						3	2	
4			2		2								2	1	
5	2					2							3		

1-Weakly correlated   2 – Moderately correlated   3 – Strongly correlated

COURSE CONTENT

Introduction: Branches of geology useful to civil engineering, scope of geological studies in various civil engineering projects. Introduction to GSI, granite dimension stone shell, NIRM departments.

Mineralogy: Mineral, origin and composition, physical properties of minerals, basic of optical mineralogy, SEM, XRD., rock forming minerals, megascopic identification of common primary & secondary minerals.

Petrology: Rock cycle, rock forming processes. Specific gravity of rocks, broad classification of rocks.
Igneous Petrology: Plutonic, hypabyssal and volcanic rocks, structure, texture and classification of Igneous rocks. Study of common rock types prescribed in practical work and their engineering applications.

Sedimentary Petrology: Rock weathering, genetic classification of secondary rocks and grain size classification and Textures, sedimentary structures, digenesis process. Study of common rock types prescribed in practical work and their engineering applications.

Metamorphic Petrology: Agents, types of metamorphism, texture and structures. Study of common rock types prescribed in practical work and their engineering applications.

Physical Geology: Weathering, erosion and denudation, factors affecting weathering and product of weathering engineering consideration. Water fall and gorges, river meandering, alluvium, glacial deposits, laterite (engineering aspects), desert landform, loess, residual deposits of clay with flints.

Strength Behavior of Rocks: Stress and Strain in rocks. Concept of rock deformation & tectonics .dip and strike. Outcrop and width of outcrop, inliers and outliers, main types of discontinuities according to sizefold-types and nomenclature, criteria for their recognition in field, faults, classification, recognition in field, effects on outcrops. joints& unconformity, types, stresses responsible, geotechnical importance.

Geological Hazards: Rock instability and slope movement, instability in vertical rock structures and measures to prevent collapse. Types of land slide. prevention by surface drainage, earthquake: magnitude and intensity of earthquake, revelation from seismic records of structure of earth, case study on elevation and subsidence in Himalayan region in India, seismic zone in India.

Rock masses as Construction Material: Main features that affects the quality of rock engineering and design. Basic element and structures of rock those are relevant in civil engineering areas. Effect of alteration and weathering classification of rock material strength.

Geology of Dam and Reservoir Site: Required geological consideration for selecting dam and reservoir site. Failure of Reservoir. Favorable & unfavorable conditions in different types of rocks in presence of various structural features, precautions to be taken to counteract unsuitable conditions, significance of discontinuities on the dam site and treatment giving to such structures.

Rock Mechanics: Sub surface investigations in rocks and engineering characteristics or rocks masses, structural geology of rocks, classification of rocks, drilling &coring technique, bore hole log, recovery ratio & rock quality designation, field & laboratory tests on rocks.

Text Books
1. Engineering and General Geology, Parbin Singh, S K Kataria & Sons, 8th edition, 2010.
2. Text Book of Engineering Geology, N. Chenna Kesavulu, Macmillan Publishers India, 2nd edition 2009.
3. Engineering Geology, S. Gangopadhyay, Oxford University Press, 1st edition, 2017.

Reference Books
1. Geology for Geotechnical Engineers, J. C. Harvey, Cambridge University Press, 1982
2. Principles of Physical Geology, Homes Arthur and Homles Doris, , ElBS Publications, 1992
3. A Geology for Engineers, F.G. H. Blyth and M.H. de Freitas, Elsevier, 8th edition, 1984.

CE207U BASIC SURVEYING LAB

Teaching Scheme: 02P, Total: 02**Hr**   **Credit:** 01
Evaluation Scheme:25 ICA + 25 ESE   **Total Marks:**50

COURSE DESCRIPTION

This course is set keeping in mind the requirements of undergraduate students of engineering .This course provides the fundamental knowledge of surveying and levelling which includes basic principles of surveying and important aspect of levelling, engineering surveys such as profile levelling and cross sectioning, measurement of horizontal and vertical angle, magnetic bearings, deflection angle by using theodolite and total station.

COURSE OBJECTIVES:

1. Use the survey instruments.
2. Take linear and angular measurements.
3. Prepare layouts and maps.
4. Set out alignments for roads, railways etc.

COURSE OUTCOMES:

After successful completion of this course; student shall be able to

1. understand the importance and scope of surveying in any engineering project.
2. apply the principles of surveying.
3. use the traditional and advanced instruments of surveying.
4. execute a survey project.

Relevance of Program Outcomes (Pos)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3												3		
2	2												2	1	
3			2										2	2	
4.	2													3	

1-Weakly correlated   2 – Moderately correlated   3 – Strongly correlated

Minimum six experiments shall be performed to cover entire curriculum of course CE202U. The list given below is just a guideline. All surveying equipment's should be introduced and used before experiments.

1. Chain / Tape & compass traversing for survey of a given area, entries in field book and plotting of features on ground on A1 size sheet
2. Measuring horizontal angles, vertical angles, deflection angles, magnetic bearing, prolonging straight lines, lying off horizontal angles by Theodolite
3. Computation of horizontal distances and elevations by tacheometry for horizontal and inclined sites
4. Box sextant, abney level use in surveying
5. Plane table surveying for a given area and plotting on A1 size sheet and measuring area by planimeter
6. Profile levelling for minimum 500 m length and Plotting of L-section & cross section of road on A1 size sheet
7. Block contouring for minimum 200x200 m area and Plotting of contour map on A1 size sheet
8. Measurement of distances, angles, magnetic bearings for a traverse by Total station**.**

Note:

- **ICA** – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format **(S 10).**
- **ESE** – The End Semester Examination (ESE) for this laboratory course shall be based on performance in one of the experiments performed by student in the semester followed by sample questions to judge the depth of

understanding/knowledge or skill acquired by the student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CE208U CONCRETE TECHNOLOGY LAB

Teaching Scheme : 02P, Total: 02 **Hr**   **Credit:** 01
Evaluation Scheme : 25 ICA + 25 ESE   **Total Marks:** 50

COURSE DESCRIPTION
The students will learn how to perform various tests to be used at construction site. They will also learn to conduct various type of slump test on concrete and constituent of mortar to be used at site. At the end they will learn mix design to arrive at required strength of concrete with specific ratio of its ingredients.

COURSE OBJECTIVES
1. To know the concept and procedure of different type of test conducted on cement, aggregate and finished concrete.
2. To understand the procedure of designing the concrete mix of given specification of its ingredients along with appropriate water cement ratio and admixtures.

COURSE OUTCOMES
After successful completion of this course the student will be able to:
1. perform different tests conducted on cement, aggregate and concrete.
2. design the concrete mix as per the site conditions and specification of materials available there.
3. understand the durability requirements of concrete.

Relevance of Program Outcomes (Pos)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3			1	2	2	1								
2	3		2				2					1			
3	3				1	2									

1-Weakly correlated   2 – Moderately correlated   3 – Strongly correlated

Minimum ten experiments shall be performed to cover entire curriculum of course CE203U. Three from group A, four from group B and two from group C and group D compulsory. List given below is just a guideline.

