MIT Academy of Engineering, Alandi, Pune

An Autonomous Institute affiliated to SavitribaiPhule Pune University

CURRICULUM FRAMEWORK (2019 PATTERN)
COMPUTER 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)			4	3	3	3	1	1	**15**
4.	DisciplineElective (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**	**8**	**7**	**7**	**7**	**6**	**5**	**52**
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				
1Lecture 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 COMPUTER ENGINEERING& TECHNOLOGY	W.E.F	:	2020-2021
SECOND YEAR BACHLEOR OF TECHNOLOGY INCOMPUTER ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: III												
SUMMER 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		
NSC5	AS204	Applied Mathematics	3	2	-	35	35	30	50	0	150	4
ESC8	IT221	Engineering Informatics										
DC01	CS221	Data Structures	3	0	-	35	35	30	0	0	100	3
DC02	CS222	Discrete Structure and Graph Theory	3	0	-	35	35	30	0	0	100	3
DC03	CS223	Computer Graphics	3	2	-	35	35	30	50	0	150	4
DC04	CS224	Programming Lab	0	4	-	-	-	25	50	-	75	2
SDP3	ET224	Digital Prototyping	0	4	-	0	0	25	0	50	75	2
SDP4	CS230	Minor Project- Design	0	2	-	0	0	0	0	50	50	1
SDP5	CS226/ 27	Skill Development Course CPP/Core Java	0	4	-	0	0	25	0	50	75	2
ESC7	CV203	Environmental Sciences	1	0	-	-	-	-	-	-	Audit	
TOTAL			**13**	**18**	**0**	**140**	**140**	**195**	**150**	**150**	**775**	**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	AS204	Applied Mathematics	3	2	-	35	35	30	50	0	150	4
ESC8	IT221	Engineering Informatics										
DC05	CS228	Advanced Data Structures	3	2	-	35	35	30	50	0	150	4
DC06	CS229	Computer organization & Architecture	3	2	-	35	35	30	50	0	150	4
DC07	CS231	Database Management System	3	2	-	35	35	30	50	0	150	4
SDP6	ET235	Rapid Prototyping	0	4	-	0	0	25	0	50	75	2
SDP7	CS240	Minor Project -Implementation	0	2	-	0	0	0	0	50	50	1
HSS3	HP202	Professional Skill	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 COMPUTER ENGINEERING& TECHNOLOGY	W.E.F	:	2021-2022
THIRD YEAR BACHLEOR OF TECHNOLOGY INCOMPUTER ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: V

SUMMER INTERNSHIP (Audit)

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		
DC08	CS341	Operating System	3	2	-	35	35	30	50	0	150	4
DC09	CS342	Theory of Computation	3	0	-	35	35	30	0	0	100	3
DC10	CS343	Computer Networks	3	2	-	35	35	30	50	0	150	4
OE01	IT351/ CS351 /CS352,/CS353 HP 311	Open/Minor Elective	3	2	-	35	35	30	50	0	150	4
HSS5	CS361	Project Management	2	0	-	0	50	25	0	0	75	2
SDP8	CS344/ CS346	Skill Development Course Red Hat Linux/ Web Technology	0	4	-	0	0	25	50	0	75	2
SDP9	CS350	Project Design	1	2	-	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						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC11	CS347	Design Analysis and Algorithms	3	2	-	35	35	30	50	0	150	4
DC12	CS348	Compiler Design	3	0	-	35	35	30	0	0	100	3
DC13	CS349	Software Engineering	3	2	-	35	35	30	50	0	150	4
OE02	IT352/ CS353/CS354 /CS355/CS356 /HP 312/	Open/Minor Elective	3	2	-	35	35	30	50	0	150	4
SDP10	CS357/CS358/CS358	Skill Development Course Adv.Java/ .Net core/Red Hat Linux	0	4	-	0	0	25	50	0	75	2
SDP11	CS360	Project- Implementation	0	4	-	0	0	25	0	50	75	2
HSS6	HP305	Professional Communication	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 COMPUTER ENGINEERING& TECHNOLOGY	W.E.F	:	2022-2023
FINAL YEAR BACHLEOR OF TECHNOLOGY INCOMPUTER ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

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		
DC14	CS481	Distributed Systems	3	2	-	35	35	30	50	0	150	4
DE01	CS471/CS472/CS	Discipline Elective	3	-	-	35	35	30	0	0	100	3
OE03	IT 461/ CS461/	Open/Minor Elective	3	2	-	35	35	30	50	0	150	4
SDP12	CS 485/ CS486	Skill Development Course AWS cloud services/ Android	-	4	-	0	0	25	50	0	75	2
SDP13	CS470	Project Evaluation	-	8	-	0	0	50	0	100	150	4
SDP14	CS400	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		
DC15	CS482	Human Computer Interaction	3	2	-	35	35	30	50	0	150	4
DE02	CS474/CS475/CS	Discipline Elective	3	-	-	35	35	30	0	0	100	3
SDP15	CS480	Capstone Work	-	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**	**100**	**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		
DC15	CS482	Human Computer Interaction	3	2	-	35	35	30	50	0	150	4
DE02	CS474/CS475/CS	Discipline Elective	3	-	-	35	35	30	0	0	100	3
SDP16	CS467	Semester Long Internship Design	-	-	-	-	-	-	-	150	150	4
SDP17	CS468	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.	CS471	Cloud and Virtualization
	CS472	Wireless and Mobile network
	CS473	Information Retrieval
2.	CS474	Digital Enterprise Management
	CS475	Ubiquitous Systems
	CS476	AR/VR

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

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.	CS221	Data Structures
2.	CS222	Discrete Structure and Graph Theory
3.	CS223	Computer Graphics
4.	CS224	Programming Lab
5.	CS228	Advanced Data Structures
6.	CS229	Computer Organization& Architecture
7.	CS231	Database Management System
8.	CS341	Operating System
9.	CS342	Theory of Computation
10.	CS343	Computer Networks
11.	CS347	Design Analysis and Algorithms
12.	CS348	Compiler Design
13.	CS349	Software Engineering
14.	CS481	Distributed Systems
15.	CS482	Human Computer Interaction

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 1
Audit	HP203	Liberal Learning
3.	HP304	Project Management
4.	HP305	Professional Skills 2
5.	HP405	Engineering Economics
6.	HP406	**Psychology**

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.	CS230	Minor Project -Design
5.	CS226/ CS227	Skill Development Course :
6.	ET235	Rapid Prototyping
7.	CS240	Minor Project -Implementation
8.	CS344/ CS346	Skill Development Course :
9.	CS350	Project- Design
10.	CS356/ CS357/	Skill Development Course:
11.	CS360	Project- Implementation
12.	CS 485/ CS486	Skill Development Course :
13.	CS470	Project Evaluation
14.	CS400	B.Tech Summer Internship
15.	CS480	Capstone Work
16.	CS467	Semester Long Internship Design
17.	CS468	Semester Long Internship Implementation
Audit	CS200	SY Summer Internship
Audit	CS300	TY Summer Internship

Programme Name	Skill Development Course 1	Skill Development Course 2	Skill Development Course 3	Skill Development Course4
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	Java Certification	Red Hat Linux certification	Red Hat Linux certification	AWS Certification

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	CS354	Predictive Analysis	CS461	Big Data Analytics
	Artificial Intelligence and Machine Learning	CS352	Artificial Intelligence	CS355	Machine Learning	CS462	Deep Learning
	Cloud Computing	CS353	Cloud Computing Foundation	CS356	Cloud Native Application Development	CS463	Cloud Native DevOps

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&Tele communi-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

Honors/Minor Elective Tracks : 5 Courses (Additional 18 to 20 Credit, Eligibility: SY B. Tech CGPA more than 7.5)

Entrepreneur-ship Cell	Innovation, Entrepreneurship & Venture Development	HP311	Foundational Course in Entrepreneurship	HP312	Advanced Course in Entrepreneurship	HP411	Startup and Incubation

Honors/Minor ElectiveTracks : 5 Courses (Additional 18 to 20 Credit)					
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	Data Science	V	IT 354	R programming	2
2		V	IT355	Descriptive Analytics	4
3		VI	IT 356	Predictive Analytics	4
4		VII	IT 464	Practitioner's Approach for data Analytics	4
5		VIII	IT 465	Big data Analytics	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.		

MIT Academy of Engineering Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
SCHOOL OF COMPUTER ENGINEERING& TECHNOLOGY	W.E.F	:	2020-2021
SECOND YEAR BACHLEOR OF TECHNOLOGY INCOMPUTER ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: III												
SUMMER 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		
NSC5	AS204	Applied Mathematics	3	2	-	35	35	30	50	0	150	4
ESC8	IT221	Engineering Informatics										
DC01	CS221	Data Structures	3	0	-	35	35	30	0	0	100	3
DC02	CS222	Discrete Structure and Graph Theory	3	0	-	35	35	30	0	0	100	3
DC03	CS223	Computer Graphics	3	2	-	35	35	30	50	0	150	4
DC04	CS224	Programming Lab	0	4	-	-	-	25	50	-	75	2
SDP3	ET224	Digital Prototyping	0	4	-	0	0	25	0	50	75	2
SDP4	CS230	Minor Project- Design	0	2	-	0	0	0	0	50	50	1
SDP5	CS226/ 27	Skill Development Course CPP/Core Java	0	4	-	0	0	25	0	50	75	2
ESC7	CV203	Environmental Sciences	1	0	-	-	-	-	-	-	Audit	
TOTAL			**13**	**18**	**0**	**140**	**140**	**195**	**150**	**150**	**775**	**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	AS204	Applied Mathematics	3	2	-	35	35	30	50	0	150	4
ESC8	IT221	Engineering Informatics										
DC05	CS228	Advanced Data Structures	3	2	-	35	35	30	50	0	150	4
DC06	CS229	Computer organization & Architecture	3	2	-	35	35	30	50	0	150	4
DC07	CS231	Database Management System	3	2	-	35	35	30	50	0	150	4
SDP6	ET235	Rapid Prototyping	0	4	-	0	0	25	0	50	75	2
SDP7	CS240	Minor Project -Implementation	0	2	-	0	0	0	0	50	50	1
HSS3	HP202	Professional Skill	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 COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Informatics
	COURSE CODE	IT221
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	IA	
3	2	35	35	30	NIL	25	25	150

PRE-REQUISITE : 1.CS102 – Application Programming - Python
2.ME105 – Engineering Tools and Techniques

COURSE OBJECTIVES :

IT221.CEO.1: To introduce facts, concept and theory of an information system for decision making.
IT221.CEO.2: To understand information evolution using data processing cycle.
IT221.CEO.3: To explain information transmission for its visualization and interpretation.
IT221.CEO.4: To design digital data acquisition system for information generation.

COURSE OUTCOMES :

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

IT221.CO.1: Interpret Data, Information and Knowledge.
IT221.CO.2: Make use of data acquisition techniques for an information system.
IT221.CO.3: Categories different storage techniques.
IT221.CO.4: Develop dashboard for effective communication of information.
IT221.CO.5: Determine components of Human computer interface interaction.
IT221.CO.6: Design digital information acquisition system.

