MIT | Academy of Engineering

Dehu Phata, Alandi (D), Pune - 412105, MH

An Autonomous Institute Affiliated to Savitribai Phule Pune University

Curriculum for

Bachelor of Technology in

Civil Engineering

(Choice Based Credit System)

2019-2023

BoS Chairman	Member Secretary	Chairman
Dean, School of Mechanical & Civil Engineering	Academic Council Dean Academics	Academic Council Director MITAOE

MIT Academy of Engineering, Alandi, Pune

An Autonomous Institute affiliated to Savitribai Phule Pune University

CURRICULUM FRAMEWORK (2019 PATTERN)

CIVIL ENGINEERING

The Bachelor of Technology Program shall be based on the following type of courses.

COURSE DISTRIBUTION : SEMESTER WISE										
S.N.	TYPE OF COURSE	NO. OF COURSES/SEMESTER								TOTAL
		1	2	3	4	5	6	7	8	
1.	Natural Science (NSC)	2	2	1						**5**
2.	Engineering Science (ESC)	3	2		1					**6**
3.	Discipline Core (DC)			3	3	3	3	1	1	**14**
4.	Discipline Elective (DE)							1	1	**2**
5.	Open Elective (OE)					1	1	1		**3**
6.	Humanities and Social Science (HSS)		1		1	1	1		2	**6**
7.	Skill Development and Project (SDP)	1	1	3	2	2	2	3	1	**15**
TOTAL		**6**	**6**	**7**	**7**	**7**	**7**	**6**	**5**	**51**
Audit Course			1	1	2		1			**5**

CREDIT DISTRIBUTION : SEMESTER WISE											
1 Lecture hour = 1 Credit		**2 Lab Hours = 1 Credit**				**1 Tutorial Hour = 1 Credit**					
S.N.	TYPE OF COURSE	NO. OF CREDITS/SEMESTER								TOTAL	%
		1	2	3	4	5	6	7	8		
1.	Natural Science (NSC)	8	8	4						**20**	**12.5**
2.	Engineering Science (ESC)	11	7		4					**22**	**13.75**
3.	Discipline Core (DC)			12	12	11	11	4	4	**54**	**33.75**
4.	Discipline Elective (DE)							3	3	**6**	**3.75**
5.	Open Elective (OE)					4	4	4		**12**	**7.5**
6.	Humanities and Social Science (HSS)	0	2		2	2	2		4	**12**	**7.5**
7.	Skill Development and Project (SDP)	2	2	5	3	4	4	10	4	**34**	**21.25**
TOTAL		**21**	**19**	**21**	**21**	**21**	**21**	**21**	**15**	**160**	**100**

CREDITS				
1 Lecture Hour = 1 Credit, 2 Lab Hours = 1 Credit, 1 Tutorial Hour = 1 Credit				
SL. NO.	YEAR	SEMESTER		TOTAL
		1	2	
1.	First Year	21	19	**40**
2.	Second Year	21	21	**42**
3.	Third Year	21	21	**42**
4.	Final Year	21	15	**36**
TOTAL				**160**

CONTACT HOURS				
SL. NO.	YEAR	SEMESTER		TOTAL
		1	2	
1.	First Year	29/27	28/30	**57**
2.	Second Year	31	31	**62**
3.	Third Year	27	30	**57**
4.	Final Year	25	20	**45**
TOTAL				**221**

ABBREVATIONS		
1.	MSE	Mid Semester Exam
2.	ESE	End Semester Exam
3.	IA	Internal Assessment
4.	T/P	Term Work / Practical
5.	DM	Demonstration
6.	L	Lecture
7.	P	Practical
8.	T	Tutorial
9.	Lab	Laboratory

MIT | Academy of Engineering An Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	:	2019-2020
FIRST YEAR BACHLEOR OF TECHNOLOGY	RELEASE DATE	:	01/07/2019
	REVISION NO.	:	1.0

SEMESTER: I (Version I)

INDUCTION PROGRAM: 3 WEEKS

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC1	AS105	Calculus and Differential Equations	3	-	1	20	40	40	50	-	150	4
NSC2	AS106	Engineering Physics	3	2	-	20	40	40	50	-	150	4
ESC1	EX102	Electrical and Electronics Engineering	3	2	-	20	40	40	50	-	150	4
ESC2	ME104	Engineering Graphics	2	4	-	-	60	40	100	-	200	4
ESC3	CS101	Logic Development-C Programming	1	4	-	-	40	-	100	-	140	3
SDP1	ME105	Experimental Tools and Techniques	-	4	-	-	-	-	40	60	100	2
TOTAL			**12**	**16**	**1**	**60**	**220**	**160**	**390**	**60**	**890**	**21**

SEMESTER: II (Version I)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC3	AS107	Statistics and Integral Calculus	3	-	1	20	40	40	50	-	150	4
NSC4	CH101	Science of Nature	3	2	-	20	40	40	50	-	150	4
ESC4	CV102	Applied Mechanics	3	2	-	20	40	40	50	-	150	4
HSS1	HP103/4/5	English for Engineers /(German/Japanese)	0	4	-	-	-	-	100	-	100	2
ESC5	CS102	Applications Programming -Python	1	4	-	-	40	-	100	-	140	3
SDP2	ME106	Design Thinking	-	4	-	-	-	-	40	60	100	2
HSS2	HP106	Indian Constitution	1	-	-	-	-	-	-	-	Audit	
TOTAL			**11**	**16**	**1**	**60**	**160**	**120**	**390**	**60**	**790**	**19**

MIT | Academy of Engineering An Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	W.E.F	:	2019-2020
FIRST YEAR BACHLEOR OF TECHNOLOGY	RELEASE DATE	:	01/07/2019
	REVISION NO.	:	1.0

SEMESTER: I (Version II)

INDUCTION PROGRAM: 3 WEEKS

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
			Hour/Week			THEORY			PRACT		TOTAL	
TYPE	CODE	NAME	L	P	T	MSE	ESE	IA	T/P	DM		
NSC1	AS105	Calculus and Differential Equations	3	-	1	20	40	40	50	-	150	4
NSC4	CH101	Science of Nature	3	2	-	20	40	40	50	-	150	4
ESC4	CV102	Applied Mechanics	3	2	-	20	40	40	50	-	150	4
HSS1	HP103/4/5	English for Engineers /(German/Japanese)	0	4	-	-	-	-	100	-	100	2
ESC3	CS101	Logic Development-C Programming	1	4	-	-	40	-	100	-	140	3
SDP2	ME106	Design Thinking	-	4	-	-	-	-	40	60	100	2
TOTAL			**10**	**16**	**1**	**60**	**160**	**120**	**390**	**60**	**790**	**19**

SEMESTER: II (Version II)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
			Hour/Week			THEORY			PRACT		TOTAL	
PE	CODE	NAME	L	P	T	MSE	ESE	IA	T/P	DM		
NSC3	AS107	Statistics and Integral Calculus	3	-	1	20	40	40	50	-	150	4
NSC2	AS106	Engineering Physics	3	2	-	20	40	40	50	-	150	4
ESC1	EX102	Electrical and Electronics Engineering	3	2	-	20	40	40	50	-	150	4
ESC2	ME104	Engineering Graphics	2	4	-	-	60	40	100	-	200	4
ESC5	CS102	Applications Programming -Python	1	4	-	-	40	-	100	-	140	3
SDP1	ME105	Experimental Tools and Techniques	-	4	-	-	-	-	40	60	100	2
HSS2	HP106	Indian Constitution	1	-	-	-	-	-	-	-	Audit	
TOTAL			**13**	**16**	**1**	**60**	**220**	**160**	**390**	**60**	**890**	**21**

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	W.E.F	:	2020-2021
SECOND YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	0.1

SEMESTER: III

SUMMER INTERNSHIP (Audit: CV200**)**

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
ESC6	ME221	Material Engineering	3	2	-	35	35	30	50	0	150	4
DC01	CV204	Geotechnical Engineering	3	2	-	35	35	30	50	0	150	4
DC02	CV205	Building Design & Construction	3	2	-	35	35	30	50	0	150	4
DC03	CV206	Mechanics of Solids	3	2	-	35	35	30	50	0	150	4
SDP3	ET224	Digital Prototyping	0	4	-	0	0	25	0	50	75	2
SDP4	CV230	Minor Project- Design	0	2	-	0	0	0	0	50	50	1
SDP5	CV23#	Skill Development Course 1- REVIT/EXCEL	0	4	-	0	0	25	0	50	75	2
ESC7	CV203	Environmental Science	1	0	-	-	-	-	-	-	Audit	
TOTAL			**13**	**18**	**0**	**140**	**140**	**170**	**200**	**150**	**800**	**21**

SEMESTER: IV

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC5	AS203	Applied Mathematics	3	2	-	35	35	30	50	0	150	4
DC04	CV214	Mechanics of fluids	3	2	-	35	35	30	50	0	150	4
DC05	CV215	Surveying and Geospatial Engineering	3	2	-	35	35	30	50	0	150	4
DC06	CV216	Structural Analysis	3	2	-	35	35	30	50	0	150	4
SDP6	ET235	Rapid Prototyping	0	4	-	0	0	25	0	50	75	2
SDP7	CV240	Minor Project - Implementation	0	2	-	0	0	0	0	50	50	1
HSS3	HP202	Professional Skills	0	4	-	0	0	25	0	50	75	2
HSS4	HP203	Liberal Learning	1	0	-	-	-	-	-	-	Audit	
TOTAL			**13**	**18**	**0**	**140**	**140**	**170**	**200**	**150**	**800**	**21**

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	W.E.F	:	2020-2021
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	RELEASE DATE	:	01/07/2021
	REVISION NO.	:	0.1

SEMESTER: V

SUMMER INTERNSHIP (Audit: CV300**)**

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC07	CV305	Concrete Technology	3	2	-	35	35	30	50	0	150	4
DC08	CV306	Drinking Water & Sanitary Engineering	3	2	-	35	35	30	50	0	150	4
DC09	CV307	Design of steel structures	3	0	-	35	35	30	0	0	100	3
OE01	CV32#	Open Elective	3	2	-	35	35	30	50	0	150	4
OE02	CV32#	Solid Waste Management	2	0	-	0	50	25	0	0	75	2
HSS5	CS361	Project Management	0	4	-	0	0	25	50	0	75	2
SDP8	CV342	Skill Development Course 2-ETABS	0	4	-	0	0	25	0	50	75	2
TO0TAL			**15**	**12**	**0**	**140**	**190**	**195**	**200**	**50**	**775**	**21**

SEMESTER: VI

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC10	CV312	Structural Design-II	3	2	-	35	35	30	50	0	150	4
DC11	CV313	Transportation Engineering	3	2	-	35	35	30	50	0	150	4
DC12	CV314	Water Resources Engineering	3	0	-	35	35	30	0	0	100	3
OE02	CV33#	Open Elective	3	2	-	35	35	30	50	0	150	4
SDP10	CV34#	Skill Development Course 3-VISSIM /Drone surveying	0	4	-	0	0	25	50	0	75	2
SDP11	CV365	Project Implementation	0	4	-	0	0	25	0	50	75	2
HSS6	HP305	Employability Skills	0	4	-	0	0	25	0	50	75	2
TOTAL			**12**	**18**	**0**	**140**	**140**	**195**	**200**	**100**	**775**	**21**

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	W.E.F	:	2022-2023
FINAL YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	0.1

SEMESTER: VII

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC13	CV405	Quantity Estimation	3	2	-	35	35	30	50	0	150	4
DE01	CV47#	Discipline Elective	3	-	-	35	35	30	0	0	100	3
OE03	CV42#	Open Elective	3	2	-	35	35	30	50	0	150	4
SDP12	CV43#	Skill Development Course 4 – WMS/QGIS	-	4	-	0	0	25	50	0	75	2
SDP13	CV464	Project Evaluation	-	8	-	0	0	50	0	100	150	4
SDP14	CV465	Summer Internship	-	-	-	-	-	-	-	150	150	4
TOTAL			**9**	**16**	**0**	**105**	**105**	**165**	**150**	**250**	**775**	**21**

SEMESTER: VIII (PART A)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC14	CV406	Design of Hydraulics Structures	3	2	-	35	35	30	50	0	150	4
DE02	CV47#	Discipline Elective	3	-	-	35	35	30	0	0	100	3
SDP15	CV466	Capstone project	-	8	-	0	0	75	0	75	150	4
HSS7	HP405	Engineering Economics	2	-	-	0	50	25	0	0	75	2
HSS8	HP406	Psychology	2	-	-	0	50	25	0	0	75	2
TOTAL			**10**	**10**	**0**	**70**	**170**	**160**	**50**	**75**	**550**	**15**

SEMESTER: VIII (PART B SEMESTER LONG INTERNSHIP)												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC14	CV406	Design of Hydraulics Structures	3	2	-	35	35	30	50	0	150	4
DE02	CV47#	Discipline Elective	3	-	-	35	35	30	0	0	100	3
SDP16	CV467	Semester Long Internship Design	-	-	-	-	-	-	-	150	150	4
SDP17	CV468	Semester Long Internship Implementation	-	-	-	-	-	-	-	150	150	4
TOTAL			**6**	**2**	**0**	**70**	**70**	**60**	**50**	**300**	**550**	**15**

Discipline Elective (DE) : 2 Courses		
Sl. No.	**Course Code**	**Course Name**
1.	CV471	Building Services
	CV472	Introduction to Dynamics of Structures
	CV473	Railway Engineering
	CV474	Numerical Methods in Civil Engineering
2.	CV475	Foundation Engineering
	CV476	Geospatial Tools and Techniques
	CV477	Air and Noise Pollution
	CV478	Finite Element Methods

Natural Science (NSC) : 5 Courses		
Sl. No.	**Course Code**	**Course Name**
1.	AS105	Calculus and Differential Equations
2.	AS106	Engineering Physics
3.	CH101	Science of Nature
4.	AS107	Statistics and Integral Calculus
5.	AS203/04	Applied Mathematics

Humanities and Social Science (HSS) : 6 Courses		
Sl. No.	**Course Code**	**Course Name**
1.	HP103	English for Engineers
	HP104	German
	HP105	Japanese
Audit	HP106	Indian Constitution
2.	HP202	Professional Skills
Audit	HP203	Liberal Learning
3.	CS361	Project Management
4.	HP305	Employability Skills
5.	HP405	Engineering Economics
6.	HP406	Psychology

Engineering Science (ESC) : 6 Courses		
Sl. No.	**Course Code**	**Course Name**
1.	EX102	Electrical and Electronics Engineering
2.	CV102	Applied Mechanics
3.	ME104	Engineering Graphics
4.	CS101	Logic Development - C Programming
5.	CS102	Application Programming - Python
6.	ME221	Material Engineering
	IT221	Engineering Informatics
Audit	CV203	Environmental Sciences

Discipline Core (DC) : 14 Courses		
Sl. No.	**Course Code**	**Course Name**
1.	CV204	Geotechnical Engineering
2.	CV205	Building Design & Construction
3.	CV206	Mechanics of Solid
4.	CV214	Mechanics of fluids
5.	CV215	Geospatial Engineering
6.	CV216	Structural Analysis
7.	CV305	Concrete Technology
8.	CV306	Drinking Water & Sanitary Engineering
9.	CV307	Structural Design-I
10.	CV312	Structural Design-II
11.	CV313	Transportation Engineering
12.	CV314	Water Resources Engineering
13.	CV405	Quantity Estimating
14.	CV406	Design of Hydraulics Structures

Skill Development and Project (SDP) : 15 Courses			
Sl. No.	**Course Code**	**Course Name**	
1.	ME105	Experimental Tools and Techniques	
2.	ME106	Design Thinking	
3.	ET224	Digital Prototyping	
4.	CV230	Minor Project - Design	
5.	CV231	Skill Development Course1	MS Excel
	CV232		Revit
6.	ET235	Rapid Prototyping	
7.	CV240	Minor Project- Implementation	
8.	CV342	Skill Development Course 2 (ETABS)	
9.	CV345	Mini Project - Design	
10.	CV343	Skill Development Course 3	VISSIM
	CV344		Drone Surveying
11.	CV365	Mini Project- Implementation	
12.	CV433	Skill Development Course 4	WMS
	CV434		QGIS
13.	CV464	Major Project - Design	
14.	CV465	Summer Internship	
15.	CV466	Major Project- Implementation	
16.	CV467	Semester Long Internship Design	
17.	CV468	Semester Long Internship Implementation	
Audit	XX200	SY Summer Internship	
Audit	XX300	TY Summer Internship	

Programme Name	**Skill Development Course 1**	**Skill Development Course 2**	**Skill Development Course 3**	**Skill Development Course 4**
Chemical Engineering	CFD	ASPEN ONE	Aspen EDR	Plant Design and Piping
Civil Engineering	REVIT/ EXCEL	ETABS	VISSIM / STADDPRO	WMS / QGIS
Computer Engineering (and IT)	CPP/Core Java	Red Hat Linux/ Web Technology	Adv. Java/ .Net Core/Red Hat Linux	AWS cloud services/ Android App Development
Mechanical Engineering	Industrial Measurements & Instrumentation	Piping Design/ Energy Audit/ Six Sigma	Computer Integrated Manufacturing	Multiphysics
Electronics Engineering (and ENTC)	Data Structures and Algorithms	OOP JAVA / C++	Networking	EMB Linux
Certification Courses				

Open Electives (OE): 03 Courses							
Programme Name	**Open Track Name**	**Semester V**		**Semester VI**		**Semester VII**	
		Course Code	**Course Name**	**Course Code**	**Course Name**	**Course Code**	**Course Name**
Chemical Engineering	Process Engineering	CH351	Process Engineering	CH371	Process Modeling and Simulation	CH471	Process Intensification and Integration
	Piping Design and engineering	CH352	Piping Engineering	CH372	Piping Layout	CH472	Piping Design & Engineering
Civil Engineering	Construction Project Management	CV325	Construction Planning and Management	CV332	Operation Research	CV422	Financial Management
	Environmental Engineering	CV326	Solid Waste Management	CV333	Unit Operations for Liquid Waste/Effluent Treatment	CV423	Environmental Impact assessment and Climate Change
	Structural Engineering	CV327	Advanced mechanics of Solids	CV334	Advanced Structural Analysis	CV424	Advanced RC structures
Computer Engineering	Data science	CS351	Descriptive Analytics	CS353	Predictive Analysis	CS461	Big Data Analytics
	Artificial Intelligence and Machine Learning	CS352	Artificial Intelligence	CS354	Machine Learning	CS462	Deep Learning
Electronics Engineering	Robotics and Automation	EX351	Fundamentals of Robotics	EX371	Robot Dynamics and Control	EX471	Robotics Vision

Open Electives (OE)							
Programme Name	**Open Track Name**	**Semester V**		**Semester VI**		**Semester VII**	
		Course Code	**Course Name**	**Course Code**	**Course Name**	**Course Code**	**Course Name**
Electronics & Telecommuni-cation	Embedded Systems	ET351	Embedded System Programming (ESP)	ET371	Embedded Processor	ET471	RTOS
	Internet of Things	ET352	IoT Architecture and Sensors	ET372	IoT Network & Protocols	ET472	Data Management and Analytics
Information Technology	Computer Security	IT351	Cryptography and System Security	IT352	Cyber Security and Forensics	IT461	Ethical Hacking & Cyber Laws
Mechanical Engineering	Computer Aided Engineering	ME351	Finite Element Analysis	ME361	Computational Fluid Dynamics	ME491	Advanced Analysis
	Robotics and Automation	ME352	Fundamentals of Robotics	ME362	Kinematics & Dynamics of Robots	ME492	Electrical and Electronics Systems of Robots
	Industrial Engineering & Management	ME353	Industrial Engineering	ME363	Operations Management	ME493	Supply Chain Management
	Automobile Engineering	ME354	Automobile System Design	ME364	Vehicle Dynamics	ME494	Autotronics and e-Vehicles
Entrepreneur-ship Cell	Innovation, Entrepreneurship & Venture Development	HP311	Foundational Course in Entrepreneurship	HP312	Advanced Course in Entrepreneurship	HP411	Startup and Incubation

Honors/Minor Elective Tracks : 5 Courses (Additional 18 to 20 Credit, Eligibility: SY B. Tech CGPA more than 7.5)					
Sl. No.	**Honors / Minor Track**	**Semester**	**Course Code**	**Course Name**	**Credits**
1	Entrepreneurship	V	HP311	Foundation Course in Entrepreneurship	4
2		VI	HP312	Advanced Course in Entrepreneurship	4
3		VII	HP411	Startup and Incubation	4
4		VIII	HP412	Project: Startup/Venture Development	6
1	Product Design	V	PD301	Fundamental of Design Elements	4
2		VI	PD302	Packaging Design	5
3		VII	PD401	Ergonomics & Human - Product Interface	4
4		VIII	PD402	Product / Systems Design Project	5
1		V			2
2		V			4
3		VI			4
4		VII			4
5		VIII			4

Honors/Minor Elective Tracks : 5 Courses (Additional 18 to 20 Credit)					
Sl. No.	**Honors / Minor Track**	**Semester**	**Course Code**	**Course Name**	**Credits**
1		V			2
2		V			4
3		VI			4
4		VII			4
5		VIII			4
1		V			2
2		V			4
3		VI			4
4		VII			4
5		VIII			4
1		V			2
2		V			4
3		VI			4
4		VII			4
5		VIII			4

MIT | Academy of Engineering An Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
SCHOOL OF ENGINEERING SCIENCES AND HUMANITIES	W.E.F	:	2019-2020
FIRST YEAR BACHLEOR OF TECHNOLOGY	RELEASE DATE	:	01/07/2019
	REVISION NO.	:	1.0

SEMESTER: I (Version I)

INDUCTION PROGRAM: 3 WEEKS

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
			Hour/Week			THEORY			PRACT		TOTAL	
TYPE	CODE	NAME	L	P	T	MSE	ESE	IA	T/P	DM		
NSC1	AS105	Calculus and Differential Equations	3	-	1	20	40	40	50	-	150	4
NSC2	AS106	Engineering Physics	3	2	-	20	40	40	50	-	150	4
ESC1	EX102	Electrical and Electronics Engineering	3	2	-	20	40	40	50	-	150	4
ESC2	ME104	Engineering Graphics	2	4	-	-	60	40	100	-	200	4
ESC3	CS101	Logic Development-C Programming	1	4	-	-	40	-	100	-	140	3
SDP1	ME105	Experimental Tools and Techniques	-	4	-	-	-	-	40	60	100	2
TOTAL			**12**	**16**	**1**	**60**	**220**	**160**	**390**	**60**	**890**	**21**

SEMESTER: II (Version I)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
			Hour/Week			THEORY			PRACT		TOTAL	
PE	CODE	NAME	L	P	T	MSE	ESE	IA	T/P	DM		
NSC3	AS107	Statistics and Integral Calculus	3	-	1	20	40	40	50	-	150	4
NSC4	CH101	Science of Nature	3	2	-	20	40	40	50	-	150	4
ESC4	CV102	Applied Mechanics	3	2	-	20	40	40	50	-	150	4
HSS1	HP103/4/5	English for Engineers /(German/Japanese)	0	4	-	-	-	-	100	-	100	2
ESC5	CS102	Applications Programming -Python	1	4	-	-	40	-	100	-	140	3
SDP2	ME106	Design Thinking	-	4	-	-	-	-	40	60	100	2
HSS2	HP106	Indian Constitution	1	-	-	-	-	-	-	-	Audit	
TOTAL			**11**	**16**	**1**	**60**	**160**	**120**	**390**	**60**	**790**	**19**

MIT | Academy of Engineering An Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
SCHOOL OF ENGINEERING SCIENCES AND HUMANITIES	W.E.F	:	2019-2020
FIRST YEAR BACHLEOR OF TECHNOLOGY	RELEASE DATE	:	01/07/2019
	REVISION NO.	:	1.0

SEMESTER: I (Version II)

INDUCTION PROGRAM: 3 WEEKS

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC1	AS105	Calculus and Differential Equations	3	-	1	20	40	40	50	-	150	4
NSC4	CH101	Science of Nature	3	2	-	20	40	40	50	-	150	4
ESC4	CV102	Applied Mechanics	3	2	-	20	40	40	50	-	150	4
HSS1	HP103/4/5	English for Engineers /(German/Japanese)	0	4	-	-	-	-	100	-	100	2
ESC3	CS101	Logic Development-C Programming	1	4	-	-	40	-	100	-	140	3
SDP2	ME106	Design Thinking	-	4	-	-	-	-	40	60	100	2
TOTAL			**10**	**16**	**1**	**60**	**160**	**120**	**390**	**60**	**790**	**19**

SEMESTER: II (Version II)

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
PE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC3	AS107	Statistics and Integral Calculus	3	-	1	20	40	40	50	-	150	4
NSC2	AS106	Engineering Physics	3	2	-	20	40	40	50	-	150	4
ESC1	EX102	Electrical and Electronics Engineering	3	2	-	20	40	40	50	-	150	4
ESC2	ME104	Engineering Graphics	2	4	-	-	60	40	100	-	200	4
ESC5	CS102	Applications Programming -Python	1	4	-	-	40	-	100	-	140	3
SDP1	ME105	Experimental Tools and Techniques	-	4	-	-	-	-	40	60	100	2
SS2	HP106	Indian Constitution	1	-	-	-	-	-	-	-	Audit	
TOTAL			**13**	**16**	**1**	**60**	**220**	**160**	**390**	**60**	**890**	**21**

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Calculus and Differential Equations
	COURSE CODE	AS105
	COURSE CREDITS	4
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	1	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS105.CEO.1: Classify and solve first order and first degree ordinary differential equations.
AS105.CEO.2: Categorize and inspect the applications of first order differential equations.
AS105.CEO.3: Inspect and solve linear differential equations of second and higher order.
AS105.CEO.4: Apply the concepts of partial differentiation.
AS105.CEO.5: Demonstrate an understanding towards the applications of partial differentiation.
AS105.CEO.6: Identify and classify first order linear and nonlinear partial differential equations.

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS105.CO.1: Solve first order and first degree ordinary differential equations.
AS105.CO.2: Analyze and solve real world phenomenon governed by first order ordinary differential equations.
AS105.CO.3: Apply concepts of linear differential equations of second and higher order to solve different systems in engineering world.
AS105.CO.4: Infer the problems based on properties of partial differentiation.
AS105.CO.5: Examine the applications of partial differentiation.
AS105.CO.6: Solve and examine the solution of partial differential equations by theoretical methods.

THEORY COURSE CONTENT		
UNIT 1	**Ordinary Differential Equations of First Order and First Degree**	**6 HOURS**
Exact differential equations, Differential equations reducible to exact form-Integrating factors, Linear differential equations, Differential equations reducible to linear form.		
UNIT 2	**Applications of Ordinary Differential Equations of First Order and First Degree**	**6 HOURS**
Orthogonal Trajectories, Newtons law of cooling, Growth & Decay, Electric circuits, Chemical applications- Mixing problems.		
UNIT 3	**Linear Differential Equation of Second Order and Higher Order**	**7 HOURS**
General solutions of linear differential equations with constant coefficients, Method of variation of parameters, Equations reducible to linear differential equations with constant coefficients: Cauchy and Legendres linear differential equation, Simultaneous linear differential equations, Applications.		
UNIT 4	**Partial Differentiation**	**7 HOURS**
Partial Differentiation: Introduction, Chain rule, Total derivative, Change of variables, Homogeneous functions, Eulers Theorem, Differentiation of Implicit functions.		
UNIT 5	**Applications of Partial Differentiation**	**6 HOURS**
Jacobian, Jacobian of Implicit functions, Partial derivative of an implicit function using Jacobians, Functional dependence, Maxima and Minima of functions of two variables.		
UNIT 6	**Partial Differential Equations**	**7 HOURS**
Introduction and formation of partial differential equation, solution of a partial differential equation, equations solvable by direct integration, Linear differential equations of first order, Non-linear differential equations of first order, Charpit's method.		

TUTORIAL		
TUTORIAL NO.01		**1 HOURS**
Exact differential equations, Differential equations reducible to exact form-Integrating factors.		
TUTORIAL NO.02		**1 HOURS**
Linear differential equations, Differential equations reducible to linear form.		
TUTORIAL NO.03		**1 HOURS**
Orthogonal Trajectories, Newtons law of cooling, Growth & Decay		
TUTORIAL NO.04		**1 HOURS**
Electric circuits, Chemical applications- Mixing problems.		

TUTORIAL NO.05		**1 HOURS**
General solutions of linear differential equations with constant coefficients, Method of variation of parameters.		
TUTORIAL NO.06		**1 HOURS**
Cauchy and Legendres linear differential equation, Simultaneous linear differential equations, Applications.		
TUTORIAL NO.07		**1 HOURS**
Partial Differentiation: Introduction, Chain rule, Total derivative, Change of variables.		
TUTORIAL NO.08		**1 HOURS**
Homogeneous functions, Eulers Theorem, Differentiation of Implicit functions.		
TUTORIAL NO.09		**1 HOURS**
Jacobian, Jacobian of Implicit functions, Partial derivative of an implicit function.		
TUTORIAL NO.10		**1 HOURS**
Functional dependence, Maxima and Minima of functions of two variables.		
TUTORIAL NO.11		**1 HOURS**
Introduction and formation of partial differential equation, solution of a partial differential equation, equations solvable by direct integration.		
TUTORIAL NO.12		**1 HOURS**
Linear differential equations of first order, Non-linear differential equations of first order, Charpits method.		

TEXT BOOK

1. Dr. B.V. Ramana, Higher Engineering Mathematics, 5 th edition, Tata McGraw Hill, 2017, ISBN: 978-0-07-063419-0
2. B.S. Grewal, Higher Engineering Mathematics, 44 th edition, Khanna Publications, 2018, ISBN: 978-81-933284-9-1

REFERENCE BOOK

1. G.B. Thomas, Maurice D. Weir, Joel R. Hass, Thomas Calculus, 12 th edition, Pearson Education, 2002, ISBN: 9789332519091
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd., 2015, ISBN: 13: 9788126554232
3. R.K. Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing house , 2010, ISBN: 8173194203.
4. Peter V. ONeil, Advanced Engineering Mathematics, 7 th edition, Cenage Learning, 2012, ISBN: 13: 9788131503102.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Physics
	COURSE CODE	AS106
	COURSE CREDITS	4
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	1	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS106.CEO.1: Make students identify the basic concept of measurements and to formulate problems in physical and mathematical terms.

AS106.CEO.2: Analyze and understand the behavior of light as a wave and get acquaint with different applications in Physics.

AS106.CEO.3: Apply the concept of behavior of light and understand the polarization phenomena.

AS106.CEO.4: Classify and understand the difference of classical mechanics and quantum mechanics.

AS106.CEO.5: Derive the basic laws governing the motion of quantum particles.

AS106.CEO.6: Apply the concept of quantum mechanics to different applications and supplement the reasoning.

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS106.CO.1: Evaluate the importance of order of all physical quantities and compare the order of size of different objects.

AS106.CO.2: Apply the theoretical knowledge of optics to understand the physics behind engineering applications.

AS106.CO.3: Apply that light is transverse in nature.

AS106.CO.4: Demonstrate the necessity of quantum mechanics and the distinction between the domains of classical and quantum mechanics.

AS106.CO.5:	Evaluate and apply the Schrdingers equation to the motion of an electron orbiting round the shell.
AS106.CO.6:	Apply the concepts of Quantum Physics in different branches of engineering.