List of Experiments
A) Test on cement
  1. Determination of fineness and consistency/specific gravity of cement.
  2. Determination of initial and final setting times of cement.
  3. Determination of compressive strength of cement.
  4. Soundness by Le-Chatelier's method
B) Test on Aggregates
  1. Determination of fineness modulus of coarse and fine aggregates
  2. Crushing value test
  3. Impact value test
  4. Moisture content
  5. Bulking of sand
  6. Abrasion test
  7. Shape test
  8. Specific gravity test
C) Test on concrete
  1. Workability tests: slump cone test, compaction factor test
  2. Determination of compressive and tensile strength of concrete
  3. Splitting Tensile Test.
**D) Mix Design of concrete by IRC:44-2017/IS Code method

One site visit to Civil Engineering project related to above topics/experiments (Compulsory).

- **ICA –** Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).
- **ESE –** The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CE209U BUILDING PLANNING AND CONSTRUCTION LAB

Teaching Scheme: 02P, Total: 02**Hr**   **Credit:** 01

Evaluation Scheme: 25 ICA + 25 ESE   **Total Marks:** 50

COURSE DESCRIPTION

By learning the subject students can produce more detailed drawing related to construction of single storied, double storied residential buildings, public buildings and other simple civil engineering structures and in this subject also consider the application of building regulation and by-laws as per local authorities.

COURSE OBJECTIVES

1. To enable students to plan and prepare drawings of building components.
2. To understanding planning and drawing of residential buildings.

COURSE OUTCOMES

After successful completion of this course; student shall be able to

1. understand building bye laws.
2. draw the plan, section and elevation of various components of buildings.
3. prepare a detailed drawing for residential and public buildings.

Relevance of Program Outcomes (Pos)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1					2					1	2		
2	3			2	2	2	3	2				1	3	2	
3	3		2	2	2	2	3	2				1	3	2	

1-Weakly correlated   2 – Moderately correlated   3 – Strongly correlated

Minimum eight experiments shall be performed to cover entire curriculum of course CE204U. No. 1, 2 and 10 are compulsory. List given below is just a guideline. Use Autocad for drawing along with manual drawing for sr no 1 and 2

List of Experiments

1. **Planning of a small residential buildings/bungalow/duplex from given data (framed structure).**
   a. Draw furniture arrangement
   b. Draw front elevation, sections (preferably through staircase or bath-wc)
   c. Site plan, built up area calculations
   d. Schedules of area & openings.
2. **Project work**
   Project work shall consist of preparation of working drawings after planning and designing of any one building mentioned in curriculum. Every student shall select different type; individual work is expected from the students.
   a. Layout plan of project building
   b. Typical floor plans.
   c. Front and road side elevations
   d. Sections.
   e. Layout plan showing water supply and drainage arrangements
3. C.C.T.W. paneled door plan, elevation and section.
4. Flush door plan, elevation and section.
5. Lintel/ Arches in stone and bricks.
6. Bonds in brick masonry with isometric view for one bond for one brick.
7. Different types of roofs.
8. Types of stairs.
9. Planning and design of dog legged stairs.

10. Report regarding visit to the construction sites. (Minimum one visits is mandatory).

- **ICA –** Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format **(S 10).**

- **ESE –** The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CE210U COMPUTER AIDED CIVIL ENGINEERING DRAWING LAB

Teaching Scheme: 02P **Total**: 02**Hr**   **Credit**: 01
Evaluation Scheme: 50 ICA   **Total Marks**: 50

COURSE DESCRIPTION:

The laboratories cover practical's/ experiments related to basic commands of Civil engineering software's and their use in the planning of building.

COURSE OBJECTIVE:

To introduce the basics of computer software and graphics for the planning of   buildings also introduce the basics commands of AutoCAD and similar software's for the effective building planning

COURSE OUTCOME :

After successful completion of this course; student shall be able to
1. understand the drawing with the help of software.
2. prepare working drawings of an existing building based upon measurements.
3. apply a software to prepare 3D models of buildings
4. understand the symbols and signs used in planning of various buildings/structures.

Relevance of Program Outcomes (Pos)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1		2			3				1		1	2	2	3	
2	2	2	2	2			2		1		2	2	2		
3		2	1		3						2		2	3	
4			1						2	1	2		2		

1-Weakly correlated   2 – Moderately correlated   3 – Strongly correlated

The list given below shall be drawn with AutoCAD/Rivet/3D Max /Auto civil software's.
List given below is just a guideline.

List of Drawing Experiments
1. Single story buildings with RCC/load bearing walls including details of doors and windows etc.
2. Preparation of standard drawings of a typical two storied building and writing out a description of the facilities.
3. RCC framed structures with plan, elevation and cross section.
4. Reinforcement drawings for typical slabs, beams, columns and spread footings.
5. Industrial buildings, North light roof structures and trusses
6. Perspective view of two storey buildings.
7. Generate 3D view of building
ICA : Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format.

CE211U: ENGINEERING GEOLOGY LAB

Teaching Scheme: 2P   **Total:** 2Hr   **Credit:**01

Evaluation Scheme: 25 ISE + 25 ESE   **Total Marks:**50

COURSE DESCRIPTION

The student will be able to identify rock and minerals. It will helpful to understand geographical maps and various symbols. The student will able to understand the selection of site for civil engineering projects from geological maps. The field visit will enhance the actual field experience about geological survey and rock masses.

COURSE OBJECTIVES

1. To study the identification of rock.
2. To study the identification of minerals
3. To understand the application of geological maps in various phases of civil engineering projects.
4. To able to identify rock and soil in field .

COURSE OUTCOMES

After successful completion of this course; student shall be able to

1. identify minerals and rocks.
2. interpret geological maps.
3. understand subsurface investigation in rocks.
4. identify favorable and unfavorable conditions for the dam through the rocks

Relevance of Program Outcomes (Pos)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3		1			1							2		
2	3					1							2		
3	3	2	2	2									3	2	
4	3					2							3		

1-Weakly correlated   2 – Moderately correlated   3 – Strongly correlated

COURSE CONTENT

Minimum nine experiments shall be performed to cover entire curriculum of course CE206U

1. Study of physical properties of minerals.
2. Study of different group of minerals.
3. Identification of minerals (Any 8)**Silica group:** Quartz, Amethyst, Opal; **Feldspar group:** Orthoclase, Plagioclase; **Cryptocrystalline group:** Jasper; **Carbonate group**: Calcite; **Element group:** Graphite; **Pyroxene group:** Talc; **Mica group**: Muscovite; **Amphibole group**: Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet, Galena, Gypsum.
4. Identification of rocks (Igneous Petrology): **Acidic Igneous rock**: Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Scoria, Pegmatite, Volcanic Tuff. **Basic rock:** Gabbro, Dolerite, Basalt and its varieties, Trachyte.
5. Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and its varieties.
6. Identification of rocks (Metamorphic Petrology): Marble, slate, Gneiss and its varieties,
7. Schist and its varieties. Quartzite, Phyllite.
8. Study of dip and strike of faults/ folds.
9. Logging of drill core and interpretation of drilling data with   graphical   representation of bore log.

10. Study of topographical features from Geological maps. Identification of symbols in map
11. Study of solution to engineering geological problems such as alignment of dams based on geological maps
12. Field visit to rock / soil strata exposure, fault zone, fractures, drilling rigs or machine work.

- **ICA –** Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format **(S 10).**
- **ESE –** The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute

SH200AU ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

Teaching Scheme: 00L   **Credit: 00**
Evaluation Scheme: 60 ESE   **Total Marks: 60**
Duration of ESE: 03 Hrs

COURSE DESCRIPTION

This course is intended to provide basic understanding of Indian traditional knowledge. This course introduces students to the fundamental concept of basic & modern Indian knowledge system as well as Indian tradition.