THEORY :

UNIT 1	Fundamentals of Informatics	6 HOURS

Data, Types of Data: Primary data, Secondary data, Operational data, Derived data, Structured, Semi-Structured, Unstructured
Meta data : Administrative and Descriptive
Data forms: Analog and Digital (Telephone and Stenography) ADC and DAC.
Information, Information Life Cycle
Knowledge, Types of Knowledge: Procedural, Declarative, Tacit and Explicit etc.
Self-Study: Grade Sheet Generation system
Further Reading: Customer Relationship Management (CRM)

UNIT 2	Data Acquisition and Information generation	6 HOURS

Data Collection Methods:
Human Interface – Interview, Interrogation, Survey and Observation
Hardware and Software Interface – Digital Data Acquisition System: Introduction to Microprocessor and Micro-controller
Web Interface: Web scrapper
Data Processing Cycle, Data Processing Stages – Activities, Business Pyramid Model, Information System.
Self-Study: Weather forecasting System
Further Reading: Trivago, Spot Code, QR Code

UNIT 3	Information Storage and Transmission	6 HOURS

Need of data storage, Types of storage: stand alone, centralized, distributed
Cloud: Deployment Model, Services, Advantages and Disadvantages
Transmission Modes : Simplex, Half Duplex and Full Duplex
Transmission Types :- Serial (Synchronous and Asynchronous) and Parallel, Satellite Transmission : Features and Types (GEO,MEO and LEO)
Wireless Communication : Bluetooth, Zigbee and RFID
Encryption and Decryption.
Self-Study: Evolution of Storage
Further Reading: LoRa and Sigfox

UNIT 4	Information Visualization	6 HOURS

Dashboard: Definition, Components: Pivot Table, Pivot Chart, Slicer and General Charts
Types: Operational, Strategic and Tactical, Advantages
KPI / Grains: Definition, Design Rules, Assessing Quality of Dashboard
Dashboard Vs Scoreboard.
Self-Study: Dashboard Vs. Scoreboard
Further Reading: Information Dashboard Design

UNIT 5	Interactive Interface attributes	6 HOURS

Human interaction interface User specific goals, Interface design life cycle, Neilsons Attributes Interaction Evaluation and Guidelines: Normans Principles, Shneidermans Rules Compliance of interaction goals : Neilsons and Normans 10 Heuristics. Self-Study: Web based systems interactivity **Further Reading:**GUI Design		
UNIT 6	**Acquisition system and IoT**	**6 HOURS**
Machine to Machine interaction, IoT: Overview, Characteristics and Architecture Componants: Sensors, Actuators, Controller and Processor Basic elements / building blocks of IOT Applications: Asset management, Industrial automation, Smart cities. Self-Study: IoT Essentials **Further Reading:**IOT and big Data		

PRACTICAL :

PRACTICAL NO.01		**8 HOURS**

In traditional manual information systems, the storage, retrieval, and update operations on elementary data item, records and files are handled manually. In the context of automation, design an information system that summarizes data while providing storage and retrieval facilities for offline analysis. This automated information system should follow:

- Identification of an interdependent elementary data items which have facts and figures
- Data collection through sensors
- Processing using Arduino
- Data Storage using MySQL in an accessible form
- Data visualization using graphs

PRACTICAL NO.02		**8 HOURS**

Over the last year, the three locations of fast-food restaurant have produced mixed financial results. You have been asked to analyze the performance data from each location and identifying the causes of these results. For the same, design the dashboard to monitor key performance indicators for given system.

- Create a graph showing how revenue evolves throughout the year for each of the sales channels
- Create an interactive chart that can be used to switch between different sales channels.
- Create three different views of the data: monthly sales revenue, sales revenue by category, and revenue by the top five distributors.

PRACTICAL NO.03		**8 HOURS**

Deploy an IoT based automation system for controlling home appliances such as fan, lights, water pumps, etc. using Raspberry Pi.

- Identify the home appliances that require human interaction for its operations and state the need of automation.
- Identify system component
- Design circuit diagram
- Assemble system components
- Program the interface
- System Testing
- System Deployment

TEXT BOOK

1. Ralph M Stair, George W Reynolds, "Fundamentals of Information Systems", Course Technology Inc; 5th edition, 2008, ISBN 978-1423925811.
2. Benny Raphael, Ian F. C. Smith, "Engineering Informatics: Fundamentals of Computer-Aided Engineering", Wiley-Blackwell; 2nd Revised edition, 2013, ISBN-13: 978-1119953418.
3. Paul Mcfedries, "Excel Data Analysis: Your Visual Blueprint for Analyzing Data, Charts and Pivot Tables", Wiley; Fourth edition 2013, ISBN-13 978-8126544004

REFERENCE BOOK

1. Gerard Jounghyun Kim, "Human–Computer Interaction: Fundamentals and Practice", CRC Press, Auerbach Publications, 1 edition, 2015 ISBN 9781482233896
2. Adrian McEwen, Hakim Cassimally, "Designing the Internet of Things", Wiley, 2013 ISBN-13: 978-1118430620

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Data Structures
	COURSE CODE	CS221
	COURSE CREDITS	3
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	IA	
3	NIL	35	35	30	NIL	NIL	NIL	100

PRE-REQUISITE : CS101 Logic Development- C Programming

COURSE OBJECTIVES :

CS221.CEO.1: To illustrate fundamental data structures and their applications in programming and problem solving.
CS221.CEO.2: To understand abstract data representation methods.
CS221.CEO.3: To build the ability to synthesize and analyze algorithms.
CS221.CEO.4: To identify appropriate data structure for the specified problem.
CS221.CEO.5: To understand the various techniques of searching and sorting.
CS221.CEO.6: To analyze different sorting and searching algorithms.

COURSE OUTCOMES:

Students successfully completing the course will be able to,

CS221.CO.1: Explain the concept of data structure.
CS221.CO.2: Develop efficient algorithm for a given problem.
CS221.CO.3: Analyze appropriate algorithm for solving the real world problem.
CS221.CO.4: Demonstrate advantages and disadvantages of data structures for variety of problems.
CS221.CO.5: Choose effective data structures in approaching a problem solution.
CS221.CO.6: Make use of appropriate sorting and searching algorithm for a given application.

THEORY COURSE CONTENT		
UNIT 1	**INTRODUCTION TO DATA STRUCTURES**	**5 HOURS**

App/System/Case Study: Social networking, Recommendation system , Map applications
Contents:
Introduction to Data Structures, Data object, Abstract Data Types (ADT), Classification of data structure, time and space complexity (iterative and recursive algorithms), Classification of algorithmic complexities(constant time to exponential/factorial time), Asymptotic notation(big O, theta and omega) and its significance, efficiency of algorithms, Performance measures for data structures.
Self-study: Analysis of algorithms for time complexity
Further reading: Case study of time complexity.

UNIT 2	**ARRAY**	**6 HOURS**

App/System/Case Study: Election Voting System, Slide puzzle game
Contents:
Array as data structure, Representation and address calculation of array, two dimensional and multidimensional arrays, operations on arrays: Insertion, deletion, searching, sorting, and traversing, Polynomial and its operations using arrays, sparse matrix and its operations(addition,multiplication,transpose and fast transpose) using array
Self-study: Conversion functions of sparse matrix
Further reading: Array and database

UNIT 3	**Linked List**	**10HOURS**

App/System/Case Study: Process management in Linux, Account Management System, Shuffle merging system for set of two integer sets
Contents:
Linked lists, Representation of linked list, comparison of sequential and linked list organizations, Types of linked list (Singly linked list, Doubly Linked list, Singular and doubly Circular linked list), operations on linked list: insertion, deletion, traversing, searching, concatenation, merging and sorting, Polynomials using linked list
Self-study: Garbage collection and linked list
Further reading: Web indexing using linked list

UNIT 4	**STACK**	**7 HOURS**

App/System/Case Study:Josephus problem, CPU Scheduling

Contents:
Stack, Stack as ADT, representation and implementation of stack using sequential linked organization, operations on stack, Expression conversion (infix, prefix, postfix), Expression evaluation, recursion,types of recursion(direct,indirect,tail and tree recursion), Use of stack in recursion and backtracking
Self-study: Role of stack in memory management
Further reading: Use of stack in Language processing

UNIT 5	Queue	6 HOURS

App/System/Case Study:Syntax checker system for matching braces, Maze solving system
Contents:
Queue, Queue as ADT, representation and implementation of linear queue and circular queue using sequential linked organization, double ended queue and Priority queue and its operations(insertion ,removal, empty and peek).
Self-study: Concurrent priority queues
Further reading: Bandwidth management using priority queue

UNIT 6	SEARCHING AND SORTING	6 HOURS

App/System/Case Study: Employee leave management system for an organization
Contents:
Searching and different techniques of searching (sequential, binary, Fibonacci, sentinel), Comparison of Searching techniques, Sorting and different sorting techniques (selection sort, insertion sort, radix sort, and quick sort), Comparison of sorting techniques
Self-study:Merge sort
Further reading: Organisation of books in library management system

TEXT BOOK

1. E. Horowitz S. Sahani, D. Mehta, Fundamentals of Data Structures in C++ , Seventh Edition, Universities Press ,2008, IS BN-13: 978-8173716065.
2. T. Cormen, C Leiserson, R. Rivest, C Stein, Introduction to Algorithms, MIT press,2009, ISBN-13: 978-0262533058
3. 'Michael T. Goodrich, Roberto Tamassia, David M. Mount, Data Structures and Algorithms in C++, John Wiley Sons, ISBN-13: 978-0470383278

REFERENCE BOOK

1. Richard F. Gilberg, Behrouz A Forouzan, Data structures- A pseudocode Approach with C++ Second edition , Cengage l earning, 2004, 9780534390808.
2. E.Horowitzs S. Sahani, S. Rajashekharan, Fundametals of Computer Algorithm s, Universities Press, 2008,ISBN-13: 978-8 173716126
3. Debasis Samanta, Classic Data Structures, Second Edition, TMH, 2009, ISBN-13: 978-8120337312

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Discrete Structure and Graph Theory
	COURSE CODE	CS222
	COURSE CREDITS	3
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	NIL	35	35	30	NIL	NIL	100

PRE-REQUISITE :

1. AS107 Statistics and Integral Calculus
2. AS105 Calculus and Differential Equations

COURSE OBJECTIVES :

CS222.CEO.1: To learn logic and proof techniques to explore mathematical reasoning.
CS222.CEO.2: To formulate the problems precisely and solve the problems.
CS222.CEO.3: To use appropriate set, function, or relation models to analyze practical examples.
CS222.CEO.4: Model and analyze computational processes using combinatorial methods.
CS222.CEO.5: To explore number of logical possibilities and algebraic structures.
CS222.CEO.6: To use graph theory and associated terminology in practical example.

COURSE OUTCOMES:

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

CS222.CO.1: Develop the notion of mathematical thinking, mathematical proofs in problem-solving.
CS222.CO.2: Evaluate elementary mathematical arguments and identify fallacious reasoning
CS222.CO.3: Make use of set, function, relation models, associated operations and terminology.
CS222.CO.4: Calculate numbers of possible outcomes of elementary combinatorial processes.
CS222.CO.5: Demonstrate the use of algebraic structure, logical possibilities for algorithmic design.
CS222.CO.6: Model problems of computing using graphs.

THEORY COURSE CONTENT		
UNIT 1	**Sets**	**6 HOURS**

Application/System/Case Study: Bank Management System, Online Shopping System: Specialization and Generalization

Sets : Sets, Basic operations of sets, Finite and Infinite sets, Principle of Inclusion and exclusion, power sets, countable and uncountable sets.Cantor's diagonal argument and The Power Set theorem,Proof by Mathematical Induction and Strong Mathematical Induction.

Self-Study: Multi-Sets, Use of Multi Sets

Further Reading: Applications of Mathematical Induction

UNIT 2	**Propositional Logic**	**5 HOURS**

APP/System/Case Study: Applications of Propositional logic in AI, Logic Puzzles

Propositional Logic: logic, Propositions, Conditional Propositions, Logical Connectivity, Prepositional calculus, Universal and Existential Quantifiers, Rules of inference, Propositional Equivalences, Application of Propositional Logic-Translating English Sentence.

Self-Study: Normal Forms

Further Reading: Application of propositional logic in Boolean Algebra, Logic Circuits

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UNIT 3	**Relations and Functions**	**7 HOURS**

App/System/Case Study: Employee Management, Time-Table Scheduling, Job scheduling Problem, Relation between sets and associated functions

Relations and Functions: Properties of Binary Relations, Closure of relations, Warshalls algorithm, Equivalence relations and partitions, Partial ordering relations ,Hasse Diagram, and lattices, Chains and Antichains. Functions, Surjective, Injective and Bijective functions, Composition of functions, Invertible functions,Schroeder-Bernstein theorem, Recurrence relations.