THEORY COURSE CONTENT		
UNIT 1	**Measurement and importance of span (order) of physical quantities**	**6 HOURS**
Concept of (i)significant numbers, (ii) accuracy versus precision (iii)error versus uncertainty (iv)systematic error versus random error (v) quantifying the uncertainty. Least-count of an apparatus, Methods to measure least-count with specific examples of vernier-calipers, screw-gauge, travelling microscope and spectrometer. Span (orders of magnitude) of prominent physical parameters. Length-scale and time-scale of specific physical phenomenon.		
UNIT 2	**Optics (Interference and Diffraction of Light)**	**7 HOURS**
Particle nature and wave-nature with examples of wave and particle behavior of light, Introduction to wave nature, Concept of thin film, Stokes law of phase-change on reflection from a thin film, Thin film interference, Coating of lenses as an application of thin film interference, Interference in films of uniform and non-uniform thickness (with derivation), Applications of thin-film interference, Newton Ring Experiment and its applications, Diffraction as a particular case of interference.		
UNIT 3	**Polarization of Electromagnetic wave**	**6 HOURS**
Polarization of electromagnetic wave, Production and analysis of polarized electromagnetic wave, Optical Activity, Specific Rotation due to optically active solutions, Application of Polarized light.		
UNIT 4	**Quantum Mechanics-I**	**7 HOURS**
Shortcomings or failure of Classical Mechanics with specific example of blackbody radiation, Plancks quantum law of blackbody radiation, Matter-waves, De-Broglies concept of matter waves, Heisenbergs Uncertainty Principle, Wave-function, Physical significance of wave function.		
UNIT 5	**Quantum Mechanics-II**	**8 HOURS**
Schrodingers equations, Time Dependent and Time Independent forms of Schrodinger Equations, Applications of Schrodinger Equation, Electron in an infinite potential well (rigid box), Electron in a finite deep potential well (non-rigid box) and concept of quantum mechanical tunneling, Application of electron in a potential well in case of Bohrs atomic model.		
UNIT 6	**LASER and Optical Fiber**	**5 HOURS**
Stimulated Absorption, Stimulated Emission of light and its comparison with spontaneous emission, Probabilities of stimulated absorption and emission of light (Einsteins coefficients), Principle and working of LASER (Ruby Laser), Application of LASER in optical fiber communication.		

PRACTICAL		
PRACTICAL NO.01	**Significant Figures**	**2 HOURS**
Determination of the mass of electron (me) upto specified significant numbers.		
PRACTICAL NO.02	**Interference of Light Waves**	**2 HOURS**
Calculate the refractive index of a given liquid using Newton Rings' Experiment.		
PRACTICAL NO.03	**Diffraction of Light Waves**	**2 HOURS**
Determination of the line density of a diffraction grating using Laser.		
PRACTICAL NO.04	**Interference of Light Waves**	**2 HOURS**
Calculate the wavelength of Sodium light source using Michelson Interferometer.		
PRACTICAL NO.05	**Phase and Phase Difference**	**2 HOURS**
Determination of the phase-difference between two given positions on the path of simple pendulum in periodic motion.		
PRACTICAL NO.06	**Bohr's Atomic Model**	**2 HOURS**
Verification of Bohr's atomic model using Frank and Hertz experiment.		
PRACTICAL NO.07	**Polarization**	**2 HOURS**
Determination of the specific rotation of a sugar solution of a given concentration.		
PRACTICAL NO.08	**Stoke's Law**	**2 HOURS**
Calculation of wavelength of a laser beam using Lloyds mirror arrangement.		
PRACTICAL NO.09	**Division of Amplitude of Light Waves**	**2 HOURS**
Determination of Radius of Curvature of a given planoconvex lens using Newton's Rings apparatus.		
PRACTICAL NO.10	**Diffraction as a Particular Case of Interference**	**2 HOURS**
Calculation of wavelength of different colors present in a white light.		

TEXT BOOK

1. Richard. P. Feynman, R.B. Leighton, M.Sands, The Feynman Lectures on Physics: Volume-1-ISBN:978-81-85015-82-8
2. The Feynman Lectures on Physics: Volume-3-Richard. P. Feynman, R.B. Leighton, M.Sands,ISBN:978-81-85015-84-2

REFERENCE BOOK

1. Alan S Morris, Butterworth Heinemann, Measurement and Instrumentation Principles,3rd Edition, Butterworth-heinmann,2001, ISBN 0750650818
2. Ajoy Ghatak ,Optics, 6th Edition Tata Mc Graw Hill Publishing Company. Ltd., 2016, ISBN-10-9339220900

3. Jenkins & White, Fundamentals of Optics, 4th Edition,Mc Graw Hill Science,2016, ISBN-0070853460.

4. Arthur Beiser, Shobit Mahajan, S. Rai. Choudhary ,Concepts of Modern Physics-,6th Edition, Mc Graw Hill Education (India) Pvt. Ltd., 2009, ISBN-10- 0070151555.

5. L I Schiff ,Quantum Mechanics,3rd Edition, Tata Mc Graw Hill Education (India) Pvt. Ltd.,ISBN-10- 0070856435, ISBN- 13- 9780070856431.

6. PAM Dirac,Principles of Quantum Mechanics,4th Edition, CBS publishers and Distributors,2004, ISBN-10- 0195671074, ISBN- 13- 978019567107

7. D J Griffiths, Introduction to Quantum Mechanics,2nd Edition,Cambridge India ,2016,ISBN-9781316646513.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Science of Nature
	COURSE CODE	CH101
	COURSE CREDITS	4
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CH101.CEO.1: Make students conversant with basic Biology regarding the life processes.

CH101.CEO.2: Study biology and engineering as biologically inspired technologies like designs in nature, bioenergetics, bioprocesses, biomaterials, biomechanics, bioinstrumentation.

CH101.CEO.3: Outline the technology involved in improving quality of water for its industrial use.

CH101.CEO.4: Illustrate the basic principles, instrumentation & applications of analytical techniques.

CH101.CEO.5: Get familiarize with the new concepts of Nano Science and Technology.

CH101.CEO.6: Define the basic aspects and applications of polymers, biomaterials & composites.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CH101.CO.1: Explain natural biological processes and their technical aspects in view of optimizing Engineering solutions.

CH101.CO.2: Explain important biological inventions that changed the human life and their impact on engineering.

CH101.CO.3: Identify different methodologies for water quality analysis for industrial application.

CH101.CO.4: Apply basic concepts of analytical techniques for analysis of various chemical compounds.

CH101.CO.5: Apply the knowledge of nano science for betterment of the society.

CH101.CO.6: Categorize the different engineering materials and to solve engineering problems.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Science of Nature**	**7 HOURS**
The basics of science of nature. Exploring science in nature, specially symmetry, spiral, golden ratio, pattern and fractal. The phenomenon observed in nature viz., Physical, Chemical and Biological. Case studies and Applications. The diversity and commonality of cells, protein structure and function, basic molecular genetic mechanisms, bio membranes and cell architecture, transport of ions and small molecules across Cell membranes, cellular energetics, cell birth, lineage and death.		
UNIT 2	**Applications of Biology**	**6 HOURS**
Physiologic Systems - An Outline of Cardiovascular Structure and Function, Endocrine System, Nervous System, Vision System, Defense mechanisms in plants and animals. Introduction to Bio Sensors, Performance Factors, Factors Affecting the Performance of Sensors, Areas of Application. Biological Sensing Elements, Biological transducers. Discovery and Innovations in applications of Biology.		
UNIT 3	**The Role of Chemistry for Engineers**	**7 HOURS**
(A) **Introduction:** This section is an introduction to chemistry and chemical methods for engineering students. It describes how chemistry is used in engineering and how chemical principles aid engineers in the choice of materials for a particular application. Principles of Green chemistry are reviewed. The classification of separation methods used for mixtures. (B) **Periodic Table:** This section covers the names and symbols of the elements. The basic structure of the atom is reviewed including an explanation of isotopes. A discussion of the atomic structure describes electronic shells, subshells, their quantum numbers, orbital shapes, electron filling order, and the determination of the complete electron configuration of the elements. General description of the modern periodic table. Correlation between the valence electron configurations and the chemical properties of the elements. The periodic trends according to the position of the elements in the periodic table.		
UNIT 4	**Chemical Bonding - The Formation of Materials**	**8 HOURS**
(A) **The Formation of Materials:** This section covers chemical bonding and its effect on the chemical properties of the elements. Ionic bonding & covalent bonding are compared in terms of the octet rule and valence bond theory. Polar and non-polar covalent bonds. Molecular orbital theory is introduced to explain magnetism, bond order and hybridization helpful in Carbon chemistry. Intermolecular forces, including hydrogen bonding, are discussed with a special Case Study focusing on the special properties of water. (B) **Engineering Materials:** This section covers the Resources of Natural Materials, Introduction to Material Sciences viz. Polymers, Specialty polymers, Biomaterials, Nano materials and Smart materials with their examples and applications.		
UNIT 5	**Chemical Analysis and Instrumentation**	**6 HOURS**
Schrodingers equations, Time Dependent and Time Independent forms of Schrodinger Equations, Applications of Schrodinger Equation, Electron in an infinite potential well (rigid box), Electron in a finite deep potential well (non-rigid box) and concept of quantum mechanical tunneling, Application of electron in a potential well in case of Bohrs atomic model.		

UNIT 6	Water Treatment and Effluent Management	5 HOURS
This chapter covers types of impurities in water & the conventional water treatment methods. Hardness, Alkalinity and Chloride content of water, its causes, types and volumetric methods for their determinations are reviewed along with numerical. Various water softening & treatment methods which includes filtration methods by Carbon adsorption, ion-exchange methods and membrane techniques are explained		

PRACTICAL: Any 8 Experiments		
PRACTICAL NO.01	**Distillation**	**2 HOURS**
Separation of two miscible liquids using distillation process		
PRACTICAL NO.02	**Polymerization**	**2 HOURS**
Synthesis by condensation polymerization reaction		
PRACTICAL NO.03	**Nano Particle**	**2 HOURS**
Synthesis of nano particles using reduction method		
PRACTICAL NO.04	**pH Metry**	**2 HOURS**
Determination of the dissociation constant of a weak acid using pH meter		
PRACTICAL NO.05	**Paper Chromatography**	**2 HOURS**
Separation of inorganic cations by paper chromatography		
PRACTICAL NO.06	**TLC**	**2 HOURS**
Separation of organic compounds by TLC		
PRACTICAL NO.07	**Conductometry**	**2 HOURS**
Conductometric titration for mixture of acids.		
PRACTICAL NO.08	**Colorimetry / Spectrophotometry**	**2 HOURS**
Absorption studies		
PRACTICAL NO.09	**Hardness of Water**	**2 HOURS**
Determination of Hardness of water by EDTA method		
PRACTICAL NO.10	**Alkalinity**	**2 HOURS**
Determination of alkalinity of water by neutralization titration		
PRACTICAL NO.11	**Adsorption Studies**	**2 HOURS**
Water purification by activated charcoal		

PRACTICAL NO.12	Physical Phenomenon	2 HOURS
Case Studies of Physical Phenomenon		
PRACTICAL NO.13	**Chemical Phenomenon**	**2 HOURS**
Case Studies of Chemical Phenomenon		
PRACTICAL NO.14	**Biological Phenomenon**	**2 HOURS**
Case Studies of Biological Phenomenon		

TEXT BOOK

1. Jain & Jain, Engineering Chemistry, 16th Edition, Dhanpat Rai Publications company,2015, ISBN: 978-93-5216-000-6
2. S.M. Khopkar , Basic Concept of Analytical Chemistry,3rd edition, New Age International (P) Ltd., 2008, ISBN-10: 81-224-2092-3; ISBN-13: 978- 81-224-2092-0
3. Dr. B. S. Chauhan , Engineering Chemistry, 3rd Edition, University Science Press (Laxmi Publications Pvt. Ltd).,2009, ISBN: 978-81-318-0579-4.
4. Lodish H, Berk A, Zipursky SL, et al., Molecular Cell Biology, 5th Ed., W. H. Freeman publications, 2000.
5. Palsson B.O. and Bhatia S.N., Tissue Engineering, Pearson, 2009,
6. Brian R. Eggins, "CHEMICAL SENSORS AND BIOSENSORS", JOHN WILEY & SONS, LTD, 2004.

REFERENCE BOOK

1. Jeffrey S. Gaffney and Nancy A. Marley General Chemistry for Engineers, Elsevier, 2018, ISBN: 978- 0-12-810425-5
2. Skoog, West, Holler, Crouch, Fundamentals of Analytical Chemistry, 8th Edition Cengage Learning, 2009, ISBN-13: 97881-315-0051-4, ISBN-10: 81-315-0051-9
3. Willard, Merritt, Dean and Settle, Instrumental Methods of analysis (Chemistry), 6th edition, Wadsworth Publishing Co., 1988, ISBN-10: 0534081428, ISBN-13: 978-0534081423.
4. Donald R. Askeland, Pradeep Fulay, W. J. Wright, The Science & Engineering of Materials, 6th Edition, Cengage Learning, 2010, ISBN: 0495668028.
5. O. G. Palanna, Engineering Chemistry, 1st Edition, Tata McGraw Hill education Pvt. Ltd., 2009, ISBN-13: 978-0-07-014610-5, ISBN (10): 0-07-014610-1.
6. Pradeep T., A Text Book of Nanoscience and Nanotechnology, Tata McGraw Hill, New Delhi, 2012.
7. Reece, J. B., Taylor, M. R., Simon, E. J. and Dickey, J. L. (2013) Campbell Biology: Concepts and Connections (Seventh Edition) (Pearson) ISBN 1292026359

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Electrical and Electronics Engineering
	COURSE CODE	EX102
	COURSE CREDITS	4
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME AND MARKS**					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX102.CEO.1: Impart knowledge of single-phase AC circuit and use of renewable energy systems.
EX102.CEO.2: Explain relations in three-phase systems and study power measurement methods.
EX102.CEO.3: Explain power supply components, electronic devices.
EX102.CEO.4: Summarize various Digital systems and application.
EX102.CEO.5: Build the knowledge of measuring system and signal conditioning circuits.
EX102.CEO.6: Get acquainted with different electrical machines.

COURSE OUTCOMES :

The students after completion of the course will be able to,

EX102.CO.1: Develop Renewable energy system (PV) & power factor improvement circuits.
EX102.CO.2: Distinguish behavior of three phase circuits & power measurement methods.
EX102.CO.3: Analyze analog circuits.
EX102.CO.4: Design Digital circuits.
EX102.CO.5: Demonstrate the use of Instrumentation system in various fields.
EX102.CO.6: Identify electrical machines used in typical domestic and industrial sector Application.

THEORY COURSE CONTENT		
UNIT 1	**AC Circuits**	**7 HOURS**
Energy Scenario, General structure of electrical power systems, A.C. fundamentals, RMS and average value, R-L,R-C,RLC series and parallel circuits, phasor diagram, power triangle and power factor, measures to improve power factor and its effects on Power system and consumer. Work, Power & Energy, costing of electricity, Application of Renewable Energy Systems, Design of PV system (offgrid), Battery selection and its series parallel connections		
UNIT 2	**Three Phase Circuit and Power Measurement**	**7 HOURS**
Three phase voltage generation and its waveform, Star and delta balanced systems, Relationship between phase and line quantities, phasor diagram, power in a three phase circuits, three phase 4 wire system, Difference between neutral and ground conductors, Safety measures in electrical system, types of wiring, Active and Reactive Power measurement in single and three phase balanced system.		
UNIT 3	**Power Supply and Electronics Devices**	**7 HOURS**
Rectifiers and Power Supplies, Elements of IC Regulated Power Supply, Clipper, Clamper. BJT - Structure and operation, CE, CB, CC configurations, biasing methods, DC Load Line, Transistor as a switch and Amplifier. Opto-electronic devices Photo conductive cell, Photo Voltaic cell.		
UNIT 4	**Digital Systems**	**7 HOURS**
Logic gates, Boolean algebra, KMap, SOP representation. Combinational circuit Design: Adder, Subtractor, MUX, DMUX, Comparator, Code converter Sequential circuit: Flip-Flop, Registers and Synchronous & Asynchronous Counters. Microprocessor and Microcontroller based systems.		
UNIT 5	**Measuring System**	**7 HOURS**
Elements of measuring system, Sensors & Transducers Temperature, Flow, Pressure, Level, IR, Speed & LVDT, Op-Amp IC 741 pin configuration, Op-amp parameters, Inverting, Non- Inverting & Differential configuration. Applications: Summing & Difference amplifier, Comparator, Voltage follower.		
UNIT 6	**Electrical Machines**	**7 HOURS**
Construction of Transformer, principle of operation, EMF equation, VA Rating, Efficiency and Voltage regulation, OC/SC Test on Transformer. Construction, principle of operation and types of DC motor, Speed Control, characteristics equation, PMDC, BLDC, Universal motor, Single phase Induction Motor, Stepper motor, Application of Electrical Motors in domestic and Industrial sector.		

PRACTICAL:		
PRACTICAL NO.01	**Kirchhoffs laws and Superposition theorem**	**2 HOURS**
To develop a circuit for Kirchhoffs laws and Superposition theorem. To build and test both theorems.		
PRACTICAL NO.02	**Single Phase Energy (Watt-hour) Measurement.**	**2 HOURS**
To measure energy and power factor. To examine improvement in the power factor. To estimate and compare energy consumption with energy meter.		
PRACTICAL NO.03	**R-L-C series A.C. Circuit**	**2 HOURS**
To calculate exact values of R, L and C for variations in X_L and X_C (3 cases) To justify the lagging and Leading nature for the three cases. To find power losses in total R, L and C and verify with total power consumed.		
PRACTICAL NO.04	**Verification of relation between Line and Phase quantities in Star and Delta Circuits.**	**2 HOURS**
To understand Line & Phase quantities and types of connection along with Three phase supply To connect Bulb load in Star connection and verify the relation between Line and Phase Quantities. To connect Bulb load in Delta connection and verify the relation between Line and Phase Quantities.		
PRACTICAL NO.05	**Power Measurement in Three Phase Balanced Circuit and Single Phase Circuit.**	**2 HOURS**
To measure active and reactive power by Two wattmeter method in three phase circuit. To measure reactive power by One wattmeter method in three phase circuit.		
PRACTICAL NO.06	**Open Circuit & Short Circuit Test on a Single Phase Transformer**	**2 HOURS**
To find iron losses and no load circuit parameters To find full load copper losses and Equivalent circuit parameters To determine efficiency and regulation of transformer at various different loading conditions.		
PRACTICAL NO.07	**Speed Control of D.C. Shunt Motor**	**2 HOURS**
To vary field current and measure speed To vary armature voltage and measure speed Draw conclusion from both the methods through graphs.		
PRACTICAL NO.08	**Step Angle Measurement of Stepper Motor.**	**2 HOURS**
To become familiar with the properties of Stepper Motor. To calculate the step angle of motor.		
PRACTICAL NO.09	**Electronics Components and Measuring Instruments**	**2 HOURS**
To study Passive components - Resistors, Capacitors & Inductor. To test semi-conducting components - Diode, BJT To measure various electronic quantities using CRO, Function generator, DMM		

PRACTICAL NO.10	D.C. Regulated Power Supply	2 HOURS
To design 12V/ 9V/ 5V IC based DC regulated power supply (Theoretically). To test and observe waveforms at various stages on CRO and measure the voltage using DMM.		
PRACTICAL NO.11	**BJT as a Switch and Amplifier**	**2 HOURS**
To adapt BJT as a switch On/Off the LED at the output by switching BJT. To adapt BJT as an Amplifier Measure voltages and observe waveforms at input and output of the single stage CE amplifier.		
PRACTICAL NO.12	**Combinational Digital Circuits**	**2 HOURS**
To design and implement Half adder and Full adder (using Half adder). To design and implement 8:1 MUX using IC-74LS153 and verify its truth table.		
PRACTICAL NO.13	**Sequential Digital Circuits**	**2 HOURS**
To design and implement Half adder and Full adder (using Half adder). To design and implement 8:1 MUX using IC-74LS153 and verify its truth table.		
PRACTICAL NO.14	**OP-AMP Applications**	**2 HOURS**
To verify operations of inverting and non-inverting amplifier for various gain factors. To verify application of OP-AMP as summing and difference amplifier. To verify the application of OP-AMP as voltage follower.		
PRACTICAL NO.15	**Sensors and Transducer**	**2 HOURS**
To study and verify operation of LVDT. To study and verify the operation of Temperature sensors. (PT100, LM35)		
PRACTICAL NO.16	**Design and Simulate using MULTISIM (Min.2)**	**2 HOURS**
To design a counter to display 2-digit Decimal Number (00 to 99) on 7-Segment Display. To design a Flashing LED Display for a specific Pattern using MUX. To design of Inverting/Non-Inverting Amplifier using Op-Amp IC-741 for a specific gain.		

In addition to total 8 Experiments, two case study reports must be attached with Laboratory Course Record.

TEXT BOOK

1. Edward Hughes, Electrical and Electronic Technology 10th Edition, Pearson India, 2011, ISBN-13: 978-8131733660
2. Thomas L. Floyd, Electronics Devices & Circuits, 5th Edition, Pearson Education India, 1998, ISBN-13: 978-0136491385.
3. A. Anand Kumar, Fundamentals of Digital Circuits, 4th Edition, Prentice Hall of India, 2016, ISBN-13: 978-8120352681

REFERENCE BOOK

1. V. N. Mittle and Arvind Mittal, Basic Electrical Engineering, 2nd Edition, McGraw Hill Education, 2005, ISBN-13: 978-0070593572.
2. D. P. Kothari, I. J. Nagrath, Electric Machines, 4th Edition, McGraw Hill, 2010, 978-0070699670.
3. Paul Horowitz, Winfield Hill, The Art of Electronics, 3rd Edition, Cambridge University press, ISBN-13: 978-0521809269.
4. Thomas E. Kissell, Industrial Electronics, 3rd Edition, Prentice Hall of India, 2003, ISBN-13:9788120322608
5. B. H. Khan, Non-Conventional Energy Resources, 2nd Edition, Tata McGraw Hill, 2009, ISBN-13: 978-0070142763.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Applied Mechanics
	COURSE CODE	CV102
	COURSE CREDITS	4
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	20	40	40	25	25	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CV102.CEO.1: Classify force systems and explain the conditions of equilibrium.
CV102.CEO.2: Illustrate laws of friction.
CV102.CEO.3: Demonstrate the concepts of Centroid and moment of inertia.
CV102.CEO.4: Describe kinematic parameters of motion.
CV102.CEO.5: Make use of laws of motion for kinetics.
CV102.CEO.6: Explain energy and momentum methods.

COURSE OUTCOMES:

The students after completion of the course will be able to,

CV102.CO.1: Determine the resultant and support reactions.
CV102.CO.2: Equilibrium Analysis of bodies involving frictional forces.
CV102.CO.3: Evaluate Centroid of bodies and moment of inertia of sections.
CV102.CO.4: Identify the type of motion and its kinematic parameters.
CV102.CO.5: Analyze the motion under action of constant and variable forces.
CV102.CO.6: Apply energy and momentum methods for kinetics problems.

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of Statics**	**8 HOURS**
Basic concepts in mechanics, Fundamental principles/laws of mechanics, Force, moment of a force and couple, Resolution and composition of forces, Resultant of coplanar forces, Free body diagrams, Equilibrium of coplanar forces, Applications to simple beams and cables. **Further Reading:** *Self study-Application to jib crane.		
UNIT 2	**Friction**	**6 HOURS**
Introduction to friction, Types of friction, Laws of friction- coefficient of friction, Theory of friction- angle of friction, angle of repose, cone of friction, Engineering applications - Block and wedge friction, ladder friction, Belt Friction. **Further Reading:** *Self study-Screw friction.		
UNIT 3	**Properties of Surfaces**	**6 HOURS**
Concept of Centroid and centre of gravity. Centroid of standard objects, Centroid of composite 1D and 2D objects, Concept of area moment of inertia, Radius of gyration and its significance, Parallel and perpendicular axis theorems, Moment of inertia of standard and composite 2D figures. **Further Reading:** *Self study- Mass moment of Inertia.		
UNIT 4	**Kinematics of Planar Motions**	**7 HOURS**
Basic concepts in kinematics, Rectilinear motion with uniform and variable acceleration, Motion under Gravity, Motion curves, Curvilinear Motion in Rectangular and path coordinates, Projectile motion. **Further Reading:** *Self study- Curvilinear motion in polar coordinates.		
UNIT 5	**Kinetics- Force and Acceleration**	**6 HOURS**
Newton's second laws of Motion, Free body diagram equation- Rectilinear motion, Concept of dynamic equilibrium. Motion of connected bodies, Equations of motion in rectangular and path coordinates for curvilinear motion. **Further Reading:** *Self study- Free Vibrations.		
UNIT 6	**Kinetics Energy and Momentum**	**6 HOURS**
Concepts of Work, power and energy, Work done by gravity, spring and frictional forces, Principle of work and Energy, Conservation of mechanical energy, Concept of Impulse and linear momentum, Impulse-momentum theorem, Conservation of linear momentum, Collisions- Types of collisions, Coefficient of restitution, Applications to vehicles and sports. **Further Reading:** *Self study- Space mechanics.		

PRACTICAL: Any 8 Experiments		
PRACTICAL NO.01	**Basic Principles/Laws**	**2 HOURS**
To verify basic laws of mechanics.		
ACTIVITY NO.01	**Exploring Scientific Calculator**	**2 HOURS**
To complete the given task of calculations in a stipulated time with desired accuracy using a scientific calculator.		
PRACTICAL NO.02	**Friction**	**2 HOURS**
To determine coefficient of friction for a given surfaces		
ACTIVITY NO.02	**Presentations**	**2 HOURS**
To prepare and deliver a PPT presentation on engineering application of friction.		
PRACTICAL NO.03	**Centroid**	**2 HOURS**
To determine Centroid of a given 1D object		
ACTIVITY NO.03	**Act of Balancing**	**2 HOURS**
To cut a 2D figure precisely and locate a balancing point on it.		
PRACTICAL NO.04	**Motions**	**2 HOURS**
To study and analyze a given set of motion.		
ACTIVITY NO.04	**Graphing the Motion**	**2 HOURS**
To draw x-t, v-t, a-t graphs for given description of motion in stipulated time.		
PROJECT		**10 HOURS**
To fabricate a model of simple structure or mechanism from low cost materials.		

TEXT BOOK

1. A. Nelson "Engineering Mechanics: Statics and Dynamics", 1st edition ,Tata McGraw-Hill Education, 2009, ISBN: 978-0-07-014614-3
2. R.C Hibbeler "Engineering Mechanics: Statics and Dynamics ",12th edition, Pearson Education, 2010, ISBN: 978-0136077909

REFERENCE BOOK

1. F. P. Beer and E. R. Johnston "Vector Mechanics for Engineers Vol.I and II",10th edition, Tata Mc-Graw-Hill Education, 2012, ISBN: 978-0077402327
2. Ferdinand Singer, "Engineering Mechanics Statics and Dynamics", 3rd edition Harper and Row, 1994 ISBN:0063506610
3. Manoj K Harbola "Engineering Mechanics",1st edition, Cengage Learning, 2009, ISBN:8131509907

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Graphics
	COURSE CODE	ME104
	COURSE CREDITS	4
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
2	4	NIL	60	40	60	40	200

PRE-REQUISITE : NIL

COURSE OBJECTIVES:

ME104.CEO.1: To impart knowledge about principles/methods related to projections of one, two and three-dimensional objects.
ME104.CEO.2: To develop & apply visualization skills to simple Objects.
ME104.CEO.3: To expose students to computer aided drafting tools.

COURSE OUTCOMES:

The students after completion of the course will be able,

ME104.CO.1: Develop and/or comprehend a simple engineering drawing in both First and Third angle orthographic projections.
ME104.CO.2: Interpret engineering drawings.
ME104.CO.3: Apply visualization skills to development of surfaces.
ME104.CO.4: Analyze engineering drawings.
ME104.CO.5: Decide annotations for two dimensional drawings.
ME104.CO.6: Create manual drawing & CAD data using SP46 standards.

THEORY COURSE CONTENT		
UNIT 1	**Visual Thinking and Solid Geometry**	**12 HOURS**
Essentials of engineering graphics including technical sketching, Projection of Line, Plane, Solid.		
UNIT 2	**Orthographic Projections and Sectional Views**	**4 HOURS**
Reference Planes, Types of Orthographic Projections, Sectional Orthographic Projections, Sectional Views, Missing views.		
UNIT 3	**Isometric Projections**	**4 HOURS**
Isometric View, Isometric Scale, Non-isometric Lines, construction of Isometric View from the given orthographic view and construction of isometric View of Pyramid, Cone, Sphere.		
UNIT 4	**Development of Surfaces**	**2 HOURS**
Development of lateral surfaces of simple and sectioned solids Prisms, pyramids cylinders and cones.		
UNIT 5	**Auxiliary Projections**	**2 HOURS**
Auxiliary Planes- Auxiliary Vertical Plane, Auxiliary Inclined Plane, Symmetrical Auxiliary View, Unilateral Auxiliary View, bilateral Auxiliary View		
UNIT 6	**Freehand Sketching and Technical Drawing**	**4 HOURS**
Free hand sketching- FV & TV of standard machine part- Hexagonal headed nut and bolt, foundation bolts, shafts, keys, couplings, springs, screw thread forms, welded joints, riveted joints, nozzles.		

PRACTICAL: **Each Assignment carries 2 questions to be draws on A2 Size Drawing Sheet**		
ASSIGNMENT NO.1	Projection of Lines	**4 HOURS**
Two Questions on line inclined to both planes		
ASSIGNMENT NO.2	Projection of Planes	**2 HOURS**
Two Questions on plane inclined to both planes		
ASSIGNMENT NO.3	Projection of Solids	**2 HOURS**
Two Questions on solid inclined to both planes		
ASSIGNMENT NO.4	Orthographic Projections	**4 HOURS**
Two Questions on Orthographic Projection of Simple Mechanical Element		
ASSIGNMENT NO.5	Development of surface	**4 HOURS**
Two Questions on Development of regular Solids		
ASSIGNMENT NO.6	Isometric View	**6 HOURS**
Two Questions on Isometric view of Mechanical Element		

ASSIGNMENT NO.7	Auxiliary View	**4 HOURS**
Two Questions on auxiliary view of Mechanical Element		
PRACTICAL: **Each Assignment carries 2 questions to be drawn on 2D CAD software package**		
PRACTICAL NO. 1	Absolute & incremental drafting	**4 HOURS**
Drawing of two sketches using absolute and incremental commands		
PRACTICAL NO. 2	Draw commands, Modify commands, Array, fillet, offset commands	**6 HOURS**
Drawing of four sketches using draw & modify commands		
PRACTICAL NO. 3	Project Drafting	**2 HOURS**
Drafting of a small project using all drafting standards		
PRACTICAL: **Each Assignment carries 2 questions to be drawn on 3D CAD software package**		
PRACTICAL NO. 4	Sketching, Solid Modeling, Assembly	**12 HOURS**
Modeling of five Mechanical models using 3D Software package		
PRACTICAL NO. 5	Project Modeling	**4 HOURS**
Modeling of small Mechanical Project of Minimum three components		

TEXT BOOK

1. Dhanajay A. Jolhe, Engineering Drawing with an introduction to AutoCAD, TMH Publishing Co Ltd, 5th Edition, 2012, (ISBN 13: 9780070648371)
2. Basant Agarwal and C M Agarwal, Engineering Drawing, TMH Publishing co Ltd, 2nd Edition 2013, (ISBN13: 978-1-259-06288-9)
3. K C John, Engineering Graphics for Degree, PHI learning pvt. Ltd. New Delhi,2009, (ISBN: 97881-203-3788-6)
4. R. K. Dhavan, A TextBook of Engineering Drawing, S Chand and co ltd., New Delhi India, 5Th Edition, 2012, ISBN 13: 9788121914314

REFERENCE BOOK

1. Luzadder, Warren J., Duff, John M, Fundamentals of Engineering, Prentice Hall of India,11th Edition, 2010, (ISBN: 978-81-203-0885-5)
2. Basudev Bhattacharya, Machine Drawing includes Autocad Supplements, Oxford University Press India, First Edition, 2011, (ISBN 13: 9780198070771)
3. K. Venugopal, Prabhu Raja V., Engineering Drawing and Graphics, New age Publications, First Edition, 2008, (ISBN: 978-81-224-2457-7)
4. N B Shaha and B C Rana, Engineering Drawing, Pearson Education, 2012, (ISBN: 9788131798058)

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	English for Engineers
	COURSE CODE	HP103
	COURSE CREDITS	2
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	CA	
NIL	4	NIL	NIL	NIL	NIL	60	40	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP103.CEO.1: Introduce a variety of English texts to the students.
HP103.CEO.2: Teach basic English grammar.
HP103.CEO.3: Enrich the vocabulary of the students with AWL and NAWL
HP103.CEO.4: Guide the students to write in English coherently and formally.
HP103.CEO.5: Improve the students overall communicative competence in English through activities like group discussions and debates.
HP103.CEO.6: Develop the students reading and listening skills with the use of written audio and video texts.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP103.CO.1: Interpret texts written in English.
HP103.CO.2: Apply English grammar rules correctly.
HP103.CO.3: Choose and employ appropriate words from AWL and NAWL in communication.
HP103.CO.4: Develop sentence and text in English coherently and formally.
HP103.CO.5: Demonstrate overall improvement in communication skills.
HP103.CO.6: Analyze and infer from written, audio and video texts.