DESIRABLE AWARENESS

Basic structure of Indian knowledge system & various Indian traditions

COURSE OBJECTIVES

1. Understand Indian knowledge system
2. Understand Indian perspective of modern scientific world view
3. Understand basic principles of yoga and holistic health care system
4. Develop ability to understand, connect up and explain basics of Indian traditional knowledge
5. Understand Indian philosophical tradition

COURSE OUTCOMES

Students are able to –

1. remember & apply Indian knowledge system in their personal as well as academic life.
2. apply Indian perspective of modern scientific world view.
3. analyzing basic principles of yoga and holistic health care system.
4. evaluate and explain basics of Indian traditional knowledge.
5. understand basic knowledge about Indian philosophical tradition.

Relevance of Program Outcomes (Pos) and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1						2						3			3
2						2						3	2		
3						2						3			2
4						2				3		3			2
5						2				3		3	2		1

1-Weakly correlated   **2 – Moderately correlated**   **3 – Strongly correlated**

COURSE CONTENT

Basic structure of Indian Knowledge System:
Ashtadashavidya –Types of vedas **-** rigveda, yajurveda, samveda, atharvveda, types of upaved**-** ayurveda, dhanurveda, gandharva veda, stapatya veda, limbs of vedang, types of upanga

Modern Science and Indian Knowledge System: Logic, mathematics, phonetics, life sciences, physics, military science

Yoga and Holistic Care: General introduction to yoga, aims and objectives of yoga , psychological aspects and mythological concepts of yoga

Philosophical Tradition (Sarvdarshan): Various Indian Philosophical Tradition (Heterodox): jain, buddhist, ajivika, ajnana, carvaka

Indian Linguistic Tradition: phonology, morphology, syntax, semantics

Indian Artistic Tradition: Understanding key terms in art appreciation: art, craft:
Sculpture - iconography: hindu, buddhist and jaina ,modern sculpture
Architecture - temple architecture -nagara, dravida and vesara ,mosques and mausoleums -tajmahal (any one)
Painting - mural painting – ajanta , mughal and rajput- miniature styles ,modern and contemporary artists
Music - traditional music**:** classical, folk, bhajan, thumri, dadra, sufi, modern music **:** bhangra, blues, dance, jazz, rock
Dance- classical, semi-classical, folk, tribal, shiva and natraja, bharatan atyam, kathak

Text Book
1. An Introduction to Indian Philosophy, S.C. Chaterjee & D.M. Datta, University of Calcutta, 1984.
2. Arts of India, Krishna Chaitanya, Abhinav Publications, 1987.
3. वासुदेवशरण अग्रवाल, कलाएवंसंस्कृत, साहित्य भवन, इलाहाबाद,1952.
4. Cultural Heritage of India-course material, Sivaramakrishnan (Ed.), Bharatiya Vidya Bhavan, Mumbai. 5th Edition, 2014.

References
1. Foundations of Indian Art, R. Nagaswamy, Tamil Arts Academy, 2002.
2. The Wave of life, Fritzof Capra.
3. Ed. RN Jha, GN Jha (Eng. Trans.),Yoga-darshanam with Vyasa Bhashya, Vidyanidhi Prakashan, Delhi 2016
4. India Arts, Pramod Chandra, Howard Univ. Press, 1st Edition, 1983

SH 296U: ADVANCED ENGINEERING MATHEMATICS

Teaching Scheme   : 03L+01T **Total**: 04
Evaluation Scheme: 10 ISA + 30 MSE +60 ESE   **Credit**: 04
Duration of ESE   : 03 Hrs   **Total Marks**: 100

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COURSE DESCRIPTION

This course introduces the student to differential equation, integral transforms, numerical methods and statistics and probability distribution.

DESIRABLE AWARENESS/SKILLS

Basics of differential equation, statistics

COURSE OBJECTIVES

1. Teach them to solve differential equation, use of integral transforms, statistic and numerical methods.
2. Equip the students with standard concept and tools at an intermediate
3. Advanced level that will serve them well towards lacking various problems in discipline.

COURSE OUTCOMES

On the successful completion of this course, students will be able to -
1. solve differential equations and apply the knowledge to engineering problems.
2. apply the idea of statistics, probability distribution for problem analysis and solution.
3. apply the idea of integral transform for problem analysis and solution.
4. demonstrate the knowledge of partial differential equations and related concepts.
5. demonstrate the knowledge of numerical methods and related concepts.

Relevance of Program Outcomes (Pos) and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	3	1										3		
2	2	3	1										2		
3	2	3	1										2		
4	3	2	2										2		
5	1	3	1										3		

1-Weakly correlated **2 – Moderately correlated** **3 – Strongly correlated**

COURSE CONTENT

Higher Order Linear Differential Equations: n^{th} order linear differential equations with constant coefficient, complementary function and particular integrals, general method, short cut method, method of variation of parameters, linear differential equations with variable coefficient: Cauchy's differential equations and Legendre's differential equations, simultaneous linear differential equations, applications: deflection of beams, vibrating springs: damping and undamping.

Partial Differential Equations: Lagrange's form, linear PDE with constant coefficients, CF and PI, Method of separation of variables, application to vibrating string-Wave equation, application to one dimensional heat flow-Diffusion equation, application to one and two dimensional heat flow-Laplace equation, Numerical Methods for partial differential equation.

Integral Transform: Laplace Transform: - definition, Laplace transform of elementary functions, properties of Laplace transform, Inverse Laplace transform: - definition and properties, Inverse Laplace transform by partial fraction, convolution theorem and standard results, Application of Laplace transform to LDE ,(Fourier integral, Fourier sine and cosine integrals), Fourier transforms:- definition & properties, Inverse Fourier transforms:- definition and properties.

Numerical Methods: Finite differences, forward, backward and central difference operator, Newton's forward and backward difference formulae, Lagrange's interpolations, numerical integration – Trapezoidal rule, Simpson's $1/3^{rd}$ and 3/8 rules. Solution of ODE by Euler's modified methods and fourth order Runge-Kutta methods, Finite difference solution of two dimensional Laplace equation and wave equation.

Statistics and Probability Distributions: Measures of central tendency, dispersion, moments, skewness and kurtosis, covariance, Karl Pearson coefficient of correlation, lines of regression, curve fitting, method of least square, straight lines, second degree parabola, exponential and power curves. Probability distribution: binomial distribution, Poisson distribution, normal distribution,

Text books
1. A Text book of Engineering Mathematics (Vol-I and II) by P.N.Wartikar and J.N.Wartikar, 7th edition, Pune Vidhyarthi Griha Prakashan, Pune, 2013.
2. A Text book of Engineering Mathematics, by N.P.Bali & Manish Goyal, 9th edition, Laxmi Prakashan, 2014.

Reference books
1. Advanced Engineering Mathematics by Erwin Kreyszig, 8th edition ,Willey Eastern Ltd. Mumbai, 2013
2. Higher Engineering Mathematics by B. S. Grewal, 33rd edition , Khanna Publication, New Delhi, 1996.
3. Advanced Engineering Mathematics by H. K. Dass, 12th edition, S. Chand Publication, New Delhi, 2003
4. Higher Engineering Mathematics by B. V. Ramana, 12th edition , Tata McGraw Hill, Delhi, 2011.
5. Statistical methods by Dr. S.P.Gupta, 43rd edition,.Sultan chand & Sons, Delhi, 2014

CE251U FLUID MECHANICS

Teaching Scheme: 3L **Total:** 3**Hr**   **Credit: 0**3
Evaluation Scheme: 30MSE + 10 ISA + 60 ESE   **Total Marks:** 100
Duration of ESE: 03 Hrs

COURSE DESCRIPTION

The objective of this course is to introduce the concepts of fluid mechanics useful in Civil Engineering applications. The course provides a first level exposure to the students to fluid statics, kinematics and dynamics. Measurement of pressure, computations of hydrostatic forces on structural components and the concepts of Buoyancy all find useful applications in many engineering problems. The topics included in this course are aimed to prepare a student to build a good fundamental background useful in the application hydraulics and hydrology.