Self-Study: Application Recurrence Relation for Analysis of Algorithm

Further Reading: Linear Recurrence Relations With constant Coefficients.

UNIT 4	**Counting Methods and The Pigeonhole Principle**	**6 HOURS**

App/System/Case Study: Library Management System, Diet Planning System

Counting : The Basics of Counting, rule of Sum and Product, Permutations and Combinations, Binomial Coefficients and Combinatorial Identities, Generalized Permutations and Combinations, The Pigeonhole principle

Self-Study: Algorithms for generating Permutations and Combinations.

Further Reading: Discrete Probability Theory

UNIT 5	Algebraic Structures and Coding Theory	6 HOURS

App/System/Case Study: Cryptography, Error Correction Systems

Groups theory: Algebraic Systems, Groups, Semi-Groups, Monoids, Subgroups, Permutation Groups, Codes and Group codes, Isomorphism and Auto-morphisms, Homomorphism, special types of groups: Abelian and cyclic groups, order of subgroups of a group, Lagrange's theorem. Number Theory, Modular Arithmetic and Euclidean algorithm,

Self-Study: Rings, and Cyclic Codes

Further Reading: Cyclic Groups

UNIT 6	Graphs	8 HOURS

App/System/Case Study: Traveling salesman problem, Map Coloring Problem

Graph Theory: Basic terminology, representation of a graph in computer memory, multigraphs and weighted graphs, Subgraphs, Complete, regular and bipartite graphs, Graph Isomorphism, operations on graph, Hamiltonian and Euler paths and circuits, shortest path in weighted graphs (Dijkstras algorithm), and Graph Coloring.

Self-Study: Planer Graph

Further Reading: Instant Insanity

TEXT BOOK

1. R. Johnsonbaugh, Discrete Mathematics, 5th Edition, Pearson Education, 2009, ISBN 817808279-9 C.
2. Liu and D. P. Mohapatra, Elements of Discrete Mathematics, SiE Edition, TataMcGraw-Hill, 2008, ISBN 10:0-07-066913-9
3. Kenneth H. Rosen, Discrete Mathematics and its Applications, 6th edition, McGraw-Hill, 2007. ISBN 978-0-07-288008-3

REFERENCE BOOK

1. N. Biggs, Discrete Mathematics, 3rd Edition, Oxford University Press, ISBN 0 19 850717 8
2. E. Goodaire and M. Parmenter, Discrete Mathematics with Graph Theory, 2nd edition, Pearson Education, 2003 ISBN 81 7808 827 4
3. Semyour Lipschutz Marc Lipson, Discrete Mathematics, McGraw-Hill, 3rd Special Indian Edition, ISBN-13 : 978-0-07-060174-1
4. B. Kolman, R. Busby and S. Ross, Discrete Mathematical Structures, 4th Edition, Pearson Education, 2002, ISBN 81-7808-556-9

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Computer Graphics - and Gaming
	COURSE CODE	CS223
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE:

1.AS204 Applied Mathematics
2.CS221 Data Structures

COURSE OBJECTIVES:

CS223.CEO.1: : To study various algorithms for generating and rendering graphical figures
CS223.CEO.2: To get familiar with mathematics behind graphical transformations
CS223.CEO.3: To understand various geometric transformations
CS223.CEO.4: To get acquainted with different techniques applied for projections
CS223.CEO.5: To understand various methods of clipping.
CS223.CEO.6: To study different techniques of animation

COURSE OUTCOMES:

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

CS223.CO.1: To understand different graphics primitives
CS223.CO.2: To apply mathematics to develop Computer graphics operations
CS223.CO.3: To develop programs on 2D and 3D transformation
CS223.CO.4: To apply various methods for projection.
CS223.CO.5: To develop programs on clipping algorithms.
CS223.CO.6: To develop animation and gaming application.

THEORY COURSE CONTENT		
UNIT 1	**Graphics primitives**	**6 HOURS**
App/System/Case study: Display devices- OLEDs, Micro LEDs, Radar displays Contents: Introduction, Pixel, Frame buffer, Resolution, Aspect ratio, Primitives: Lines, Line segments, Vectors Display file Structure, Display file Interpreter, Character generating methods, Antialising techniques, Self-study: Graphics files: TIFF, GIF, JPEG, GTK+ Further reading: Raster scan displays, CRT basics, Flat panel displays		
UNIT 2	**Scan Conversion**	**6 HOURS**
App/System/Case study: Design of different 2D objects and 3D objects Contents: Line Drawing algorithms: DDA, Bresenham, Circle drawing algorithms: Bresenham, Midpoint Self-study: Line styles: Thin, Thick, Dotted Further reading: DDA Circle drawing algorithm		
UNIT 3	**Clipping and Windowing**	**6 HOURS**
App/System/Case study: Games, Animation Contents: Polygon: Introduction, Types of polygon, Representation of Polygon, Inside test, Polygon filling algorithms, Windowing: Introduction, Viewport, Viewing transformation, Clipping: 2D clipping, Polygon clipping Self-study: Self Intersecting polygon Further reading: Cyrus – Beck Clipping		
UNIT 4	**Geometric transformation**	**6 HOURS**
App/System/Case study: Animation, Augmented Reality Contents: 2D Transformations: Introduction, Matrices, Translation, Scaling, Rotation, Homogeneous coordinates and matrix representation, rotation about an origin, rotation about an arbitrary point, Inverse transformation, Shear transformation, Reflection, 3D Transformations: Introduction, Matrices, Rotation about an arbitrary axis, Projections: Parallel and Perspective projections Self-study: Classification of Projection Further reading: 3D Viewing, 3D Clipping.		
UNIT 5	**Segment, Light and Color models**	**6 HOURS**
App/System/Case study: Image Segmentation, 3D effects Contents: Segment: Segment table, Segment creation, Segment closing, deleting segment, Visibility Light and Color: Introduction, Diffused illumination, Point source illumination, Shading algorithms, Color models: RGB Self-study: Morphing Further reading: HSV, CMY		

UNIT 6	Curves, Fractals, Animation	6 HOURS

App/System /Case study: Fractals in Biology/ Chemistry, Animation in Medical
Contents: Introduction to curve generation, Interpolation, B-Splines, Bezier curve, Blending function Fractals, Fractal lines and surfaces, Irregular curves: Joints and Knots, Connectivity, Animation: Introduction to animation, Animation Languages, Guidelines
Self-study: Approximation Algorithms
Further reading: Triadic curve

PRACTICAL:

PRACTICAL NO.01		2 HOURS

- Develop program to draw a line with line style (Thin, Thick, Dotted)

PRACTICAL NO.02		2 HOURS

- Develop a program to draw a Circle of desired radius (Midpoint, Bresenham)

PRACTICAL NO.03		4 HOURS

- Develop a program for 2D transformation(Translation, Rotation, Scaling, Shear, Reflection)

PRACTICAL NO.04		4 HOURS

- Develop program for polygon filling

PRACTICAL NO.05		2 HOURS

Write program to simulate any one of or similar scene- 1.Clock with pendulum 2. National Flag hoisting 3.Vehicle/boat locomotion 4.Water drop falling into the water and generated waves after impact

PRACTICAL NO.06		2 HOURS

- Develop a program for bouncing ball using animation tool like 3D Blender, Seamless 3D,cartoona etc.

TEXT BOOK

1. D. Hearn and M. Baker "Computer Graphics",2nd Edition, Pearson Education,2002,ISBN-7808-794-4
2. S. Harrington, Computer Graphics", 2nd Edition, McGraw-Hill Publications,1987,ISBN 0-07-100472-6
3. D.Rogers, J.Adams, "Mathematical Elements for Computer Graphics", 2nd Edition, Tata McGraw-Hill publication, 2002, ISBN 0-07-048677-8.

REFERENCE BOOK

1. D. Rogers,"Procedural Elements for Computer Graphics",2nd Edition, Tata McGraw-Hill publication,2001,ISBN 0-07-047371-4.
2. James D.Foley,Andries Van Dam, "Fundamentals of Interactive Computer Graphics", Addison-Wesley

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Programming Lab
	COURSE CODE	CS224
	COURSE CREDITS	2
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	T/P	DM	IA	
NIL	4	NIL	NIL	NIL	50	NIL	25	75

PRE-REQUISITE : 1. CS101 Logic Development-C Programming

COURSE OBJECTIVES :

CS221.CEO.1: To illustrate fundamental data structures and their applications in programming and problem solving.
CS221.CEO.2: To understand abstract data representation methods.
CS221.CEO.3: To build the ability to synthesize and analyze algorithms.
CS221.CEO.4: To identify appropriate data structure for the specified problem.
CS221.CEO.5: To understand the various techniques of searching and sorting.
CS221.CEO.6: To analyze different sorting and searching algorithms.

COURSE OUTCOMES:

Students successfully completing the course will be able to,

CS221.CO.1: Explain the concept of data structure.
CS221.CO.2: Develop efficient algorithm for a given problem.
CS221.CO.3: Analyze appropriate algorithm for solving the real world problem.
CS221.CO.4: Demonstrate advantages and disadvantages of data structures for variety of problems.
CS221.CO.5: Choose effective data structures in approaching a problem solution.
CS221.CO.6: Make use of appropriate sorting and searching algorithm for a given application.

PRACTICAL:		
PRACTICAL NO.01		**4 HOURS**
Design and implement a program to read, display, insert, update and delete operations on data objects for customer information supply chain management system using array.		
PRACTICAL NO.02		**4 HOURS**
Design and implement a program for sparse matrix operations of addition, multiplication and transpose of sparse matrix for climate prediction data stored in 2D array.		
PRACTICAL NO.03		**4 HOURS**
Design and develop program for insertion, up-dating, searching, sorting, listing and deletion operations using singly linked list for placement information system.		
PRACTICAL NO.04		**4 HOURS**
Design and develop program for polynomial addition, multiplication operations for disease information using circular linked list.		
PRACTICAL NO.05		**4 HOURS**
Design and implement a program for sorting two given lists and merging these two sorted lists of marks scored for technical skill examination of recruitment cell using doubly linked list.		
PRACTICAL NO.06		**4 HOURS**
Design and implement a menu driven program for expression conversion from infix to postfix, postfix to prefix expression and evaluation of postfix expression using stack.		
PRACTICAL NO.07		**2 HOURS**
Design and implement a program for poker hand royal flush game using recursion.		
PRACTICAL NO.08		**4 HOURS**
Design and implement a menu driven program for linear and circular queue for food ordering using array and linked list.		

PRACTICAL NO.09		4 HOURS
Design and implement a program for double ended queue and its operations for a shopping mall.		
PRACTICAL NO.10		**4 HOURS**
Design and implement a menu driven program for implementing insertion sort and quick sort for population of a town.		
PRACTICAL NO.11		**4 HOURS**
Design and implement a menu driven program for implementing Fibonacci, binary and sentinel searching for students marks scored in an examination.		
PRACTICAL NO.12		**2 HOURS**
Design and implement a program for survey information of sports using principle of inclusion and exclusion.		
PRACTICAL NO.13		**2 HOURS**
Design and implement a program for generating all possible combinations of given string using recursion.		
PRACTICAL NO.14		**2 HOURS**
Design and develop a program using linear recurrence relations for various loan schemes of a bank.		
PRACTICAL NO.15		**2 HOURS**
Design and implement program for parity checker of ASCII equivalence of given word.		