PRACTICAL:		
PRACTICAL NO.01	**Pronunciation and Phonemic Transcription**	**4 HOURS**
Identification of correct pronunciation of words by decoding phonemic scripts; writing phonemic transcriptions of the given words		
PRACTICAL NO.02	**Parts of Speech**	**3 HOURS**
Use of parts of speech in a sentence composition		
PRACTICAL NO.03	**Tenses**	**5 HOURS**
Use of tenses in day to day communication and academic writing		
PRACTICAL NO.04	**Vocabulary Enrichment and Common Errors**	**8 HOURS**
Online exercises on AWL and NAWL using web-based applications; Dictionary Skills and Common errors in grammar while speaking and writing English		
PRACTICAL NO.05	**Letter and Email Writing**	**4 HOURS**
How to write an email, characteristics and essentials of a good email, formal letter writing and layout of business letters		
PRACTICAL NO.06	**Essay Writing**	**4 HOURS**
What is an essay? Tips to write a good essay, Types of essays		
PRACTICAL NO.07	**Report Writing and Summarizing**	**4 HOURS**
Types of reports, format and writing a report, what is summarizing? Rules of summarizing		
PRACTICAL NO.08	**Group Discussion**	**4 HOURS**
Concept of GD, Criteria for evaluation, types of GD General, Creative and Technical, Dos and Donts, Guidelines for participation and success, Group Dynamics, Expression of thoughts and ideas, body language and interpersonal and analytical skills		
PRACTICAL NO.09	**Presentation Skills**	**4 HOURS**
Essentials of effective presentations; Data collection and compilation; Preparation of outlines; PPT and Prezi		
PRACTICAL NO.10	**Role Play**	**4 HOURS**
Role-play for verbal communication, team building and group dynamics, decision making, leadership, analytical and creative thinking, group presentation		
PRACTICAL NO.11	**Debate**	**4 HOURS**
Concept, Dos and Donts, Guidelines for participation and success, Expression of thoughts and ideas, body language and interpersonal and analytical skills		
PRACTICAL NO.12	**Listening Skills**	**4 HOURS**
Active listening; Conversations, audio and video clips; Listening with comprehension		

PRACTICAL NO.13	Reading Comprehension	4 HOURS
Techniques of reading- Intensive, Extensive, Skimming and Scanning; Reading Comprehensions		

REFERENCE BOOK

1. Ashok Thorat and Munira Lokhandwala: Enriching Oral and Written Communication in English, ISBN 9788125037446
2. Michael Swan: Practical English Usage, Oxford, 3rd Edition, ISBN-13: 978-0194420983
3. Dutt et.al. : A Course in Communication Skills, Foundation, 1 edition
4. Peter Roach: English Phonetics and Phonology, 4th Edition, Cambridge, ISBN-0521149215
5. Lynch: Listening, Cambridge, 1st edition, ISBN- 0521707757
6. Malcom Goodale: Professional Presentations, Cambridge, ISBN- 8175962577
7. S. Aggarwal: Essential Communication Skills, Ane Books pvt. Ltd, ISBN- 8180522806
8. Jennings: Communication Basics, Cengage Learning, 1st edition, ISBN- 8131515206

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	German Language
	COURSE CODE	HP104
	COURSE CREDITS	2
RELEASED DATE : 01/07/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
2	NIL	NIL	NIL	30	20	NIL	50

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP104.CEO.1: To introduce German as a foreign language and enhance knowledge, communication and intellectual capabilities which helps to improve cognitive skills and creativity vital for problem solving and innovation.

HP104.CEO.2: To develop an awareness of German culture along with providing better career opportunities later in life.

COURSE OUTCOMES:

The students after completion of the course will be able to,

HP104.CO.1: Participant will study the foundational aspects of grammar, develop comprehension of low to medium difficulty text and practice speaking about every day basic topics

HP104.CO.2: Develop basic communication and comprehension skills for conducting day-to-day business effectively

HP104.CO.3: Use simple, familiar expressions to interact with native speakers or when visiting Germany

HP104.CO.4: Enhance their knowledge of German culture and society

THEORY COURSE CONTENT		
UNIT 1		**2 HOURS**
Introduction- Alphabets, Numbers 0-20, Self Introduction and Introducing third person. Grammar- wh Questions(w-frage), pronouns.		
UNIT 2		**4 HOURS**
Greetings, Speaking about different Languages and Countries, numbers above 20, seasons Grammar- Yes or no Questions, Sentence Construction verbs and conjugations of regular verbs		
UNIT 3		**4 HOURS**
Speaking about hobbies and interests, different professions, weekdays, months Grammar- Nouns, Articles, conjugations of irregular verbs		
UNIT 4		**6 HOURS**
Vocabulary related to food, different places in the city, transport Grammar- Imperative sentence		
UNIT 5		**4 HOURS**
Relations, understanding clock timings Grammar- Cases, Nominative case, nominative verbs pronouns and articles		
UNIT 6		**6 HOURS**
Body parts, directions, asking for the address email address and telephone number Grammar- Accusative case, accusative verbs pronouns and articles		

TEXT BOOK

1. Netzwerk Deutsch als Fremdsprache- Kursbuch A1(Stefanie Dengler), Goyal Publications.

REFERENCE BOOK

1. https://www.klett-sprachen.de , https://www.duolingo.com/

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Japanese Language
	COURSE CODE	HP105
	COURSE CREDITS	2
RELEASED DATE : 01/07/2019	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
2	NIL	NIL	30	20	NIL	NIL	50

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP105.CEO.1: To perform daily basic activities including below mentioned.
HP105.CEO.2: Self Introduction, Greetings in Japanese.
HP105.CEO.3: Introduction to Japanese scripts- Hiragana, Katakana, Kanji.
HP105.CEO.4: Develop basic vocabulary throughgroup activities, videos.
HP105.CEO.5: Develop an understanding business etiquette.
HP105.CEO.6: Introduce topics related daily conversation, listening skills, cultural awareness.

COURSE OUTCOMES:

The students after completion of the course will be able to,

HP105.CO.1: Participant will study the foundational aspects of grammar, develop comprehension of low to medium difficulty text and practice speaking about every day basic topics.
HP105.CO.2: Develop basic communication and comprehension skills for conducting day-to-day business effectively.
HP105.CO.3: Use simple, familiar expressions to interact with native speakers or when visiting Japan.
HP105.CO.4: Enhance their knowledge of Japanese culture and society.

THEORY COURSE CONTENT		
UNIT 1		**4 HOURS**
How to give self-Introduction in Japanese, Greetings in Japanese.		
UNIT 2	**Hiragana, vocabulary and listening.**	**4 HOURS**
How to give self-Introduction in Japanese, Greetings in Japanese.		
UNIT 3		**4 HOURS**
Hiragana and Katakana, and Japanese games.		
UNIT 4		**4 HOURS**
Family Members understanding in Japanese. and Vocab.		
UNIT 5		**5 HOURS**
Japanese cultures study, and business etiquette.		
UNIT 6		**5 HOURS**
Daily conversation and cultural study.		

TEXT BOOK

1. Minna Na Nihongo, Goyal Publications.

REFERENCE BOOK

1. Nil

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Logic Development- C Programming
	COURSE CODE	CS101
	COURSE CREDITS	3
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		**EXAMINATION SCHEME & MARKS**						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	IA	
1	4	NIL	40	NIL	30	30	40	140

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CS101.CEO.1: Develop programming skills using the fundamentals and basics of C Language.

CS101.CEO.2: Enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.

CS101.CEO.3: Teach the issues in file organization and the usage of file systems.

COURSE OUTCOMES:

The students after completion of the course will be able to,

CS101.CO.1: List the various data types, control structures and looping structures supported by C language.

CS101.CO.2: Differentiate between various data types supported by C language.

CS101.CO.3: Implement the solutions for various algorithms in C language.

CS101.CO.4: Analyze various parameter passing methods to functions in C language.

THEORY COURSE CONTENT		
UNIT 1	**Fundamentals of C Language**	**2 HOURS**
Overview of C, Character set, Constants, Variables and Keywords, Data types (Primitive and Derived), Operators (arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operators) and Expressions (Type Conversion, precedence and order of evaluation), C Storage Classes, Managing Input and Output Operations, A structure of C Program, C Preprocessor, C Macro, Compilation, Execution, Debugging and Testing of C program.		
UNIT 2	**Control Structures**	**2 HOURS**
Decision Control Structure-If statement, if-else statement, Nested if-else statement, Ternary operator, Case Control structure- Switch Case Statements, GOTO statement, Loop Control Structure- while statement, do while statement, for statement, odd loop, nesting of loops, break and continue statement, finite & infinite Loop.		
UNIT 3	**Arrays and Functions**	**3 HOURS**
Arrays: Array Declaration and Initialization, Bounds Checking, Array arithmetic, One dimensional arrays and multi-dimensional Arrays, Strings - Standard Library String Functions, Array of strings. **Functions:** Function definition and prototype, Scope Rule of Functions, Calling Conventions, Passing Values between Functions - Call by Values and Call by References, Recursive functions, Passing Array Elements to a Function.		
UNIT 4	**Pointers**	**3 HOURS**
Pointers and Addresses, Pointer Notation & Arithmetic, Pointer to array, Array of pointers, Pointer to a function, Passing pointers as function arguments, Strings and Pointers, Structures and Pointers.		
UNIT 5	**User Defined Data Types**	**1 HOURS**
Structures & Union: Declaration of Structure and Union, Difference between Structure and Union, Accessing Structure Elements, How Structure Elements are Stored, Array of Structures.		
UNIT 6	**File Handling**	**2 HOURS**
File Operations-open, read, write, append, delete, Error Handling, File Opening Modes Using command line argument(argc and argv), line input and output operations, Miscellaneous Functions.		

PRACTICAL:		
PRACTICAL NO.01		**2 HOURS**
• Write a program in C to display "Hello World" • Write a menu driven program in C to display addition, subtraction, multiplication, division of two numbers		
PRACTICAL NO.02		**2 HOURS**
• Write a program in C to display the quotient and remainder after the division of two numbers • Write a menu driven program in C to demonstrate the use of left shift, right shift, and, or, xor operators		
PRACTICAL NO.03		**2 HOURS**
• Write a menu driven program in C to demonstrate the use of mathematical functions supported by math.h library • Write a program in C to display the grade obtained by the student in a course. The input will be the marks obtained and the output will be the grade obtained		
PRACTICAL NO.04		**2 HOURS**
• Write a program in C to display first N numbers on the screen using while, do while and for loop • Write a program in C to display first N number in reverse order on the screen using while, do while and for loop		
PRACTICAL NO.05		**2 HOURS**
Write a program in C display various patterns using *		
PRACTICAL NO.06		**2 HOURS**
• Write a program in C to display the addition of N numbers stored in an array • Write a program in C to copy the array of N numbers into another array in reverse order • Write a program in C to display the minimum and maximum element in an array		
PRACTICAL NO.07		**2 HOURS**
• Write a program in C to display the prime numbers within a given range • Write a program in C to display the fibonacci series within a given range		
PRACTICAL NO.08		**2 HOURS**
Write a menu driven program in C to perform addition, subtraction, division and transpose of matrices		

PRACTICAL NO.09		**2 HOURS**
• Write a program in C to convert every lowercase letter to uppercase letter and vice versa in a given string • Write a program in C to implement the string functions using the standard library functions supported by string.h like: string length, string copy, string reverse, string concatenate, string compare, sub string		
PRACTICAL NO.10		**2 HOURS**
• Write a program in C using functions to display addition, subtraction, multiplication, division of two numbers • Write a program in C using functions to display the minimum and maximum element in an array		
PRACTICAL NO.11		**2 HOURS**
Write a program in C using functions to implement the string functions without using the standard library functions supported by string.h like: string length, string copy, string reverse, string concatenate, string compare, string palindrome		
PRACTICAL NO.12		**2 HOURS**
• Write a program in C using functions and pointers to display addition, subtraction, multiplication, division of two numbers • Write a program in C using function and pointers to swap two numbers		
PRACTICAL NO.13		**2 HOURS**
Write a program in C using function and pointers to demonstrate the use of pointer arithmetic by taking input in an array		
PRACTICAL NO.14		**2 HOURS**
• Write a program in C using recursion to display the factorial of a number • Write a program in C using recursion to display fibonacci series within a given range		
PRACTICAL NO.15		**2 HOURS**
• Write a program in C to accept the information of single student and store it in structure and display the same • Write a program in C to accept the information of students and store it in array of structure and display the same		

PRACTICAL NO.16		2 HOURS
• Write a program in C to display Semester Grade Point Average (SGPA). Input will be stored in array of structure • Write a program in C to demonstrate the concept of union		
PRACTICAL NO.17		**2 HOURS**
Write a program in C to read a single line from the file using functions like fgetc, fgets, fscanf, and fread		
PRACTICAL NO.18		**2 HOURS**
Write a program in C to write a single string in a file using functions like fputc, fputs, fprintf and fwrite		
PRACTICAL NO.19		**2 HOURS**
Write a program in C to display contents of whole file on the screen		
PRACTICAL NO.20		**2 HOURS**
Write a program in C to read and write the record stored in structure from file		
PRACTICAL NO.21		**2 HOURS**
Write a program in C to implement student information system using array of structures		
PRACTICAL NO.22		**2 HOURS**
Write a program in C to implement Linear Search and Binary Search		
PRACTICAL NO.23		**2 HOURS**
Write a program in C to check whether a given matrix contains a saddle point		
PRACTICAL NO.24		**2 HOURS**
Write a program in C to implement union and intersection of two sets		

TEXT BOOK

1. E. Balguruswamy , "Programming in ANSI C" , Tata Mc-Graw Hill
2. Yashvant Kanitkar, "Let Us C" BPB Publication
3. "Programming With C", Schaum Series

REFERENCE BOOK

1. Kernighan and Ritchie , "The 'C' programming language" , Prentice Hall
2. V. Rajaraman , "Computer Programming in 'C' " , Prentice Hall
3. R.G. Dromey , "How to solve it by Computer", Pearson Education

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Experimental Tools and Techniques
	COURSE CODE	ME105
	COURSE CREDITS	2
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	40	60	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME105.CEO.1: Introduce different tools and study various measurement techniques.
ME105.CEO.2: Study different parts of the system along with its functions and applications.
ME105.CEO.3: List various tools used for the said application.
ME105.CEO.4: Identify the function of various parts of the system.
ME105.CEO.5: Impart comprehensive knowledge for selection of appropriate techniques to the said application.
ME105.CEO.6: Apply the knowledge to find the solution for basic engineering problems.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ME105.CO.1: Recall the tools required for the measurements.
ME105.CO.2: Summarize the application of various engineering tools used.
ME105.CO.3: Identify the right tools for selected purpose.
ME105.CO.4: Inspect various parts of the system.
ME105.CO.5: Justify the most appropriate technique which can be compatible with the existing environment.
ME105.CO.6: Develop the system which will give appropriate solution to the identified problem.

PRACTICAL:		
PRACTICAL NO.01	**Information Technology/Computer Engineering (Any 6 Practicals from the following list)**	**12 HOURS**

1. Study and analysis of various components on the motherboard of a standard desktop computer
2. Installation of various components like hard disk drive on the motherboard and check the system setup for verification
3. Formatting the hard disk drive and installation of Windows and Linux operating system making the system dual boot
4. Study of various network components like switch, Router and configure the devices.
5. Crimping of Unshielded Twisted Pair cable. (Cat-6)
6. Study of TCP/IP Stack, and configure as well as develop a Local Area Network.
7. Configuration of Network Monitoring tool and checking the results
8. Installation of DHCP server and checking the results.
9. Installation of web server and checking the results.
10. Configuration of MS Access and Deploying Access 2007 Runtime-Based Solutions.
11. Study and usage of Google Tools (creating Forms, Blog).
12. Using the Google form with add on, create a PDF file of the form.
13. Designing a static HTML page
14. Uploading the pages using FTP server on a web site
15. Deploy a simple web site using LAMP server
16. Creation of a web site using Google sites.

PRACTICAL NO.02	**Electronics Engineering (Any 06 practicals from the following list)**	**12 HOURS**

1. Study of basic electronics component and Switches.
2. PCB and Soldering Tools and Technique.
3. Relay and application.
4. Domestic wiring for Extension Board and Inverter.*
5. Load test of D.C. series motor.*
6. Brake test on D.C. Shunt motor.*
7. Load test on 3-phase induction motor.
8. V-I Characteristics of Thyristor & measurement of holding & latching current
9. V-I Characteristics of MOSFET.
10. V-I Characteristics of IGBT.
11. V-I Characteristics of TRIAC.
12. Solar cell and application (Generation of Energy).
13. Speed control of DC Motor (Toy Motor)
14. Actuators and application (Electrical and Mechanical).

15 Study of Virtual Instrumentation.

16 Open IT : Optical Mouse, Cathode Ray Oscilloscope, Study of Power Supply PA System, CD Player, TV, Microwave oven (Any Two)

PRACTICAL NO.03	**Mechanical Engineering (Any 6 practicals from the following list)**	**12 HOURS**

1. Linear and angular measurements.
2. Measurement of transmission ratio in Belt drive, Chain drive, and Gear drive.
3. Measurement of RPM of rotating machine using contact and non-contact type tachometer.
4. Types of mechanism and making any one mechanism containing four links using cardboard.
5. Measurement of Barometric pressure, introduction to pressure measuring devices like bourdon tube pressure gauge and manometer. Fabrication of simple type manometer.
6. Introduction to temperature measuring devices. Making and calibration of thermo couple and using it with temperature indicator.
7. Measurement of Relative humidity of air in the lab.
8. Measurement of hardness of Steel and Aluminum.
9. Measurement of stiffness of helical spring (compression or tension)
10. Servicing of 2 wheeler and 4 wheeler system.
11. Study of various components of automobile system.
12. Open IT: Mixer or kitchen machine, Refrigerator, Boiler and accessories thermal power plant (Mini), Two stroke and four stroke engine, Introduction to threaded fasteners and joints using threaded fasteners. Bearing and its lubrication, Bicycle /Two wheeler/ 4 wheeler(Any Two)

PRACTICAL NO.04	**Chemical Engineering (Any 3 practicals from the following)**	**6 HOURS**

1. Determination of specific gravity of liquid
2. Study of molecular diffusion
3. Liquid liquid extraction: Separation of one liquid component from the solution.
4. Solid-liquid separation from filtration
5. Membrane Separation process
6. Fuel from Plastic
7. Demonstration of mechanical operation models.
8. Plate type heat exchanger
9. Water purifier (Household)

PRACTICAL NO.05	Civil Engineering (Any 3 Practicals from the following)	6 HOURS

1. To find the area and included angle of given plot and fix boundary from given plan.
2. To determine the level difference between 5 points with level tube and determine height of tower with trigonometry.
3. To draw the plan of given parcel of land to a given scale.
4. To draw line diagram of household water supply line and sewage line with list of materials used.
5. To draw line diagram of rain water harvesting unit with all details and its importance.
6. To make report on daily water requirement in public building and its waste water disposal, and reuse.
7. To identify and make report on the earthquake resisting structural members of building and its role.
8. To demonstrate the life saving do s and donts during the different natural calamities.
9. To demonstrate the dos and donts after different natural calamities.

Assessment	Common to all branches	4 HOURS

TEXT BOOK

1. Bruce Hallberg, Networking A Beginners Guide , 4th edition, Tata McGraw-Hill,2005, ISBN 0-07-060791-5
2. R.S. Khandpur, Printed Circuit Boards: Design, Fabrication, Assembly and Testing, Tata McGraw-Hill Education, 2005, ISBN 0070588147, 9780070588141.
3. S R Dara, Engineering Chemistry, 5th edition, S.Chand , ISBN 81-219-0359-9

REFERENCE BOOK

1. Mackenzie L. Davis, Water and Wastewater Engineering, 13th edition, Tata McGraw- Hill, ISBN 978-1-25-906483-8.
2. R. S. Khurmi, J. K. Gupta, Theory of Machines, 14th edition, S. Chand, ISBN 81-219-2524-X.
3. Philip Wankat, Seperation Process Engineering , 3rd edition, Pearson, ISBN 978-93-325-2484-2.
4. N.V. Ragvendra, L. Krishnamurthy, Engineering Metrology and Measurements, Oxford University Press, ISBN 978-0-19-808549-2.
5. . Dr. Vinod Hosur, Earthquake- Resistant Design of Building Structures, Wiley, ISBN 978-81265-3859-1.
6. M. S. Shetty, Concrete Technology, S. Chand, 2008, ISBN 9788121900034.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Design Thinking
	COURSE CODE	ME106
	COURSE CREDITS	2
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	40	NIL	60	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME106.CEO.1: Disseminate the philosophy of design thinking.
ME106.CEO.2: Impart the information regarding User centric approach.
ME106.CEO.3: Give exposure to information collection tools to clearly define user centric problem.
ME106.CEO.4: Enhance thinking in order to inspect diverse solutions.
ME106.CEO.5: Sensitize about the feasibility, desirability and viability criterias for selection of Appropriate solution.
ME106.CEO.6: Educate about different types of prototyping.

COURSE OUTCOMES:

The students after completion of the course will be able to,

ME106.CO.1: Recall fundamental principles of design thinking.
ME106.CO.2: Explain all the dimensions of user and his needs using design thinking approach.
ME106.CO.3: Outline user centric problem by using information gathering techniques.
ME106.CO.4: Compare multiple solutions through ideation process.
ME106.CO.5: Interpret most appropriate solution for defined user centric problem.
ME106.CO.6: Develop the most optimum solution.

PRACTICAL:		
PRACTICAL NO.01	**Human Centred Design**	**2 HOURS**
Introduction to Human Centred Design, Human Centred Design Phases, Human Centred Design Process, Human Centred Design case study		
PRACTICAL NO.02	**Research Methodology (Problem Definition, Information Gathering)**	**4 HOURS**
Design thinking Models & Methodology - General Problem Statement, Random check list, mind mapping Categorization of random check list. Brainstorming of problem areas, Research Methodology - Information gathering - Primary, Secondary Sources, data presentation, Preparation of survey forms, Survey Analysis, Drawing Inference.		
PRACTICAL NO.03	**Ideation**	**4 HOURS**
SWOT analysis, Vein Diagram (User Desirability, Feasibility, Viability check) Drawing inferences, Translation of inferences into design criteria, specific problem statement, Ideation free hand sketching drawing of simple form of products (Isometric views, layout, circuit diagram, Ideation sketches), Ergonomic and aesthetic consideration in design.		
PRACTICAL NO.04	**Prototyping**	**2 HOURS**
Concept validation, evaluation and detailing, Different methods of Prototyping, selection of right method of prototyping.		
PROJECT		**40 HOURS**
PRACTICAL NO.05	**Phase 1 : General Problem Statement and problem background**	**4 HOURS**
PRACTICAL NO.06	**Phase 2 : Research methodology**	**4 HOURS**
PRACTICAL NO.07	**Phase 3 : Product Specification**	**4 HOURS**
PRACTICAL NO.08	**Phase 4 : Ideation**	**6 HOURS**
PRACTICAL NO.09	**Phase 5 : Concept Evaluation, Validation and Concept detailing**	**8 HOURS**
PRACTICAL NO.10	**Phase 6 : Prototyping**	**10 HOURS**
PRACTICAL NO.11	**Phase 7 : Documentation**	**4 HOURS**

TEXT BOOK

1. Emrah Yayici, Design Thinking Methodology Book, Amazon Digital Services LLC - Kdp Print Us, 2016, ISBN: 6058603757, 9786058603752
2. Idris Mootee, Design Thinking for Strategic Innovation, Wiley (2017), ISBN-13: 978-8126572694
3. Thomas Lockwood, Design Thinking: Integrating Innovation, Customer Experience, and Brand Value, Allworth Press; Original edition (10 November 2009), ISBN-13: 978-1581156683

REFERENCE BOOK

1. Harper Perennial, Lateral Thinking: Creativity Step by Step; Reissue edition, 2015 (Perennial Library).
2. John Chris Jones, Design Methods, John Wiley & Sons, David Fulton Publishers, London, 1980, ISBN 0-471-28496-3.
3. Nigel Cross, Design Thinking: Understanding How Designers Think and Work, Berg Publishers (May 15, 2011), ISBN-13: 978-1847886361
4. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, Published September 29th 2009 by Harper Business, ISBN 0061766089

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Statistics and Integral Calculus
	COURSE CODE	AS107
	COURSE CREDITS	4
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	1	20	40	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS107.CEO.1: Study different statistical methods for solving problems.
AS107.CEO.2: Analyze different probability distribution functions.
AS107.CEO.3: Extend the basic concepts of integration for evaluation of complex integration problems.
AS107.CEO.4: Categorize and use equation of curves to trace the given curve.
AS107.CEO.5: Demonstrate an understanding towards evaluating multiple integrals.
AS107.CEO.6: Relate and examine the applications of multiple integrals.

COURSE OUTCOMES:

The students after completion of the course will be able to,

AS107.CO.1: Assess statistical problems.
AS107.CO.2: Solve the probability distribution problems.
AS107.CO.3: Evaluate complex integrals.
AS107.CO.4: Sketch curves by analyzing the given equation of curves.
AS107.CO.5: Evaluate the multiple integrals.
AS107.CO.6: Apply the knowledge of multiple integrals to solve engineering problems.

THEORY COURSE CONTENT		
UNIT 1	**Statistics**	**6 HOURS**
Measures of central tendency, standard deviation, coefficient of variation, moments, skewness and kurtosis, correlation(Karl Pearsons coefficient of correlation) and regression		
UNIT 2	**Probability**	**6 HOURS**
Probability, probability density function, probability distribution: Binomial, Poisson, Normal		
UNIT 3	**Integral Calculus**	**7 HOURS**
Reduction formulae, Gamma function, Beta function, Differentiation under integral sign.		
UNIT 4	**Curve Tracing and Rectification**	**7 HOURS**
Tracing of Curves: Cartesian curves, Parametric curves, Polar curves. Rectification: Rectification of Cartesian, Parametric and Polar curves		
UNIT 5	**Multiple Integrals**	**7 HOURS**
Double Integration, Evaluation of Double Integration, Change of order of integration, Integration by transforming Cartesian to Polar Coordinate system, Triple integration, Integration by transforming to spherical and cylindrical polar coordinates		
UNIT 6	**Applications of Multiple Integrals**	**6 HOURS**
Applications of multiple integrals to find Area, Volume, Centre of Gravity, and Moment of Inertia		

TUTORIAL: Problem solving session		
TUTORIAL NO.01		**1 HOURS**
Measures of central tendency, standard deviation, coefficient of variation		
TUTORIAL NO.02		**1 HOURS**
Moments, skewness and kurtosis		
TUTORIAL NO.03		**1 HOURS**
Correlation and regression		
TUTORIAL NO.04		**1 HOURS**
Probability, probability density function, Probability distribution: Binomial		
TUTORIAL NO.05		**1 HOURS**
Probability distribution: Poisson, Normal. Reduction formulae, Gamma function		
TUTORIAL NO.06		**1 HOURS**
Beta function, DUIS Rule1 & 2.		

TUTORIAL NO.07		**1 HOURS**
Tracing of Cartesian, Polar and Parametric curves.		
TUTORIAL NO.08		**1 HOURS**
Rectification of Cartesian, Polar and Parametric curves.		
TUTORIAL NO.09		**1 HOURS**
Double Integration, Evaluation of Double Integration, Change the order of integration, Integration by transforming Cartesian to Polar Coordinate system		
TUTORIAL NO.10		**1 HOURS**
Triple integration, Integration by transforming to spherical and cylindrical polar coordinates. Applications of multiple integrals: To find Area, Volume		
TUTORIAL NO.11		**1 HOURS**
Applications of multiple integrals: To find Centre of Gravity of an arc, plane lamina and a solid.		
TUTORIAL NO.12		**1 HOURS**
Applications of multiple integrals: To find Moment of Inertia about an arc, plane and solid		

TEXT BOOK

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd, 2015, ISBN: 9788126554232, 8126554231,
2. B.S. Grewal ,Higher Engineering Mathematics ,39th edition, Khanna Publications,2005 , ISBN: 81-7409- 195-5

REFERENCE BOOK

1. G.B. Thomas & R.L.Finney, Calculus, 9th edition, Pearson Education, 2002, ISBN: 81-7758-325-5.
2. Dr. B.V. Ramana ,Higher Engineering Mathematics,4 th edition, Tata McGraw Hill,2016, ISBN: 978-0-07-063419-
3. R.K. Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing house,2002,ISBN No.0849324173
4. Peter V. ONeil , Advanced Engineering Mathematics,7th Edition , Cenage Learning ,2012, ISBN-13: 9788131503102.
5. Dennis G. Zill & Warren S. Wright ,Advanced Engineering Mathematics ,4th edition ,Jones and Bartlett Publishers, 2011, ISBN-10: 0-7637-7966-0, ISBN 13: 978-0-7637-7966-5.
6. Douglas C. montgomery , George C runger ,Applied statistics and probability for engineers, 5 th edition, wiley ,2012, ISBN No: 9788126537198, 8126537191 .
7. Richard A Johnson, Irwin Miller,John freund ,Miller & Freunds Probability and statistics for engineers 8th edition, Pearson, 2011,ISBN no:978-93325-5041-4.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2019 - 2020
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Applications Programming-Python
	COURSE CODE	CS102
	COURSE CREDITS	3
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	IA	
1	4	NIL	40	NIL	30	30	40	140

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CS102.CEO.1: Get familiar with basics of Python programming.
CS102.CEO.2: Understand usage of conditional and looping statements in Python.
CS102.CEO.3: Learn different simple data structure supported in Python.
CS102.CEO.4: Acquire knowledge and skills of strings and dictionary.
CS102.CEO.5: Implement Object Oriented Programming concepts using Python.
CS102.CEO.6: Introduce the concepts of Pandas & NumPy.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS102.CO.1: Debug syntax and semantics in Python programs.
CS102.CO.2: Demonstrate proficiency in handling strings and file system.
CS102.CO.3: Implement the programs using core data structures like Lists and Dictionaries.
CS102.CO.4: Interpret the concepts of Object Oriented Programming in Python
CS102.CO.5: Develop solution for real life problems using Python.