COURSE OBJECTIVES

1. Understand the broad principles of fluid statics, kinematics and dynamics
2. Understand definitions of the basic terms used in fluid mechanics
3. Understand classifications of fluid flow
4. To be able to apply the continuity, momentum and energy principles
5. To be able to apply dimensional analysis

COURSE OUTCOMES

After successful completion of this course; student shall be able to

1. Measure fluid pressure by various methods.
2. compute hydrostatic and hydrodynamic forces
3. analyze flow through various openings
4. apply principles of dimensional analysis to design experiments

Relevance of Program Outcomes (Pos)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3					2							3		
2	3					2							2	1	
3	2	2				2							2		
4	2		3		2								2	2	

1-Weakly correlated   2 – Moderately correlated   3 – Strongly correlated

COURSE CONTENT

Introduction: Scope and applications of fluid mechanics, Newton's law of viscosity, classification of fluids, newtonian and non-newtonian fluids, ideal and real fluids.

Physical Properties of Fluids: mass density, specific weight, specific volume, specific gravity, dynamic and kinematic viscosity, variation of viscosity with temperature, compressibility, surface tension, capillarity, vapor pressure, boiling point, cavitation.

Fluid Pressure Measurement: Fluid pressure, pressure head, Pascal's law, pressure variation with temperature, measurement of pressure Simple and differential manometers, introduction to mechanical gauges.

Pressure on Surfaces: Static fluid pressure forces on plane and curved surfaces and their simple Civil Engineering applications.

Buoyancy: Archimedes's principle, buoyancy and flotation, metacentric height, stability of floating and submersed bodies.

Kinematics of Fluid Flow: Types of fluid flows steady and unsteady, uniform and non uniform laminar and turbulent, one, two and three dimensional, rotational and irrational flows. Velocity and acceleration for one and three dimensional flows. Stream lines, equipotential lines and flow net, uses and limitations of flow net. equations of continuity for one and three-dimensional flows.

Dynamics of Fluid Flow: Forces acting on fluids in motion, forces exerted by fluid flow on pipe bend, vortex flow-free &forced, various equations of motion. Euler's equation of motion and Bernoulli's theorem for one and three dimensional flows, hydraulic gradient line and total energy line, kinetic energy correction factor. Simple applications of continuity and Bernoulli's equations such as Pitot tube and Venturimeter.

Dimensional Analysis and Hydraulic Similitude: Dimensions of physical quantities, dimensional homogeneity, Buckingham pi-theorem.

Model Analysis: Geometric, kinematics and dynamic similitudes, important dimensionless parameters and their significance. Model laws, Reynolds and Froude model laws and their applications to simple fluid flow problems.

Laminar Flow: Laminar flow through pipes Hagen-Poiseuilli's equation, Stoke's law. Various methods of measurement of viscosity. Reynolds's experiment, transition from laminar to turbulent flow.

Flow Through Opening: Orifices: types, coefficients of velocity, contraction and discharge, small and large orifices, completely submerged orifices.

Mouthpieces: Types, external cylindrical mouthpiece.

Flows over Notches and Weirs: Rectangular, triangular and trapezoidal notches and weirs, Cipolletti weir, empirical formulae for discharge over rectangular weirs, corrections for velocity of approach and end contractions.

Text Books
1. Hydraulics and Fluid Mechanics Including Hydraulic Machines , Modi S.M. and Seth S.M, PHI Learning Pvt. Ltd. 20th edition 2015
2. Fluid Mechanics and Machinery, C.S.P.Ojha, R. Berndtsson and P. N. Chadramouli, Oxford University Press, 1st 2010
3. Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill, 2003

Reference Books
1. Engineering Fluid Mechanics Garde R.J. and Mirajgaokar A.G., Scitech Publication 3rd edition 2011.
2. Fluid Mechanics with Engineering Applications, R.L. Daugherty, J.B. Franzini and E.J. Finnemore, International Student Edition, Mc Graw Hill.
3. Introduction to Fluid Mechanics and Fluid Machines Som S.K., Gautam Biswas and Suman Chakraborty;, Mc Graw Hill Education, 3rd edition 2017

CE252U WATER TREATMENT AND PROCESSES

Teaching Scheme: 03L **Total: 3Hr**   **Credit:** 03
Evaluation Scheme: 30 MSE + 10 ISA + 60 ESE   **Total Marks:** 100
Duration of ESE: 03Hrs

COURSE DESCRIPTION

This course introduces about source of water, water quality and quantity, suitable methodsfor treatment of the impurities in water design of water treatment plant and water supply system.

COURSE OBJECTIVES

1. To learn the fundamentals of water treatment
2. To understand various components of water supply scheme
3. To build skills to quantitative and qualitative assessment of water requirement
4. To understand operation of water treatment units

COURSE OUTCOMES

After successful completion of this course; student shall be able to

1. understand the water supply scheme
2. estimate quantities and quality of water for municipal purpose.
3. analyze water supply engineering problems.
4. design and operate the processes used in water treatment systems.

Relevance of Program Outcomes (Pos)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3		3										3		
2		2		2		2		2					3	2	
3		3		2		3							2	3	
4	3		2		1								2	2	1

5. 1-Weakly correlated   2 – Moderately correlated   3 – Strongly correlated

COURSE CONTENT

Sources of Water: Factors considered in selection of source of water for treatment plant, conveyance of raw water-, canals and pipelines, hydraulics of conduits, different types of pipes used and their suitability, designing of rising main., intake structure, different types of intake structures. Quality- characteristics, Indian standards, testing of raw water for physical, chemical and bacteriological parameters and their significance.

Quantity: Population forecasting, different methods of population forecasting, rate of water consumption for various purposes, factors affecting demand of water, calculation of fire demand. Water treatment, necessity of water treatment processes different types of water treatment flow sheets. Aeration, principle and concept, necessity, methods,

Sedimentation- Theory of sedimentation, types of suspended solids, determination of settling velocity, types of sedimentation tanks, surface loading, detention time, and design of PST, inlets and outlets arrangements theory of chemical coagulation, factors affecting coagulation, turbidity, rapid mixing, coagulant dosage, characteristics of water, optimum PH, coagulant aids, choice of coagulants, common coagulants, coagulant aids like bentonite clay, lime stone, silicates and poly electrolytes, rapid mixing-necessity, gravitational, mechanical, pneumatic devices, slow mixing and flocculation, design of flocculation chamber, mean velocity gradient "g" and power consumption, concept of plate settler and tube settler.

Filtration: Theory of filtration, mechanism of filtration, filter materials, types of filters- rapid gravity filter, slow sand-filter and pressure filter. Components, materials, underdrainage system, working and cleaning of filters, operational troubles, design of filters. Theory of disinfection, factors affecting efficiency of disinfection, types of disinfectants, mathematical relationship governing disinfections variables. Theory of chlorination, break point

chlorination, bleaching powder estimation, water softening methods- lime-soda, ion exchange method and demineralization.