TEXT BOOK

1. E. Horowitz S. Sahani, D. Mehta, "Fundamentals of Data Structures in C++" , Seventh Edition, Universities Press ,2008, IS BN-13: 978-8173716065.
2. T. Cormen, C Leiserson, R. Rivest, C Stein, "Introduction to Algorithms", MIT press,2009, ISBN-13: 978-0262533058
3. Michael T. Goodrich, Roberto Tamassia, David M. Mount, "Data Structures and Algorithms in C++", John Wiley Sons, ISBN-13: 978-0470383278

REFERENCE BOOK

1. Richard F. Gilberg, Behrouz A Forouzan, " Data structures- A pseudocode Approach with C++" Second edition , Cengage l earning, 2004, 9780534390808.
2. E. Horowitzs S. Sahani, S. Rajashekharan, "Fundametals of Computer Algorithm s", Universities Press, 2008,ISBN-13: 978-8 173716126
3. Debasis Samanta, " Classic Data Structures", Second Edition, TMH, 2009, ISBN-13: 978-8120337312

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 COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Minor Project- Design
	COURSE CODE	CS230
	COURSE CREDITS	1
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	2	NIL	NIL	NIL	NIL	50	50

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

ME230.CEO.1: To categorize and define a problem to be solved.
ME230.CEO.2: To realize the ethical principles in general and its importance.
ME230.CEO.3: To make the students aware of project requirement analysis, design and planning.
ME230.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,

ME230.CO.1: Delineate the problem to be solved.
ME230.CO.2: Comprehend the paramount of the health, safety and welfare of the public in the practice of engineering profession.
ME230.CO.3: Embark project planning and design.
ME230.CO.4: Inculcate problem solving skills and critically analyze the options available to solve the problem.
ME230.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 COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Skill Development Course - CPP
	COURSE CODE	CS226
	COURSE CREDITS	2
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE : CS101 Logic Development

COURSE OBJECTIVES :

CS226.CEO.1: To implement Object Oriented Programming concepts.
CS226.CEO.2: To understand usage of conditional and looping statements in C++.
CS226.CEO.3: To evaluate benefits of static and dynamic data structures.
CS226.CEO.4: To illustrate inheritance and polymorphism.
CS226.CEO.5: To make use of standard template library.
CS226.CEO.6: To analyze file handling, exception handling.

COURSE OUTCOMES:

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

CS226.CO.1: Make use of class and objects using C++.
CS226.CO.2: Demonstrate control structures using C++.
CS226.CO.3: Implement the programs using data structures in C++.
CS226.CO.4: Develop solution for real world problems using inheritance and polymorphism.
CS226.CO.5: Apply standard template library to solve real world instances.
CS226.CO.6: Make use of various file handling and exception handling operations in C++.

CONTENTS :

Introduction to C++, Tokens, Data types, Operators, Structure of C++ Program, Arrays, Pointers, Expressions and Control Structures. Functions in C++: Argument passing in function, Inline Functions, Default Arguments, Const. Arguments, Friend function, Classes and Objects, Constructors Destructors, Overloading, Virtual Functions, Inheritance, Polymorphism, Templates, Exception Handling, Standard Template Library, Managing Console I/O Operations, Files.

PRACTICAL: All assignments should be performed considering real world applications.		
PRACTICAL NO.01		**4 HOURS**
Assignment based on Class, constructor and user defined functions.		
PRACTICAL NO.02		**4 HOURS**
Assignment based on types of constructors and member functions.		
PRACTICAL NO.03		**4 HOURS**
Assignment based on operator overloading using default and parameterized constructor.		
PRACTICAL NO.04		**4 HOURS**
Assignment based on different string operations using operator overloading.		
PRACTICAL NO.05		**4 HOURS**
Assignment based on class, objects, this pointer, inline function, static member function and friend class.		
PRACTICAL NO.06		**4 HOURS**
Assignment based on different types of Inheritance.		
PRACTICAL NO.07		**4 HOURS**
Assignment based on Polymorphism.		
PRACTICAL NO.08		**4 HOURS**
Assignment based on Exception Handling.		

PRACTICAL NO.09		4 HOURS
Assignment based on Pointers to objects.		
PRACTICAL NO.10		**4 HOURS**
Assignment based on Class template, Function template.		
PRACTICAL NO.11		**4 HOURS**
Assignment based on List class as container of standard template library.		
PRACTICAL NO.12		**4 HOURS**
Assignment based on File Handling.		

TEXT BOOK

1. E. Balgurusawmy, "Object Oriented Programming with C++", (TMH).
2. Paul Deitel, Harvey Deitel, "C++: How to Program", Prentice Hall.

REFERENCE BOOK

1. Bjarne Stroustroup, "Programming - Principles and Practice using C++", Addison Wesley.
2. Herbtz Schildt, "C++: The Complete reference", MGH.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2020 - 2021
SECOND YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Skill Development Lab Core Java
	COURSE CODE	CS227
	COURSE CREDITS	2
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

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

PRE-REQUISITE :

CS101 - Logic Development

COURSE OBJECTIVES :

CS226.CEO.1: To design and program stand-alone Java applications.
CS226.CEO.2: To extend Java classes with inheritance and dynamic binding.
CS226.CEO.3: To use exception handling and file handling in Java applications.
CS226.CEO.4: To design a graphical user interface (GUI) with Java Swing.
CS226.CEO.5: To implement database applications.

COURSE OUTCOMES :

Students successfully completing the course will be able to,

CS226.CO.1: Implement Object Oriented Programming Concepts in java.
CS226.CO.2: Use and create packages and interfaces in Java.
CS226.CO.3: Use graphical user interface in Java programs.
CS226.CO.4: Perform file handling operations.
CS226.CO.5: Implement exception handling in Java.
CS226.CO.6: Implement applications using JDBC .

GUIDELINES FOR CONDUCTION OF LAB

1. Course instructor has to frame practical assignments based on the contents mentioned in syllabus.
2. According to assigned number of hours, course instructor has to decide minimum number of practical assignments
3. Use notepad for at least first 4-6 Hours sessions after that use edit plus or net beans as per availability.

CONTENTS

1. Fundamentals of java, Object and class,Java Collections,Interfaces, Abstract class and inheritance, Exception handling,File Handling,Packages,Graphical user interfaces using swing,Database management

ASSIGNMENTS:		
PRACTICAL NO.01	**Fundamentals of Java**	**6 HOURS**
a) Simple program based on Input and Output in java b) Simple program based on Looping, Control Statement ,String, Array.		
PRACTICAL NO.02	**Object and Class**	**6 HOURS**
a) Program to create Class,declare Member Variables, Define Methods b) Program to define Constructor, Passing Information to a Method or a Constructor.		
PRACTICAL NO.03	**Java Collections,Interface, Abstract Class and Inheritance**	**8 HOURS**
a) Program based on Java collections b) Program based on Interfaces c) Program based on Inheritance		
PRACTICAL NO.04	**Exception Handling and File Handling**	**8 HOURS**
a) Program to handle different exceptions b) Program to create own exception class c) Program to perform file handling operations		
PRACTICAL NO.05	**Packages**	**6 HOURS**
a) Program to create own package b) Program to develop and deploy (executable) Jar File.		
PRACTICAL NO.06	**Graphical User Interfaces using Swing**	**6 HOURS**
a) Program to create Frame and make use of Layout Management, User Interface Components		
PRACTICAL NO.07	**Database Management**	**6 HOURS**
Program to make use of JDBC for performing different database transactions		

TEXT BOOK

1. The Complete Reference Java seventh edition, Herbert Schidlt.

REFERENCE BOOK

1. K. Arnold and J. Gosling, "The JAVA programming language", Third edition, Pearson Education, 2000.
2. Timothy Budd, "Understanding Object-oriented programming with Java", Updated Edition, Pearson Education, 2000.
3. C. Thomas Wu, "An introduction to Object-oriented programming with Java", Fourth Edition, Tata McGraw-Hill Publishing company Ltd., 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**	Environmental Science
	COURSE CODE	CV203
	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	NIL	NIL

PRE-REQUISITE :

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**	
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 II	**Environmental Pollution**	
Students have to visit any one non hazardous 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.		
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 and Sustainable goals, Environmental Audits, Rainwater harvesting and 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 and conducting the activity, its 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 BOOK

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 BOOK

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 Autonomous Institute Affiliated to SPPU	COURSE STRUCTURE (2019 - 2023)		
SCHOOL OF COMPUTER ENGINEERING& TECHNOLOGY	W.E.F	:	2021-2022
THIRD YEAR BACHLEOR OF TECHNOLOGY INCOMPUTER ENGINEERING	RELEASE DATE	:	01/06/2020
	REVISION NO.	:	1.0

SEMESTER: V

SUMMER INTERNSHIP (Audit)

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		
DC08	CS341	Operating System	3	2	-	35	35	30	50	0	150	4
DC09	CS342	Theory of Computation	3	0	-	35	35	30	0	0	100	3
DC10	CS343	Computer Networks	3	2	-	35	35	30	50	0	150	4
OE01	IT351/ CS351 /CS352,/CS 353 HP 311	Open/Minor Elective	3	2	-	35	35	30	50	0	150	4
HSS5	CS361	Project Management	2	0	-	0	50	25	0	0	75	2
SDP8	CS344 /CS34	Skill Development Course Red Hat Linux/ Web Technology	0	4	-	0	0	25	50	0	75	2
SDP9	CS350	Project Design	1	2	-	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						CREDIT
TYPE	CODE	NAME	Hour/Week			THEORY			PRACT		TOTAL	
			L	P	T	MSE	ESE	IA	T/P	DM		
DC11	CS347	Design Analysis and Algorithms	3	2	-	35	35	30	50	0	150	4
DC12	CS348	Compiler Design	3	0	-	35	35	30	0	0	100	3
DC13	CS349	Software Engineering	3	2	-	35	35	30	50	0	150	4
OE02	IT352/ CS353/CS	Open/Minor Elective	3	2	-	35	35	30	50	0	150	4
SDP10	CS356/CS 357/CS35	Skill Development Course Adv .Java/ .Net core/Red Hat	0	4	-	0	0	25	50	0	75	2
SDP11	CS360	Project- Implementation	0	4	-	0	0	25	0	50	75	2
HSS6	HP305	Professional Communication	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 Affilated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Operating System
	COURSE CODE	CS341
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

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

PRE-REQUISITE : CS 221-Data Structures

COURSE OBJECTIVES :

CS341.CEO.1: To provide an understanding of major Operating system components.

CS341.CEO.2: To impart comprehensive understanding of the concepts related to process,IPC,scheduling and deadlock

CS341.CEO.3: To understand memory management in operating system

CS341.CEO.4: To understand file management,protection and security aspects of OS.

COURSE OUTCOMES :

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

CS341.CO.1: Illustrate the role of OS in the management of system resources.

CS341.CO.2: Organize process and threads execution in operating system effectively

CS341.CO.3: Identify deadlock to resolve the related issues.

CS341.CO.4: Analyze the memory management and its allocation policies.

CS341.CO.5: Make use of the file system, protection and security aspects of OS effectively

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Operating System**	**6 HOURS**

App/System/Case study: Open Source Operating Systems-Fedora
Contents:
Introduction to Operating System, Functions, Types of OS- Batch, timesharing, multiprogramming,multi tasking ,distributed,network os and real time os , Functions of OS , OS Structure, System Calls and its types.
Unix: Architecture and System concepts
Self -Study: Unix Booting and Login Process
Further Reading: Boot Loaders

UNIT 2	**Process Management**	**6 HOURS**

App/System/Case study: Multitasking In Mobile Systems.
Contents: Process Concept, Process Scheduling-Scheduling Queues, Schedulers, Context Switch, Operations on processes, Inter process Communication-Shared Memory, Message Passing Systems, Pipes.
Unix: Process States and Transitions ,System Calls for Process management
Self-Study: Communication in Client-Server Systems.
Further Reading: Operating System Debugging

UNIT 3	**Multithread Programming and CPU Scheduling**	**6 HOURS**

App/System/Case study: Multi process-Any Web Browser
Contents: Thread Overview, Multicore Programming, Multithreading Models, Thread Libraries Threading issues. Basic Concepts of CPU scheduling, Scheduling criteria, Scheduling Algorithms-FCFS, SJF, Priority and Round Robin
Unix: System Calls for process scheduling in Unix.
Self-study: Real Time Scheduling
Further Reading: Examples of IPC Systems.

UNIT 4	**Process Synchronization and Deadlock**	**8 HOURS**

App/System/Case study: Distributed Deadlocks.
Contents: Process Synchronization overview, The critical Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic problem of synchronization, Deadlock, Methods for Handling Deadlocks
Self- Study: Synchronization examples
Further Reading: Scheduling and Synchronization in xv6.