THEORY COURSE CONTENT		
UNIT 1	**Python Fundamentals and Data Handling**	**2 HOURS**
Introduction, Features of Python, History and Future of Python, Writing and executing Python program, Literal constants, variables and identifiers, Data Types ,Mutable and immutable types, Input output operation , Comments, Reserved words, Indentation, Operators and expressions.		
UNIT 2	**Decision and Iterative Statements**	**2 HOURS**
Introduction to Decision Statements: Decision control statements, Selection/conditional branching Statements: if, if-else, nested if, if-elif-else statements. **Introduction to Iterative Statements:** Basic loop Structures/Iterative statements: while loop, for loop, selecting appropriate loop. Nested loops, break, continue, pass, else statement used with loops.		
UNIT 3	**List manipulation, Tuples and Python Function**	**2 HOURS**
List: Introduction, creating & accessing lists, list operations, working with lists, list functions & methods. **Tuples:** Introduction, creating & accessing tuples, tuples operations, tuples functions & methods. **Functions:** Need for functions, definition, call, variable scope and lifetime, the return statement. Defining functions, Lambda or anonymous function, documentation string, good programming practices. Introduction to modules, Introduction to packages in Python, Introduction to standard library modules.		
UNIT 4	**Strings and Dictionary**	**3 HOURS**
Strings: Introduction, string operations- concatenation, appending, multiplication and slicing. Strings are immutable, strings formatting operator, built in string methods and functions. Slice operation, ord() and chr() functions, in and not in operators, comparing strings, Iterating strings, the string module. **Dictionary:** Introduction, working with dictionaries, dictionary functions and methods		
UNIT 5	**Object Oriented Programming**	**2 HOURS**
Programming Paradigms-monolithic, procedural, structured and object oriented, Features of Object oriented programming-classes, objects, methods and message passing, inheritance, polymorphism, containership, reusability, delegation, data abstraction and encapsulation. Classes and Objects: classes and objects, class method and self-object, class variables and object variables, public and private members, class methods		
UNIT 6	**Data Structure and Libraries in Python**	**2 HOURS**
Introduction to data structure, pandas, NumPy.		

PRACTICAL:		
PRACTICAL NO.01		**2 HOURS**
To accept an object mass in kilograms and velocity in meters per second and display its momentum. Momentum is calculated as e=mc2 where m is the mass of the object and c is its velocity.		
PRACTICAL NO.02		**2 HOURS**
Write a Python program for following conditions. • If n is single digit print square of it. • If n is two digit print square root of it. • If n is three digit print cube root of it.		
PRACTICAL NO.03		**4 HOURS**
Solve the Fibonacci sequence using recursive function in Python.		
PRACTICAL NO.04		**4 HOURS**
Write a Python program to print different patterns.		
PRACTICAL NO.05		**2 HOURS**
To accept students five courses marks and compute his/her result. Student is passing if he/she scores marks equal to and above 40 in each course. If student scores aggregate greater than 75%, then the grade is distinction. If aggregate is 60>= and <75 then the grade if first division. If aggregate is 50>= and <60, then the grade is second division. If aggregate is 40>= and <50, then the grade is third division.		
PRACTICAL NO.06		**4 HOURS**
To check whether input number is Armstrong number or not. An Armstrong number is an integer with three digits such that the sum of the cubes of its digits is equal to the number itself. Ex. 371.		
PRACTICAL NO.07		**2 HOURS**
Write a program in Python to enter two unequal nos. if first no. is greater than display square of the smaller no. and cube of the greater no. otherwise vice-versa. If no. are equal display the message both no. are equal find square, square root and cube root of a number.		
PRACTICAL NO.08		**4 HOURS**
Write a Python program to perform following string operations. a) String concatenation b) String Reverse c) String compare d) String length e) Palindrome f) Case change.		
PRACTICAL NO.09		**2 HOURS**
Select the number from the entered list and find its position in Python (use Linear Search).		
PRACTICAL NO.10		**4 HOURS**
Choose cricket team of eleven players find the captain of the team (consider tallest person as a captain) using dictionary.		

PRACTICAL NO.11		6 HOURS

1. Write Python class for bank customer with withdraw and deposit operations (use inheritance) (Introduce class, object concepts).
2. Using concepts of polymorphism write Python application program.

Write a Python program to perform addition and multiplication of 2 matrices.

PRACTICAL NO.12		4 HOURS

Write a Python program to convert a Panda module Series to Python list and it's type.

PRACTICAL NO.13		4 HOURS

Write a NumPy program for Plotting and analyzing data.

Mini Project:

1. Project is for a period of 2 weeks.
2. Group of two or three has to choose project topic from the list designed by concerned faculty of particular division.
3. Each group has to collect requirements for project and get approved by concerned teachers in first weeks.
4. implementation and testing need to be performed in second week.
5. Demonstration along with presentation need to be given as final project submission.
6. Project carries 20 Marks.

TEXT BOOK

1. Charles R. Severance, Python for Everybody: Exploring Data Using Python 3, 1st Edition, Create Space Independent Publishing Platform, 2016. (http://do1.drchuck.com/pythonlearn/EN_us/pythonlearn.pdf) (Chapters 1 13, 15)
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist, 2ndEdition, Green Tea Press, 2015. http://greenteapress.com/thinkpython2/thinkpython2.pdf) (Chapters 15, 16, 17) (Download pdf files from the above links)

REFERENCE BOOK

1. Charles Dierbach, "Introduction to Computer Science Using Python", 1st Edition, Wiley India Pvt Ltd. ISBN-13: 978-8126556014.
2. Mark Lutz, Programming Python, 4th Edition, OReilly Media, 2011.ISBN-13: 978-9350232873
3. Wesley J Chun, Core Python Applications Programming, 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365.
4. Roberto Tamassia, Michael H Goldwasser, Michael T Goodrich, Data Structures and Algorithms in Python, 1stEdition, Wiley India Pvt Ltd, 2016. ISBN-13: 978- 8126562176.

MIT | Academy of Engineering **Autonomous Institute Affiliated to SPPU**	**COURSE STRUCTURE (2019 - 2023)**		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING	**W.E.F**	**:**	**2020-2021**
SECOND YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**RELEASE DATE**	**:**	**01/06/2020**
	REVISION NO.	**:**	**0.1**

SEMESTER: III

SUMMER INTERNSHIP (**Audit:** CV200)

COURSE			**TEACHING SCHEME**			**EXAMINATION SCHEME AND MARKS**						**CREDIT**
TYPE	**CODE**	**NAME**	**Hour/Week**			**THEORY**			**PRACT**		**TOTAL**	
			L	P	T	MSE	ESE	IA	T/P	DM		
ESC6	ME221	Material Engineering	3	2		35	35	30	50	0	150	4
DC01	CV204	Geotechnical Engineering	3	2	-	35	35	30	50	0	150	4
DC02	CV205	Building Design & Construction	3	2	-	35	35	30	50	0	150	4
DC03	CV206	Mechanics of Solids	3	2	-	35	35	30	50	0	150	4
SDP3	ET224	Digital Prototyping	0	4	-	0	0	25	0	50	75	2
SDP4	CV230	Minor Project- Design	0	2	-	0	0	0	0	50	50	1
SDP5	CV23#	Skill Development Course 1-REVIT/EXCEL	0	4	-	0	0	25	0	50	75	2
ESC7	CV203	Environmental Science	1	-	-	-	-	-	-	-	Audit	
TOTAL			**13**	**18**	**0**	**140**	**140**	**170**	**200**	**150**	**800**	**21**

SEMESTER: IV

COURSE			**TEACHING SCHEME**			**EXAMINATION SCHEME AND MARKS**						**CREDIT**
TYPE	**CODE**	**NAME**	**Hour/Week**			**THEORY**			**PRACT**		**TOTAL**	
			L	P	T	MSE	ESE	IA	T/P	DM		
NSC5	AS203	Applied Mathematics	3	2	-	35	35	30	50	0	150	4
DC04	CV214	Mechanics of fluids	3	2	-	35	35	30	50	0	150	4
DC05	CV215	Surveying and Geospatial Engineering	3	2	-	35	35	30	50	0	150	4
DC06	CV216	Structural Analysis	3	2	-	35	35	30	50	0	150	4
SDP6	ET235	Rapid Prototyping	0	4	-	0	0	25	0	50	75	2
SDP7	CV240	Minor Project - Implementation	0	2	-	0	0	0	0	50	50	1
HSS3	HP202	Professional Skills	0	4	-	0	0	25	0	50	75	2
HSS4	HP203	Liberal Learning	1	0	-	-	-	-	-	-	Audit	
TOTAL			**13**	**18**	**0**	**140**	**140**	**170**	**200**	**150**	**800**	**21**

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Materials Engineering
	COURSE CODE	ME221
	COURSE CREDITS	4
RELEASED DATE : 01/07/2019	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	35	35	30	NIL	50	150

PRE-REQUISITE :

COURSE OBJECTIVES:

ME221.CEO.1: To illustrate the fundamental properties of various engineering materials and demonstrate the need and applications of different heat treatment processes to it.

ME221.CEO.2: To explain the structure- property co relationship as a basis for performance of materials.

ME221.CEO.3: To identify the most appropriate material and the required manufacturing process for the given project in the industry/research fields.

ME221.CEO.4: To categorize the various material testing methods and characterization techniques and make use of it to apply for given component/product.

COURSE OUTCOMES:

The students after completion of the course will be able to,

ME221.CO.1: Relate the applications of various engineering materials and heat treatment processes in material processing industry.

ME221.CO.2: Interpret the specifications, composition, concepts and fundamental properties of engineering materials applied in industrial/research field.

ME221.CO.3: Select the suitable materials, manufacturing process for specified application to meet the product performance requirements within its product service life.

ME221.CO.4: Analyze the suitable material testing and characterization technique to ensure service life for specific product without any failure or deterioration in its performance.

THEORY COURSE CONTENT		
UNIT 1	**Ferrous, Nonferrous metals and alloys**	**14 HOURS**

Basics of extractive metallurgy-

Importance of metallurgy in day to day life and in industry, Overview or introduction of raw material processes of steel (Melting, Continuous casting, rolling)

Ferrous metals-

Steels-Classifications and specifications of steels and cast iron as per ASTM, SAE and Indian Standard designation system. Iron (Fe)-Iron Carbide (Fe3C) equilibrium diagram, Critical cooling rate, transformation products of Austenite-Pearlite-Martensite, Alloy steels- High Strength Low Alloy (HSLA), Boron steel, Stainless steel- Austenitic, Ferritic, Martensitic, Maraging steels- Significance, composition and applications.

Cast Irons- Classification, Manufacturing, Composition, Properties & applications of white C.I., Grey cast iron, malleable C.I., S.G. cast iron, chilled and alloy cast iron, effect of various parameters on structure and properties of cast irons. Specific applications such as machine tools, automobiles, pumps, valves etc.

Heat treatment of steels- Time- Temperature Transformation Diagram, Annealing-Conventional, Normalizing, Comparison of Annealing and Normalizing, Hardening- effects of different media- water, oil, salt bath, Vacuum Hardening (Latest oxygen free Heat treatment), Tempering- High-medium-low temperature Defects due to heat treatment- Quench cracks, oxidation, overheating. Classification of surface hardening treatments- Carburizing, Nitriding, Carbonitriding, flame hardening, induction hardening, Anodizing

Non-ferrous metals- Classification, Composition, Properties & applications of: Copper and Its Alloys-Alpha, beta and gamma brasses, Nickel and Its alloys-Inconel- Monel-Invar-Elnivar-Alnico, Aluminium and Its alloys-LM6-LM11- LM13-LM14-Hinduminium (RR350).

Bearing materials and its applications- Properties of bearing materials, Materials-Tin based babbits, Lead based babbits, Gray Cast Iron, Non-metallic bearings-Nylon, Polyamide, Self-lubricating bearings-powder metallurgical bearings

UNIT 2	**Non-metallic materials-Polymers, Ceramics and Composites**	**8 HOURS**

Classification of polymers, Polymer types-thermoplastics-thermoset-Elastomers, Polymer synthesis and processing-injection moulding-extrusion-blow moulding-calendaring, Degradation of polymers-chemical, thermal-biological- mechanical. Polymer recycling methods Introduction to Advanced Ceramics-Barium Titanate, Barium Zirconium Titanate and Barium Calcium Titanate(BZT-BCT) Ferrites, Silicon Carbide, Alumina, Ceramics, its classifications and their applications. **High Performance Polymers:** Acrylo Butadiene Styrene- Polycarbonate-Polyamide, Polymethyl Methacrylate: Characteristic, properties and evaluation

Composites: Need of composites, fabrication and testing of composite material, Particle-reinforced composites, large-particle composites, dispersion-strengthened, Fiber-reinforced composites, polymer-matrix composites, metal-matrix composites, ceramic matrix composites, carbon–carbon composites, structural composites, laminar composites. Case study for industrial applications.

UNIT 3	Strength of materials	6 HOURS

Strengthening mechanisms: Refinement of grain size, Cold working/strain hardening, Solid solution strengthening, Dispersion strengthening. Heat treatment of nonferrous metals: Precipitation, Age hardening and homogenization Creep strength, High temperature-intergranular and low temperature-trans granular fracture of materials, Fracture toughness properties of materials applied in cryogenic and high temperature- rocket and aerospace applications, Fracture toughness improvement methods-shot peening

UNIT 4	Powder metallurgical materials	8 HOURS

Basic steps of powder metallurgy process, classification & methods of powder manufacturing, characteristics of metal powders, Conditioning of metal powders (Screening, Blending & mixing, annealing), Compaction techniques (cold compaction, hot compaction, Isostatic compaction & powder rolling), mechanism & importance of sintering, Pre-sintering & sintering secondary operations.
Advantages, limitations and applications of powder metallurgy. Production of typical P/M components (with flow charts), self-lubricated bearing, cemented carbides, cermets, refractory metals, electrical contact materials, friction materials, and diamond impregnated tools, friction plate, clutch plate, commutator brushes.

UNIT 5	Corrosion and its prevention techniques	6 HOURS

Classification of corrosion- Dry corrosion & wet corrosion, Mechanism of corrosion, Types of corrosion: Pitting corrosion, stress corrosion, season cracking, Cavitation corrosion, caustic embrittlement, intergranular corrosion, crevice corrosion, erosion corrosion, uniform corrosion, galvanic corrosion,
Corrosion prevention methods- classification of different methods, e.g. inhibitors, Cathodic & anodic protection, internal & external coatings, Low & High temperature corrosion. Design against corrosion.

UNIT 6	Introduction to Advanced Materials-Nanomaterials, Magnetic, Piezoelectric materials	6 HOURS

Nanomaterials-Basic concepts of Nano science and Nanotechnology,Nanomaterials synthesis methods- Top down and bottom up approach, Sol gel technique, solution blending, laser vaporization, arc discharge method Carbon nanotubes and its classification, Graphene Principle of SEM, TEM and AFM, X ray diffraction, Fundamentals principles of SEM, SE and BSE imaging modes, Fracture mode analysis and failure analysis using SEM.AFSEM-Correlative SEM-AFM analysis
Magnetic materials- Soft & Hard Ferrites, Vibrating Sample Magnetometer for studying hysteresis curve of magnetic materials.
Dielectric material- Piezo electric and Ferro electric materials and their applications, superconductors. Modern Materials for high, low temperatures and Cryogenic applications

PRACTICAL: **Perform the following experiments.**		
PRACTICAL NO. 1	Jominy End Quench Test	**2 HOURS**
Jominy End Quench Test for hardenability.		
PRACTICAL NO. 2	Izod Impact Test	**2 HOURS**
Izod impact test		
PRACTICAL NO. 3	Charpy Impact Test	**2 HOURS**
Charpy impact test		
PRACTICAL NO. 4	Hardness Test	**2 HOURS**
Vickers hardness test		
PRACTICAL NO. 5	Hardness Test	**2 HOURS**
Rockwell hardness test		
PRACTICAL NO. 6	Hardness Test	**2 HOURS**
Poldi hardness test		
PRACTICAL NO. 7	Dye Penetrant Test	**2 HOURS**
Dye Penetrant Test for detection of surface level flaws in materials		
PRACTICAL NO. 8	Ultra-sonic Test	**2 HOURS**
Ultra-sonic test for detection of internal flaws in materials.		
PRACTICAL NO. 9	Case study-based experimentation	**4 HOURS**
Selection and performance of suitable hardness testing method for the given industrial components.		
PRACTICAL NO. 10	Microstructural analysis of steels	**2 HOURS**
Microstructural analysis of steels		
PRACTICAL NO. 11	Microstructural analysis of Cast irons	**2 HOURS**
Microstructural analysis of Cast irons		

TECHNICAL PAPER PRESENTATION/PUBLICATION ASSESSMENT PROCESS

1. Course champion should conduct meetings with faculty members, students from all disciplines for the given semester regarding following points-Importance of paper publication at SY level for placements/research work, plagiarism, research ethics, technical paper formation and publication process, demonstration of experimental and review paper formation.
2. Each faculty member should form students' groups in practical session as per students' interest domain selected from any content form the syllabus or from content beyond syllabus.
3. Each student groups will download the research papers, discuss the various technical points and doubts with peers and faculty member during the time left after conduction of practical in laboratory session as a continuous process for all weeks during semester.
4. In case of doubts are unsolved within particular practical session, then doubts are discussed within course meeting held weekly and the information is conveyed back to students to complete the loop.
5. Faculty members should display the list of Scopus/web of science indexed journals with no article processing fee or SPPU UGC CARE included journals' list and list of conferences scheduled within the semester to students and motivate students to prepare drafts.
6. The drafts are prepared by students and reviewed by faculty member, team of materials Engineering and then DRC should be done to receive suggestions on the paper draft.
7. The evaluation of the assessment can be said as complete if students' groups are able to
   (a) Publish the paper in journal or conference proceedings which are Scopus indexed or web of science indexed
   (b) Students' group has received the acceptance for the publication of their paper.
8. In case any students' group is not able to publish or receive the acceptance then minimum criteria is to communicate the paper and receive at least review 1 from reviewers of the paper with no major corrections. Communication to the journal for the paper with no major corrections and possibility of publication is mandatory for all project groups.

PROJECT BASED LEARNING- CONTENT BEYOND SYLLABUS

A group of 3 students will be given following set of experiments which needs to be performed to prepare a review report based on the practical observations, literature review discussions among peers and faculty members:

1. Identification of failure mode (cup/cone/brittle/ductile) of the given failed component obtained from any manufacturing company or workshop
2. Selection of suitable destructive and non-destructive testing method for the given component which has defects obtained from any manufacturing company or workshop

TEXT BOOK

1. Material Science & Metallurgy for Engineers, Dr. V.D. Kodgire & S. V. Kodgire, Everest Publications.31st Edition, ISBN No: 8186314008
2. Mechanical Behavior & Testing of Materials, A. K. Bhargava, C.P. Sharma P H I Learning Private Ltd. 2011 edition, ISBN No 13-9788120342507

REFERENCE BOOK

1. Engineering Metallurgy, Higgins R. A., Viva books Pvt. Ltd., 2004 ISBN No 13-9788176490276
2. Material Science & Engineering, Raghavan V., Prentice Hall of India, New Delhi. 2003 ISBN No 13-9788120324558
3. Introduction to Physical Metallurgy, Avner, S. H., Tata McGraw-Hill, 2014, ISBN 13-9780074630068
4. Materials Science & Engineering, W. Callister, Wiley Publications,2013, ISBN No 13-9788126521432
5. Physical Metallurgy for Engineers, Clarke D.S. & Varney W.R. Affiliated East-West Press, New Delhi ISBN No 13-978-8176710350

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Geotechnical Engineering
	COURSE CODE	CV204
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : Applied Mechanics

COURSE OBJECTIVES :

CV204.CEO.1: To describe the basics of soil and its importance in Civil Engineering.
CV204.CEO.2: To establish an understanding of the fundamental concepts of mechanics for soil.
CV204.CEO.3: To provide students with exposure to the systematic methods for solving geotechnical engineering related problems.
CV204.CEO.4: To give an experience in the implementation of Engineering concepts which are applied in field of Geotechnical Engineering

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV204.CO.1: grade engineering properties of soil based on index property by performing relevant experiments.
CV204.CO.2: explain seepage and flow net.
CV204.CO.3: choose suitable method for improvement in soil characteristics.
CV204.CO.4: apply basic soil mechanics principle to calculate various stresses induced in soil.
CV204.CO.5: calculate the stability of slope.
CV204.CO.6: evaluate bearing capacity of soils.

THEORY		
UNIT 1	**Introduction to Soil and Site Investigation**	**6 HOURS**
Introduction to Geotechnical Engineering, Introduction to soil. Properties of soil and their significance. Soil structure and classification systems. Weight volume relationship, (Study of working model on soil structure) Purpose and planning of subsurface exploration. Methods of Investigation, DCPT, SCPT and Demo- SPT. Case Study: Geotechnical investigation planning of subway projects in urban areas Self Study: Three phase soil system		
UNIT 2	**Permeability and Seepage**	**6 HOURS**
Darcys Law, Validity of Darcys Law, Laboratory and field tests for determination of permeability. Seepage and Seepage Pressure, hydraulic gradient, Laplace equation, Flow Net, Demonstration: Construction of model for flow net though earthen body. Case Study: A Case Study on Seepage Failure of Hauser Lake Dam Self Study: Introduction to permeability of soils.		
UNIT 3	**Compaction and Consolidation**	**6 HOURS**
Introduction to compaction, Field compaction methods (Site Visits). Introduction to consolidation, spring analogy, Terzaghis consolidation theory, Lab methods of compaction and consolidation. Case Study: A case study on Soil Improvement with Heavy Dynamic Compaction Self Study: compaction equipment's		
UNIT 4	**Stresses In Soil and Shear Strength of Soil**	**12 HOURS**
Stresses in Soil Boussinesqs theory, Pressure bulb and Westergaards theory, Contact Pressure distribution. Earth Pressure-, Rankines theory, Coulombs Wedge theory. Shear Strength of Soil Shear strength- an Engineering Property. Mohr-Coulomb failure theory. The effective stress principle-Total stress, effective stress and neutral stress / pore water pressure. Case Study: Hai Phong City, Viet Nam Shear Resistance and Stability Study of Embankments. Self Study: Introduction to stress and shear strength of soil		
UNIT 5	**Stability of Slope**	**4 HOURS**
Modes of slope failure, Stability analysis finite and Infinite slope, Taylors stability Case Study: Soil nailing behaviour for slope stabilization Self Study: Introduction to slope		
UNIT 6	**Bearing Capacity of Soil and Foundation**	**6 HOURS**
Bearing capacity of soil, bearing capacity analysis: list of methods and field tests, types of shear failure, Settlement and its types, its causes and remedial measures. Case Study: Investigation of Foundation Failure of a Residential Building. Self Study: Types of Foundation		

PRACTICALS/PROJECT: Project should be perform in a group of 5 students		
PROJECT	**Preparation of Soil mass**	**14 HOURS**
Prepare a sub grade of 1m X 1m X 0.15m with well graded locally available soil having dry density of 1.85 gm/cc. Also find for atterberg's limits and coefficient of permeability. Objective: 1) Find water content, Sp. Gravity, and Bulk Density of Borrow soil 2) Calculate dry density and required quantity of borrow soil 3) Find and fix the gradation of soil 4) Find required W.C. to compact soil embankment at given dry density 5) Compact embankment at site Note: All tests must follow relevant I.S. codes OR Prepare trapezoidal shape hearting of an earthen dam of given dimension using well graded locally available soil having dry density of 1.85 gm/cc. Also check for atterberg's limits and coefficient of permeability. Objective: 1) Find water content, Sp. Gravity and Bulk Density of Borrow soil 2) Calculate dry density and required quantity of borrow soil 3) Find and fix the gradation of soil 4) Find required W.C. to compact hearting at given dry density 5) Compact embankment at site Note: All tests must follow relevant I.S. codes		
PRACTICAL NO.01	**Shear strength of the soil**	**2 HOURS**
To find the unconfined compressive strength of cohesive soil		
PRACTICAL NO.02	**Shear strength of the soil**	**2 HOURS**
To find the shear strength parameters of the soil by direct shear test		
PRACTICAL NO.03	**Shear strength of the soil**	**2 HOURS**
To find the Shear strength of cohesive soil using vane shear test		
PRACTICAL NO.04	**Shear strength of the soil**	**2 HOURS**
To find the Shear strength of cohesive soil using triaxial shear test		
PRACTICAL NO.05	**Consolidation of soil**	**2 HOURS**
To find the consolidation test on soil using oedometer		

TEXT BOOK

1. Gopal Ranjan and A. S. Rao, Basic and Applied Soil Mechanics, G. K. Publications Pvt. Ltd, Dec. 2006, ISBN : 978-81-224-1223-9
2. V. N. S. Murthy, Soil Mechanics and Foundation Engineering, B. S. Publications, Dec 2009, ISBN 0 324 06680 5.
3. B. C. Punmia, Soil Mechanics and Foundation Engineering, Laxmi Publishing Co, Dec. 2005, ISBN: 81-7008-081-9.
4. Dr. K .R. Arora, "Soil Mechanics and Foundation Engineering", (8th Edition) 2015, Standard Publishers, ISBN:81-8014-112-8

REFERENCE BOOK

1. Joseph E Bowles, Engineering Properties of Soils And Their Measurements, McGraw Hill Publications, 1992, ISBN: 0070067783, 9780070067783.
2. Palanikumar. M, Soil Mechanics, PHI Learning Private Limited, 2013, ISBN: 978-81-203-4838-7
3. R. F. Craig "Craigs Soil Mechanics", E and FN Spon an imprint of Chapman and Hall, 2012, ISBN: 0-415-32702-4, 0-415-32703-2.
4. Venkatramaiah, C. Geotechnical Engineering, (3rd edn.) New Age International Publishers, New Delhi, 2006.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Building Design and Construction
	COURSE CODE	CV205
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	Nil	150

PRE-REQUISITE : Engineering Graphics

COURSE OBJECTIVES :

CV205.CEO.1: To implement the various building bye laws.
CV205.CEO.2: To know the different rules and regulation for development of any area
CV205.CEO.3: To identify the different types of building materials and components.
CV205.CEO.4: To understand the green building concept and terminologies.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV205.CO.1: design functionally a single/multi-storied building for various components of residential/commercial units.
CV205.CO.2: implement relevant bye laws in functional design of buildings in a prescribed locality in India.
CV205.CO.3: select suitable types of basic building material and masonry used for construction of various types of buildings
CV205.CO.4: explain various components of buildings namely forms of floors, roofs, doors, windows, arches, lintels, staircases.
CV205.CO.5: select suitable type of formwork and scaffolding.
CV205.CO.6: describe green building concept and Rating Systems.

THEORY		
UNIT 1	**Introduction to Building and Planning**	**7 HOURS**
Definition and different types of buildings. Components of buildings. Types of structure. Types of foundation, Principles of Planning and Design. Rules for ventilation, lighting .Types of drawings. Conventions as per IS 962. (Self-Study : DCPR: Provisions for high rise development and structural safety)		
UNIT 2	**Bye Laws and Legal Aspects**	**7 HOURS**
A. Necessity of bye laws. Different rules and regulation according to NBC and IS. Types of areas and area calculations. B. Different permissions and certifications required before, during and after building construction, permissions and procedure for land acquisitions. (Self-Study : Introduction RERA)		
UNIT 3	**Masonry Construction**	**6 HOURS**
Brick masonry: types of bonds, construction procedure and supervision, Block masonry: Hollow, Solid, CLC, ACC, cavity wall construction, Pointing and Painting Purpose, types and procedure, (Self-Study : Stones masonry: procedure for UCR and CR masonry)		
UNIT 4	**Building Components**	**6 HOURS**
A: Doors and Windows: Types, materials used, purposes. B: Floors and Roofs: Types, materials used, purposes. Lintels: Need and types of lintels,Staircase: types, design. (Self-Study : Arches: principle of arch action, types of arches, method of arch construction)		
UNIT 5	**Formwork and Scaffolding**	**6 HOURS**
Formwork: Timber, Aluminum, Mivan and Plastic, Slip form work: component parts, Procedure for erection and checking of formwork. Scaffolding: Purpose, types and suitability. (Self-Study : Introduction and types of basic building materials)		
UNIT 6	**Green Building**	**4 HOURS**
Concept of green building, Salient features, Materials, Planning, Rating Systems- LEED, GRIHA. (Self-study : BREEAMS, Green Building challenge Assessment Framework)		

PRACTICALS/PROJECT: Project should be perform individually		
PROJECT NO.01	**Residential building**	**18 HOURS**
Draw following plans of a G+1 residential multistoried building having minimum B/U area 125 square meter also minimum one cantilever projection and overhead water tank required by using computer software (AutoCAD) and prepare brochure containing following drawings Lay out plan Line Plan Development Elevation. Section. Foundation Plan		
PRACTICAL NO.01	**Commercial or Public building**	**6 HOURS**
Draw line plans of two different commercial or public building with scale 1:50 or 1:100 (hand sketch)		
PRACTICAL NO.02	**Site Visit**	**4 HOURS**
Site visit and technical report on the visit (Minimum Two). (Visit should contain Stage of visit, related sketches of components-C/S-Dimensions, Materials used, site plan sketch and detailed report etc.)		

TEXT BOOK

1. Punmia B.C., Building Construction, Laxmi Publications Delhi, sixth edition, 2009, ISBN: 81-7008-053-3
2. Shaha M.G., Kale C.M., Principles of Building Drawing, Macmillan Publishers India Limited, Fourth edition, 2010, ISBN-0333925467
3. Duggal S. K., Building Materials, New Age International Limited, First Edition, 2003, ISBN -81222414354

REFERENCE BOOK

1. Shah, kale and Patki, Building Drawings with an Integrated Approach to Build Environment, Tata McGraw Hill Publications, Fifth edition, 2015, ISBN- 0071077871
2. Rangwala, Civil Engineering Drawing, Charotar Publications, First Edition, 2017, ISBN - 9789385039300
3. Rangwala, Building Construction, Charotar Publications, 33rd Edition, 2017, ISBN - 978-93-85039-04-1

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Mechanics of Solids
	COURSE CODE	CV206
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : Applied Mechanics

COURSE OBJECTIVES :

CV206.CEO.1: To analyze axially loaded bars, beams, columns and shafts subjected to torsion.

CV206.CEO.2: Learner should be able to identify most critical locations, planes and critical direct and shear stresses for various loading scenarios on different types of structures.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV206.CO.1: enlist and explain different types of actions on a structural component[Understand].

CV206.CO.2: draw axial force diagrams for axially loaded members, shear force diagrams and bending moment diagrams for statically determinate beams and twisting moment diagram for statically determinate shafts[Apply].