Tertiary Treatments: Softening, lime soda, quantity of lime and soda. Ion exchange, effect of fluoride, fluoridation and de-fluoridation. Demineralization methods like reverse osmosis, electro-dialysis, adsorption, MBR process.

System of Water Supply: Continuous and intermittent system. Distribution of water, different distribution systems and their components, layouts, methods of supply like gravity, pumping and combination, design of distribution system, determination of balancing capacity of ESR

Text Book
1. Water Supply Engineering, Garg S.K , Khanna Publisher, New Delhi 33rd edition 2015.
3. Water Supply and Sanitation Engineering, G.S.Birdi and J.S.Birdi, Dhanpat Rai Publication Company, New Delhi 9th edition 2014.

Reference Book
1. Water Supply and Sewerage, E W Steel and Terence J McGhee, Tata McGraw Hill Publishing Company, 6th edition 2007
2. Physici-Chemical Processes for Water Quality Control,Walter J Weber, Wiley Inter-science Publications 2012.
3. Water Supply Engineering, Punamia, Jain and Jain, Laxmi Publications, New Delhi 2015.
4. Manual on Water Supply and Treatment, Central Public Health and Environmental Engineering, Organization, Ministry of Urban Affairs, Government of India.
5. Water Supply, Waste Disposal and Environmental Engineering, A. K. Chatterjee, Khanna Publisher, 8th edition, 2006.

CE253U BASIC THEORY OF STRUCTURES

Teaching Scheme: 03L**Total: 3Hr**,   **Credit**: 03

Evaluation Scheme: 30 MSE + 10 ISA + 60 ESE   **Total Marks**: 100

Duration of ESE :03Hrs

COURSE DESCRIPTION:

Basic theory of structures is an important aspect of Civil Engineering covers the statically indeterminate structures, which emphasis on the analysis of statically indeterminate beams and rigid frames. Methods included are moment area method to calculate slope and deflection, and matrix analysis. The course also includes Influence Line Diagram and three hinged arches.

COURSE OBJECTIVES

1. Analyze statically determinate and indeterminate structures such as beams and arches subjected to external loads.
2. Get knowledge of different analytical tools for understanding the behavior of statically determinate and indeterminate structures.
3. Know computation of deflections, internal axial forces, shear forces, and bending moments in beams, frames and arches.
4. Able to deal with the methods necessary for analyzing various types of structures such as fixed beam, continuous beams and frames.
5. Know the fundamental concepts of flexibility and stiffness method of structural analysis, and influence line diagram including identification of positions of load for maximum shear force and bending moments at specified sections.

COURSE OUTCOME

After successful completion of this course; student shall be able to

1. formulate equilibrium and compatibility equations for structural members
2. analyze one dimensional and two dimensional problems using classical methods
3. analyze indeterminate structures
4. analyze structures for dead /gravity loads, moving loads and lateral loads
5. draw influence line diagrams to understand behavior of structural elements and to find out response of structure and deformations.

Relevance of Program Outcomes (Pos)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	2	2	3									2		
2	1	3	1	2								1	3	2	
3	2	2	2	3								1	1	2	
4		2	2	2									2		
5	2	2	3	2								1	2	2	

1-Weakly correlated   2 – Moderately correlated   3 – Strongly correlated

Course content:

Deflection of Beams: Relation between bending moment, slope and defection, introduction to double integration method, concept of moment area method, Mohr's theorems, use of moment area method to calculate slope and deflections of beams such as simply supported, over hanging and of uniform cross sections and different cross sections. Conjugate beam method, application of conjugate beam method to simply supported, overhanging and compound beams.

Slope and Deflection: Castiglione's first theorem and its application to find slope and deflection of simple beams and frames, deflection in determinate trusses. Analysis of redundant trusses by Castiglione's second theorem, lack of fit and temperature changes in members, sinking of supports

Fixed Beams:- Concept, advantages and disadvantages, nature of bending moment diagrams, fixed end moment due to various types of loads such as point, uniformly distributed, uniformly varying, couples for beams, effect of sinking of support, plotting of bending moment and shear force diagrams.

Continuous Beams: Analysis of continuous beam by three moment (Clapyeron's theorem) up to three unknowns, effect of sinking of supports, plotting of bending moment and shear force.

Three Hinged Arch: Concept of three hinged arch as a hunched beam, support reactions, B.M., S.F. and axial thrust diagrams for circular and parabolic three hinged arches.

Two Hinged Arches: Horizontal thrust at supports, shear, normal thrust and BM at a point, BM diagrams for parabolic arch due to concentrated load and uniformly distributed load.

Influence Lines: Influence line diagrams for reactions, bending moment and shear force for determinate beams. Rolling loads on simply supported beams, concentrated and uniformly distributed loads, maximum shear force and bending moment, absolute maximum shear force and bending moment.

Text Books
1. Basic Structural Analysis, C.S. Reddy. Tata McGraw-Hill Pub. Co. Ltd., New Delhi, 3rd edition, 2011.
2. Theory of Structures, S. Ramamruthum and R. Narayanan, Dhanpat Rai and Sons Publication.9th edition, 2019

Reference Books
1. Mechanics of Structures Vol. – II, S. B. Junnarkar and Dr. H.J. Shah, Charotar Publishing House, 34th edition,2014.
2. Indeterminate Structures, C. K. Wang. Tata McGraw-Hill Pub. Co. Ltd., New Delhi, 2014.
3. Theory of Structures, Timoshenko S. P. &Young D.H., McGraw Hill, International edition, 2nd edition,1965.

Useful Link

NPTEL, www.nptel.ac.in

CE254U HYDROLOGY AND IRRIGATION

Teaching Scheme: 03L **Total:** 3**Hr**   **Credit:** 03

Evaluation Scheme: 30 MSE + 10 ISA + 60 ESE   **Total Marks:** 100

Duration of ESE: 03Hrs

COURSE DESCRIPTION

This course introduce the elements of hydrology and describe the precipitation, infiltration evaporation, runoff and hydrograph. The course is focused on developing the skills of students for identification and assessment of available natural and artificial water resources. It deals with the study of Hydrology and water requirement of crops related to Civil Engineering. The part of the subject is focused on irrigation engineering and development of water resources.

COURSE OBJECTIVES

1. Measure and analyze rainfall, runoff and water losses
2. Construct and analyze different hydrographs
3. Determine ground water flow
4. Compute the water requirement of crops

COURSE OUTCOMES

After successful completion of this course; student shall be able to

1. analyze hydrological parameters required for water resource management.
2. analyze ground water potential.
3. understand different hydrograph and statistical methods
4. identify suitable method of irrigation and drainage of waterlogged area**.**

Relevance of Program Outcomes (Pos) and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2		1									3		
2	2					1							1	2	
3	2	2		1										2	
4	3				1	1							3		1

1-Weakly correlated   2 – Moderately correlated   3 – Strongly correlated

COURSE CONTENT

Introduction: Hydrologic cycle, water-budget equation, history of hydrology, world water balance, applications in engineering, sources of data.

Precipitation: Forms of precipitation, characteristics of precipitation in India. Measurement of precipitation, rain gauge network, mean precipitation over an area. Depth-area-duration relationships, maximum intensity/depth-duration-frequency relationship, probable maximum precipitation (PMP), rainfall data in India.