UNIT 5	**Memory Management**	**8 HOURS**

App/System/Case study: ARM architecture.
Contents: Main memory-Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of page table, Virtual Memory-Demand Paging, Page Replacement Policies: FIFO, LRU, Optimal.
Memory management policies in Unix: Swapping: Allocation of swap space,Swapping processes in,Swapping processes out, Demand Paging : Data structures for Demand paging in unix
Self- Study: Linux memory management schemes.
Further Reading: Memory Management in xV6

UNIT 6	File Management and Access Control	8 HOURS

App/System/Case study: Fedora linux operating system's Access Control.

Contents:: File-System structure, File-System Implementation, Directory Implementation File System Access Control, Role based Access Control, Real world Access Control , Root user Access Control, Pseudo user other than root.

UNIX: An overview of the File subsystem(File descriptors, File Table and Inode Table, File System Layout of Unix)

Self -Study: Access Control Lists

Further reading: Active Directory

PRACTICAL: Perform following experiments using Open source tools		
PRACTICAL NO.01		**4 HOURS**
Write shell scripts to a. Rename all files in the current directory that end in ".jpg" to begin with today's date in the following format: YYYY-MM-DD. For example, if a picture of my cat was in the current directory and today was December 31,2020 it would change name from "mycat.jpg" to "2020–12–31-mycat.jpg". b. Delete the zero sized file c. Take an input file and remove identical lines (or duplicate lines from the file) d. Simulate the two level directory organization		
PRACTICAL NO.02		**2 HOURS**
Implement the Unix file commands using shell scripting.		
PRACTICAL NO.03		**2 HOURS**
Implement Interprocess Communication using PIPE/Shared Memory/Message Passing		
PRACTICAL NO.04		**4 HOURS**
Write a menu driven program for implementing CPU Scheduling Algorithms-FCFS,SJF,Priority & Round Robin		
PRACTICAL NO.05		**4 HOURS**
In a real computer system, neither the resources available nor the demands of processes for resources are consistent over long periods (months). Resources break or are replaced, new processes come and go, and new resources are bought and added to the system. If deadlock is controlled by the banker's algorithm, which of the following changes can be made safely (without introducing the possibility of deadlock), and under what circumstances? a.Increase Available (new resources added). b.Decrease Available (resource permanently removed from system).		
PRACTICAL NO.06		**4 HOURS**
Sleeping Barber: The analogy is based upon a hypothetical barber shop with one barber. There is a barber shop which has one barber, one barber chair, and n chairs for waiting for customers if there are any to sit on the chair. If there is no customer, then the barber sleeps in his own chair. When a customer arrives, he has to wake up the barber. If there are many customers and the barber is cutting a customer's hair, then the remaining customers either wait if there are empty chairs in the waiting room or they leave if no chairs are empty. Design and implement the given scenario in such a way that the barber and customers will not get into race condition		
PRACTICAL NO.07		**4 HOURS**
Implement Page Replacement Policies using FIFO,LRU and Optimal		

TEXT BOOK

1. Silberschatz, Galvin, Gagne, Operating System Concepts: International Student Version, 9th Edition, Paperback: 992 pages Publisher: Wiley; Eighth edition (20 April 2009) Paperback – 20 Apr 2009, Language: English, ISBN-10: 8126520515, ISBN-13: 978-8126520510.
2. Maurice J. Bach, "The Design of the Unix Operating System", Fourth Edition, Pearson Education, ISBN: 9789332549579, 9789332549579
3. Evi Nemeth, Garth Snyder, Trent R. Hein - UNIX and Linux System Administration Handbook, 4th Edition, Prentice Hall, ISBN-13: 978-0-13-148005-6

REFERENCE BOOK

1. Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau: Operating Systems: Three Easy Pieces, https://www.overleaf.com/project/60508e799f7fac226457bf7c Arpaci-Dusseau Books, August, 2018
2. Evi Nemeth, Garth Snyder, Trent R. Hein - UNIX and Linux System Administration Handbook, 4th Edition – 2010,Prentice Hall, ISBN-13: 978-0-13-148005-6
3. Tanenbaum, Operating Systems Design and Implementation, Paperback: 1080 pages, Publisher: Pearson Education India; 3 edition (2015), Language: English, ISBN-10: 9332550514,ISBN-13: 978-9332550513.
4. Deitel, Operating System, 3rd Edition, Paperback: 1270 pages, Publisher: Pearson Education India; edition (2007), Language: English, ISBN-10: 8131712893, ISBN-13: 978-8131712894.

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 COMPUTER ENGINEERING	**COURSE NAME**	Theory of Computation
	COURSE CODE	CS342
	COURSE CODE	CS351
	COURSE CREDITS	3
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	NA	NA	100

PRE-REQUISITE : CS101-Logic Development

COURSE OBJECTIVES :

CS342.CEO.1: To introduce students to the mathematical foundations of computation including automata theory and the theory of formal languages and grammars.

CS342.CEO.2: To develop an ability to conduct mathematical proofs for computation and algorithms.

CS342.CEO.3: To exhibit the relation between problem solving and theory of formal languages and automata.

COURSE OUTCOMES :

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

CS342.CO.1: Differentiate between types of languages and respective recognition automata..

CS342.CO.2: Construct various types of automata and grammar from language and vice versa..

CS342.CO.3: Make use of the properties of languages and automata to design complex automata prove equivalence of automata.

CS342.CO.4: Decide the type of automata to be used to recognize the particular language.

CS342.CO.5: Identify decidability of languages

THEORY :

UNIT 1	Finite Automata	6 HOURS

App/System/Case study: Working of Vending Machines, Automatic Door Controller.
Contents: Introduction to Complexity Theory, Computability Theory Automata Theory, String, Alphabet Languages, Regular Languages,
Finite state Machines, Deterministic Non-Deterministic Finite State Machines, Union, Intersection Complement of Finite Automata, Epsilon NFA, Equivalence of the three Models, Minimization of Finite Automata,
Finite Automata with output (Moore and Mealy Machines- Definitions, Models Inter Conversion).
Self Study: Myhill-Nerode theorem.
Further reading: Timed Automata, Hidden Markov Model, Transducers in NLP.

UNIT 2	Regular Expression	7 HOURS

App/System/Case study: Grep utility of Linux.
Contents: Operators of Regular Expression, Precedence of Operators, Building Regular Expression, Algebraic Laws for Regular expression, conversion of Regular Expression to DFA and vice versa,
Use of Regular Expression in practical programming, Regular expression equivalence, Closure Properties of Regular languages, pumping lemma for Regular Languages.
Self Study: Decision properties of RE.
Further reading: Application of regular expressions in Lexical Analysis, Web scrapping, Regular expression in information retrieval.

UNIT 3	Context Free Grammar	6 HOURS

App/System/Case study: Design of Parser for Compilers or Interpreters/ Web crawler.
Contents: Context Free Language Models, context free grammars, simplification of CFG, Chomsky normal form(CNF), Greibach normal form(GNF), Ambiguous Grammar, Removing ambiguity, Closure Properties,
Application of CFG:- Mark up languages, XML Document Type Definition, Chomsky Hierarchy, Regular Grammar.
Self Study: Decision properties of Context Free Languages .
Further reading: Chart parsing, CYK parsing, Early parsing.

UNIT 4	Pushdown Automata	6 HOURS

App/System/Case study: Parser design for Compilers or Interpreters.
Contents: Introduction to Pushdown Automata, Pushdown Automata Design, Deterministic Pushdown Automata, Non – Deterministic Pushdown Automata Design, Pushdown Automata to Context free grammar and Vice Versa, Closure properties, Pumping Lemma for Context Free Languages.
Self Study: Multi – Stack Push Down Automata .
Further Reading: Post Machines.

UNIT 5	Turing Machines	7 HOURS

App/System/Case study: Memcomputing, Von Neuman Architecture
Contents: Turing Machines Introduction, Comparison of Turing Machine with other machines, Designing Turing Machine for different set of problems, Universal Turing Machine, Recursive Sets, Churches Turing Machine, Halting Problem
Self Study: Multi Tape Turing Machines.
Further Reading: Non Deterministic Turing Machine.

UNIT 6	Decidability and Complexity Theory	7 HOURS

App/System/Case study: Travelling Salesman Problem.
Contents: Not Recursively Innumerable Problems, Decidable Languages ,Decidable problems concerning regular languages ,Un-decidability,post correspondence problem, The diagonalization method, An undecidable language, A Turing-unrecognizable language, Introduction to Complexity Theory, P, NP Complete and NP Hard Problems, Polynomial-Time Reductions NP Complete Problems, Tractable and Intractable, Representing Satisfiability, Instances.
Self Study: 3 SAT Problem.
Further Reading: Simple Reducibility Problem.

TEXT BOOK

1. "Introduction to Automata Theory Languages And Computation" by John E. Hopcroft, Rajeev Motwani, Jeffrey D-Ullman, Third Edition,Pearson,2008,ISBN 978-8131720479.
2. "Introduction to Theory of Computation" By Michael Sipcer, Third Edition, Cengage Learning, 2014,ISBN-13: 978-8131525296.
3. "Automata and Computability" by Dexter Kozen, Springer Publishers, 2013 ISBN 978-3642857065.

REFERENCES

1. "Theory of Computation", Vivek Kulkarni, Oxford University Press,2013,ISBN: 978-0198084587.
2. "Theory of Computation", George Tourlakis, Willey, 2014,ISBN:978-1118315354.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Computer Networks
	COURSE CODE	CS343
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

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

PRE-REQUISITE: :

1. CS201 Data and File Structure
2. CS211 Discrete Structure and Graph Theory

COURSE OBJECTIVES :

CS343.CEO.1: To comprehend the fundamental concepts of data communication and networking.
CS343.CEO.2: To differentiate between network topologies.
CS343.CEO.3: To understand routing algorithms.
CS343.CEO.4: To classify connection oriented and connectionless services.
CS343.CEO.5: To explore current trends in networking technologies.

COURSE OUTCOMES:

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

CS343.CO.1: Comprehend signals and communications types.
CS343.CO.2: Build different types of network topologies and protocols.
CS343.CO.3: Evaluate routing protocols for different real time systems.
CS343.CO.4: Analyze connection oriented and connectionless services.
CS343.CO.5: Demonstrate different application/systems related to networking.