CV206.CO.3: Draw bending stress distribution diagram for beams and shear stress distribution diagrams for beams and shafts. [Apply].

CV206.CO.4: Calculate load corresponding to elastic instability for columns with various end conditions[Apply].

CV206.CO.5: Calculate principal stresses and absolute maximum shear stresses at various locations of a structural component using analytical method and Mohrs circle whichever is suitable[Analyse].

CV206.CO.6: Select particular shape of cross section to economically carry calculated bending/shear stresses under flexure/shear[Evaluate]

THEORY		
UNIT 1	**Linear elasticity**	**6 HOURS**
Deformation and strain, concept of the stress, constitutive matrix for isotropic matrix, strain energy, composite sections subjected to axial/flexure/temperature loading Simulation/ Demonstration : compute change in stress strain and volume using excel or any suitable computational program.		
UNIT 2	**Axially loaded bars and torsion of shafts**	**6 HOURS**
Axial force diagram, deformation of axially loaded bars, axially composite bars, composite bars subjected to temperature change, twisting moment diagram, torsion formula, angle of twist, torsion of prismatic shafts, shear stress distribution.		
UNIT 3	**Shear force diagram and bending moment diagram**	**8 HOURS**
Introduction, relations between shear force diagram and bending moment at a section, forward and reverse problems. Case studies: Observe locations of flexure and flexure-shear failures in the beams and correlate them with shear force diagram and bending moment diagram. Field studies: Shapes of beams in steel structures/ RCC structures, amount of steel and its correlation with variation of bending moment.		
UNIT 4	**Stresses in beams**	**8 HOURS**
Bending formula, bending stress distribution and shear stress distribution in a beam, economic shape of cross section of beam to maximize moment of inertia. Programming: compute bending and shear stresses at all locations in the prismatic or non-prismatic beams with various support conditions and for complex loading pattern. Reading: Research papers related with bending and shear stress in prismatic cross sections. Suggested: Reflections on following research paper, Minamino R and Tateno M, 2014, Tree Branching: Leonardo da Vincis Rule versus Biomechanical Models. PLoS ONE Volume 9, issue 4		
UNIT 5	**Principal planes and principal stresses**	**6 HOURS**
State of stress, state of pure shear, direct state of stress, analytical and graphical method of finding principal planes and principal stresses, maximum in-plane shear stress, absolute maximum shear stress. Simulation/ Demonstration : finding out critical planes and maximum shear and normal stresses in beams and shaft (under twisting) problems using any computational program.		
UNIT 6	**Columns**	**8 HOURS**
Stability of columns, Euler buckling of columns, Rankine's and Jhonson's interpretations of critical load on column, eccentric load, initially imperfect columns. Reading: Research papers related to inelastic stability of prismatic members. Suggested: Reflections on how high the trees can grow? Karl J N, 2006, Maximum plant height and the biophysical factors that limit it, Tree Physiology, Vol. 27, pp 433-440		

PRACTICALS: Experimental study may be checked using MATLAB or Excel		
PRACTICAL NO.01	**Tension test on metals.**	**4 HOURS**
Tensile strength of steel (M.S And TOR Steel)		
PRACTICAL NO.02	**Bending test**	**6 HOURS**
Four point monotonic and half cyclic bending test on timber/concrete beam/steel beam.		
PRACTICAL NO.03	**Torsion test on metals.**	**2 HOURS**
Torsion test on metals like aluminum, Mild steel specimens		
PRACTICAL NO.04	**Buckling test of column.**	**4 HOURS**
Buckling tests on columns with different end conditions		
PRACTICAL NO.05	**Desk experiments**	**6 HOURS**
Stiffness of spring, and effect of various combination of springs.		
PRACTICAL NO.06	**Simulation using MATLAB/ Excel**	**2 HOURS**
Using MATLAB/ Excel make simulation for the specimen tested in experiment no. 1, 2 and 3.		

TEXT BOOK

1. Beer F P, J. E. Russell Johnston, John T. DeWolf, and David F. Mazurek, Mechanics of Materials, McGraw-Hill, 7th edition, 2014, ISBN : 9780073398235
2. Gere J. M. and Timoshenko S. P., Mechanics of Materials, Boston: PWS Kent Publishing, 5th edition, 1970, ISBN: 9788123908946
3. S. S. Bhavikatti, Strength of Materials, Vikas Publishing House, 4th Edition, 2013, ISBN : 978-93259- 7157-8
4. S. Ramamrutham, R. Narayanan, Strength of Materials, Dhanpat Rai Publishing Company,9th edition, 2017, ISBN - 13: 978-9352164387.

REFERENCE BOOK

1. Nash W. A., Strength of Materials, Schaum's Outline Series, McGraw-Hill, 1994, 3rd edition, ISBN: 9780070843660
2. R.C.Hibbeler, Mechanics of materials, Prentice Hall, 2011, 8th edition, ISBN: 9780134321233
3. Egor P. Popov, Engineering Mechanics Of Solids, Pearson , 2nd Edition, 2010, ISBN: 9788178085357

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Digital Prototyping
	COURSE CODE	ET224
	COURSE CREDITS	2
RELEASED DATE : 01/07/2020	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	25	NIL	50	75

PRE-REQUISITE : ME104 - Engineering Graphics, EX102 - Electrical and Electronics Engineering, CV102 - Applied Mechanics

COURSE OBJECTIVES :

ET224.CEO.1: To learn about materiality and techniques.
ET224.CEO.2: To justify the product development cycle through prototype project.
ET224.CEO.3: To inculcate implementation of skills by proper budget planning with effective troubleshooting and practices in aesthetics & ergonomics.
ET224.CEO.4: To develop abilities to transmit technical information clearly and test the same by delivery of presentation based on the prototype Project.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET224.CO.1: Consolidate the techniques, skills and modern engineering tools.
ET224.CO.2: Apply acquired skills to the construction of a prototype project.
ET224.CO.3: Develop a prototype project by performing tasks in team.
ET224.CO.4: Demonstrate the work carried out in a team.

PRACTICAL

Course Introduction:

This course is aiming at a Project Based Learning methodology. Through a series of projects, students will learn to design, build, and debug engineering prototype systems. They will cover multiple aspects of the prototyping process.

Students will complete four modules in rotational manner,

1. Hardware Prototyping (HP)
2. Software Prototyping(SP)

In the module hardware prototyping students will develop a prototype of electronic product. Student will be acquiring different skills in electronics like Soldering, Wiring and PCB Design using Electronic Design Automated tools, Assembly of electronic product, Testing and troubleshooting, requirement Analysis , Product concept development in electronic product design.

On the other hand in software prototyping students will learn Software development life cycle (SDLC) concepts, AEIOU framework, UML diagrams, Requirement analysis, data flow diagrams, creating high fidelity prototypes, Testing and Analysis etc.

Each module will have on an average six laboratory sessions. The students will complete them in rotational manner. Every module will award for 75 marks.

Marks of two modules at a time will be averaged in one semester and if student secures passing marks (passing grade) after averaging; then the required credits of the course will be earned.

For Digital Prototyping, Semester - III

Module	**Programs**
a) Hardware Prototyping (HP)	SY BTECH Electronics Engineering, Electronics & Telecommunication Engineering, Computer Engineering, Information technology
b) Software Prototyping (SP)	

For Digital Prototyping, Semester - IV

Module	**Programs**
a) Hardware Prototyping (HP)	SY BTECH Civil Engineering, Mechanical Engineering, Chemical Engineering
b) Software Prototyping (SP)	

MODULE: 1/2	Hardware Prototyping (HP)	28 HOURS

PRACTICAL:

PRACTICAL NO. 01	Introduction to design and construction of electronic prototyping	02 HOURS

1. Gain familiarity with basic product design stages; Conceptualization, Detailed Design and Implementation. Form a group of students. (04 max)
2. Acquire concepts of basic processes in electronic prototyping. Develop Concept Description Sheet (CDS) for product to be designed.
3. Perform Brainstorming and develop a simple electronic product idea based on given pre-declared theme in given time span. Hence draw Physical and Mechanical Drawing.
4. Perform Customer Survey and Competitor Analysis
5. Develop Specifications and Make requirement analysis. Hence develop Bill of Material.
6. Develop a plan for construction of electronic proto from a concept.

PRACTICAL NO. 02	Basic electronic prototyping skills	02 HOURS

1. Soldering
   - Demonstrate structure of solder wire, soldering temperature, soldering station and gun.
   - Highlight Industrial safety norms, use of lead free solder, extractor fan etc.
   - Use of flux, desoldering gun, desoldering techniques, removing components/wires.
   - Fix Solder defects and inspect quality of solder joints.
2. Wiring
   - Cleaning, stripping and tinning the wires.
   - Connections and protections for wires.

PRACTICAL NO. 03	PCB design using basic Electronic Design Automation (EDA)tools	06 HOURS

1. Gain familiarity with PCB Design software.
2. Draw schematics for PCB design.
3. Make PCB layout as per circuit diagram. Learn PCB design standards.
4. Export PCB files like gerber (.gbr), .pdf etc.

PRACTICAL NO. 04	PCB fabrication	06 HOURS

1. Develop negative imprints of top and bottom sides and expose to PCB.
2. Perform etching process for PCB.
3. Perform cleaning and shearing for required size.
4. Check continuity of tracks.
5. Use drilling machine to make drills.

PRACTICAL NO. 05	Assembly and testing of electronic proto	08 HOURS

1. Make assembly of electronic prototype
2. Insert components, perform lead cutting with standard clearance.
3. Review mechanical fitment of PCB with component insertion.
4. Solder components and make wiring.
5. Test prototype for electrical functionality, to perform rework if required.
6. Assemble PCB with mechanical fitments and assemblies.
7. Analyze performance and compare with specifications.
8. Develop Customer feedback sheet and Take feedback from Customers.
9. Make Customer feedback Analysis based on ratings.

PRACTICAL NO. 06	Final project presentation	04 HOURS

1. Demonstrate an electronic prototype in a team.
2. Write a report on implementation of prototype. (10-15 pages max)
3. Present prototype implementation in a team by Power Point presentation.
4. Enumerate proposed specifications of electronic prototype.
5. Highlight financial aspects including proposed cost and bill of material.
6. Present Customer feedback analysis.

REFERENCE BOOK

1. Printed Circuit Boards: Design and Technology, Walter C. Bosshart, Tata McGraw-Hill Education, 1983, ISBN: 978-0074515495.
2. Electronic Assembly Fabrication, Charles A. Harper, 1st ed.,McGraw-Hill Education, 2002 ISBN: 978-0071378826.
3. Soldering in Electronics Assembly, Frank Riley, 1st ed., Springer, 2013, ISBN: 978-3-662-13163-3.
4. Electronic Techniques: Shop Practices and Construction, R. S. Villanucci, A. W. Avtgis, W.F. Megow, 6th ed., Practice-Hall, 1999. ISBN: 978-0130195661.
5. Printed Circuit Boards: Design, Fabrication, and Assembly, R. S. Khandpur, 1st ed. McGraw-Hill Education, 2005, ISBN: 978-0071464208.
6. Practical Electronics for Inventors, Paul Scherz , Simon Monk ,3rd Edition, McGraw-Hill Education, 2013, ISBN 978-0071771337 (Available on TAB edition, Kindle)
7. IPC-J-STD-001E-2010, Requirements for Soldered Electrical and Electronic Assemblies, IPC. , ISBN: 9781580986922.
8. IPC-A-610 D-2014, Acceptability of Electronic Assemblies, IPC. ISBN: 9781611931549.

MODULE: 2/2	**Software Prototyping (SP)**	**28 HOURS**
PRACTICAL		
PRACTICAL NO. 01	**Introduction to software engineering**	**04 HOURS**
Concepts, Software development life cycle (SDLC). Student need to use AEIOU Framework (Design Thinking) to decide the problem statement. Students will work in group of three on AEIOU framework		
PRACTICAL NO. 02	**Requirement analysis**	**04 HOURS**
Find the requirement specification of given problem statement and formulate the feasible solution.		
PRACTICAL NO. 03	**Design UML Diagrams for given problem statement**	**06 HOURS**
Students have to work in group on Project Development canvas and then design following, 1. Creation of data flow diagram 2. Creation of block diagram 3. Design a activity diagram		

PRACTICAL NO. 04	Design analysis	02 HOURS
Create High Fidelity Prototype		
PRACTICAL NO. 05	**Prototype Implementation**	**06 HOURS**
Use of prototype development tools such as Proto.io, Invision		
PRACTICAL NO. 06	**Presentation**	**04 HOURS**
Each group will be given 10 min to present their work.		

REFERENCE BOOK

1. Software Engineering A practitioners Approach, Roger S, Pressman, 7th Edition, ISBN: 9780073375977
2. Effective prototyping for software Makers, Jonathan Arnowitz, MIchaleArent by, ACM Digital Library,ISBN-13:978-0120885688
3. Rapid prototyping: Principles and applications in manufacturing, Chua, C. K., Leong, K. F. (1997). New York: Wiley, ISBN: 978-9812778987.
4. Fab - The coming revolution on your desktop - from personal computer to personal fabrication, Gershenfeld, N. (2005). New York: Basic Books. ISBN:978-0465027453
5. Rapid prototyping: Principles and applications, Noorani, R. (2006). Hoboken, NJ: Wiley.ISBN: 978-0-471-73001-9.
6. Rapid manufacturing: The technologies and applications of rapid prototyping and rapid tooling, Pham D. T.,Dimov S. S. (2001). New York: Springer. .ISBN: 978-1447111825
7. Digital design and manufacturing: CAD/CAM applications in architecture and design, Schodek D., Bechthold M., Griggs K., Kao K. M., Steinberg M. (2005). Hoboken, NJ: Wiley , ISBN: 978-0471456360

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY CIVIL ENGINEERING	**COURSE NAME**	Minor Project- Design
	COURSE CODE	CV230
	COURSE CREDITS	1
RELEASED DATE : 01/07/2020	**REVISION NO**	0.1

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	2	NIL	NIL	NIL	NIL	50	50

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CV230.CEO.1: To categorize and define a problem to be solved.
CV230.CEO.2: To realize the ethical principles in general and its importance.
CV230.CEO.3: To make the students aware of project requirement analysis, design and planning.
CV230.CEO.4: To appreciate the importance of documenting and ethics of writing.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV230.CO.1: Delineate the problem to be solved.
CV230.CO.2: Comprehend the paramount of the health, safety and welfare of the public in the practice of engineering profession.
CV230.CO.3: Embark project planning and design.
CV230.CO.4: Inculcate problem solving skills and critically analyze the options available to solve the problem.
CV230.CO.5: Cognize the importance of documentation and report writing.

COURSE ABSTRACT

It is a need of the time to pay attention to the societal needs by an engineering graduate to solve some of the real life societal problems by providing affordable technological solutions. The concept of the minor project follows the same theme. The minor project aims to identify the problems from the society and develop the solutions for the same using science and technology for the betterment of society or human life. This will help students to understand the process of product/project development, best practices and encourage their creativity to solve real life problems. The students will learn effective team building, designing, budgeting, planning, engineering skills and processes, safety norms and standards while developing the application/ product. The students will be able to understand importance of documentation and professional ethics.

Guidelines

1. Every student shall undertake the Minor Project in semester III and IV.
2. Every student shall work on an approved project, a group of 03/04 students (maximum) shall be allotted for each minor project.
3. The group members may be from different programme to support the interdisciplinary functioning.
4. The students have to identify the problem by discussion with various stakeholders, site visits, expert-opinions and various research articles.
5. Collect the sufficient data and survey to establish the criticality of the problem to be solved.
6. Apply various tools for project planning and design.
7. Critically analyze various solutions/techniques to solve real world problems.
8. Select and justify one of the solutions identified based on the feasibility, affordability and ease of use.
9. Learn and apply standards of engineering ethics and professional behavior.
10. Adherence to the highest principles of ethics, conduct and practices.

TIMELINE

The four member jury/committee will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the project guide. Assessment shall be done jointly by the guide and jury members.

1. Formation of Project Group: 2 Weeks (1^{st} week and 2^{nd} week)
2. Finalizing title, feasibility study and approval: 3 Weeks (3^{th} week to 5^{th} week)
3. Engineering Ethics: 3^{rd} week
4. Project Review 1 Presentation: 6^{th} week
5. Analysis and Design of the Project: 3 Weeks (7^{th} week to 9^{th} week)
6. Project Review 2 Presentation: 10^{th} week
7. Report Writing, Documentation and Presentation: 2 Weeks (11^{th} week and 12^{th} week)
8. Project Review 3 Presentation: 13^{th} week (Assessment by Guide)
9. Final Evaluation/Examination Presentation: 14^{th} week

Project Demonstration (50 Marks)

1. **Review 1 (Problem Statement and Literature Survey) (10 marks)**
2. **Review 2 (Project Modeling and Designing) (10 marks)**
3. **Project Activities (10 Marks)**
    - Quiz on Ethics
    - Drafting of Literature Review and Synopsis
    - Project Planning and Design
4. **Review 3 (Project Documentation) (10 marks)**
5. **Final Demonstration & Presentation (10 marks)**

WEEK NO	INSTRUCTIONS	STUDENT'S GROUP ACTIVITIES	EXPECTED OUTCOME
Week 1	Introduction to different forefront areas available within the School. Discussion on innovative application in domain area and resources such as Books, Blog, Publication Houses	To search the domain area of interest	At least 4 subtopics in area of interest (Template I)
Week 2	To brief at least two Innovative products with complete details and their Evolution	To search the domain area/innovative products of interest	Search in area of interest (Template II)
Week 3	Ethics, Morals, Values and Integrity, Work Ethic, Civic Virtue, Senses of Engineering Ethics, Business Ethics, Media Ethics, Environmental Ethics, Bio Ethics, Computer Ethics, Research Ethics	Graded Activity Quiz on Engineering Ethics	Understand the Ethics of an Engineer (Template III)
Week 4	Introduction to Research publication, its type, science citation index, methods to search Journals. Introduction to Ethics of writing(Plagiarism)	Search domain related five papers (from Journal Paper, Conference paper, Technical report, Manual, Thesis)	Student will learn searching SCI journal and understand Ethics of writing
Week 5	Presentation on how to make Project Presentation. Title, problem statement, objective, Scope etc (Select suitable topic of domain and explain it as per the template-IV)	Graded Activity on background study (market survey, customer survey, literature Survey) of domain area of interest	Drafting literature review and Synopsis (Template IV)
Week 6	NIL	Project Review 1 Presentation	Problem Definition and Objectives

WEEK NO	INSTRUCTIONS	STUDENT'S GROUP ACTIVITIES	EXPECTED OUTCOME
Week 7	Guidelines and tools for Analysis and Design of the Project and problem solving sessions	Analysis and Design of the Project	Best practices for Analysis and Design
Week 8	Guidelines and tools for the Project Planning, Introduction to Block Diagram, System Architecture	Make use of Project Planning Tools and Design Tools	Best practices for Project Planning and Design
Week 9	Presentation, discussion and doubt clearing based on • Working on Algorithms • Working on Design/ System Architecture • Working on Analysis/ CAD modeling	Graded Activity on Project Design and Planning	Best practices of Project Planning and Design
Week 10	NIL	Project Review 2 Presentation	Project Planning, Design of a solution
Week 11	Guidelines and tools for report writing	Project Report Writing	Effective Report Writing Practices
Week 12	How to give effective presentation on project	Report Writing and Presentation	Effective Documentation of the Project
Week 13	NIL	Project Review 3 Presentation	Final Report and Presentation
Week 14	NIL	Examination: Final Demonstration and Presentation	Problem Statement, Objectives, Design and Planning

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Skill Development Course 1
	COURSE CODE	CV231
	COURSE CREDITS	2
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	25	NIL	50	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CV231.CEO.1: To know the difference between a workbook and a worksheet
CV231.CEO.2: To use basic statistical functions
CV231.CEO.3: To understand basic chart functionality

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV231.CO.1: examine spreadsheet concepts and explore the Microsoft Office Excel environment.
CV231.CO.2: understand basic operators and the order of operations
CV231.CO.3: learn what a function is, and the syntax of a function
CV231.CO.4: apply basic math functions and logical operation
CV231.CO.5: creating Scripts in Worksheet for Auto-cad sheet

PRACTICALS/PROJECT:		
PRACTICAL NO.01	**Introduction to Microsoft Excel**	**2 HOURS**
Worksheet and Workbook, Ribbon, Setting the colour theme, Settings for formulas, Proofing settings, Data Type, Formula, BuiltIn Function, Data Formatting, Making Charts.		
PRACTICAL NO.02	**Excel Functions**	**2 HOURS**
Common functions, Numeric Functions, String functions, Date Time Functions, VLOOKUP functionon tools		
PRACTICAL NO.03	**Sorting and Filtering**	**2 HOURS**
Hiding rows and columns, Basic sorting in Google Sheets, Sorting with multiple criteria, filtering		
PRACTICAL NO.04	**Creating Macro**	**4 HOURS**
Control Structures, Structure of Program, Chart Macro, Manipulation on Program Steps		
PRACTICAL NO.05	**Matrix Program**	**2 HOURS**
Types of Matrix, Matrix Operation, Program for Matrix Operations		
PRACTICAL NO.06	**Auto-cad Script File**	**2 HOURS**
Creating Scripts in Worksheet		
PRACTICAL NO.07	**What If Analysis**	**2 HOURS**
Goal Seek, Data Tables, Scenario Manager		
PRACTICAL NO.08	**Charts**	**2 HOURS**
Using Charts, Formatting Charts, Using 3D Graphs, Using Bar and Line Chart together, Using Secondary Axis in Graphs, Sharing Charts with PowerPoint / MS Word, Dynamically, (Data Modified in Excel, Chart would automatically get updated)		
PRACTICAL NO.09	**Working with Templates**	**2 HOURS**
Designing the structure of a template, Using templates for standardization of worksheets		

ACTIVITIES- 20 HOURS (1 Hour for each activity)

1. Determination of water content
2. Mechanical sieve analysis
3. Classification of fine grained soil
4. Data of Characteristic compressive strengths of concrete cubes
5. Determination of shear strength of soil
6. Draw SFD and BMD
7. Mohr circle
8. Calculating travel time based on GPS coordinates
9. Produce complex AutoCAD drawings
10. AutoCAD Excel Data
11. Creating Autocad script in worksheet
12. Designing the organisation chart of MITAOE
13. Creating Own Excel Templates
14. Monthly expense sheet
15. Daily / weekly / monthly activity planner
16. Gantt chart
17. EMI sheet
18. Future value of money
19. Student marks datta
20. Generating forms (Attendance letters)

TEXT BOOK

1. Gunthar Pangaribuan, Aplikasi Excel untuk Rekayasa Teknik Sipil, Penerbit PT. Elex Media Komputindo, Jakarta.
2. William Weaver, Jr., James M. Gere, Matrix Analysis of Framed Structures, Second Edition, Van Nostrand Reinhold Company, New York.

REFERENCE BOOK

1. Walkenbach, J. (2010). Excel 2010 formulas. Wiley Pub.
2. Jeschke, E., Reinke, H., Unverhau, S., and Pfeifer, E. (2011). Microsoft Excel 2010 Formulas and Functions Inside Out. Pearson Education.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Skill Development Course 1-Revit
	COURSE CODE	CV232
	COURSE CREDITS	2
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	50	NIL	25	75

PRE-REQUISITE : Engineering Graphics

COURSE OBJECTIVES :

CV232.CEO.1: To Learn and get familiar with Autodesk Revit Architecture.
CV232.CEO.2: To Understand concept and technique in the 2D and 3D modeling.
CV232.CEO.3: To be able to provide complete rendering and animation

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV232.CO.1: describe building information modeling methodology and its benefits.
CV232.CO.2: draw all Architectural components.
CV232.CO.3: design detail views, add 3D and 2D elements and detail components.
CV232.CO.4: create construction documentation.

PRACTICALS/PROJECT: Project should be performed individually		
PRACTICAL NO.01	**BUILDING INFORMATION MODELING**	**4 HOURS**
Building Information Modeling for architectural		
PRACTICAL NO.02	**REVIT ARCHITECTURE BASICS**	**4 HOURS**
Understanding Revit element hierarchy Revit Architecture user interface The ribbon framework Guidelines for using the interface Using Common modification tools Assignment 1 : Questionaries on BIM		
PRACTICAL NO.03	**VIEWING THE MODEL**	**4 HOURS**
About Views View Properties Guidelines for Working with Views About Controlling Object Visibility View Templates Using Filters Guidelines for Controlling Object Visibility About Elevation and Section Views Guidelines for Working with Elevation and section views About 3D Views Perspective view About Cameras Creating and Modifying Camera Views Axonometric view		
PRACTICAL NO.04	**STARTING A NEW PROJECT**	**4 HOURS**
About Projects Creating Project Templates Guidelines for Creating Project Template Files About Levels Adding and Modifying Levels Guidelines for Adding and Modifying Levels About Grids Methods of Creating and Modifying Grid Lines Guidelines for Creating and Modifying Grids Assignment 2 : Questionaries on REVIT architecture.		

PRACTICAL NO.05	WALLS AND CURTAIN WALLS	6 HOURS
Creating generic walls Sketching walls Hosting element in walls Modifying walls Editing walls Creating curtain walls Adding curtain grids, mullions and panel Modifying curtain walls Editing curtain walls structure Assignment 3 : Draft models of building with Walls.		
PRACTICAL NO.06	**FLOORS AND ROOFS**	**4 HOURS**
About floor elements Process of adding a floor element Sketching floors Editing Floors About roofs Process of sketching roofs Roof modification and example About Ceiling elements Creating ceiling Editing ceiling Assignment 4 : Add floors, roofs and ceiling to drafted model.		
PRACTICAL NO.07	**STAIRS AND RAILINGS**	**4 HOURS**
About stairs and railing Process for creating a staircase by component Process for creating a staircase by sketch Creating the generic railing Assignment 5 : Add Staircases and railings at different locations in model		
PRACTICAL NO.08	**ADDING FAMILIES and ROOMS AND COLOR FILL PLANS**	**4 HOURS**
Adding families Loading families Placing families Editing families in project Tagging spaces with room tags Room tags Room Boundaries Room separation line Generating color rooms plan Assignment 6 : Add families in plan to create color floor plan, furniture plans, etc.		

PRACTICAL NO.09	CREATING PLAN ANNOTATION AND SCHEDULES	4 HOURS

About Temporary Dimensions
About Permanent Dimensions
About Spot Dimension Symbols
Guidelines for Adding Dimensions
Exercise: Add Dimensions and Spot Symbols
About Text
Setting Text Placement Parameters
About Legends
Guidelines for Creating Legends
About Schedules
Working with Schedules
Guidelines for Working with Schedules
Assignment 7 : Add annotations in plans and create schedule documents for different components.

TUTORIAL NO.10	CREATING CONSTRUCTION DOCUMENTATION	4 HOURS

About Sheets and Title blocks
About Revision Tracking
Process of Creating Sheets by using customized title blocks
Creating Revision Clouds
Print settings
Print setup setting
Guidelines for printing sheets
Setting for exporting content
Process of exporting views to CAD formats
Guidelines for exporting content to CAD formats
Assignment 8 : Prepare all working and commercial plans along with walkthrough video.

PRACTICALS/PROJECT: Project should be performed individually		
PROJECT	**Draw, Design and Develop Residential building Model**	

Draw, Design and Develop G+1 residential multistoried building having minimum B/U area 125 square meter also minimum one cantilever projection and overhead water tank, by using computer software (REVIT). Also prepare commercials Brochure and a Walkthrough video showing internal and external details of building.

Objectives :

1. Prepare all types of submission plans for a building namely :

a. Lay out plan

b. Development Plan

c. Elevation Plans from all sides

d. Section plans

e. Foundation Plan

2. Compose a brochure containing all types of commercials plans for a building namely:

. Colored floor Plans

b. Axonometric Plans

c. 3D Views

d. Perspective Views

3. Prepare basic schedules for different materials used.

4. Compose a Walkthrough video showing internal and external details of building.

5. Present and demonstrate a building prepared in REVIT

TEXT BOOK

1. Autodesk Revit Architecture Essentials User Guide Manual.
2. Punmia B.C., Building Construction, Laxmi Publications Delhi, sixth edition, 2009, ISBN: 81-7008-053-3
3. Shaha M.G., Kale C.M., Principles of Building Drawing, Macmillan Publishers India Limited, Fourth edition, 2010, ISBN-0333925467
4. Building Services Handbook, Routledge Publication, 7 edition, 2013, ISBN-10: 0415631408
5. Duggal S. K., Building Materials, New Age International Limited, First Edition, 2003, ISBN -81222414354

REFERENCE BOOK

1. Shah, kale and Patki, Building Drawings with an Integrated Approach to Build Environment, Tata McGraw Hill Publications, Fifth edition, 2015, ISBN- 0071077871
2. Rangwala, Civil Engineering Drawing, Charotar Publications, First Edition, 2017, ISBN 9789385039300
3. Building Services Design Management , Wiley-Blackwell Publication, 1 edition, 2014, ISBN-10: 9781118528129
4. Rangwala, Building Construction, Charotar Publications, 33rd Edition, 2017, ISBN - 978-93-85039-04-1
5. Additional learning from YouTube channel BIMscape The Complete Beginner's Guide to Autodesk Revit Architecture (https://www.youtube.com/watch?v=hyKGzX4lSg and list=PLbJykfQm9O8cArlgixHjUnHI4QLbTZpV3)

MIT | Academy of Engineering (An Autonomous Institute)			**COURSE SYLLABI (2019 - 2023)**		
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING			**W.E.F.**	**:**	2020-2021
SECOND YEAR BACHELOR OF TECHNOLOGY			**COURSE NAME**	**:**	Environmental Science
			COURSE CODE	**:**	CV203
			COURSE CREDITS	**:**	Audit
RELEASE DATE	**:**	**01/07/2020**	**REVISION NO.**	**:**	1.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		ICE	**ECE**	**IA**			
0	2	NIL	NIL	NIL	NIL	NIL	NIL

COURSE OBJECTIVES:

CV203.CEO.1: Create awareness about environmental problems among future citizens.
CV203.CEO.2: Interpret basic knowledge about the environment and its allied problems.
CV203.CEO.3: Develop an attitude of responsibility for the environment and society.
CV203.CEO.4: Perceive the importance of sustainable development.

COURSE OUTCOMES:

The students after completion of the course will be able to:
CV203.CO.1: summarize the importance of ecosystem and biodiversity for maintaining ecological balance.
CV203.CO 2: identify environmental problems arising due to engineering and technological activities and the science behind those problems.
CV203.CO.3: categorize the major pollutants along with sources and abatement devices for the environmental management.
CV203.CO.4: perceive the social and professional responsibility towards the environment.