Abstractions from precipitation: Evaporation process, analytical methods of evaporation estimation, reservoir evaporation and methods for its reduction. Measurement of evapotranspiration, evapotranspiration equations, potential evapotranspiration over India. Actual evapotranspiration, interception, depression storage, infiltration, infiltration capacity, measurement of infiltration, modelling infiltration capacity, classification of infiltration capacities, infiltration indices.

Runoff: Runoff volume, SCS-CN method of estimating runoff volume, flow duration curve, flow-mass curve

Floods: Estimation of peak flow, rational method and introduction to other methods. Introduction to design floods for various hydraulic structures.

Hydrographs: Definition, components, factors affecting the shape, base flow separation, flood hydrograph, unit hydrograph – definition, assumptions, applications, derivations and limitations, S-hydrograph.

Ground Water Hydrology: Occurrences and distribution of ground water, specific yield of aquifers, movement of ground water, Darcy's law, permeability, safe yield of basins, hydraulics of wells under steady flow in confined and unconfined aquifers, well loss, specific capacity of well, well irrigation: introduction to tube wells and open wells.

Introduction to Irrigation: Necessity, benefits, Ill effect, irrigation systems and methods and their classifications.

Soil-water-plant Relationships: Classification of soil water, saturation capacity, Field capacity, determination of field capacity, quality of irrigation water.

Water Requirement of Crops: Limiting soil moisture condition, depth of irrigation water and frequency, principal Indian crops and their seasons, base period, duty of water and delta, factors affecting & methods of improving the duty of water, intensity of irrigation, paleo irrigation, kor depth and kor period, outlet factor, capacity factor, time factor, crop ratio, overlap allowance, calculations of canal capacities, application of water, warabandi, National Water Policy.

Water Logging: Causes, preventive and curative measures of water logging

Text Books

1. Irrigation, Water Resources and Water Power Engineering, Modi P.N., Standard Book House, Delhi, 8thedition, 2012
2. Hydrology and Water Resources Engineering, Garg S.K., Khanna Publishers, Delhi, 23rd edition 1998.

Reference Books

1. Engineering Hydrology, Subramanya K, Tata McGraw-Hill Publishing Co.Ltd, New Delhi, 4rd edition, 2013.
2. Irrigation and Water Power Engineering, Punmia B.C., Pande B.B., .Lal, Ashok Kumar Jain, Laxmi Publications Pvt. Ltd., New Delhi, 2016.
3. Fundamentals of Irrigation Engineering, Bharat Singh, Nem Chand & Bros.,India; 7th Revised edition,1983
4. Irrigation and Water Resources Engineering, Asawa, G.L, New Age International publisher, 1st edition 2008

CE255U CIVIL ENGINEERING – SOCIETAL AND GLOBAL IMPACT

Teaching Scheme: 2L   Total: 2 Hr   **Credit: 02**
Evaluation Scheme: 30MSE + 10 ISA + 60 ESE   **Total Marks: 100**
Duration of ESE: 03 Hrs

COURSE DESCRIPTION

The course is designed to provide a better understanding of the impact which civil engineering has on the society at large and on the global arena. Civil engineering projects have an impact on the infrastructure, energy consumption and generation, sustainability of the environment, aesthetics of the environment, employment creation, contribution to the GDP, and on a more perceptible level, the quality of life. It is important for the civil engineers to realize the impact which this field has and take appropriate precautions to ensure that the impact is not adverse but beneficial.

COURSE OBJECTIVES

1. To develop awareness of the importance of civil engineering and the impact it has on the Society and at global levels
2. To illustrate the impact of civil engineering for the various specific fields of human endeavor
3. To think innovatively to ensure sustainability

COURSE OUTCOME

After successful completion of this course; student shall be able to

1. understand the impact which civil engineering projects have on the society
2. know the extent of infrastructure and its requirements for energy
3. able to identify the potentials of civil engineering for employment creation and its contribution to the GDP
4. know the built environment and factors impacting the quality of life

Relevance of Program Outcomes (Pos)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2		3										2		
2	2	2			2								2	1	
3				2		1				1			2		1
4	1						2					2			3

1-Weakly correlated   2 – Moderately correlated   3 – Strongly correlated

Following curriculum is at elementary and basic level without numericals.

Introduction: Pre-industrial revolution days, agricultural revolution, first and second industrial revolutions, it revolution, the ancient and modern marvels and wonders in the field of civil engineering, recent major civil engineering breakthroughs and innovations, future vision for civil engineering.

Ecosystems in society and in nature, the steady erosion in sustainability, global warming, its impact and possible causes, evaluating future requirements for various resources.

GIS and applications for monitoring systems, human development index and ecological footprint of India vs other countries and analysis.

Infrastructure: Habitats, megacities, smart cities, futuristic visions; transportation (roads, railways & metros, airports, seaports, river ways, sea canals, tunnels (below ground, under water); futuristic systems (ex, hyper loop));

Energy generation (Hydro, Solar, Photovoltaic, Solar Chimney), wind, wave, tidal, geothermal, thermal energy); water provisioning; telecommunication needs (towers, above-ground and underground cabling);

Environment: Traditional &futuristic methods; solid waste management, water purification, wastewater treatment & recycling, hazardous waste treatment, flood control (dams, canals, river interlinking), multi-purpose water projects, atmospheric pollution; global warming phenomena and pollution mitigation measures.

Built Environment: Energy efficient built environments and LEED ratings, temperature/ sound control in built environment, security systems, intelligent/ smart buildings, aesthetics of built environment, role of urban arts commissions; conservation, repairs & rehabilitation of structures & heritage structures, innovations and methodologies for ensuring sustainability.

Civil Engineering Projects: Environmental impact analysis procedures, waste (materials, manpower, equipment) avoidance/ efficiency increase, advanced construction techniques for better sustainability, techniques for reduction of green house gas emissions in various aspects of civil engineering projects, contribution of civil engineering to GDP contribution to employment(projects, facilities management), quality of products, health & safety aspects for stakeholders.

Text books
1. Global Challenges and the Role of Civil Engineering, Žiga Turk, Chapter 3 in: Fischinger M. (eds) Performance-Based Seismic Engineering: Vision for an Earthquake Resilient Society. Geotechnical, Geological and Earthquake Engineering, Vol. 32,(2014). Springer, Dordrecht.
2. Engineering impacting Social, Economical and Working Environment, Brito, Ciampi, Vasconcelos, Amarol, Barros ,120th ASEE Annual Conference and Exposition,(2013) .
3. Challenges for Engineering ,NAE Grand Engineering for the Developing World, The Bridge, Vol 34, No.2, Summer 2004.
4. Risk and resilience to enhance sustainability with application to urban water systems, Blackmore J M., Plant R A J, J. Water Resources Planning and Management. ASCE. Vol. 134, No. 3, May.(2008).

Reference books
1. UK's engineering Council guidance on sustainability, Bogle D. (2010). Proc ICE Engineering Sustainability 163. June Issue ES2 p61-63
2. Cleansing the city, Allen M. (2008). Ohio University Press. Athens Ohio
3. http://www.thamestunnelconsultation.co.uk/consultation-documents.aspx

CE256U FLUID MECHANICS LAB

Teaching Scheme: 02P, **Total**: 02**Hr**   **Credit: 1**
Evaluation Scheme: 25 ISE + 25 ESE   **Total Marks: 50**

COURSE DESCRIPTION

The course illustrates the practical usefulness of fluid mechanics in hydraulics, hydrology and water resources engineering. The course covers the measurement of flow pressure, calibration of measuring devices; identify the flow and flow net. It will make students to apply the knowledge in flow through pipes, channel or dams.