THEORY COURSE CONTENTS		
UNIT 1	**Physical Layer**	**8 HOURS**

App/System/Case study:: E-Mail System, Real time video conferencing
Contents:
Data Communications, Networks, Network Types, Protocol Layering, The OSI Model, TCP/IP Protocol Suite, Data and Signals, Periodic analog signals, Digital Signals,Transmission Impairments, Data rate limits, Performance, Line Coding , Line Coding Schemes : Unipolar, Polar, Bipolar
Self-study: Standards And Administration
Further Reading: Transmission Modes

UNIT 2	Data Link Layer	8 HOURS

App/System/Case study: WinRAR, WinZip
Contents:
Introduction: Nodes and Links, Services, Two categories of links, Two sublayers , Link Layer addressing: Three types of addresses, Address Resolution Protocol(ARP), Error detection and correction: Types of errors, redundancy, Detection Vs Correction, Coding, Block Coding: Hamming codes ,Cyclic Redundancy Check, Data Link Control and Services: Framing, Flow Control, Connectionless and Connection-Oriented, Data Link Layer Protocols : Simplest Protocol, Stop and Wait Protocol , Piggybacking , Stop-and-Wait ARQ ,Sliding Window Protocols: GO-Back-N ARQ, Selective-Repeat ARQ, Random Access: CSMA,CSMA/CD,CSMA/CA
Self-study: Standard Ethernet
Further Reading: Wi-Max(IEEE Project 802.16)

UNIT 3	Network Layer	8 HOURS

App/System/Case study: Team viewer, Windows Remote Desktop Connection
Contents: Introduction, Network Layer Services: Packetizing, Routing and Forwarding, Other Services, Packet Switching: Datagram Approach: Connectionless Service, Virtual-Circuit Approach: Connection-Oriented Service, Network-layer Performance: Delay, Throughput, Packet loss, Congestion Control, IPv4 Addresses: Address Space, Classful addressing, Classless Addressing, Dynamic Host Configuration Protocol(DHCP), Network Address Translation(NAT), Internet Protocol(IP) , Internet Control Message Protocol(ICMPv4), Routing Algorithms: Distance-Vector Routing, Link-State Routing, Path-Vector Routing, Unicast Routing Protocols : Routing Information Protocol(RIP) ,Open Shortest Path First(OSPF), Border Gateway Protocol(BGP)
Self-study: Multicast Routing(Unicasting, Multicasting, Broadcasting)
Further Reading: Internet Group Message Protocol(IGMP)

UNIT 4	Transport Layer	6 HOURS

App/System/Case study: Microsoft Team, Cisco Webex, Google Hangout

Contents:

Introduction: Transport Layer Services, Connectionless and Connection-Oriented Protocols, Transport-Layer Protocols: Services, Port Numbers, User Datagram Protocol(UDP): Datagram, Services, Applications, Transmission Control Protocol(TCP): Services, Features, Segment, Connection, Applications, Socket Programming

Self Study: Stream Control Transmission Protocol(SCTP)

Further reading: Real Time Transport Protocol (RTP)

UNIT 5	Application Layer	6 HOURS

App/System/Case study: Moodle Server, FileZilla, IP messenger, WhatsApp

Contents:

Introduction: Providing Services, Application-Layer Paradigms, Domain Name System (DNS), Hypertext Transfer Protocol (HTTP), Simple Mail Transfer Protocol (SMTP), File Transfer Protocol (FTP)

Self Study: Simple Network Management Protocol (SNMP)

Further reading: TErminaL NETwork(TELNET),Secure Shell(SSH)

UNIT 6	Networking Trends	6 HOURS

App/System/Case study: VOIP, IoT

Contents:

Introduction, Software Defined Networking(SDN): Concept, Architecture, Communication, Application, Network Security: Policy - Integrity , Confidentiality, Availability , Privacy, Data Centric Networks

Self Study: SD-WAN

Further reading: Platform for Privacy Preferences(P3P)

PRACTICAL:		
PRACTICAL NO.1		**2 HOURS**
Setup a wired LAN using Layer 2 Switch and then IP switch of minimum four computers. It includes preparation of cable, testing of cable using line tester, configuration machine using IP addresses, testing using PING utility and demonstrate the PING packets captured traces using Wireshark Packet Analyzer Tool.		
PRACTICAL NO.2		**4 HOURS**
Using cisco packet tracer design different network topologies and Subnet.		
PRACTICAL NO.3		**4 HOURS**
Write a program to detect and correct single bit error using 1. Parity Check 2. Hamming Code 3. Cyclic Redundancy Check		
PRACTICAL NO.4		**4 HOURS**
Write a program to implement sliding window mechanisms using 1. Stop and Wait ARQ 2. Go Back N ARQ 3. Selective Repeat ARQ		
PRACTICAL NO.5		**2 HOURS**
Write a program to implement subnet calculator.		
PRACTICAL NO.6		**2 HOURS**
Write a program to implement Distance Vector Routing /Link State Routing.		
PRACTICAL NO.7		**4 HOURS**
Write a program to implement simple communication between Client-Server using sockets utility(TCP and UDP) and demonstrate the packets captured traces using Wireshark Packet Analyzer Tool.		
PRACTICAL NO.8	**Mini Project**	**12 HOURS**
Guide Lines 1. Maximum 3 students allowed in each group. 2. Each group will work on design and Implementation. 3. Students should submit the report in soft copy and hard copy.		

TEXT BOOK

1. Behrouz A. Forouzan, "Data Communications and Networking", 5th edition, Tata McGraw-Hill Publications, 2013, ISBN 978-0073376226
2. Doulas E. Comer, "Computer Networks and Internets, 6th edition, Pearson Education Limited, 2016, ISBN 978-1292061177

REFERENCE BOOK

1. Andrew S. Tanenbaum, David J.Wetherall, "Computer Networks", 5thedition, Pearson Education India, 2013, ISBN 978-9332518742
2. Larry L. Peterson Bruce S. Davie, "Computer Networks", 5thedition, Morgan Kaufmann Publisher, 2011, ISBN 978-0123850591.
3. William Stallings, "Data and Computer Communications", 9thedition, Pearson Education India, 2013, ISBN 978-9332518865.
4. Behrouz A. Forouzan, "Data Communications and Networking", 4thedition, Tata McGraw-Hill Publications, 2006, ISBN 978-0-07-296775-3
5. Alberto Leon-Garcia , Indra Widjaja, "Communication Networks" ,2nd edition, McGraw-Hill Education,2003, 978-0072463521.

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 COMPUTER ENGINEERING	**COURSE NAME**	Cryptography and Network Security
	COURSE CODE	IT351
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				PRESENTATION/	TOTAL
LECTURE	PRACTICAL	ICE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	35	35	30	50	NA	150

PRE-REQUISITE : CS343-Computer Networks

COURSE OBJECTIVES :

CS352.CEO.1: To understand Cryptography Theories, Algorithms and Systems.

CS352.CEO.2: To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks.

CS352.CEO.3: To understand the basic categories of threats to computers and networks.

CS352.CEO.4: To understand the fundamental ideas of public-key cryptography and symmetric key cryptography.

CS352.CEO.5: Discuss IP Security , Web security and Firewalls

COURSE OUTCOMES :

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

CS352.CO.1: Identify the security threats, and the security services and mechanisms to counter them.

CS352.CO.2: Apply security principles to protect the data.

CS352.CO.3: Analyze symmetric key and asymmetric key algorithm.

CS352.CO.4: Identify the different Authentication method in digital signature

CS352.CO.5: Analyze network security protocols.

CS352.CO.6: Identify and investigate network security threat and provide solution to protect the network.

THEORY :

UNIT 1	Security in Computing Environment	8 HOURS

App/System/Case study: Threats, Vulnerabilities, and Controls.
Contents: Need for Security; Security Attack – Threats, Vulnerabilities, and Controls, Types of Threats (Attacks); Security Services – Confidentiality, Integrity, Availability; Information Security; Methods of Protection Terminologies used in Cryptography; Substitution Techniques – The Caesar Cipher, One-Time Pads, The Vernam Cipher, Book Cipher; Transposition Techniques – Encipherment/Decipherment Complexity, and Other Patterns
Further reading: steganography- Foundations of modern cryptography

UNIT 2	Symmetric Key Encryption or Block Cipher	8 HOURS

App/System/Case study: Properties of Trustworthy Encryption Systems.
Contents: Modular Arithmetic, Euclidean and Extended Euclidean algorithm, Prime numbers , Data Encryption Standard (DES) Algorithm – Overview of the DES Algorithm; Double and Triple DES – Double DES, Triple DES; Security of the DES; Advanced Encryption Standard (AES) IDEA, Blowfish ,RC4 , Strength of the Algorithm; .
Further reading: DES and AES Comparison.

UNIT 3	Public Key Encryption	6 HOURS

App/System/Case study: Case study on Public key cryptography.
Contents: Characteristics of Public Key System; RSA Technique – Encryption-Method; Key Exchange; Diffie Hellman Key exchange-Elliptic curve arithmetic-Elliptic curve cryptography.
Further reading: Knapsack Algorithm.

UNIT 4	Hash Functions and Digital Signature	6 HOURS

App/System/Case study: Demonstration Digital Certificate Creation.
Contents: Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC –MD5 - SHA - HMAC – CMAC - Digital signature and authentication protocols – DSS – EI Gamal – Schnorr, private key management, the PKIX model, Public key cryptographic standards (PKCS).
Further reading: Different version of PKIX

UNIT 5	IP Security and Web Security	6 HOURS

App/System/Case study: case study on security policy.
Contents: Overview of IP Security (IPSec); IP Security Architecture; Modes of Operation; Security Associations (SA) – Security Parameter Index (SPI), SA Management, Security Policy; Authentication Header (AH); Encapsulating Security Payload (ESP); Internet Key Exchange.
Web Security Requirements; Secure Socket Layer (SSL) – SSL Architecture, SSL Protocol; Transport Layer Security (TLS); Secure Electronic Transaction (SET) – Features, Components, Dual Signature, Purchase Request. Self-Study: Applications of SET .
Further Reading: Secure E-Mail System – PGP (Pretty Good Privacy).

UNIT 6	Security Practice ad System Security	6 HOURS

App/System/Case study: Demonstration of Windows firewall or Sonic firewall.
Contents: Authentication applications – Kerberos – X.509 Authentication services, Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls - Firewall designs - SET for E-Commerce Transactions. Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles Self-Study: Single KDC
Further Reading: Firewall configuration.

PRACTICAL		
PRACTICAL NO.01		**4 HOURS**
Write a program to encrypt and decrypt the message using encryption decryption techniques a) Substitute Method b) Transposition Method		
PRACTICAL NO.02		**4 HOURS**
Develop a program in C++/Java/Python on Advanced Extended Euclidean Algorithm		
PRACTICAL NO.03		**4 HOURS**
Write a program to implement one of Symmetric Key Cryptography (AES, /DES/ RC4 etc.)		
PRACTICAL NO.04		**4 HOURS**
Write a program to implement public key cryptography algorithm RSA		
PRACTICAL NO.05	**Minimum Two**	**4 HOURS**
Implement Diffie Hellman key exchange algorithm in client server architecture		
PRACTICAL NO.06		**4 HOURS**
Calculate the message digest of a text using the SHA-1 or MD5 algorithm in JAVA/Python/C++		
PRACTICAL NO.07		**2 HOURS**
Create your own digital certificate using java key tool		
PRACTICAL NO.08		**4 HOURS**
Security Tools : 1. Configure and demonstrate firewall 2. Configure and demonstrate use of traffic monitoring tool such as wireshark with security perspective		

TEXT BOOK

1. Atul Kahate, "Cryptography and Network Security",The McGraw Hill Publication Second Edition, ISBN – 13: 978-0-07-064823-4.
2. 2. Eric Maiwald , "Network Security: A Beginners' Guide" , ISBN: 978-0-07-179571-5.

REFERENCES

1. William Stallings , "Cryptography and Network Security", Prentice Hall, Fourth Edition ISBN-13: 978-0-13-187316-2.
2. Peter Harrington, "Machine Learning in Action", Dreamtech Press, 2012, ISBN 978-1-617-29018-3
3. Bernard Menezes ," Network Security and Cryptography: Bernard Menezes", CENGAGE Learning.
4. Charlie Kaufman, Radia Perlman and Mike Speciner , "Network Security - Private Communication in a Public World", Pearson/PHI.

MIT Academy of Engineering (An autonomous Institute Affiliated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Descriptive Analytics
	COURSE CODE	CS351
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY				CONTINUOUS	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	ASSESSMENT	
3	2	35	35	30	30	20	150

PRE-REQUISITE :

1. CS203: Applications Programming - Python
2. CS229: Database Management System
3. AS203: Applied Mathematics

COURSE OBJECTIVES :

CS351.CEO.1: To understand the data warehouse architecture.
CS351.CEO.2: To elaborate schema modelling.
CS351.CEO.3: To apply the various operations on OLAP cubes.
CS351.CEO.4: To outline the various preprocessing operations on data warehouse.
CS351.CEO.5: To explain the different hypothetical Tests.
CS351.CEO.6: To apply regression methods for a given dataset.

COURSE OUTCOMES :

The students after completion of the course will be able to

CS351.CO.1: Outline the data warehouse architecture.
CS351.CO.2: Build data marts using different modeling techniques for given application.
CS351.CO.3: Create OLAP cubes and Visualize data using visualizing tools.
CS351.CO.4: Recognize trends, detect outliers, and summarize data sets on real life dataset.
CS351.CO.5: Validate hypothesis using various testing methods for a real-life problem statement.
CS351.CO.6: Predict output by applying correct regression model.