THEORY:	
Module I	**Overview of Environment**
Multidisciplinary nature of environmental studies, Types of spheres, Natural Resources: Forest, Water, Mineral, Energy, Land, Ecosystems, Biodiversity and its conservation, Natural cycles: Hydrologic, Carbon, Nitrogen, Phosphorus and Sulphur cycle.	
Module II	**Environmental Pollution**
Environmental Pollution: Air, Water, Soil, Solid and Hazardous Waste Management; Environment and human health, Overutilization of natural resources, Environmental Legislation, Environmental monitoring organizations in India, Environmental Protection Agency (EPA)	
Module III	**Global Environmental Issues**
Introduction to: Climate change, Global warming, Acid rain, Ozone layer depletion, Plastic waste management, Municipal solid waste management, Food problem, E-waste management, Social Issues: Environmental ethics and economics.	
Module IV	**Sustainable Development**
Concept of sustainable development, International Institute of Sustainable Development (IISD) : Introduction & Sustainable goals, Environmental Audits, Rainwater harvesting & Water management techniques	

Activity Based Learning and Evaluation:	
Activity No. 1	**Site Visit**
Students have to visit any one nonhazardous polluted site for finding the various reasons of its pollution and suggest preventive measures for it. Prepare the detailed report on it along with the photos. This could be completed in a group.	
Activity No. 2A	**Students has to perform any one of the following activities : (2A or 2B)**
Students have to organize any one of the following activities in the institute and prepare a detailed report on their experience of organizing & conducting the activity, it's possible benefits to the environment along with the photos. This could be completed in group of students: 1. 'No Car and Bike Day' 2. Shutting down the fans and air conditioning systems of the campus for an hour. 3. Environmental awareness programs like organizing essay competition, poster competition, slogan making competition or any other related to it. 4. Celebrating various environmental days. 5. Any other similar activity related to the environment.	

Activity No. 2B	Project Work	

Students have to identify the real life environmental problems from their daily observations and try to find out the various feasible solutions for it as their project work. They are supposed to prepare the prototype, demonstration model, poster, detailed report and present it to the evaluators. The project should be related to the below mentioned heads:

1. Reuse, Recycle and Reduce
2. Environmental Pollution Monitoring and Control
3. Material Balance Concept
4. Sustainable Development
5. Environmental Innovations

The evaluation is based on at least one number of project presentation reviews apart from the final project presentation.

TEXT BOOKS:

1) R. J. Ranjit Daniels and Jagdish Krishnaswamy, “Environmental Studies”, Wiley India Publications, ISBN: 9788126519439.
2) Rao C.S. “Environmental Pollution Control Engineering”, Wiley Eastern Publications, ISBN: 9780470217634.
3) Cunningham W.P. and Cunningham M.A., “Principles of Environmental Science”, Tata McGraw-Hill Publishing Company, New Delhi, 2002.
4) Miller T. G. Jr., “Environmental Science”, Wadsworth Publishing Co., ISBN-10: 1111988935 ISBN: 9781111988937.

REFERENCE BOOKS:

1) H. S. Peavy, D. R. Rowe and G. Tchobanoglous, “Environmental Engineering”, McGraw Hill, ISBN: 84-282-0447-0.
2) Helen Kavitha “Principles of Environmental Science”, Sci tech Publications, 2nd Edition, 2008. ISBN: 9780444430243.
3) Henry J.G. and Heinke G.W., “Environmental Science and Engineering”, 2nd Edition, Prentice Hall of India, New Delhi, 2004, ISBN: 978-0131206502.
4) Metcalf Eddy “Wastewater engineering: Treatment and reuse”, McGraw Hill, ISBN: 007041878.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY CHEM/CIVIL/MECH ENGINEERING	**COURSE NAME**	Applied Mathematics
	COURSE CODE	AS203
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : First Year Engineering Mathematics OR Diploma Engineering Mathematics

COURSE OBJECTIVES :

AS203.CEO.1: To evaluate the Laplace and inverse transform of functions.

AS203.CEO.2: To evaluate the Fourier series of periodic functions and Fourier transform of non-periodic functions.

AS203.CEO.3: To evaluate the derivative of vector-valued functions.

AS203.CEO.4: To evaluate the area and the surface integrals of the vector functions.

AS203.CEO.5: To apply numerical methods for solving the problems of general calculus and differential equations.

AS203.CEO.6: To execute the program on problems of numerical methods using MATLAB.

COURSE OUTCOMES :

The students after completion of the course will be able to,

AS203.CO.1: Evaluate the Laplace and Inverse Laplace transform and will solve the differential equations.

AS203.CO.2: Rewrite the periodic and non-periodic functions as a series of sines and cosines.

AS203.CO.3: Differentiate a vector valued function in plane or space.

AS203.CO.4: Solve and compute the area and volume of the objects.

AS203.CO.5: Apply the numerical methods to problems of calculus and differential equations.

AS203.CO.6: Execute the program codes using MATLAB.

THEORY

UNIT 1	Laplace Transform and its Applications to LDE	9 HOURS

Introduction of Laplace Transform, Properties: First shifting, Change of scale, Linearity, Multiplication by t, Division by t. Laplace Transform of derivatives, Unit Step function, Impulse Function and Periodic Functions. Introduction of Inverse Laplace Transform, Properties: First shifting, Change of scale, Linearity, Multiplication by s, Division by s. Derivatives, Integration. Use of partial fractions to find Inverse Laplace Transform. Applications of Laplace Transfrom to find Solution of linear differential equations.

UNIT 2	Vector Differentiation	6 HOURS

Vectors in 2-D and 3-D, Scalar Product, Vector Product, Vector/scalar functions and fields, Derivative of vectors, Velocity and Acceleration, Gradient of a Scalar Field, Directional Derivative, Divergence of a Vector Field, Curl of a Vector Field.

UNIT 3	Vector Integration	6 HOURS

Line Integration, Line Integrals Independent of Path, Double Integrals Green's Theorem in the Plane, Surfaces for Surface Integrals. Surface Integrals, Volume Integrals, Divergence Theorem, Stoke's Theorem.

UNIT 4	Fourier Series and Fourier Transform	9 HOURS

Periodic functions, Fourier series, Dirichlets conditions, determination of Fourier constants, Half ranges series, arbitrary period functions series. Introduction of Fourier Transform, Fourier Integral Theorem (without proof), Fourier transform and its properties, Fourier Sine Transform, Fourier Cosine Transform, and Inverse Fourier transforms.

UNIT 5	Numerical Methods I	6 HOURS

Numerical Differentiation and Integration, Interpolation: Finite Differences, Newtons and Lagranges Interpolation. Numerical solution of System of linear equations by Gauss elimination method, LU-Decomposition method.

UNIT 6	Numerical Methods II	6 HOURS

Solution of Ordinary differential equations by Eulers, Modified Eulers, Runge-Kutta 4th order methods, Adams-Bashforth Predictor and Corrector Method, Solution of Partial Differential equations by Numerical method: Crank Nicholson method .

PRACTICAL: Any 10 practicals are performed as per the requirement of a branch.		
PRACTICAL NO.01		**2 HOURS**
Introduction to MATLAB: Syntax, keywords, matrices, polynomials, loops.		
PRACTICAL NO.02		**2 HOURS**
Introduction to MATLAB: In-built functions, 2D/3D plots, creating simple programs.		
PRACTICAL NO.03		**2 HOURS**
Finding Laplace transforms of functions, solution of differential equations using Laplace transforms.		
PRACTICAL NO.04		**2 HOURS**
Finding Fourier transforms of functions, Plotting of transforms.		
PRACTICAL NO.05		**2 HOURS**
Numerical Integration: Trapezoidal, Simpsons 1/3rd and Simpsons 3/8th rule.		
PRACTICAL NO.06		**2 HOURS**
Interpolation techniques: Lagranges Interpolation.		
PRACTICAL NO.07		**2 HOURS**
Interpolation techniques: Newtons Interpolation.		
PRACTICAL NO.08		**2 HOURS**
Solution of differential equation by modified Eulers method.		
PRACTICAL NO.09		**2 HOURS**
Solution of differential equation by Runge-Kutta method.		
PRACTICAL NO.10		**2 HOURS**
Curve Fitting: Linear, Quadratic.		
PRACTICAL NO.11		**2 HOURS**
Solution of algebraic equations: Newton- Raphson method.		
PRACTICAL NO.12		**2 HOURS**
Solution of algebraic equations: Bisection method.		
PRACTICAL NO.13		**2 HOURS**
Curve Fitting: Cubic, Exponential.		

TEXT BOOK

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd., 2015, ISBN: 13: 9788126554232.
2. Dr. B.V. Ramana, Higher Engineering Mathematics, 5 th edition, Tata McGraw Hill, 2017, ISBN: 978-0-07-063419-0.
3. Amos Gilat, MATLAB: An Introduction with Applications, 4th edition, Wiley Publication, 2010, ISBN-13: 978-0-470-76785-6.

REFERENCE BOOK

1. B.S. Grewal, Higher Engineering Mathematics, 44 th edition, Khanna Publications, 2018, ISBN: 978-81-933284-9-1.
2. Ram N. Patel and Ankush Mittal, Programming in MATLAB- A Problem solving approach, Pearson Education, 2014, ISBN-978-93-325-2481-1.

MIT | Academy of Engineering (An Autonomous Institute)			COURSE CURRICULUM (2019 - 2023)		
SCHOOL OF MECHANICAL & CIVIL ENGINEERING			W.E.F.	:	2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY			COURSE NAME	:	Mechanics of Fluids
			COURSE CODE	:	CV214
			COURSE CREDIT	:	4
RELEASE DATE	:	01/07/2020	REVISION NO.	:	0.0

TEACHING SCHEME :		EVALUATION SCHEME :					
LECTURE	PRACTICAL	THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		ICE	ECE	IA			
3	2	35	35	30	50	NIL	150

PREREQUISITE:

- CV102 : Applied Mechanics
- CH101: Science of Nature

COURSE OBJECTIVES:

- CV 214.CEO.1: To relate the knowledge of fluid behavior at rest and in motion for problem solving.
- CV 214.CEO.2: To summarize the fundamentals of open channel flow.
- CV 214.CEO.3: To apply conservation equations to pipe flow and open channel flow problems.
- CV 214.CEO.4: To make use of the concepts related to dimensional analysis and model studies for design of hydraulic structures.

COURSE OUTCOMES:

- The students after completion of the course will be able to:
- CV214.CO.1: interpret the properties and behavior of the fluid at rest and in motion.
- CV 214.CO.2: apply the principles of hydrostatics and determine the forces.
- CV 214.CO.3: utilize equations of motion for various flow conditions and compute discharge of the flows.
- CV 214.CO.4: analyze laminar and turbulent flows through pipes.
- CV 214.CO.5: evaluate various parameters related to the flow around immersed bodies.
- CV 214.CO.6: analyze the different types of open channel flow using various governing equations.

THEORY:

Unit I	**Fundamental Concepts and Fluid Statics**	**6 Hours**

Fundamental Concepts: Continuum, Fundamental fluid properties, Viscosity and Newton's law of viscosity, Vapour pressure, Surface tension, Capillarity, Bulk Modulus and Compressibility.

Fluid Statics: Introduction to fluid statics, Pressure and Pressure measuring devices, Pascal's law, Hydrostatic equation, Hydrostatic forces on submerged surfaces, Buoyancy, Stability of floating and submerged objects.

Unit II	**Fluid Flow and Equations of Motion**	**7 Hours**

Fluid Flow: Parameters of Fluid Flow, Types of Fluid Flow, Potential, Stream function, Rotationality, Vorticity and Circulation, Conservation of Mass and Equation of Continuity.

Equations of Motion: Forces acting on fluid mass in motion, Euler's equation of motion along a streamline, Navier stokes equation, Bernoulli's Equation and conservation of Energy, Applications of Bernoulli Equation, Hydraulic Grade line and Total Energy line, Kinetic Energy Correction Factor, Linear Momentum Equation, Momentum Correction Factor.

Unit III	**Flow Through Pipes**	**7 Hours**

Reynold's Equation

Laminar Flow: Characteristics of Laminar flow through circular pipes, Resistance to Flow in Smooth and Rough Pipes, Darcy's law, Energy losses in pipe flow, Flow through simple, compound, parallel, branched pipes and siphons.

Turbulent Flow: Characteristics of Turbulent Flow through Pipes, Boussinesq's theory, Prandtl's mixing length theory, Velocity distribution in turbulent flow, Velocity distribution for smooth and rough boundaries, Average Velocity Concept.

Unit IV	External Flows and Dimensional Analysis	8 Hours

Flow Analysis: Practical problems involving fluid flow around submerged objects, Definitions and expressions for drag, Lift, Drag coefficient, Lift coefficient, Types of drag, Stokes' law, Drag on - Sphere, Cylinder, Flat plate and Aerofoil, Karman's vortex street, Effects of free surface and compressibility on drag, Development of lifts, Lift on cylinder and aerofoil, Magnus effect, Polar diagram.

Dimensional Analysis: Methods of Dimensional Analysis, Dimensionless Numbers.

Self-Study: Boundary layer theory, Different types of thicknesses, Boundary layer separation

Unit V	Open Channel Flow	6 Hours

Introduction to Open Channel Flow: Classification of Channels and Channel Flows, Froude Number, Continuity and Energy Equations for Open Channel flows. Specific Force, Specific Energy, Critical flow computations based on specific force and energy criteria.

Uniform flow in Open channels: Characteristics and establishment of uniform flow, Chezy's and Manning's formula, Normal Depth, Conveyance, Section factor, Hydraulic Exponent, Uniform flow computations, Most efficient channel sections.

Unit VI	Gradually and Rapidly Varied Flows in Open Channels	6 Hours

Gradually Varied Flow (GVF): Assumptions and Differential equations of GVF, Classification of Bed slopes, GVF profiles, GVF computations.

Rapidly Varied Flow (RVF): Phenomenon of Hydraulic Jump and energy dissipation, Conjugate depths, Types of hydraulic jump, Applications of Hydraulic jump.

PRACTICALS:

Important Instructions:

1. Practicals have to be performed in a group of maximum 4 numbers of students.
2. Students have to submit the detailed report on each practical.

Practical No. 1	Designing the Pipe System	6 Hours

Design a pipe system for the assigned area by using the appropriate software.

In order to complete this practical, students has to do following activities and refer it's result as a input data to design the pipe system:

1. Determine viscosity of the fluid.
2. Identify the type of flow by using Reynold's experiment.
3. Calculate all the losses in the flow field (except losses in the pump).

Practical No. 2	Discharge Measurement	4 Hours

1. Pipe Flows: Using Venturimeter & Orifice meter.

2. Open Channel Flow: Using Notches.

Practical No. 3	**Analyzing the Internal & External Flows**	**4 Hours**

In order to complete this practical, students have to do following activities:

1. Verify the Bernoulli's Theorem for Internal Flow.
2. Plot the pressure distribution around aerofoil shape by using a wind tunnel.

Practical No. 4	**Energy Dissipation in Hydraulic Jump**	**6 Hours**

In order to complete this practical, students have to do following activities:

1. Determine the value of Manning's coefficient for the given channel and calculate the velocity.
2. Identify the type of hydraulic jump based on Froude number.
3. Determine the percentage energy dissipation (relative loss) due to hydraulic jump both experimentally and analytically.

Practical No. 5	**Mini Project**	**4 Hours**

Students have to identify real-world situation/problem related to applications of basic fluid mechanics concepts and prepare the working model or prototype for the selected project along with the detailed report.

TEXT BOOK:

1. Modi, P.N. and S.M. Seth, "Hydraulics and Fluid Mechanics including Fluid Machines", Standard Book House, Delhi, Nineteenth edition, 2009, ISBN 13: 978-8189401269
2. Frank M. White, "Fluid Mechanics in SI Units", McGraw Hill Publications, Eighth edition, 2017, ISBN 13: 978-9385965494.
3. Streeter and Wylie, "Fluid Mechanics", McGraw Hill Publications, ISBN 13: 978-0070622425
4. Subramanya K, "Flow in Open Channels", Tata McGraw-Hill Education, Fourth edition, 2015, ISBN 13: 978-9332901339.

REFERENCES:

1. Yunus Cengel and John Cimbala, "Fluid Mechanics Fundamentals and Applications", McGraw Hill, Publications, ISBN 13:978-0070700345.
2. Fox, McDonald and Pritchard, "Fluid Mechanics", Wiley publication, 2015, ISBN: 978-8126541287.
3. R. C. Hibbeler, "Fluid Mechanics", Person Publication, 2018, ISBN: 978-9332547018
4. Ven te Chow, "Open Channel Hydraulics" Tata McGraw Hill, 2009, ISBN 13: 978-1932846188.

MIT | Academy of Engineering (An Autonomous Institute)			COURSE CURRICULUM (2020-2023)		
DEPARTMENT OF CIVIL ENGG.			**W.E.F.**	**:**	2020
SECOND YEAR BACHELOR OFTECHNOLOGY			**COURSE NAME**	**:**	Surveying & Geospatial Engineering
			COURSE CODE	**:**	CV 215
			COURSE CREDIT	**:**	4
RELEASE DATE	**:**		**REVISION NO.**	**:**	0.0

TEACHING SCHEME :		**EVALUATION SCHEME :**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		MSE	**ESE**	**IA**			
3	2	35	35	30	30	20	150

PRE-REQUISITE:

None

COURSE OBJECTIVES:

1. CV202.CEO.1: To introduce the students, to the theory and application of Surveying in Civil Engineering projects.
2. CV202.CEO.2: To facilitate understanding of the fundamentals of surveying knowledge and familiarizing them with latest surveying practices.
3. CV202.CEO.3: To train the students to work in the field with the knowledge acquired in the classroom through mini field projects

COURSE OUTCOMES:

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

1. CV202.CO.1: Apply the techniques of levelling to solve engineering problems.
2. CV202.CO.2: Implement the principles of trigonometry for surveying using standardized methods.

3. CV202.CO.3: Perform traversing and triangulation by implementing the basic principles of surveying.
4. CV202.CO.4: Construct different types of curves for alignment of roads and railways and layout civil engineering structure on field.
5. CV202.CO.5: Interpret spatial data and perform analysis by using modern surveying tools
6. CV202.CO.6: Analyze field data to minimize errors using mathematical models.

THEORY:

Unit I	**Introduction to Surveying and measurement of elevations**	**8 Hours**

Introduction: Principle of surveying, classification of surveys. Introduction to coordinate systems. Applications of surveying. Equipment used in surveying. Concept of temporary and permanent adjustments. Errors in measurements- sources and types. Introduction to EDM: Study of Total Station

Spirit Levelling- different types of levels and staffs; booking and reduction of data, methods of levelling, errors in levelling.

Contours- characteristics, uses, and methods of contouring, contour maps-toposheets, drawing sections, measurements from cross section, earth work calculations, contouring using software.

Self Study: Principle of plane table surveying, advantages and disadvantages

Unit II	**Measurement of Linear Distances and Directions**	**8 Hours**

Prismatic Compass- concept of bearings and angles; magnetic bearings, dip-declination, local attraction, errors and adjustments;

Theodolites- different types, methods of observation and booking of data, Optical methods for linear measurement with theodolite. Direction measurement with theodolite, horizontal angles by repetition and reiteration, vertical angles, measurement of horizontal distance & reduced levels of inaccessible locations.

Total Station- Distance and Coordinate Measurement, Remote Elevation Measurement.

Self-Study-Fundamental axes of theodolite: testing and permanent adjustments of a transit theodolite (assisted With demonstration and practical)

Unit III	**Traversing and Triangulation**	**8 Hours**

Traversing: Purpose and classification of traversing, traversing with a theodolite and Total Station. balancing of traverses, Computation of coordinates, computation of areas from plans, calculation of area of a closed traverse, omitted measurements,

Triangulation- network, strength of figures, selection of stations, intervisibility, satellite stations, measurements and computations.

Self Study: deflection angles using transit theodolite and magnetic bearing.

Unit IV	Curves and Survey Projects	8 Hours
Curve Setting: Types of curves, elements of a curve, setting out a simple curve, types of vertical curves, setting out vertical curves. **Engineering Project Surveys**- requirements and specifications, various stages of survey work. Setting out of works- buildings **Self-Study**: Setting out of culverts		
Unit V	**Fundamentals of RS, GIS & Photogrammetry**	**8 Hours**
Remote Sensing: Fundamentals of remote sensing- definition & overview of remote sensing, electromagnetic spectrum, concept of resolution, earth observation satellite & their characteristics. **GIS:** introduction to GIS definition, evolution, components of GIS, Input data, GIS data models, address geocoding, digital image processing **Introduction to Aerial Photogrammetry:** vertical & oblique photography, scale, image parallax, geodetic reference co-ordinate system, introduction digital elevation model		
Unit VI	**Adjustment to errors in computation**	**4 Hours**
Theory of errors, propagation of errors, variance and covariance; Least squares principle and adjustment of field survey data by parametric and condition equation methods		

PRACTICAL: The following practical are to be performed		
Project No. 1	**Road Project**	**8 Hours**
Prepare a project report on road setting out a road having simple circular curve. Objective: 1. Draw the contour map of ground either manually or using standard software. 2. Fix the alignment of road with its magnetic bearings 3. Calculate deflection angle- with at least one change in direction, 4. Setting out of simple circular curve 5. Calculate RLs of road profile by auto level- simple & differential levelling 6. Draw l/s to fix formation line & draw c/s at various chainage 7. Calculate the volume of earthwork in cutting & filling		
Project No. 2	**Setting out of foundation**	**10 Hours**
Prepare a project report on setting out a designed foundation plan on ground Objective:		

1. Prepare of the plan of a whole area/populated area/closed traverse (survey number such as the campus of a college) with total station using Auto-CAD
2. Calculate the co-ordinates of respective plot
3. For proposed building, find the position of required plot size on ground & mark the area
4. Perform preliminary survey of an area with a total station
5. Calculate the co-ordinates of respective foundation on the same area using AutoCAD
6. Mark out a designed foundation plan on ground with total station

Project No. 3	**Digital Elevation Model**	**6 Hours**

Development of digital elevation model 3D made by using QGIS software

TEXT BOOK:

1. Dr. B. C. Punmia, Ashok K. Jain, Arun K. Jain, “Surveying Vol. I & II”, Laxmi Publication, ISBN: 81-7008-054-1.
2. T. P. Kanetkar and S. V. Kulkarni , “Surveying and Levelling” Vol. I and Vol. II, PVG Publication, ISBN: 10 8185825009, ISBN: 13 9788185825007.

REFERENCES:

1. Charles D Ghilani, Paul R Wolf., “Elementary Surveying: An introduction to Geomatics”, Prentice Hall, 14th Edition, ISBN-13: 978-0132554343/ ISBN-10:0132554348.
2. A.M.Chandra, “Plane Surveying”, New Age International Publishers, ISBN 13 :9788122419023.
3. N. N. Basak, “Surveying and Levelling”, Tata Mc-Graw Hill, ISBN 10: 007460399X / ISBN 13: 9780074603994.
4. Dr. K. R. Arora, “Surveying Vol. I & II”, Standard Book House. ISBM-13:9788189401238
5. Subramanian, “Surveying and Levelling”, Oxford University Press, ISBN : 0195684249, 9780195684247.
6. S. Gopi, R. Sathishkumar, “Advanced Surveying: Total Station, GIS and Remote Sensing” Pearson Education, ISBN-10: 9788131700679, ISBN-13: 978-8131700679
7. QGIS User Guide (https://docs.qgis.org/3.10/en/docs/user_manual/#)

FURTHER LEARNING :

NPTEL Videos & Web notes of course Geospatial Engineering, Videos by Institute Faculties

MIT Academy of Engineering (An Autonomous Institute)			COURSE CURRICULUM (2019 - 2023)		
DEPARTMENT OF CIVIL ENGG.			**W.E.F.**	:	2020-21
SY BTECH			**COURSE NAME**	:	Structural Analysis
			COURSE CODE	:	CV216
			COURSE CREDIT	:	4
RELEASE DATE	:	**01/01/2020**	**REVISION NO.**	:	0.0

TEACHING SCHEME:		**EVALUATION SCHEME:**					
LECTURE	**PRACTICAL**	**THEORY**			**PRACTICAL**	**PRESENTATION/ DEMONSTRATION**	**TOTAL**
		MSE	**ESE**	**IA**			
3	2	35	35	30	50	--	150

COURSE OBJECTIVES:

1. CV216.CEO.1: To understand the process of structural analysis.
2. CV216.CEO.2: To apply geometric and energy methods to determinate structures.
3. CV216.CEO.3: To apply force methods of analysis for indeterminate structures.
4. CV216.CEO.4: To apply displacement methods of analysis for indeterminate structures.
5. CV216.CEO.5: To draw influence line diagrams for determinate structures.
6. CV216.CEO.6: To introduce plastic analysis for steel structures.

COURSE OUTCOMES:

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

1. CV216.CO.1: Determine internal forces in structure and sketch deflected shapes. (L3)
2. CV216.CO.2: Determine displacements of determinate structures. (L3)
3. CV216.CO.3: Analyse indeterminate structures by force methods. (L4)
4. CV216.CO.4: Analyse indeterminate structures by displacements methods. (L4)
5. CV216.CO.5: Analyse determinate structures for moving loads. (L4)
6. CV216.CO.6: Estimate the collapse load for indeterminate structures. (L5)

THEORY:		
Unit I	**Introduction to structural analysis**	**06 Hours**
Types of structures and loads. The process of analysis of structures. Stability of structures. Degree of static and kinematic indeterminacy. Symmetry of loads and supports. Review of Axial force, shear force, bending moment diagrams. Static analysis of trusses.		
Unit II	**Geometrical and Energy methods**	**07 Hours**
Displacements of Statically Determinate Structures by Macaulay's Method, moment area method and conjugate beam method. Principles of virtual work, Strain energy, Castigliano's theorems. Principle of superposition, Betti's theorem, Maxwell's reciprocal theorem.		
Unit III	**Force Methods**	**07 Hours**
Basic Concepts of the Force Method. Formulation of compatibility equations. Method of consistent deformations. Clapeyron's three moment theorem, least work method. Analysis of indeterminate beams frames and trusses. Analysis for Temperature and lack of fit.		
Unit IV	**Displacement Methods**	**07 Hours**
Basic Concepts of the displacement method. Stiffness coefficients, Slope deflection equations. Formulation of equilibrium equations. Relative stiffness, Moment distribution method. Analysis of indeterminate beams, frames and trusses, effect of settlement of supports.		
Unit V	**Influence Lines**	**07 Hours**
Concept of moving loads. Influence lines for cantilever, simply supported beams and pin jointed truss. Criteria for maximum shear force and bending moment. Absolute maximum shear force and bending moment under moving point loads.		
Unit VI	**Plastic Methods**	**06 Hours**
Concept and assumptions in plastic analysis theory, shape factor, collapse load, load factor, plastic modulus of section and plastic moment of resistance. Upper bound and lower bound theorems. Computation of collapse load for fixed beam, continuous beam and plane frames.		

A] Practicals: Numericals based on following topics should be solved in groups and homework should be completed by an individual using methods.		
Practical No. 1	**Static analysis of determinate structures**	**2 Hours**
Use of FBD and equilibrium equations for analysis of determinate structures.		
Practical No. 2	**Geometrical and energy methods**	**2 Hours**
Determination of slope and deflections for determinate beams by geometric and energy methods		
Practical No. 3	**Force methods**	**2 Hours**
Analysis of indeterminate structures by force methods and plotting SFD and BMD.		
Practical No. 4	**Displacement Methods**	**2 Hours**

Analysis of indeterminate structures by displacements methods and plotting SFD and BMD.		
Practical No. 5	**Influence Lines**	**2 Hours**
Drawing ILD for determinate beams and trusses under moving point loads.		
Practical No. 6	**Plastics Methods**	**2 Hours**
Plastic analysis of indeterminate beams and frames by static and kinematic methods.		
B] V Labs: Following experiments are to be completed by students using Virtual Labs and report should be submitted.		
Experiment No. 1	**Single Span Beams Experiment**	**2 Hour**
http://bsa-iiith.vlabs.ac.in/exp2/Objective.html?domain=Civil%20Engineering&lab=Structural%20Analysis%20Lab		
Experiment No. 2	**Continuous Beams Experiment**	**2 Hour**
http://bsa-iiith.vlabs.ac.in/exp3/Objective.html?domain=Civil%20Engineering&lab=Structural%20Analysis%20Lab		
Experiment No. 3	**Portal Frames Experiment**	**2 Hour**
http://bsa-iiith.vlabs.ac.in/exp5/Objective.html?domain=Civil%20Engineering&lab=Structural%20Analysis%20Lab		
Experiment No. 4	**Trusses Experiment**	**2 Hour**
http://bsa-iiith.vlabs.ac.in/exp8/Objective.html?domain=Civil%20Engineering&lab=Structural%20Analysis%20Lab		
Experiment No. 5	**Plastic Hinge Experiment**	**2 Hour**
http://bsa-iiith.vlabs.ac.in/exp10/Objective.html?domain=Civil%20Engineering&lab=Structural%20Analysis%20Lab		
C] Case Study and Presentation		**4 Hours**
Detailed case study of any unique signature structure/ monument. Collecting all data about geometry, dimensions, materials used, load calculations, structural forms used, load path, type of foundations adopted. Presentations to be given at the end of semester.		

TEXT BOOK:

1. C S Reddy, “Basic Structural Analysis”, Tata McGraw Hill, 2011, ISBN-13: 978-007-0702-769
2. R.C.Hibbeler, “Structural Analysis”, Pearson Education; 9th Edition, 2017, ISBN-10: 9332586144
3. Devdas Menon, “Structural Analysis”, Narosa Publishing House, 2008, ISBN: 978-81-7319-750-5

REFERENCES:

1. Amin Ghali, Adam M Neville and Tom G Brown, “Structural Analysis: A Unified Classical and Matrix Approach”, Sixth Edition, 2007, Chapman & Hall, ISBN: 978-04-1577-433-8
2. T.S. Thandavamoorthy, “Structural Analysis”, Oxford Higher Education, 2011, ISBN-10: 0198069189

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Rapid Prototyping
	COURSE CODE	ET235
	COURSE CREDITS	2
RELEASED DATE : 01/07/2020	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	25	NIL	50	75

PRE-REQUISITE : ME104 - Engineering Graphics, EX102 - Electrical and Electronics Engineering, CV102 - Applied Mechanics

COURSE OBJECTIVES :

ET235.CEO.1: To learn about materiality and techniques.
ET235.CEO.2: To justify the product development cycle through prototype project.
ET235.CEO.3: To inculcate implementation of skills by proper budget planning with effective troubleshooting and practices in aesthetics & ergonomics.
ET235.CEO.4: To develop abilities to transmit technical information clearly and test the same by delivery of presentation based on the prototype Project.

COURSE OUTCOMES :

The students after completion of the course will be able to,

ET235.CO.1: Consolidate the techniques, skills and modern engineering tools.
ET235.CO.2: Apply acquired skills to the construction of a prototype project.
ET235.CO.3: Develop a prototype project by performing tasks in team.
ET235.CO.4: Demonstrate the work carried out in a team.

PRACTICAL

Course Introduction:

This course is aiming at a Project Based Learning methodology. Through a series of projects, students will learn to design, build, and debug engineering prototype systems. They will cover multiple aspects of the prototyping process.

Students will complete four modules in rotational manner,

1. Mechanical Prototyping (MP)
2. Civil Prototyping (CP)

In Mechanical prototyping, students will learn rapid prototyping skills. Students will focus on basics of CAD modeling, hands on practice on CAD software, 3D Modeling , 3D Printing, Fabrication of prototype and testing etc.

On the contrary in civil prototyping students will learn developing bamboo structures by testing and analyzing bamboo, designing bamboo joinery, and testing of bamboo structures.

Each module will have on an average six laboratory sessions. The students will complete them in rotational manner. Every module will award for 75 marks.

Marks of two modules at a time will be averaged in one semester and if student secures passing marks (passing grade) after averaging; then the required credits of the course will be earned.