COURSE OBJECTIVES

1. To study the flow pressure measurement methodology.
2. To study the calibration of measuring devices
3. To understand the application flow net in dam.
4. To able to identify type of flow.

COURSE OUTCOMES

After successful completion of this course; student shall be able to
1. determine flow pressure
2. calibrate flow measuring devices used in pipes, channels and tanks
3. determine fluid and flow properties.
4. characterize laminar and turbulent flows
5. determine seepage through dam

Relevance of Program Outcomes (Pos)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1											2		
2	2				2								3		
3	3		2			1							2	2	
4	3		1			1							2		
5	3		2		2		1						2		

1-Weakly correlated   2 – Moderately correlated   3 – Strongly correlated

Lab Experiments
Minimum ten experiments shall be performed to cover entire curriculum of course CE251U. The list given below is just a guideline.
List:
1. Measurement and study of variation of viscosity of oil with temperature.
2. Study of simple and differential manometers.
3. Determination of pipe flow losses.
4. Buoyancy and Meta-centric height of ship model.
5. Verification of Bernoulli's theorem.
6. Calibration of Venturimeter.
7. Flow net by graphical method /Electrical analogy method.
8. Study of laminar/turbulent flow in Reynolds apparatus.
9. Determination of coefficients of Orifice / Mouthpiece.
10. Calibration of notch.
11. Study of Impact of jet.
12. Report based on visit to any such relevant place.

- **ICA** – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and

record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format **(S 10)**

- **ESE** – The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CE257U WATER TREATMENT AND PROCESSES LAB

Teaching Scheme: 02P, Total: 02**Hr** **Credit:** 01
Evaluation Scheme: 25 ICA + 25 ESE **Total Marks:** 50

COURSE DESCRIPTION

In this Laboratory the emphasis is given on determining various properties and characteristics of water, design of water supply scheme, design of water distribution scheme and prepare a report on site visit to water treatment plant

COURSE OBJECTIVES

1. To determine the various properties of water.
2. To understand the application various units of water treatment process.
3. To able to design water distribution system.

COURSE OUTCOMES

After successful completion of this course; student shall be able to

1. analyze the characteristics of water.
2. design of water treatment plant.
3. access required water treatment..
4. design the water distribution system for city

Relevance of Program Outcomes (Pos)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	3											3	2	
2			3	2	1								3		1
3		1	2				1						3		
4			2			1	2							2	

1-Weakly correlated   2 – Moderately correlated   3 – Strongly correlated

Minimum six experiments shall be perform from group A and group B is compulsory and one from group C to cover entire curriculum of course CE252U, The list given below is just a guideline

List of Experiments:

(A) Determination of (Any six)
   1. pH and Alkalinity
   2. Hardness
   3. Chlorides
   4. Chlorine demand and residual chlorine
   5. Turbidity and optimum dose of alum. ,
   6. MPN
   7. Sulphates
   8. Fluorides
    9. Iron

B) Site visit to water treatment plant. A report based on the visit to water treatment plant would be submitted and would form a part of the term work.

C) Design of various components of water treatment plant Design of various components of water treatment plant would be carried out based on the theory covered in CE- 252U Water Treatment and Processes

OR

C) Study of Software or programming for analysis of water distribution system, Programmes available for the design of various water treatment plants would be used or Computer Programmes to Design various units of water treatment plant would be written in any suitable programming language.

- **ICA** – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format **(S 10)**
- **ESE** – The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CE258U TESTING OF MATERIALS LAB

Teaching Scheme: 02P, Total: 02**Hr**   **Credit:** 01

Evaluation Scheme : 25 ICA + 25 ESE   **Total Marks:** 50

COURSE DESCRIPTION

This course deal with the study of testing of common materials related to civil engineering.

COURSE OBJECTIVES

1. To prepare the students to effectively link theory with practice and application and to demonstrate background of the theoretical aspects of testing of concrete, bricks, tiles and metals.
2. To provide knowledge on mechanical behaviour of materials.

COURSE OUTCOMES

After successful completion of this course; student shall be able to

1. apply knowledge of mathematics and engineering in calculating the mechanical properties of structural materials
2. conduct various tests on hardened concrete, bricks, tiles and metals.
3. analyze and Interpret the test results according to IS requirements.

Relevance of Program Outcomes (Pos)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2											3		
2	2			3									2		
3	2		2			1							3	2	

1-Weakly correlated   2 – Moderately correlated   3 – Strongly correlated

Minimum eight experiments shall be perform. The list given below is just a guideline

List of Experiments

1. Tests on bricks (water absorption, efflorescence and compressive strength
2. Test on tiles
3. To determine tensile strength of metals(a) Mild Steel and (b) Tor steel by conducting tension test on U.T.M.
4. Shear test on metals (single shear and double shear test)
5. To determine hardness of metal (mild Steel or aluminum).
6. Torsion test on mild steel rod
7. To determine impact strength of steel. (By Izod test and by Charpy test)
8. Torsion test on mild steel rod.
9. Rebound hammer test on concrete
10. Ultrasonic Pulse velocity test.
11. Compressive strength of solid/ hollow blocks and paver blocks

One site visit to civil engineering project related to above topics/experiments (Compulsory).

- **ICA** – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format **(S 10)**

- **ESE** – The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CE259U HYDROLOGY AND IRRIGATION LAB

Teaching Scheme: 02P, **Total**: 02Hr   **Credit:** 01
Evaluation Scheme: 25 ICA + 25 ESE   **Total Marks:** 50

COURSE DESCRIPTION

Water is an important source. This laboratory course deals with determination of precipitation, determination of reservoir capacity which required for design of various water resources projects. This course also include design of micro-irrigation methods.

COURSE OBJECTIVES

1. To Study the method to determine the average rainfall for the area
2. To draw the hydrograph from the given data
3. To study the determination of reservoir capacity
4. To estimate aquifer parameters.
5. To design the irrigation method

COURSE OUTCOMES

After successful completion of this course; student shall be able to

1. plot flow distribution curve, mass curve and derive unit hydrograph from given data.
2. estimate reservoir capacity required for water requirements of crops.
3. decide suitable method for irrigation

Relevance of Program Outcomes (Pos)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	2											3		
2	3		2		1									2	
3	2	1	2	2									2		1

1-Weakly correlated   2 – Moderately correlated   3 – Strongly correlated

Minimum eight experiments shall be performed to cover entire curriculum of course CE254U. The list given below is just a guideline.

List of experiments

1. Marking catchment area on a topo-sheet and working out average annual rainfall and determining yield.
2. Checking for inconsistency of precipitation record by double mass curve technique.
3. Frequency analysis of precipitation data (plotting on semi-log graph paper)
4. Development of flood hydrograph from unit hydrograph and complex storm.
5. Development of unit hydrograph from isolated and composite flood hydrograph.
6. Determination of canal and reservoir capacity for water requirement of crops.
7. Determination of reservoir capacity from mass inflow and mass demand curve.
8. Benefit cost analysis of water resources project.
9. Determination of yield of well by recuperating test data.
10. Design of micro – irrigation system; either sprinkler or drip irrigation
11. Plotting hydrograph using software.

ICA – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format **(S 10)**

ESE – The End Semester Exam for this course shall be based on oral examination tojudge the skills acquired by student. It shall be evaluated by two examiners out of whichone examiner shall be out of institute.