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Data Warehouse**	**6 HOURS**

App/System/Case study:
Retail-Industry Case Study
Content:
Introduction to Data Science and Data Mining, Descriptive, Predictive and Prescriptive Data Analysis Techniques.
Introduction to Data Warehouse, DW Architecture, DW Characteristics, ETL, Introduction to Business Intelligence. Applications of BI.
Distributed Data Warehouse, Real Time Data Warehouse Architecture.
Self-Study: Data Warehouse Security Measures : User access, Data load, Data movement, Query generation
Further Reading: Advancement Data Collection Security.

UNIT 2	**Dimensional Modeling**	**6 HOURS**

App/System/Case study:
Retail-Industry Case Study
Content:
Data Modeling, Types of Dimensions and Facts, Granularity of Facts, Measures and Categorization of Measures, Making of Data Mart, Scheme Modeling (Star, Snowflake, Star Constellation Schema), Case Studies on Dimensional Modeling.
Self-Study: Advanced Dimensional Modelling
Further Reading: Data Design

UNIT 3	**Online Analytical Processing**	**6 HOURS**

App/System/Case study:
Retail-Industry Case Study
Content:
OLAP versus OLTP, MOLAP, ROLAP, HOLAP. OLAP cubes, Cube operations- Roll up, Drill down, slice, dice and pivot, OLAP Queries, Data Cube Computations, Key Performance Indicators, BI Dashboards, BI Scorecards
Self-Study: Analyze OLAP cube with Microsoft Excel, Cross Table Cube
Further Reading: Cubing Service Security, Multidimensional Data Analysis

UNIT 4	**Data Pre-processing**	**7 HOURS**

App/System/Case study:
Retail-Industry Case Study
Content:
Handling Methods-Missing Values, Noisy Values, Inconsistent Values, Data Preprocessing Techniques-Data Cleansing, Data Integration, Data Reduction, Data Transformation and Discretization, Concept Hierarchy Generation, Data Quality, Descriptive Data Summarization and Representation
Self -Study: Outlier Analysis
Further Reading: Real Time ETL

UNIT 5	Hypothesis Testing	9 HOURS

App/System/Case study:
Real Estate Case Study
Content:
Descriptive Statistics. Probability Distributions, Null Hypothesis, Alternative Hypothesis, Type-I and Type-II Error, Inferential Statistics through Hypothesis Tests, Z-Test, T-Test, Chi Square Test, ANOVA, F Test.
Self-Study: Permutation Test
Further Reading: Randomization Test

UNIT 6	Regression and Correlation	5 HOURS

App/System/Case study:
Retail-Industry Case Study
Content:
Simple Regression, Multiple Regression, Linear-Logistic Regression, Poisson Regression, Non-Linear Regression. Correlation Coefficient, Measuring Performance of a Model, Accuracy, ROC Curves, Precision-Recall Curves.
Self-Study: Regression Models using Excel 2013
Further Reading: Correlation Mining for Massive data

PRACTICAL : Perform following experiments using programming language (R/Python)		
PRACTICAL NO.01		**2 HOURS**
Getting Started Analyzing Data, Importing and Exporting Data, Packages for Data Science, Understanding the Data, Plotting Different Graphs		
PRACTICAL NO.02		**4 HOURS**
Dimensional Modeling, Data Mart, Cube Analysis, making a Dimensional model for given case study given, Identification of dimensions, measures and fact tables		
PRACTICAL NO.03		**4 HOURS**
Writing OLAP queries for the case study from Assignment no.2 Making of Cubes using Palo cube.		
PRACTICAL NO.04		**4 HOURS**
Data Preprocessing, Data wrangling, Binning, Finding Central tendency, Five-point summary using box plot. Data curation project (http://cs.iit.edu/Or Tableau-Prep (source system, mapping, meta data, cleansing, transformation, reduction, target system)		

PRACTICAL NO.05		**4 HOURS**
Data visualization using tableau/ Power BI/ Talend and making of Dashboards and Story boards.		
PRACTICAL NO.06		**4 HOURS**
Implementation of Regression Analysis (Simple, multiple, polynomial).		
PRACTICAL NO.07		**4 HOURS**
Implementation of hypothesis testing (Z-test, Chi test, F test, T-test).		

TEXT BOOK

1. Jiawei Han, Micheline Kamber, Jian Pei Professor, "Data Mining: Concepts and Techniques", The Morgan Kaufmann Series in Data Management Systems, ISBN 978-9380931913.
2. Rick Sherman, "Business Intelligence Guidebook: From Data Integration to Analytics", The Morgan Kaufmann Series in Data Management Systems, ISBN 012411461X.
3. Sheldon Ross, "Introductory Statistics", Academic Press; 4th edition, Hardcover ISBN: 9780128043172 eBook ISBN: 9780128043615.

REFERENCE BOOK

1. Paulraj Ponniah,"Data Warehousing: Fundamentals for IT Professionals", 2nd Edition, Paperback, McGraw Hill Publishers, ISBN 978-0-07-352332-3.
2. Ralph Kimball, "Data Warehouse Lifecycle Toolkit", Willey, ISBN 0471200247
3. Maria Sueli Almeida, Missao Ishikawa, Joerg Reinschmidt, Torsten Roeber, "Getting Started with Data Warehouse and Business Intelligence", IBM.
4. Ramesh Sharda, DursunDelen, Efraim Turban, "Business Intelligence, Analytics, and Data Science: A Managerial Perspective", Pearson Publication, 4th Edition, ISBN 0134633288
5. Grolemund, Garrett "R for Data Science", O'Reilly
6. Murrey R Spiegal, Larry Stifens, "Statistics" , 5th edition ,Schaum's Series, McGraw-Hill Education; 5 edition, ISBN-10: 0071822526 , ISBN-13: 978-0071822527

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 INFORMATION TECHNOLOGY	**COURSE NAME**	Artificial Intelligence
	COURSE CODE	CS352
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

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

PRE-REQUISITE : CS102-Application Programming

COURSE OBJECTIVES :

CS352.CEO.1: To provide strong foundation of fundamental Artificial Intelligence concepts of perception, knowledge, inference, reasoning and learning.

CS352.CEO.2: To provide a basic exposition to the goals and problem solving techniques of Artificial intelligence.

CS352.CEO.3: To provide knowledge about the key algorithms and concepts that form the foundation of machine learning and computational intelligence.

CS352.CEO.4: To introduce best practices of machine learning and performance analysis of statistical models.

COURSE OUTCOMES :

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

CS352.CO.1: Apply basic principles of knowledge representation, inference and reasoning in Artificial Intelligence[L3].

CS352.CO.2: Apply problem solving and searching techniques of Artificial Intelligence to reach desired goals [L3].

CS352.CO.3: Analyze appropriate methods of Machine Learning based on the particular characteristics of the domains and applications under consideration[L4].

CS352.CO.4: Accurately formulate, test and evaluate hypothesis and performance of machine learning algorithms[L4].

THEORY :

UNIT 1	Introduction	8 HOURS

App/System/Case study: Medical Diagnosis System, Self Driving Vehicle.
Contents: Introduction: Foundation and history of AI, AI applications and types, Impact and ethical concerns of AI, Intelligent Agents, PEAS Representation.
Introduction to Reasoning and Knowledge Representation, First order Logic, Rules based reasoning, Architecture of expert systems, Knowledge Acquisition, Chatbots.
Further reading: Applications of AI: Robotics, Natural Language Processing, Computer Vision.

UNIT 2	Search Strategies	7 HOURS

App/System/Case study: GPS Navigation systems, Robot navigation.
Contents: Search Strategies: State Space Search, Uninformed search (breadth-first, depth-first, depth limited, iterative deepening, Bidirectional).
Heuristic search (Greedy best first search, A* Algorithm, Admissibility of A*).
Hill-climbing, Genetic Algorithm.
Further reading: Searching with Partial Observations.

UNIT 3	Constraint Satisfaction Problem and Adversarial Search	6 HOURS

App/System/Case study: Map Coloring, IBM Deep Blue.
Contents: Constraint Satisfaction Problem(CSP), Constrain Propagation and Inference in CSP, Local Search and Backtracking search in CSP.
Adversarial Search, Minimax Search, Alpha-Beta Pruning.
Further reading: Stochastic Games.

UNIT 4	Introduction to Machine Learning	9 HOURS

App/System/Case study: Real Estate Price Prediction.
Contents: Introduction to Machine Learning and Applications, Types of Learning, Regression Model (univariate, multivariate, polynomial regression), Cross Validation, Bias-Variance tradeoff, Cost Function, Optimization of Cost Function, Gradient Descent, Convergence.
Self Study: Locally Weighted Linear Regression, Regularization.

UNIT 5	Classification	6 HOURS

App/System/Case study: Disease Detection.
Contents: Classification, Logistic Regression, Cost Function for Classification, Multi class classification.
K-Nearest Neighbour, Naive Bayes, Bayesian Network, Assessing Classification Performance.
Further Reading: Nonlinear Classifiers.

UNIT 6	Mining, Clustering and Reinforcement Learning	6 HOURS

App/System/Case study: Market Basket Analysis.
Contents: Association rule, Support, Confidence, Apriori Algorithm.
Introduction to Clustering, Partitional Clustering, Hierarchical Clustering, Density Based Clustering.
Reinforcement Learning: Markov Decision Process, Exploration, Exploitation, Rewards, Penalties.
Further Reading: Applications of Reinforcement Learning.

PRACTICAL		
PRACTICAL NO.01		**4 HOURS**
a) Develop Vacuum Cleaner Agent Application. b) Develop an knowledge base system consisting of facts and rules about some specialized knowledge domain of your choice.		
PRACTICAL NO.02	**Minimum Two**	**6 HOURS**
a) Implement uninformed search algorithm for any suitable real time application. b) Find the shortest path for any particular source and destination using A* Algorithm. c) Implement hill climbing algorithm for real time application. d) Implement Traveling Salesman Problem using Genetic Algorithm. e) Develop 8-puzzle problem using appropriate search method.		
PRACTICAL NO.03		**4 HOURS**
a) Design and implement map coloring problem using backtracking. b) Develop and implement game of tic-tac-toe using minimax algorithm.		
PRACTICAL NO.04		**4 HOURS**
a) To implement techniques of Feature Engineering. b) To implement Multiple Linear Regression model with parameter estimation.		
PRACTICAL NO.05	**Minimum Two**	**4 HOURS**
a) Write a program to implement k-Nearest Neighbour algorithm to classify the selected data set. b) Write a program to design an email spam filtering using Naive Bayes Classifier. Compute the accuracy of the classifier, for selected data set. c) Write a program for weather forecasting using Naive Bayes Classifier. Compute the accuracy of the classifier, for selected data set.		
PRACTICAL NO.06		**2 HOURS**
Develop apriori algorithm for finding frequent itemsets and suggest association rules for selected application domain.		
PRACTICAL NO.07		**4 HOURS**
Implement K-means clustering and Hierarchical clustering for selected dataset. Compute the following, 1. K-Means: Compute the squared error for k=3 and k=4 clusters 2. K-Means: Find optimum number of clusters 3. Compute (and store) the squared errors of all possible clustering in hierarchical clustering 4. Compare k-means and hierarchical clustering with respect to error and optimum number of clusters.		