For Rapid Prototyping, Semester - III

Module	**Programs**
a) Mechanical Prototyping (MP)	SY BTECH Civil Engineering, Mechanical Engineering, Chemical Engineering
b) Civil Prototyping (CP)	

For Digital Prototyping, Semester - IV

Module	**Programs**
a) Mechanical Prototyping (MP)	SY BTECH Electronics Engineering, Electronics & Telecommunication Engineering, Computer Engineering, Information technology
b) Civil Prototyping (CP)	

MODULE: 1/2	Mechanical Prototyping (MP)	28 HOURS

PRACTICAL:

PRACTICAL NO. 01	Introduction to prototyping	04 HOURS

1. Introduction to different prototyping, traditional prototyping vs. advance rapid prototyping, different types of prototyping techniques (clay modeling, casting, carpentry, metal art etc.) and their working principle.
2. Different types of materials used in prototyping model.
3. Introduction of multi axis (4D and 5D) machines used in prototyping and machining.
4. Making of paper prototyping (virtual or physical).
5. Applications and need of prototype in emerging field like Bio - medicals, defense, manufacturing, aerospace etc.

PRACTICAL NO. 2a	Basics of CAD modeling	04 HOURS

1. Introduction of CAD software.
2. Introduction of 2D, 3D Modeling using CAD software package.
3. Hands on practice of CATIA or any other CAD software.
4. Formation of students group per project team.

PRACTICAL NO. 2b	3D Modeling for prototyping	04 HOURS

1. Introduction of 3D modelling and its interaction with prototype machine
2. Identify physical constraints of prototyping.
3. Sketcher-workbench and its applications
4. Part design workbench.
5. Preparation of 3D prototyping model by CAD software for final project

PRACTICAL NO. 03	Preprocessing of 3D printing slicing	03 HOURS

1. Generating STL files of 3D models from CAD software & working on STL files.
2. Pre-Processing the 3D Model in Cuba software / kisslicer - repeater for slicing.
3. Selection of orientation of model, support generation, skin and wall thickness- depth setting.
4. Setting of printing speed, flow rate, volume, mass and time require for printing or manufacturing.
5. Practice of slicing on 3D Cad model and decide optimize parameters.

PRACTICAL NO. 04	Orientation and support generation, manufacturing planning	03 HOURS

1. Suitable filament material for 3D printing and selection and its properties.
2. Selection of material and process for making physical models by other tradition methods (machining, wood, clay, paper, polymer, etc).
3. Slicing pattern, tool path generation, G Code and gives input to prototype machine for actual part/object manufacturing.

PRACTICAL NO. 05	Manufacturing and fabrication of model	06 HOURS

1. Introduction 3D printer machines, and other machines used for prototyping.
2. Demonstration of 3D printing machine pre-setting and filament material loading.
3. Hands on experience of rapid prototype machine for part/object/model, manufacturing of conventional prototype model if any, assembly if required.
4. Calculation of cost of product, financial aspect, Bill of material (BOM), testing for prototyping, Plan to promote product/model in market, etc.

PRACTICAL NO. 06	Project presentation	02 HOURS

1. Final Presentation and demonstration of models.
2. Report submission (assessment).

REFERENCE BOOK

1. Rapid Prototyping: Principles and Applications in Manufacturing, Chua C K, Leong K F, Chu S L, World Scientific, ISBN-13: 978-9812778987.
2. Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, Gibson D W Rosen, Brent Stucker, Springer, ISBN: 978-1-4419-1119-3.
3. Rapid Prototyping: Principles and Applications in Manufacturing, Noorani R, John Wiley & Sons, ISBN: 978-0-471-73001-9.
4. Rapid Tooling: Technologies and Industrial Applications, Hilton P, Jacobs P F, CRC press. ISBN:978-0824787882
5. Rapid Prototyping and Engineering applications: A tool box for prototype development, Liou W L, Liou F W, CRC Press, ISBN: 978-0849334092.
6. Rapid Prototyping: Theory & practice, Kamrani A K, Nasr E A, Springer, ISBN: 978-0-387-23291-1.
7. Kenneth Cooper, Rapid Prototyping Technology: Selection and Application, Marcel Dekker, Inc. New York, ISBN: 082470261.

MODULE: 2/2	Civil Prototyping (CP))	28 HOURS
PRACTICAL:		
PRACTICAL NO. 01	**Introduction to civil prototyping**	**02 HOURS**
Introduction of bamboo, its physical, mechanical properties, selection, seasoning and treatment, case studies of bamboo structures.		
PRACTICAL NO. 02	**Testing & Analysis of Bamboo**	**04 HOURS**
Study of different test on Bamboo & Analysis of structures made by bamboo.		
PRACTICAL NO. 03	**Design of bamboo Joinery**	**04 HOURS**
Study of different bamboo structures, Hands on different types of joinery, axial and angular joints by different methods		
PRACTICAL NO. 04	**Making bamboo structures**	**08 HOURS**
Making of bamboo structures		
PRACTICAL NO. 05	**Testing on bamboo structure (Post Testing)**	**04 HOURS**
Testing of different bamboo structures		
PRACTICAL NO. 06	**Final project presentation**	**04 HOURS**
Comparative study of analytical and test results of the bamboo Structure, final project presentation.		

REFERENCE BOOK

1. Vector mechanics for Engineers: statics and dynamics by Beer & Johnston 10th edition, McGraw Hill Education , ISBN: 978-0073398242
2. Bamboo Architecture & Design (Architecture & Materials), by Chris van Uffelen, , ISBN: 978-3037681824
3. Designing and Building with Bamboo ,Jules J.A. Janssen Technical University of Eindhoven Eindhoven, The Netherlands, ISBN 978-8186247464
4. Codes and standards:
    - IS 1902:1993.Code of Practice for preservation of bamboo and cane for non-structural purposes.
    - IS 6874:1973 Methods of test for round bamboos
    - IS 7344:1974 Specification for bamboo tent bamboos.
    - IS 8242:1976 Methods of tests for split bamboos
    - IS 8295 (Part 1): 1976 Specification for bamboo chicks
    - ISO 22157 Standard guidelines for tensile, compressive, shear and bending Strength Parallel to grain and Perpendicular to grain.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Minor Project-Implementaion
	COURSE CODE	CV240
	COURSE CREDITS	1
RELEASED DATE : 01/07/2020	**REVISION NO**	0.1

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	2	NIL	NIL	NIL	NIL	50	50

COURSE OBJECTIVES :

CV240.CEO.1: To disseminate different methodical approaches to make solution.
CV240.CEO.2: To explain different conventional and modern engineering tools/techniques.
CV240.CEO.3: To engage them in creative thinking to improve the project performance using recent trends.
CV240.CEO.4: To educate about different types of prototyping.
CV240.CEO.5: To be more self efficient to solve problem in real time design environment.
CV240.CEO.6: To create awareness about Intellectual Property Rights(IPR).

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV240.CO.1: Select appropriate method for making of solution.
CV240.CO.2: Compare various engineering tools/technique to develop solution.
CV240.CO.3: Justify the selected method/tools opted for making of solution.
CV240.CO.4: Develop tangible solution to defined problem.
CV240.CO.5: Test the developed solution.
CV240.CO.6: Document solution in the form of Project report / IPR drafts.

COURSE ABSTRACT

Project is an avenue to cater Societal and Industrial needs. Minor project is one of the platform which students will use to solve real time problems. This course focuses on Selection of Methods/Engineering tools/Analytical techniques for making of solution.Further it emphasizes on importance of testing of solution by various stake holders.Through this course student learns to comprehensively understand engineering fundamentals and concepts, gets practical experience, chance to showcase skills, learns about team work, communication skills and responsibilities. It also imparts knowledge of Intellectual Property Rights.

Guidelines

1. Group members should deliberate upon different methodical approaches and finalize the appropriate method.
2. Students group should explore different Engineering tools/techniques for making of solution.
3. Justify the selected method/Engineering tools/analytical techniques identified based on the feasibility, affordability and ease of use.
4. While making the solution ,its imperative to take inputs/suggestions from various stake holders.
5. Solution must be critically analyzed from aspects.
6. Completed solution must be tested by target user/stake holders.
7. Students must protect their innovation,proof of concept through IPR .
8. While working in team, individual student should contribute and communicate effectively to maintain team balance.

TIMELINE

1. IPR Activity on Earlier allocated Group : 2 Weeks (1^{st} ,2^{nd} week)
2. Presentation of Project Review -1- Finalizing title with feasibility study and approval: 2 Weeks (4^{th}, 5^{th} week)
3. Presentation of Project Review -2 Analysis and Design of Project: 2 weeks (9^{th}, 10^{th} week)
4. Preparation of Project Progress Report – I (week 11^{th} and 12^{th}) Project Phase-II
5. Project Review III (10 marks) (11^{th} week)
6. Evaluation by external examiner (End Semester by 12^{th}, 13^{th} week)

Demonstration and Presentation (50 Marks)

1. **Review 1 (Project Implementation) (10 marks)**
2. **Review 2 (Project Demostration) (10 marks)**
3. **Project Activities (10 Marks)**
   - Quiz on IPR (5 marks)
   - Patent Drafting (5 marks)
4. **Review 3 (Project Documentation) (10 marks)**
5. **Final Demonstration and Presentation (10 marks)**

WEEK NO	TASK TO BE DONE BY MENTOR	ACTIVITY TO BE PERFORMED BY STUDENTS GROUP	EXPECTED OUTCOME
Week 1	Introduction to IPR (Patent & Right) (30 min) Videos on Patent: (30 min)	Student will attempt Quiz-I IPR after the lecture (10 Questions) Graded Activity 5marks Template I	Student will learn the patents and how to search patent
Week 2	How to check patent through CDAC online portal.	Student will do prior art search for their project, and try to generate patent Abstract as per the (Template- II)	Submission of Patent Abstract as per the prescribed Template.
Week-3	Design, Architectural overview /feasibility analysis of the project, Recent trends available to improve the performance.	Discussion on system architecture/ design method/ feasibility of project idea.	Student will implement the best feasible method to generate prototype
Week-4	NIL	Review I (10 Marks) - Presentation	Student will present progress done in project prototype building.
Week-5	Searching of Patents, Drafting of Patents , Filing of Patents , types of patent Application, Patent Documents. Expert lecture on above topic.	Final Drafting of complete patent document (5 marks) Graded Activity	Student will understand the basics of drafting patents, important of filling patent Submission in LMS
Week-6	Presentation, discussion and doubt clearing based on • Working on Algorithms / Design • Working on Analysis • Developing Prototype / Programming/ Circuits etc	As per department / school	Student will learn to prevent design flaws.

WEEK NO	TASK TO BE DONE BY MENTOR	ACTIVITY TO BE PERFORMED BY STUDENTS GROUP	EXPECTED OUTCOME
Week-7	Presentation, discussion and doubt clearing based on • Working on Algorithms/Design • Working on Analysis • Testing of Prototype/ Code/ Circuits of project	As per department / school	Student will analyze for project outcome
Week-8	NIL	Review-II (10 Marks) - Presentation	Student will work for performance improvement if project not working satisfactorily.
Week-9	Regarding Final PPT For Project Faculty himself gives a presentation based on how to make effective presentation on research topics.	Student will submit the Draft PPT through LMS at the end of Week-10	Student will learn to generate PPT covering all final outcomes of the project.
Week-10	Regarding Final report Generation For Project Faculty himself gives a presentation based on how to make effective project report should explain all guidelines to be followed while preparing report	Student will submit the Draft Project report through LMS at the end of Week-10	Student report are expected to have design Analysis, and the project should be expected to one year with the same guide
Week-11	NIL	Review-III (10 Marks)-Presentation	Students are expected to prepare a detailed project report and Project PPT , they should also check for plagiarism.
Week-12	Final Project presentation and project report submission to the project coordinator. Faculty will review the student projects with external examiner	Presentation and demonstration of project.	Prototypes/Software and Final Project report

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Professional Skills
	COURSE CODE	HP 202
	COURSE CREDITS	2
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
NIL	4	NIL	NIL	NIL	50	25	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP202.CEO.1: To increase students confidence during everyday communication.

HP202.CEO.2: To increase impact of students communication during presentations and public speaking.

HP202.CEO.3: To develop Leadership qualities among students.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP202.CO.1: Express themselves effectively in routine and real-world interactions through verbal and written communication.

HP202.CO.2: Show Confident Public Speaking skills.

HP202.CO.3: To showcase leadership qualities during tough tasks, make decisions and actions effectively within time.

TUTORIALS: (SECTION A)		
TUTORIAL NO.01	**Role Plays and Picture Description**	**4 HOURS**
It helps students to sharpen their extempore skills with effective articulation and logical sequencing of content.		
TUTORIAL NO.02	**Creative Writing Skills and Presentation Skills**	**8 HOURS**
It aims at evolving effective writing skills and presentation skills.		
TUTORIAL NO.03	**Voice Modulation and Audio - Video Listening and Debate**	**8 HOURS**
To enhance listening skills and to teach the students the basic components of voice modulations and helping them practice it. It helps overcome stage fear and learn audience engagement		
TUTORIAL NO.04	**Leadership**	**6 HOURS**
Leadership qualities helps person to lead a team in achieving the set vision. It helps in planning to execute it, utilizing resources and motivating people involved in it.		
TUTORIAL NO.05	**Decision Making**	**4 HOURS**
It helps to make necessary courageous and difficult decisions and carry them into action.		
TUTORIAL NO.06	**Time Management**	**6 HOURS**
It helps organizing and planning how to divide valuable time between specific activities and prioritizing activities.		
SECTION B:	**Verbal, Reasoning and Aptitude Training through BtechGuru**	**12 HOURS**

TEXT BOOK

1. J.K.Gangal, A Practical Course in Effective English Speaking Skills, Prentice Hall India Learning Private Limited (2012), ISBN-10: 8120345843.
2. Jean Yates, Practice Makes Perfect: English Conversation, Premium Second Edition, McGraw-Hill Education; 2 edition, ISBN-10: 1259643271.
3. Brian Stacy, Speak to Win. How to Present with Power in Any Situation, AMACOM; Special ed. edition (16 February 2008). ISBN-10: 0814401570.
4. Simon Wootton and Terry Horney, Strategic Thinking A Nine Step Approach to Strategy and Leadership for Managers and Marketer, ISBN13: 9780749460778.
5. Lorin Woolfe, The Bible on Leadership: From Moses to Matthew – Management Lessons for Contemporary Leaders, ISBN-10 : 0814439438; ISBN-13 : 978-0814439432.

REFERENCE BOOK

1. J.K.Gangal, A Practical Course in Effective English Speaking Skills, Prentice Hall India Learning Private Limited (2012), ISBN-10: 8120345843.
2. Jean Yates, Practice Makes Perfect: English Conversation, Premium Second Edition, McGraw-Hill Education; 2 edition, ISBN-10: 1259643271.
3. Brian Stacy, Speak to Win. How to Present with Power in Any Situation, AMACOM; Special ed. edition (16 February 2008). ISBN-10: 0814401570.
4. Garr Reynolds, Presentation Zen: Simple Ideas on Presentation Design and Delivery (Voices That Matter) , New Riders; 2 edition (8 December 2011), ISBN-10: 0321811984.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Liberal Learning
	COURSE CODE	HP203
	COURSE CREDITS	AUDIT
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
1	NIL	NIL	NIL	NIL	NIL	DEMONSTRATION	NIL

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

HP203.CEO.1: To create awareness about joy of learning among students
HP203.CEO.2: To teach the skills necessary to be a lifelong learner
HP203.CEO.3: To provide students with broad knowledge of the wider worlds.
HP203.CEO.4: To develop a sense of social responsibility as well as strong and transferable intellectual and practical skills.
HP203.CEO.5: To inculcate intellectual, civic, and practical capacities in students.

COURSE OUTCOMES :

The students after completion of the course will be able to,

HP203.CO.1: Develop a skill in the domain of their interest.
HP203.CO.2: Demonstrate the skills learnt in the course.
HP203.CO.3: Apply the concepts learnt in real-life situations.

NOTE : Students may select any one of the following tracks

COURSE CONTENTS

Track 1	**Introduction to photography**	**12 HOURS**

Types of camera, Basic camera controls. Light & Lenses, Understanding the Exposure Triangle. Aperture, Shutter Speed, and ISO. Auto and manual focus, Depth of field Landscape & nature photography, Creative aspects.

Track 2	**Dance**	**12 HOURS**

Study and demonstration of various dance forms such as classical, Bollywood, street dance, ballroom dance and Contemporary.

Track 3	**Creative Writing**	**12 HOURS**

Introduction to Creative Writing-How, literary aspects, different genres, forms of writing and script writing, Short Story Writing. Blog Writing.

Track 4	**Guitar**	**12 HOURS**

Parts of guitar, Names of strings, Proper right hand techniques, Proper left hand techniques, Tuning Guitar, Tuning by Ear, Tuning to a keyboard

Introduction to guitar fret board & The Chromatic Scale- The Chromatic Scale, Fret board, How to read Guitar Tablature, Finger exercises, how to read Chord Blocks.

Track 5	**Art and Craft**	**12 HOURS**

Sketching & Drawing, Elements of Art, types of art forms, types of Painting, Craft, Wrap in scrap, Best out of waste, Paper craft, Cloth craft & Rangoli.

Track 6	**Robotics**	**12 HOURS**

Introduction to Robotics, Robotics Links and joints, Selection & types of sensors, Actuators.

Track 7	**Drama**	**12 HOURS**

Learning & practicing narrations, craft and art conceptualization as an effective presentation, Survey for identification of social and global issues as a concept in script writing, Sound and illumination measures.

Understanding the audition for various sections like drama & film.

Illustrating the dialog delivery, expressions, volume, pitch in the dialog, Expression through photography and editing skill with an expertise in handling cameras, microphone, effective management skill enabling the justification through foundation till representation.

Track 8	**Yoga and Meditation**	**12 HOURS**

Concept of mind, Consciousness. Concentration techniques, Breathing exercises, Visualizations, Walking meditations. Simple yoga, Meditation and prayer, Asana and its types , Pranayama, its types and principles.

Track 9	**Automotive Skills**	**12 HOURS**

Introduction to Automotive system, Brake system, Power train of automotive, Suspension system, Computer Aided Engineering, Manufacturing and safety, Assembly and finishing.

Track 10	**Empathy & Compassion**	**12 HOURS**

Importance of Empathy, Role of empathy and compassion for engineers, Empathy activities, Skepticism About the Self, Free Will and the Situation, Recognizing emotions reading body language, improving listening skills, mindful self compassion, Compassionate Leadership,Origins of Morality, joy of giving, social responsibility, exercising social services.

Track 11	**Singing**	**12 HOURS**

Vocal cords, Voice types, Female: Soprano or alto, Male: Tenor, baritone or bass, Breathing Techniques, Role of breathing in singing, types of scales and pitches, Musical notes foundation of any song, warm-up exercises: Humming exercise, tongue twisters, vowels, Tempo of song, Tempo Markings, Practicing all octaves, analysis of songs, practicing songs.

Track 12	**Chess**	**12 HOURS**

Introduction to game of Chess. Rules, movement of pieces, strengths and weaknesses of all pieces. Stalemate, touch move, etiquette, pawn promotion and zugzwang, square of the pawn. Fundamental checkmate patterns, basic rules, special moves and rules such as castling, promotion, EnPassant, good moves for the opening.

Track 13	**RC Plane**	**12 HOURS**

Introduction to RC planes, study with categorization of planes and study of control forces on RC plane. Study of control surfaces. Study of airfoil, Studying the concepts of take-off, cruising, landing and motions during flight. Study of graphs. Study on factors affecting the flight of plane. Control and propulsion system of RC aircraft. Introduction and making of Electrical glider.

Track 14	Drone Making	12 HOURS

Three thumb rules, Basic of FAA, Combination of electronics, Frame design , Motor stator reading and dimension, Basic of electronics, Introduction to Drones, Fundamental of Flight, Airframes and Electric Motors, ESC and flight controller, Receivers And Transmitter, Battery and chargers, Basic building Tutorial with working on software(Betaflight), FPV and LOS Simulations, Working on development of Betaflight.

NOTE : More tracks will be added as per demand of the students

MIT | Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	W.E.F	:	2021-2022
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	RELEASE DATE	:	01/07/2021
	REVISION NO.	:	0.1

SEMESTER: V												
SUMMER INTERNSHIP (**Audit:** CV300)												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC07	CV305	Concrete Technology	3	2	-	35	35	30	50	0	150	4
DC08	CV306	Drinking Water & Sanitary Engineering	3	2	-	35	35	30	50	0	150	4
DC09	CV307	Design of steel structures	3	0	-	35	35	30	0	0	100	3
OE01	CV32#	Open Elective	3	2	-	35	35	30	50	0	150	4
OE02	CV32#	Solid Waste Management	3	2	-	35	35	30	50	0	150	4
HSS5	CS361	Project Management	2	0	-	0	50	25	0	0	75	2
SDP8	CV342	Skill Development Course 2-ETABS	0	4	-	0	0	25	50	0	75	2
SDP9	CV350	Project Design	0	4	-	0	0	25	0	50	75	2
TOTAL			**15**	**12**	**0**	**140**	**190**	**195**	**200**	**50**	**775**	**21**

SEMESTER: VI												
COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						C R
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC10	CV312	Structural Design-II	3	2	-	35	35	30	50	0	150	4
DC11	CV313	Transportation Engineering	3	2	-	35	35	30	50	0	150	4
DC12	CV314	Water Resources Engineering	3	0	-	35	35	30	0	0	100	3
OE02	CV33#	Open Elective	3	2	-	35	35	30	50	0	150	4
SDP10	CV34#	Skill Development Course 3-VISSIM /Drone surveying	0	4	-	0	0	25	50	0	75	2
SDP11	CV365	Project Implementation	0	4	-	0	0	25	0	50	75	2
HSS6	HP305	Employability Skills	0	4	-	0	0	25	0	50	75	2
TOTAL			**12**	**18**	**0**	**140**	**140**	**195**	**200**	**100**	**775**	**21**

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Concrete Technology
	COURSE CODE	CV305
	COURSE CREDITS	4
RELEASED DATE : 01-07-2021	**REVISION NO**	0.1

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA			
3	2	35	35	30	50	NIL	150

PRE-REQUISITE : 1. CV 305 – Building Design & Construction

COURSE OBJECTIVES :

CV305.CEO.1: To understand fundamental knowledge of concrete, its properties and its behaviour under various conditions.

CV305.CEO.2: To design mix of regular and special types of concrete.

CV305.CEO.3: To understand special techniques of concreting and machineries used for concreting work.

COURSE OUTCOME :

The students after completion of the course will be able to,

CV305.CO.1: Describe different type's concrete ingredients with their properties. (L1)

CV305.CO.2: Illustrate properties of concrete using various IS tests. (L3)

CV305.CO.3: Produce a concrete with specific mix. (L4)

CV305.CO.4: Explain special types of concrete techniques.(L2)

CV305.CO.5: Describe different concrete related equipment. (L2)

CV305.CO.6: Analyze Methods of Concrete Repair. (L3)

THEORY		
UNIT 1	**Introduction and General Ingredient Of Concrete**	**6 HOURS**
History and Introduction of concrete. Cement: Different types of cement, Important properties and applications, Manufacturing of Portland cement, Chemical composition of Portland cement, Hydration of cement, Setting of cement. Aggregate: Classification- Fine aggregate, coarse aggregate, Mechanical and Physical properties, Deleterious Materials, Soundness, Alkali aggregate reaction, Grading of Aggregates, Artificial and Recycled aggregate. Water: Mixing Water, Curing water, Tests on water. Fly Ash: Classification of fly ash, properties of fly ash, tests on fly ash. Admixtures: functions, classification, types. (Self-study component : cements and cement replacement materials https://www.sciencedirect.com/science/article/pii/B9780081002759000188)		
UNIT 2	**Properties Of Fresh And Hardened Concrete**	**6 HOURS**
Fresh Concrete: Workability: Factors affecting workability, measurement of workability, cohesion and segregation, bleeding, Mixing, Transporting, Placing, and Compaction of concrete, Curing Methods of concrete, Influence of temperature, Maturity rule, Steam curing. Hardened concrete: strength of concrete, factors affecting strength, micro-cracking and stress-strain relationship, other strength properties, relation between tensile and compression strength, impact strength, abrasion resistance, elasticity and creep, shrinkage and swelling. (Self-study component : Conventional precast assembly : https://sci-hub.se/https://www.sciencedirect.com/science/article/pii/B9780081027219000017)		
UNIT 3	**Concrete Mix Design**	**6 HOURS**
Concrete mix design: Concepts of Mix Design, Laboratory trial mixes and guidelines to improve mix, methods of Mix Design, IS method of Mix Design as per IS 10262:2019. (Self-study component : Mix design from DOE method: https://web.iitd.ac.in/ bishwa /LEC$_P DF_7$74/LEC1.*pdf*)		
UNIT 4	**Special Concrete and Concreting Techniques**	**6 HOURS**
Roller compacted concrete, Light weight concrete, Polymer concrete, Fibre reinforced concrete, High performance concrete, Pumped concrete, self-compacting concrete, Ferrocrete. Under water concreting, Cold weather concreting, hot weather concreting (Site Visit : Visit to any R.M.C. plant and prepare a detailed report)		
UNIT 5	**Introduction to Concrete Related Equipment**	**6 HOURS**
Introduction, Significance and Types of: Batching plants, Hauling, Pumps, Concrete mixers, Concrete vibrators. (Self-study component : New equipment used in industry: Boom placer , Lifting cranes)		
UNIT 6	**Reclamation: Concrete Repair**	**6 HOURS**
Standard Methods of Concrete Repair : Thin Repairs, Thick Repairs , Crack and Water Leak Repairs, 1. Strengthening of concrete by Reinforced Concrete Jacketing, Steel Jacketing, FRP Confining or Jacketing. (Self-study component : Case study of Repair and rehabilitation of hardened concrete)		

PRACTICALS/PROJECT: Project should be perform in a group of maximum students		
PROJECT NO.1	**Design of Concrete Mix**	**16 HOURS**

Perform following tests on materials and use findings to prepare a concrete mix of M20/M25/M30/M35/M40 grade.

- Tests on Cement: Fineness, Standard Consistency and Setting time
- Tests on fine aggregate: Particle size distribution, Moisture content, Silt content, Specific gravity
- Tests on aggregate:, Gradation, Density test, Specific gravity.

PROJECT NO.02	**Perform Tests on Fresh and Hardened Concrete**	**4 HOURS**

- Tests on fresh concrete: Slump Cone, Compaction factor, Vee Bee
- Tests on hardened concrete: Compressive strength,
- Flexural strength test and Split tensile strength

PROJECT NO.03	**Evaluate strength of old concrete by NDT tests.**	**4 HOURS**

Evaluate strength of old concrete by using following NDT tests

- Rebound Hammer Test
- Ultrasonic Pulse Velocity Meter

TEXT BOOK

1. Shetty M. S., "Concrete Technology", S. Chand Publications, eleventh edition, 2015, ISBN-13: 978- 8121900034
2. Gambhir M.L., "Concrete technology", Tata McGraw hill Publication, sixth edition, 2009, ISBN: 978- 1259062551
3. S. S. Bhavikatti, "Concrete technology", I.K. International Publishing House Pvt. Limited, 2015, ISBN: 9384588679
4. Dr. S. Kandasamy, Advanced Concrete Technology, 2020, Notion Press, ISBN: 9781648690785

REFERENCE BOOK

1. Neville A. M., Brooks J.J., "Concrete Technology", Pearson Publications, fifth edition, 2012, ISBN:978-0273732198
2. Zongjin Li, Advanced Concrete Technology, John Wiley Sons, 2011, ISBN: 0470902434
3. John Newman, B S Choo, Advanced Concrete Technology 1: Constituent Materials, Elsevier, 2003, ISBN: 0080489982, 9780080489988
4. Santhakumar A.R., "Concrete technology", Oxford University Press, Fourth edition, 2010, ISBN: 978 0195671537

FURTHER LEARNING

1. NPTEL Videos Web notes of course Concrete Technology
2. IS Codes

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2021 - 2024
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Drinking Water and Sanitary Engineering
	COURSE CODE	CV306
	COURSE CREDITS	4
RELEASED DATE : 01-07-2021	**REVISION NO**	0.1

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NIL	150

PRE-REQUISITE:

COURSE OBJECTIVES:

CV306.CEO.1: To study the various sources and properties of water and wastewater.

CV306.CEO.2: To acquire the knowledge of components design associated with water supply and sanitation systems.

CV306.CEO.3: To attain knowledge of various aspects related to supply of pure and safe drinking water to communities.

CV306.CEO.4: To comprehend methods of waste water collection, characterization, treatment, safe disposal practices and reuse of wastewater.

COURSE OUTCOME:

The students after completion of the course will be able to:

CV306.CO.1: Analyze the characteristics of water and wastewater.

CV306.CO.2: Estimate the quantity of drinking water and domestic wastewater generated

CV306.CO.3: Design the various units of water treatment plant.

CV306.CO.4: Summarize the advancement in water distribution system.

CV306.CO.5: Design the various units of sewerage treatment plant.

THEORY		
UNIT 1	**Water Demand , Quality and Quantity**	**6 HOURS**
Source of Water, Water quality and Characteristics of water (ISO 10500: 2012) 2ND Revision, Water Quantity Estimation and Water Demand (ISO 10500: 2012) 2ND Revision and (MWRRA Guideline), Water Intake Works. Self-Study: Pipe Appurtenances. Reference: Manual on Water supply and Treatment by CPHEEO.		
UNIT 2	**Water Treatment Units**	**7 HOURS**
Layout of Water Treatment Plant, Treatment for the removal of suspended, colloidal and dissolved solids, Design of Coagulation- Flocculation-Settling Plain Sedimentation, Filtration Methods of Disinfection (U-V method, ozone disinfection). Self-Study: Miscellaneous Treatments Reference: Manual on Water supply and Treatment by CPHEEO Site visit to Water Treatment Plant is recommended.		
UNIT 3	**Water Distribution Systems**	**6 HOURS**
Requirements of a good distribution system, Methods of Distribution, Layout and Components of distribution system, Systems of Supply of Water, Design of Distribution System, Distribution Reservoirs, Design of ESR, Analysis of pipe networks of distribution system, Hardy cross method for network analysis, Appurtenances in distribution system (fire hydrant). Self-Study: Maintenance of water distribution system Reference: Manual on Water supply and Treatment by CPHEEO		
UNIT 4	**Advancement in Water Distribution**	**6 HOURS**
Water loss detection control in water Supply Systems, Software's for Water Supply Systems EPANET and GEMS, Smart metering and Sensing devices, IoT and Automation in Water Supply, Pricing water, water audit. Site visit to Water Treatment Plant: Application of SCADA System in PCMC Water Distribution System.		
UNIT 5	**Characterization and Collection of Sewage**	**7 HOURS**
Quantification of sewage; Characterization of sewage; Types of sewerage systems; Design of Sewers and Storm Sewers, Variation in Sewage Flow Self-Study: Sewer appurtenances Reference: Manual of Sewerage Sewage Treatment by CPHEEO		
UNIT 6	**Design of Sewage Treatment Units**	**8 HOURS**
Bearing capacity of soil, bearing capacity analysis: list of methods and field tests, types of shear failure, Settlement and its types, its causes and remedial measures. Case Study: Investigation of Foundation Failure of a Residential Building. Self Study: Types of Foundation		

PRACTICALS/PROJECT:		
PROJECT NO.1		**6 HOURS**
Prepare a water testing report for domestic water as per guidelines of CPHEEO manual		
PROJECT NO.02		**6 HOURS**
Prepare a water testing report for sewage as per the guidelines of CPHEEO manual		
PROJECT NO. 3		**2 HOURS**
Designing the Water Distribution Network by using Appropriate Software		

TEXT BOOK

1. Water Supply Engineering: S. K. Garg, Khanna Publishers, ISBN-13: 978-8174091208
2. Water Supply and Sanitary Engineering: G. S. Birdie and J. S. Birdie, Dhanpat Rai Publishing Company, ISBN-13, 9788187433798
3. Environmental Engineering 1: Water Supply Engineering: B. C. Punmia, Ashok Jain and Arun Jain. Laxmi Publications (P) Ltd. ISBN 13: 9788174091208
4. Environmental studies by Rajgopalan- Oxford University Press. ISBN: 9780198072089
5. Waste Water Treatment – Rao Dutta. ISBN:9788120417120

REFERENCE BOOK

1. Environmental Engineering, Peavey, H.S, Rowe, D.R., and G. Tchobanoglous (1985), McGraw Hill Inc., ISBN-13: 978-0070491342
2. Water supply Engineering – Environmental Engineering (Vol. I) P.N. Modi (2006), – Standard Book House. ISBN-13: 978-8189401351
3. Sewage treatment Disposal and waste water Engineering – Environmental Engineering (Vol.II) P.N. Modi (2008),– Standard Book House. ISBN-10, 8190089324
4. Sewage Disposal and Air Pollution Engineering – Environmental Engineering (Vol.II) – S.K. Garg (1999), Khanna Publishers. ISBN-13: 978-8174092304
5. Wastewater Engineering Treatment and Reuse Metcalf Eddy, Inc. (2003), McGraw Hill Inc., ISBN-10: 0070418780

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Design of Steel Structures
	COURSE CODE	CV 307
	COURSE CREDITS	3
RELEASED DATE : 01/07/2021	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EVALUATION SCHEME :					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	0	35	35	30	Nil	Nil	100

COURSE OBJECTIVES :

1.CV307.CEO.1: To design steel elements subjected to Axial force/Shear force/ Bending moment or any combination of these actions for Limit State of Collapse.