SH299U EFFECTIVE TECHNICAL COMMUNICATION

Teaching Scheme: 00L+02 PR   **Credit: 01**

Evaluation Scheme: 25 ICA + 25 ESE   **Total marks: 50**

COURSE DESCRIPTION

The course is intended to provide basic technical communication to engineering students. This course introduces various engineering ethics as well as self development & assessment of the student.

DESIRABLE AWARENESS

Basic knowledge of technical communication skill and engineering ethics

COURSE OBJECTIVES

1. Identify and describe the basic communication process.
2. Appreciate the value of empathic listening and effective feedback.
3. Use technology appropriately to enhance communication success.
4. Prepare and deliver an effective oral presentation.
5. Understand the role of communication in personal & professional success.

COURSE OUTCOMES

Students are able to –

1. understand & apply business communication strategies and principles to prepare effective communication for domestic and international business situations.
2. remember ethical, legal, cultural, and global issues affecting technical communication.
3. evaluate accurate business documents using computer technology.
4. apply an effective oral technical presentation.
5. understand ethically use of document and integrate sources.

Relevance of Program Outcomes (Pos)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	-	-	-	-	2	2	1	-	3	-	2		3	
2	-	-	-	-	-	2	2	1	-	3	-	2		1	
3	-	-	-	-	-	2	2	1	-	3	-	2		2	
4	-	-	-	-	-	2	2	1	-	3	-	2	1		
5	-	-	-	-	-	2	2	3	-	3	-	2		1	

1-Weakly correlated   **2 – Moderately correlated**   **3 – Strongly correlated**

COURSE CONTENT

Introduction to Technical Communication: Definition of technical communication, aspect of technical communication, forms of technical communication, importance of technical communication, technical communication skills, (listening, speaking, reading, writing), linguistic ability, style in technical communication.

Nature of Technical Communication: Communication as sharing, stages of communication, channels of communication, nature of technical communication, aspects of technical communication, forms of technical communication, general and technical communication, importance and need for technical communication, technical communication skills: listening, speaking, reading, writing, barriers to effective communication

Comprehension of Technical Material :(Information Design and Development)

Different kinds of technical documents, information development life cycle, organisation structures, factors affecting information and document design, strategies for organization, information design and writing for print and for online media

Technical Writing: Grammar and Editing- technical writing process, forms of discourse, writing drafts and revising, collaborative writing, creating indexes, technical writing style and language, basics of grammar, study of advanced grammar, editing strategies to achieve appropriate technical style, introduction to advanced technical communication, usability, human factors, managing technical communication projects, time estimation, single sourcing, localization

Engineering Ethics: Senses of engineering ethics, variety of moral issues, types of inquiry, moral dilemmas, moral autonomy, Kohlberg's theory, consensus and controversy, professional ideals and virtues, attributes of an ethical personality, theories about right action, self interest, responsibilities and rights of engineers, collegiality and loyalty, respect for authority, collective bargaining, confidentiality, conflict of interest, professional rights

Self Development and Assessment: Self assessment, awareness, perception and attitude, values and beliefs, personal goal setting, career planning, self esteem, managing time, personal memory, rapid reading, taking notes, complex problem solving, creativity

Text Books
1. Effective Technical Communication By M Ashraf Rizvi, 2nd Edition, The McGraw Hill Publication, 2017
2. Business Communication, Rai and Rai, 2nd edition, Himalaya Publishing House, 2014
3. Organization Behavior, Suja R. Nair, 2nd Edition, Himalaya Publications, 2014
4. Technical Communication: Principles And Practice, Meenakshi Raman, Sangeeta Sharma, 2nd Edition, 2012

Reference Books
1. Goal Setting: How to Create an Action Plan and Achieve Your Goals, Susan Wilson and Michael Dobson, 2008
2. Business Communication, Raman and Singh, 2nd edition, Oxford Publication, 2012
3. Nonverbal Communication in Human Interaction by Mark L. Knapp, Judith A. Hall, Terrence G. Horgan
4. Business Communication (BCOM), Lehman Sinha, 2nd edition, Cengage Learning, 2012
5. Business Communication for Managers, Penrose, Rasberry, Myers, 5th edition, Cenage Learning

It is a representative list of practical. The instructor may choose experiments as per his requirements (so as to cover entire contents of the course) from the list or otherwise. Ten practical should be performed to cover entire curriculum of course SH299U. The list given below is just a guideline.

List of practical / Assignments
1. Delivery of a speech on general topics by giving emphasis on non-verbal communication
2. Practical based on fourfold skills (Technical communication skills)
3. Delivery of a speech on technical topic
4. Role play on importance of time management
5. Performing a corporate meeting
6. Personal goal setting with priorities
7. Resume writing along with application letter
8. Group discussion
9. Personal interview
10. Debate on recent topics
11. Practical based on reading skills
12. Writing business letter
13. Role play on engineering ethics

Guide lines for ICA

Internal Continuous Assessment should support for regular performance of practical by student and his/her regular assessment with proper understanding practical carried out.

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SH 250AU INTRODUCTION TO THE CONSTITUTION OF INDIA

Teaching Scheme: 00L: **Credit: 00**
Evaluation Scheme: 60 ESE   **Total Marks: 60**

COURSE DESCRIPTION
The course provides knowledge about constitution of India, state and central policies, fundamental rights, fundamental duties, powers and functions of municipalities, panchayats and co-operative societies, electoral process and judiciary system.

DESIRABLE AWARENESS
Basic knowledge of Indian Constitution

COURSE OBJECTIVES
1. Provide knowledge about legal literacy, state and central policies, fundamental rights, fundamental duties, powers and functions of municipalities, panchayats and co-operative societies, electoral process
2. Enable the students to take up competitive examinations and also demonstrate the qualities of a responsible citizen.

COURSE OUTCOMES
On the successful completion of this course, student shall be able to –
1. understand & remember the knowledge of basic information about Indian constitution.
2. analyse individual role and ethical responsibility towards society.
3. apply the knowledge of human rights and its implications while behaving with other citizens.

Relevance of Program Outcomes (Pos)and strength of co-relation

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	-	-	-	-	3	2	3	1	-	-	2			1
2	-	-	-	-	-	2	2	3	3	-	-	3			2
3	-	-	-	-	-	3	2	3	3	-	-	3			2

1-Weakly correlated   2 – Moderately correlated   3 – Strongly correlated

COURSE CONTENT
Introduction to the constitution of India: the making of the constitution and salient features of the constitution., preamble to the constitution, fundamental rights and its limitations.

Directive principles of state policy and relevance of directive principles, state policy fundamental duties, union executives – president, prime minister, parliament, supreme court **State executives:** governor, chief minister, state legislature, high courts of state, electoral process in India, procedures for amendment in constitution

Human rights – meaning and definitions, emergency provisions, working of national human rights commission in India, powers and functions of municipalities, panchyats and co-operative societies

Text Books
1. Introduction to the Constitution of India, (Students Edn.) Durga Das Basu, Prentice –Hall EEE, 19th / 20th Edition., 2001
2. Introduction to the Constitution of India", Brij Kishore Sharma, PHI Learning Pvt. Ltd., New Delhi, 2011

Reference Books

1. An Introduction to Constitution of India, M.V. Pylee, Vikas Publishing, 5th edition 2002
2. Constitution of India, Dr. B. R. Ambedkar, Government of India Publication
3. Latest Publications of Indian Institute of Human Rights, New Delhi