1.CV307.CEO.2: To design a structure using software to perform tasks mentioned in CEO.1

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV307.CO.1: Explain the various design philosophies.[L2 Understanding].

CV307.CO.2: Design connections of structural elements for the actions they are subjected to, using limit state method. [L4 Analyzing]

CV307.CO.3: Design axially loaded steel elements using Limit state method.[L4 Analyzing]

CV307.CO.4: Design steel elements subjected to bending and shear using Limit state method. [L4 Analyzing]

THEORY		
UNIT 1	**Introduction and Design philosophies**	**3 HOURS**
Introduction to structural design, Structural systems, Properties of Structural Steel, I.S. Rolled Sections, I.S. Specifications ,Factor of Safety, Permissible and Working Stresses, Elastic Method, Introduction to Plastic theory, Introduction to Working stress method, Limit States of Design. Types of loads acting on structure, Introduction to IS Codes and specifications: IS 875, IS 800 **Self study:** Advantages of steel as a structural material, Types of structural steel, Mechanical properties of cold- formed sections, structural pipe (tubes)) sections and their properties. **Tasks:** Planning and drawing of Structural frame system (beam to beam, beam to column, bracings and splicing details sheet drawn using drafting software)..		
UNIT 2	**Connections**	**10 HOURS**
Bolted connections: Bolted including friction grip connections subjected to shear and/or bending. Beam to beam, Beam to Column and Moment resistant connections Welded connections: Fillet and Butt weld subjected to shear and/or bending. Self study: Mechanical properties of bearing bolts and High strength friction grip bolt, advantages and disadvantages of bolted and welded connections. Case study: https://www.sciencedirect.com/science/article/pii/S0143974X08001685		
UNIT 3	**Tension and compression Members**	**10 HOURS**
Design of Tension Member: Behavior, Modes of failure, permissible stress in tension and Design of single and double angle sections. Design of compression member: Modes of Failure of compression member, Buckling Failure: Euler's Theory, Effective Length, Slenderness Ratio, Design Formulae: I.S. Code Formulae. Designing of lacing and battening system for columns. Design of column base. Case study: https://www.sciencedirect.com/science/article/pii/S2352012416300248 torsional or buckling failure of column.		
UNIT 4	**Design of flexure member**	**6 HOURS**
Design of members subjected to flexure: Laterally restrained and unrestrained members. Design of compound beams.		
UNIT 5	**Industrial sheds**	**5 HOURS**
Roof trusses, roof side coverings, design loads, design of purlins, design of truss members, end bearings. Tasks : **Full imperial size sheets** Full imperial size sheets covering. 1. Provisions and details of purlins, trusses, rafter and tie level bracings. 2. Connections showing roof truss to the column cap plate. 3. Column, column bracings, gable end bracings, base plates, shear-keys, holding down bolts.		
UNIT 6	**Welded Plate Girder**	**6 HOURS**
Plate-girders including stiffeners, splices and curtailment of flange plates.		

TEXT BOOK

1. S.K.Duggal, "Design of Steel structures",McGraw Hill, ISBN: 978-0136077909
2. N Subramanian,"Limit state design of Steel Structures", Oxford university press, ISBN10: 9780199460915

REFERENCE BOOK

1. IS 800-2007, IS 875 (part I to IV), IS 808, SP-6(4).
2. Karuna Moy Ghosh,"Practical Design of Steel Structures", Whittles Publishing ISBN 97814398357
3. Luís Simões da Silva, Rui Simões, Helena Gervásio, "Design of steel structures, Part 1-1 - General rules and rules for buildings", First Edition Author(s): Print ISBN: 9783433029732

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Construction Planning and Management
	COURSE CODE	CV325
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	0.1

TEACHING SCHEME (HOURS/WEEK)		EVALUATION SCHEME :					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	30	20	150

Basic knowledge of Building Design and Construction :

COURSE OBJECTIVES :

CV311.CEO.1: To understand basic concepts and novel technologies in project management and project planning.

CV311.CEO.2: To acquire skills for planning, scheduling, controlling, forecasting, and earned value management of various construction projects.

CV311.CEO.3: To take part in practical training in the planning and scheduling of construction projects.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV311.CO.1: Relate various project managerial and planning concepts with onsite work. L2

CV311.CO.2: Analyze the technique of project scheduling network analysis L4

CV311.CO.3: Utilize the methods of project controlling inventory management L3

CV311.CO.4: Contrast on earned value management with administrative incentive schemes L4

CV311.CO.5: Illustrate various concepts and methods for quality and safety management L2

CV311.CO.6: Functionally design a schedule for a residential building. L4

THEORY COURSE CONTENT		
UNIT 1	**Project Management and Planning**	**4 HOURS**
Basic concepts of project management, Management theories, SWOT Analysis in construction, Project Planning Methods, Work study, Method study, Construction Project Life-Cycle, construction site layout introduction. (Self-study component: Selection of construction enterprises management strategy based on the SWOT and multi-criteria analysis- https://www.sciencedirect.com/science/article/abs/pii/S164496651260096X)		
UNIT 2	**Project Scheduling**	**8 HOURS**
Basics of project scheduling, Work Breakdown Structure, Line of balance, Development of network, Network Analysis PERT CPM, Estimating, analyzing, and managing the schedule, Tool for optimizing project schedules, Graphical Evaluation and Review Technique. (Self-study component: Scheduling of Industrialized Construction Project using Graphical Evaluation and Review Technique (GERT)		
UNIT 3	**Project Controlling**	**8 HOURS**
Crashing,Network compression: Least Cost and Optimum Duration, Resource allocation, Smoothening and leveling. (Self-study component: Project Acceleration via Activity Crashing, Overlapping, and Substitution: - https://ieeexplore.ieee.org/document/4604760)		
UNIT 4	**Advance Techniques in Construction Management**	**6 HOURS**
Earned Value Management (EVM Techniques), Importance of EVM, Issues Involved and its solutions Administration of Incentive Schemes- Introduction to artificial intelligence technique, Introduction to BIM. (Self-study component: https://theirf.org/research/the-impact-and-potential-of-artificial-intelligence-in-incentives-rewards-and-recognition/2558/ Conceptual Framework and Roadmap Approach for Integrating BIM into Lifecycle Project Management)		
UNIT 5	**Quality and Safety Management**	**6 HOURS**
Quality and safety concerns,Total Quality Control,Quality Control by statistical methods,Causes of Accidents, safety measures and safety policies to be adopted Personal protective equipment, Occupational Safety and Health Administration (OSHA) guidelines, Hazard Identifications and Control Techniques (Self-study component: Case Studies on the Safety Management at Construction Site)		
UNIT 6	**Inventory Management**	**6 HOURS**
Application of ABC and Economic Order Quantity analysis in inventory control, Use of Indices in materials/inventory mode ls Inventory Management, Materials Management Systems. (Self-study component: Construction Material Management through Inventory Control Techniques: - https://www.sciencepubco.com/index.php/ijet/article/view/16558/7073)		

PRACTICAL		
PRACTICAL NO.01	**Project Planning using MS-Project**	**16 HOURS**
Developed a schedule for ten storied residential building using MS-Project.		
PRACTICAL NO.02	**Prepare Line of Balance for project no.1**	**4 HOURS**
Prepare LOB for above project.		
PRACTICAL NO.03	**Presentation on Safety Measures at site**	**4 HOURS**
Students must visit any ongoing high-rise construction site and identify various safety measures. Collect the information and give presentation.		

TEXT BOOK

1. S. Seetharaman, "Construction Engineering and Management", Umesh Publications Delhi, sixth edition, 2009, ISBN:9382533095
2. B. Sengupta and H Guha, "Construction Management and Planning", Tata Mc-GrawHill Publishing Company, New Delhi, ISBN:0074623982
3. K.K.Chitkara,"Construction Project Management",McGraw-Hill Education third edition, ISBN:9339205448

REFERENCE BOOK

1. Newman,"Engineering Economic Analysis,"tenth edition,Oxford University,ISBN:091055496X
2. Dennis Lock,"The Essentials of Project Management",2nd Revised edition,Gower Publishing Ltd, ISBN:0566082241
3. P S GahlotandBMDhir,"Construction Planning and management",First Edition NewAge International Limited Publishers
4. Construction Project planning Scheduling By Charles Patrick, Pearson, 2012
5. Project Management-Planning and Control—Rory Burkey 4th ed.—Wiley,India.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Solid Waste Management
	COURSE CODE	CV326
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ISE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	25	25	150

PRE-REQUISITE:

COURSE OBJECTIVES:

CS326.CEO.1: To understand the core concepts of solid waste management and the importance of this on economic development and environmental protection.

CS326.CEO.2: To impart knowledge and skills in the collection, storage, transport, treatment, disposal and recycling options for solid wastes management.

CS326.CEO.3: To characterize the solid waste.

CS326.CEO.4: To describe the components of solid waste management and laws governing it.

COURSE OUTCOMES:

The students after completion of the course will be able to,

CV326.CO.1: Describe the functional elements of a solid waste management system.

CV326.CO.2: Identify the methods of collection, storage and transportation of solid waste.

CV326.CO.3: Evaluate recovery, treatment and disposal alternatives according to properties of solid waste.

CV326.CO.4: Understand basic concepts in hazardous waste management and integrated waste management for urban areas.

CV326.CO.5: Recognize the relevant smart techniques for collection, transport disposal of waste.

CV326.CO.6: Acquire knowledge on waste to energy productions in the perspective of sustainable development.

THEORY :

UNIT 1	Fundamentals of Solid Waste	6 HOURS

Present scenario of Solid Waste Management (SWM), Need of SWM, Solid Waste: Sources and engineering classification, Generation and Quantification, Characterization, Functional elements of solid waste management (SWM) system, Importance of SWM for economic development and environmental protection, Linking SWM and climate change.

Case Study: Solid Waste Management issues in different urban sub-urban areas of India.

Reference: IS: 9234 -1979 (Reaffirmed 2003), Indian Standard for 'Method for Preparation of Solid Waste Sample for Chemical and Microbiological Analysis.

UNIT 2	Waste Collection and Transport	6 HOURS

Handling and segregation of wastes at source, Collection: Primary and Secondary, Storage of municipal solid wastes, Collection equipment, Transfer stations.

Case Study: Five way segregation system at source of city Panaji, Goa, India.

Reference: SOP on Segregation at Source by Ministry of Urban Development, Government of India.

UNIT 3	Treatment and Disposal Technologies	6 HOURS

Mechanical Biological treatment, Incineration, Pyrolysis, Gasification, Aerobic anaerobic decomposition, Composting Types of composting, Recycling of plastics, Biomethanation, Sanitary landfills, Leachate management.

Case Study: Dumpsite Management / Legacy Waste Management for different cities in India.

Reference: 'Clean It Right: Dumping Management in India', a research report by 'Centre for Science and Environment (CSE), New Delhi.

UNIT 4	Hazardous Waste Management	6 HOURS

Need for hazardous waste management, Sources of hazardous wastes, Effects on community, Terminology and Classification, Storage and Collection of hazardous wastes, Problems of hazardous waste management in developing countries, Pollution prevention and Waste minimization.

UNIT 5	Advancement in Solid Waste Management	8 HOURS

Smart waste segregation using Machine Learning (ML) techniques, Real time data monitoring, Geographically mapping of: collection points, Bin locations, Solid waste management garages, Dumping grounds, Transfer stations, Ward offices on GIS maps, Smart bins, Automation of transfer station disposal sites for daily garbage inward and outward movement, Minimize human intervention, Use of IoT in SWM : Route optimization, RFID tagging.

Case Study: Integrated Solid Waste Management of 'Navi Mumbai Municipal Corporation', Maharashtra, India by using smart tools.

UNIT 6	Sustainable Techniques in SWM	8 HOURS

Waste to Energy: Energy recovery, Power generation, Blending with construction materials and Best Management Practices (BMP), Community based waste management, Waste as a Resource concept, Public private partnership (PPP), 7R approach, Circular Economy in SWM, Extended producer responsibility (EPR).

Case Study: Co-processing of Segregated Plastic Waste: An Initiative of Jabalpur Municipal Corporation and ACC–Holcim, Crushing units at Burari CD waste recycling plant. **Reference:** Manual on 'Waste To Wealth' published by 'Ministry of Housing and Urban Affairs', Government of India.

PRACTICALS :

Important Instructions:

1. Practicals has to be performed in a group of maximum 4 numbers of students.
2. Students has to submit the detailed report on each practical.

PRACTICAL-1	Physical Characterization of Solid Waste	6 HOURS

Determine the physical characteristics of given solid waste sample and prepare a detailed report on it.

PRACTICAL-2	Chemical Characterization of Solid Waste	8 HOURS

Determine the chemical characteristics of given solid waste sample and prepare a detailed report on it.

PRACTICAL-3	Visit to Solid Waste Management Plant, Moshi, PCMC or Gasification Plant of Pune Municipal Corporation	2 HOURS

Visit to the mentioned site and prepare a detailed report on it including the information about site, photographs, site map, process flow diagram, different treatment / disposal methods etc.

PROJECTS :

Important Instructions:

1. Projects has to be performed in a group of maximum 4 numbers of students.
2. Students has to submit the detailed report on project work done.

PROJECT-1	Lab Scale Study on Household Kitchen Waste Management using IoT	4 HOURS

Prepare a lab scale model and carry out the project work at your individual house for mentioned waste. Maintain the weekly records of the observations and findings. Prepare a detailed report and short film on it.

PROJECT-2	Land Disputes for Treatment Sites and Legislation	2 HOURS

Go through the various clauses and provisions of 'Solid Waste Management Rules, 2016' and ' Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016'. Carry out the a case study related to land legal disputes related to solid waste treatment sites and draft a detailed report on it.

PROJECT-3	Awareness Programs	4 HOURS

Organize a social awareness program for societies on importance of functional elements of solid waste management. Prepare a short film of the activity.

REFERENCES

1. Tchobanoglous, G., Theisen, H. and Vigil, S.A., 'Integrated Solid Waste Management - Engineering Principles and Management Issues', McGraw Hill (1993).
2. Rowe, R. Kerry, Quigley, Robert M., Brachman, Richard W. I., and Booker, John R., 'Barrier Systems for Waste Disposal Facilities' , 2nd Edition 2004. Spon Press, Taylor Francis Group, London, ISBN 0-419-22630-3.
3. Vesilind, P.A. and Worrell, W. A., 'Solid Waste Engineering', 2nd Edition 2016, Cengage India.
4. Manual on 'Municipal Solid Waste Management, 2016' published by Central Public Health and Environmental Engineering Organization (CPHEEO), Ministry of Urban Development, Government of India.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Project Management
	COURSE CODE	CS361
	COURSE CREDITS	2
RELEASED DATE : 01/07/2021	**REVISION NO**	0.1

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
2	NA	NA	50	25	NA	NA	75

PRE-REQUISITE :

COURSE OBJECTIVES :

CS361.CEO.1: To create awareness of organizational strategy for project implementation.
CS361.CEO.2: To understand the rules for creating a Work Breakdown Structure for a Project. .
CS361.CEO.3: To illustrate approaches for risk identification, analysis, and assessment.
CS361.CEO.4: To identify key characteristics of a high-performance project team.
CS361.CEO.5: understand the critical success factors in project management.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CS361.CO.1: Identify the Project Management Knowledge Areas and Processes.
CS361.CO.2: Classify the responsibilities while designing the Project Master Plan.
CS361.CO.3: Outline the Cost Estimating and Cost Escalation Process.
CS361.CO.4: Demonstrate and highlight The Processes of Project Quality Management.
CS361.CO.5: Analyze Management of a Project and Maturity Models.

THEORY :		
UNIT 1	**Basics of Project Management**	**6 HOURS**
Contents: Introduction, Need for Project Management, SMART Project, Knowledge Areas and Processes, The Project Manager and Project Management Office, Phases of Project Management Life Cycle, Project environments, Impact of Delays in Project Completions **Case Study:**		
UNIT 2	**Systems and Procedures for Planning and Control**	**5 HOURS**
Contents: Type of Projects, The Project Master Plan, The Project Charter, Project Organization and Responsibilities, Work Breakdown Structure (WBS), Networks Diagrams, The Critical Path, Gantt Charts and Calendar Schedules, CPM, PERT (Project Management Tools: GanttProject, OpenProj) **Case Study:**		
UNIT 3	**Cost Estimating, Budgeting and Risk Management**	**5 HOURS**
Contents: Cost Estimating and Cost Escalation, Cost Estimating Process, Elements of Budgets and Estimates, Risk Management process, Project Risk by Phases, Risk Assessment, Risk Response Planning, Risk Tracking and Response **Case Study:**		
UNIT 4	**Project Quality Management and Organization Behavior**	**5 HOURS**
Contents: The Concept of Quality, The Processes of Project Quality Management, Techniques for Quality Assurance during System Development, Stakeholders, Managing Participation, Teamwork and Conflict. **Case Study:**		
UNIT 5	**The Corporate Context**	**5 HOURS**
Contents: Project Management Maturity and Maturity Models, Knowledge and Time Management, International Projects and associated problems, Entrepreneurs and Startup. **Case Study:**		

TEXT BOOK

1. Project Management for Business, Engineering, and Technology, 3rd Edition, John M. Nicholas and Herman Steyn ELSEVIER ISBN: 978-0-7506-8399-9.
2. Project Management Planning and Control, Managing Engineering, Construction and Manufacturing Projects to PMI, APM and BSI Standards, Seventh Edition, Eur Ing Albert Lester, B H Copyright © 2017 Elsevier Ltd, ISBN: 978-0-08-102020-3.
3. Project Management in Product Development, George Ellis, Copyright © 2016 Elsevier Inc, ISBN: 978-0-12-802322-8.
4. Project Management best Practices, 4th Edition, HAROLD KERZNER, Wiley Copyright © 2018, ISBN 978-111-9-46885-1.

REFERENCES

1. Project Management Toolbox, Second Edition, Russ J. Martinelli, Dragan Z. Milosevic, Wiley Copyright © 2018, ISBN 978-1-118-97312-7.
2. Project Management Essentials You Always Wanted To Know, Kalpesh Ashar, VIBRANT PUBLISHERS
3. The Practical guide to Project Management, 1st Edition, Christine Petersen, ISBN 978-87-403-0524-1
4. Beginning Project Management (e book), John M. Preston
5. Project Management from Simple to Complex, Russell W. Darnall, John M. Preston, The Open University of Hong Kong

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Skill development course II - (ETABS)
	COURSE CODE	CV 342
	COURSE CREDITS	2
RELEASED DATE : 01/07/2021	**REVISION NO**	0.2

TEACHING SCHEME (HOURS/WEEK)		EVALUATION SCHEME :					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
0	04	00	00	50	00	25	75

COURSE OBJECTIVES :

CV304.CEO.1: To Understand the basics methodologies of analyzing and designing structures using software.

CV304.CEO.2: To apply various tools and techniques in analysis and design.

CV304.CEO.3: To design the various structures using ETABS.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV304.CO.1: Prepare structural framing plan. [Applying]

CV304.CO.2: Assigning material properties, boundary conditions and loading to structural elements. [Applying]

CV304.CO.3: Analyze the R.C. and steel structures for various load combinations. [Analysis]

CV304.CO.4: Interpret the results of software. [Applying] [L4 Analyzing]

CV304.CO.5: Design the structural elements (reinforced or fabricated) for static and dynamic loading as per Indian standards.

CV304.CO.6: Articulate importance of software's in research and industry by simulation work.

THEORY		
UNIT 1	**Introduction to analysis and design software**	**8 HOURS**
Introduction to various analysis and design software, overview of ETABS, Unit system, knowing interface, generating grids for structural plan, Edit grid system and storey data, Master storey and similar stories.		
UNIT 2	**Modeling In ETABS**	**8 HOURS**
Defining materials and section properties, assigning material properties and boundary conditions to the structural elements.		
UNIT 3	**Gravity Loads and load combinations**	**6 HOURS**
Load calculation as per IS 875 part I II, defining and assigning primary load cases viz. Dead load, Live load and superdead load, Design load combinations as per IS 456 - 2000		
UNIT 4	**Analysis and result interpretation**	**4 HOURS**
Perform analysis for defined load cases, Interpretation of analysis results viz. deflection, shear force, bending moment, axial force and reactions.		
UNIT 5	**Design and optimization.**	**4 HOURS**
Design the structural elements as per codal provisions. Optimization for structural elements.		
UNIT 6	**Analysis of multi storied structures for lateral loading.**	**8 HOURS**
Conceptualization of lateral loading, Modeling, defining and assigning material properties, section properties, load cases and load combinations, base shear calculation and verification with manual calculations.		
UNIT 7	**Analysis and Design of Industrial shed.**	**8 HOURS**
Modeling, defining and assigning material properties. Selecting steel sections as per Indian standards, load cases and load combinations as per IS 875 –III, performing analysis, and verification of section, design and optimization.		
UNIT 8	**Generating the report.**	**2 HOURS**
Preparing customized final report as per requirement. Report reading and interpretation for execution.		

TEXT BOOK

1. Analysis Design of a Multistorey Building using STAAD.Pro E-TABS (with Manual Calculation) (First Edition,2016), by D. Rajendran.

REFERENCE BOOK

1. ETAB 2016, User's Guide, July 2016, by Computers Structures Inc.
2. IS 800- 2007,
3. IS-875 – Part I,II and III,
4. IS 1893 – 2016
5. IS 456- 2000

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF MECHANICAL AND CIVIL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING	**COURSE NAME**	Project Design
	COURSE CODE	CV350
	COURSE CREDITS	2
RELEASED DATE : 01/07/2021	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA			
NIL	4	NIL	NIL	25	NIL	50	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

CV350.CEO.1: To embrace innovation and creativity in project design while empathizing real world needs.

CV350.CEO.2: To acquaint with requirement analysis process and techniques.

CV350.CEO.3: To inculcate the agile project management tools for project design and planning.

CV350.CEO.4: To upskill in quality technical writing and related tools for project documentation.

COURSE OUTCOMES :

The students after completion of the course will be able to,

CV350.CO.1: Delineate the problem to be solved.

CV350.CO.2: Inculcate problem solving skills by critically analyzing real world needs, possible solutions and challenges.

CV350.CO.3: Carry out systematic literature review, planning and project design.

CV350.CO.4: Cognize the importance of documentation and report writing.

COURSE ABSTRACT

The project is most important part of undergraduate curriculum and enables student's to develop analytical, critical thinking, problem solving, and communication, cooperation, leadership skills. Project enable students to assimilate their learning to address a real-world interdisciplinary problems. The objective of undergraduate project is to analyze, design, implement, compelling solution to real world problems, and do performance evaluation with relevant documentation. To enhance the effectiveness and achieve worthwhile outcome of engineering knowledge that the student has acquired, the entire project process is divided in three phases, viz., Project Design, Project Implementation and Project Evaluation. The first phase of Project Design mainly focuses on formulating system's requirement, background/literature review, and defining scope, objective and apply project management/modeling tools to design proposed solution. This enables students to apply their technical acumen and innovativeness in proposing methodology, milestones, and expected outcome.

GUIDELINES

1. Every project group should consist of minimum 03 and maximum of 04 students.
2. The group members may be from different programs to support the interdisciplinary functioning.
3. Project group members and title of the project need to be approved by Project Guide and School.
4. Projects should preferably have a national/international industry/academic/research collaboration.
5. User Oriented Collaborative Design: The students need to identify the problem by discussion with various stakeholders, site visits, expert-opinions and various research articles.
6. The relevance and criticality of the problem to be solved, need to be established by collecting sufficient information and background study.
7. Define proposed solution and apply project management/modeling tools for project planning and design.
8. Critically analyze various solutions/techniques to solve real world problems and perform feasibility study to select and justify proposed solution.
9. Define outcome, milestones, definite roadmap for project design, implementation, evaluation and documentation.

Collaborative/Sponsored Project

1. Students are encouraged to take real time problems from national/international industry/academic/research organizations of repute (like NCL, BARC, IISER, DRDO, CDAC, etc) for final project work.
2. Project statement, scope of the work, objectives and final outcomes must be decided and approved by faculty mentor and collaborative organization, anytime before the commencement of the sixth semester.
3. Proposed Collaborative Project work need to reviewed by team of faculty reviewers to ensure assigned work is equivalent to the final undergraduate project work of minimum 12 months to 18 months.
4. Final assessment will be carried out in presence of faculty mentor, external mentor and examiner.

TIMELINE

1. Exploration of fore front research/specialization areas and opportunities in the various fields.
2. Formation of Project Group. Finalization of area of work/title as per forefront areas.
3. Exploration of abridged courses, valid resources, challenges, relevance with current opportunities.
4. Project Review I Presentation.
5. Background study Systematic literature review.
6. Literature review documentation for Project Report and Research Article.
7. Define problem statement and objectives.
8. Define scope of the work and Outline of the work.
9. Project Review II Presentation.
10. Project Design, Modelling, Simulation etc.
11. Proposed Methodology of the solution and its documentation.
12. Project Documentation: Project Report Writing, Final Synopsis
13. Project Documentation: Ethics in Writing
14. Project Review III Presentation

ASSESSMENT and EVALUATION

The three member jury/committee will be appointed to monitor the progress and continuous evaluation of each project. One of the member will be the project guide. Assessment shall be done jointly by the guide and jury members.

1. Internal Assessment (25 Marks)
   (a) Project Review I: Problem Identification, Motivation and Relevance
   (b) Synopsis
   (c) Project Review II: Background Study, Literature Review and Problem Definition
   (d) Background Study and Literature Review
   (e) Project Review III: Project Planning, Analysis and Design
2. Project Demonstration (50 Marks)
   (a) Project Report
   (b) Final Presentation and Demonstration

REFERENCES

1. Nicholas John M.,"Project Management for Engineering, Business and Technology", Butterworth Heinemann, ISBN: 9780080967042
2. Michelle Reid, "Report Writing (Pocket Study Skills)"', Second Edition, Macmillan Eduation.
3. Sara Efrat Efron, Ruth David, "Writing the Literature Review : A Practical Guide", Guilford Press, ISBN-13: 978-1462536894.
4. Leslie Lamport,"LaTeX: A document preparation system, User's guide and reference manual", Second Edition 1994, Addison Wesley, ISBN: 978-0201529838.
5. Michel Goossens, Frank Mittelbach, Sebastian Rahtz, Denis Roegel and Herbert Voss,"The LaTeX Graphics Companion", Second Edition 2007, Addison-Wesley Professional, ISBN: 078-5342508925.

WEEK NO	TASK TO BE DONE BY MENTOR	ACTIVITY TO BE PERFORMED BY STUDENTS GROUP	EXPECTED OUTCOME
Week 1	Exploration of fore front research/specialization areas and opportunities in the various fields.(School Level Awareness Session)	Students may introspect within themselves to think about their choice of domain areas	Students should be clear about subjects which would lead towards research or towards product related jobs
Week 2	Students are briefed about Specialization open electives tracks and interdisciplinary project available in the institute.(School Level Awareness Session)	Students start deliberating on project ideas by referring to various sources linked directly or indirectly to their minor track.	Open electives and project domain are chosen with close connectivity.
Week 3	Mentor guidelines for abridged courses, valid resources, challenges, relevance with current opportunities	Finalization of area of work/title as per fore front area of the project work, objectives and feasibility study	Greater understanding of the project work and requirement. Synopsis of the Project
Week 4	Guideline to define outcome and roadmap of the project progress for three semester	Define Roadmap of the Project.	Project Synopsis and Review Presentation I
Week 5	Guide introduces a fundamental / recent paper / reports / manuals / book / book-chapter / moocs selective lectures / case study to provide the initial platform of the proposed project. Guideline to identify valid resources and properly read the contents of article.	Valid resources are identified by group. Every student study these resources and articles in detail. Presentation by each student on their understanding about all referred resources.	Collection of state of the art work documents / research papers / research material / industry report / books / blogs / Websites / manuals etc. for the decided topic.

Week 6	Guideline to perform background study /Literature Review and various ways of documenting literature review.(School Level Awareness Session)	Documentation of referred resources, publication details, contribution and identification of opportunities/gap in the field.	Systematic literature review, background study, and its documentation.
Week 7 and 8	Guidelines for defining problem statement, objectives, and scope of the work.	Explore related work and define problem statement, objectives etc.	Refinement in proposed work /synopsis if any.
Week 9	Verification and Validation of Project Proposal created by students.	Refinement in the proposal as per suggestion by guide and review members.	Review Presentation II.
Week 10 and 11	Introduction of tools for Project Design, Modelling, Simulation and planning etc. Verification of the Proposed Methodology of the solution.	Use various software/hardware tools for Project Management, Project Design, and Simulation. Description of methodology. Algorithm Steps, Process, Modules, milestones. System Architecture, Modeling diagrams etc.	Design Documentation, Graphical Presentation of proposed solution and entire planning of project implementation and evaluation.
Week 12 and 13	Introduction to Project Report Writing tools and plagiarism checking. Guidelines for Project Documentation and Ethics in Writing. (School Level Awareness Session)	Prepare the Project Report as per format shared by Project Coordinator.	Project Documentation: Project Report Writing, Final Synopsis.
Week 14	Verification of Project Report, Final Synopsis prepared by Students	Refinement in the project report as per suggestion by guide and review members.	Review Presentation III.
Final End Semester Examination: Project Design: Report, Presentation and Demonstration.			

NOTE:

1. *School should organize awareness sessions on topics highlighted in RED.*
2. *Suggested to provide templates for project documents at the starting of the semester such as Synopsis, Literature Review, Report, Review Presentation I, II, III and Final Presentation*