TEXT BOOK

1. Stuart Russel and Peter Norvig, "Artificial Intelligence: A Modern Approach", Forth Edition 2020, Pearson, ISBN: 0-13-461099-7.
2. Elaine Rich, Kevin Knight, Shivashankar B. Nair, "Artificial Intelligence", Third Edition, Tata McGraw Hill, ISBN-13: 978-0-07-008770-5.
3. Ethem Alpaydin, "Introduction to Machine Learning", Forth Edition, The MIT Press,2020, ISBN: 978-0-262-04379-3
4. Tom Mitchell, "Machine Learning" , McGraw Hill, 1997, ISBN 007-0-42807-7

REFERENCES

1. Deepak Khemani, "A First course in Artificial Intelligence", First Edition 2013, McGraw Hill Education, ISBN: 9781259029981.
2. Peter Harrington, "Machine Learning in Action", Dreamtech Press, 2012, ISBN 978-1-617-29018-3
3. Trevor Hastie, Robert Tibshirani, Jerome Friedman, "The Elements of Statistical Learning: Data Mining, Inference, and Prediction", Second Edition, Springer, 2009, ISBN: 978-0-387-84857-0
4. Introduction to Machine Learning with Python: A Guide for Data Scientists, by Andreas Muller,Paperback: 392 pages,Publisher: Shroff/O'Reilly; First edition (2016), ISBN-10: 9352134575, ISBN-13: 978-9352134571
5. Python Machine Learning Cookbook, Prateek Joshi,Paperback: 304 pages, Publisher: Packt Publishing Limited (23 June 2016), ISBN-10: 1786464470 ISBN-13: 978-TMH, 2009, ISBN-13: 978-8120337312

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 COMPUTER ENGINEERING	**COURSE NAME**	Cloud Computing Foundations
	COURSE CODE	CS353
	COURSE CREDITS	4
RELEASED DATE : 01/07/2021	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME & MARKS						
		THEORY			PRACTICAL			TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	MSE	ESE	IA	
3	2	35	35	30	NIL	40	10	150

PRE-REQUISITE:

1: Data Structures
2: Database Management Systems
3: Discrete Structures and Graph Theory

COURSE OBJECTIVES:

CS228.CEO.1: To introduce various cloud computing services and models
CS228.CEO.2: To learn how to select appropriate configuration for compute node
CS228.CEO.3: To configure appropriate storage service for the specific application
CS228.CEO.4: To understand networking and security settings in cloud environment
CS228.CEO.5: To design the application using high scalability and reliability considerations

COURSE OUTCOMES:

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

CS228.CO.1: To classify various cloud computing services and models
CS228.CO.2: To build various compute services in cloud
CS228.CO.3: To distinguish between various storage related services used during application development
CS228.CO.4: To select appropriate database service during application development
CS228.CO.5: To choose various networking and security options during application development
CS228.CO.6: To estimate the resource requirements for the application with high availability and reliability features

THEORY COURSE CONTENT		
UNIT 1	**Introduction to Cloud Computing**	**6 HOURS**

App/System/Case study: Amazon AWS, Microsoft Azure, Salesforce
Contents: Distinguishing Cloud Types, Deployment Models, Service Models, Scalability, Virtualization, Software as a service (SaaS): understanding multitenant nature, service oriented architecture, Platform as a service (PaaS): Benefits and disadvantages, Infrastructure as a service (IaaS): Improving Performance Through Load Balancing, System and Storage Redundancy.
Web as a portal to cloud : Overview of web protocols like HTTP, SOAP, REST and XML.
Virtualization : types, hypervisors.
Cloud economics and billing
Self study: Hybrid cloud service providers
Further Reading: REST implementation

UNIT 2	**Compute Services in Cloud Computing**	**6 HOURS**

App/System/Case study: Amazon EC2, Virtualbox, Docker
Contents: Compute node architecture, parameters to consider while configuring compute node, Machine images, instances, instance types, tags, key pairs, security groups, regions and zones – types
Types of compute nodes – virtual machines and containers
Self study: Kubernetes
Further Reading: Virtual Machine Internal XML file

UNIT 3	**Storage Services in Cloud Computing**	**6 HOURS**

App/System/Case study: Amazon S3, Amazon EBS, Amazon EFS, Amazon Glacier
Contents: Examining the Evolution of Network Storage, Understanding Cloud-Based Data Storage, Advantages and Disadvantages of Cloud-Based Data Storage. Cloud- Based Backup Systems, Understanding File Systems
Types of cloud storage – File Storage, Block Storage – Elastic Block Storage, File Systems, Storage for Backups, Storage for Databases Storage gateway for hybrid cloud storage systems
Self Study: Google File System
Further Reading: CEPH File System

UNIT 4	**Database Services in Cloud Computing**	**6 HOURS**

App/System/Case study: Amazon RDS, Amazon DynamoDB, Amazon ElastiCache, Amazon Neptune
Contents: Need for cloud databases, considerations for cloud databases, architecture and common characteristics, Data Models
Relational database, Key – value based database, In-memory database, Document based database, Graph based database, Time series database, Ledger based database.
High availability and load balancing in databases
Self Study: Real time graph databases
Further Reading: Blockchain

UNIT 5	Networking and Security Services in Cloud Computing	8 HOURS

App/System/Case study: Amazon VPC, Amazon Route S3, Amazon Elastic Load Balancing, Amazon Cloud Front

Contents: Building cloud network : defining and provisioning isolated networks, gateways in cloud, providing private connectivity in hybrid cloud environments

Scaling cloud network : automatic traffic distribution across pool of servers, direct traffic routing for achieving performance

Securing network traffic : Configuring and managing firewall rules, access permissions

Content delivery networks: to deliver data, images and videos with low latency and high transfer speeds

Self Study: Advanced Firewall Settings

Further Reading: VPN Connectivity in AWS

UNIT 6	High Availability and Scalability Services in Cloud Computing	6 HOURS

App/System/Case study: Amazon EC2, Amazon EBS, AWS Autoscaling

Contents: Definition, elements of high availability. High availability for compute resources, high availability for databases and high availability for storage services.

Regions and availability zones, Auto scaling, Elastic Load Balancing, Reserved instance, Elastic Block Store, EBS snapshots.

Scalability issues, vertical scaling vs. horizontal scaling vs. diagonal scaling, difference between scalability and elasticity

Self Study: Autoscalling algorithms

Further Reading: Highly available and salable file system features

PRACTICAL:		
PRACTICAL NO.01	**First Virtual Machine on AWS**	**4 HOURS**
Launching the virtual machine on Amazon AWS and doing basic settings		
PRACTICAL NO.02	**Storage Configuration**	**4 HOURS**
Configuring various storages available on AWS and storing, retrieving, deleting the data from those storage applications		
PRACTICAL NO.03	**Database Configuration**	**4 HOURS**
Configuring and using various databases available on Amzon AWS		
PRACTICAL NO.04	**Networking and Security Services Configuration**	**4 HOURS**
Configuring various networking and security options		
PRACTICAL NO.05	**High availability and scalability services**	**4 HOURS**
Configuration of high availability and scalability services		
PRACTICAL NO.06	**Project**	**4 HOURS**
Implement a project based on all the services studied for a given application on Amazon AWS		

TEXT BOOK

1. Wittig, Michael, Andreas Wittig, and Ben Whaley. Amazon web services in action. Manning,, 2018.
2. Murty, James. Programming amazon web services: S3, EC2, SQS, FPS, and SimpleDB. " O'Reilly Media, Inc.", 2008.
3. Piper, Ben, and David Clinton. AWS Certified Solutions Architect Study Guide: Associate SAA-C02 Exam. John Wiley Sons, 2020.
4. Anthony, Albert. Mastering AWS Security: Create and maintain a secure cloud ecosystem. Packt Publishing Ltd, 2017.
5. van Vliet, Jurg, Flavia Paganelli, and Jasper Geurtsen. Resilience and Reliability on AWS: Engineering at Cloud Scale. " O'Reilly Media, Inc.", 2013.
6. Sarkar, Aurobindo, and Amit Shah. Learning AWS: Design, build, and deploy responsive applications using AWS Cloud components. Packt Publishing Ltd, 2018.

REFERENCE BOOK

1. Kavis, Michael J. Architecting the cloud: design decisions for cloud computing service models (SaaS, PaaS, and IaaS). John Wiley Sons, 2014.
2. Vacca, John R., ed. Cloud computing security: foundations and challenges. CRC Press, 2016.
3. Furht, Borivoje, and Armando Escalante. Handbook of cloud computing. Vol. 3. New York: springer, 2010.

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 COMPUTER ENGINEERING	**COURSE NAME**	Skill Development Lab - RHA I
	COURSE CODE	CS344
	COURSE CREDITS	2
RELEASED DATE : 01-07-2021	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MSE	ESE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	20	45	10	75

AIM : To provide technical skills, for sharpening the students to enable them to meet the techno-socio-economic challenges.

COURSE OBJECTIVES :

CS344.CEO.1: To learn configuring, installing, and upgrading Linux systems using established standards and procedures.
CS344.CEO.2: To understand Redhat Linux operational support.
CS344.CEO.3: To monitor system performance and availability.
CS344.CEO.4: To develop scripts for task automation and system administration.

COURSE OUTCOMES :

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

CS344.CO.1: Illustrate essential Linux administration tasks.
CS344.CO.2: Experiment with installation, networking and user profiles.
CS344.CO.3: Examine physical storage, file systems and log files.
CS344.CO.4: Inspect the Linux processes, control services, daemons and basic security administration.
CS344.CO.5: Analyze Redhat Linux System with a comprehensive and systematic approach.

Red Hat Administration - I	40 HOURS

Access the command line: Log in to a Linux system and run simple commands using the shell.
Manage files from the command line: Copy, move, create, delete, and organize files from the bash shell prompt.
Get help in Red Hat Enterprise Linux: Resolve problems by using online help systems and Red Hat support utilities.
Create, view, and edit text files: Create, view, and edit text files from command output or in an editor.
Manage local Linux users and groups: Manage local Linux users and groups, and administer local password policies.
Control access to files with Linux file system permissions: Set Linux file system permissions on files and interpret the security effects of different permission settings.
Monitor and manage Linux processes: Obtain information about the system, and control processes running on it.
Control services and daemons: Control and monitor network services and system daemons using Systemd
Configure and secure OpenSSH service: Access and provide access to the command line on remote systems securely using OpenSSH
Analyse and store logs: Locate and accurately interpret relevant system log files for troubleshooting purposes.
Manage Red Hat Enterprise Linux networking: Configure basic IPv4 networking on Red Hat Enterprise Linux systems.
Archive and copy files between systems: Archive files and copy them from one system to another.
Install and update software packages: Download, install, update, and manage software packages from Red Hat and yum package repositories.
Access Linux file systems: Access and inspect existing file systems on a Red Hat Enterprise Linux system.
Use virtualized systems: Create and use Red Hat Enterprise Linux virtual machines with KVM and Libvirt.

REFERENCE BOOK

1. Red Hat Enterprise Linux 8.0, "RH124: RED HAT SYSTEM ADMINISTRATION I", Student Guide.

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2019 – 2023)	
SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY COMPUTER ENGINEERING	**COURSE NAME**	Web Technology
	COURSE CODE	CS346
	COURSE CREDITS	2
RELEASED DATE : 01/01/2020	**REVISION NO**	1.0

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

PRE-REQUISITE : CS321: Database Management System

COURSE OBJECTIVES :

CS346.CEO.1: To understand the concepts and principles of web applications and development.
CS346.CEO.2: To apply current web technologies and web business models.
CS346.CEO.3: To understand the client-side web UI frameworks and world wide web client-server request and response.
CS346.CEO.4: To build mobile apps for multiple platforms with a single codebase.

COURSE OUTCOMES :

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

CS346.CO.1: Build a responsive website using HTML, CSS, JavaScript and Web UI Frameworks.
CS346.CO.2: Construct a functional front-end web application using AngularJS
CS346.CO.3: Build and configure a backend server using NodeJS and ExpressJS framework
CS346.CO.4: Build a RESTful API for the front-end to access backend services.

Course Project

Student will work in the group of 4, every group member has to contribute for project work.

Following reviews will be conducted during the course, date's will be provided in the planning.

Review - I: Presentation on topic (ungraded)
Review - II: Progress review (graded)
Review - III: Progress review (graded)

PRACTICAL NO. 1	**HTML, CSS and Frameworks**	**8 HOURS**

- Installation and Configuration of Web Application Servers- Tomcat.
- Design and develop any suitable web application using HTML, CSS and Framework in consultation of course instructor.

PRACTICAL NO. 2	**JavaScript**	**8 HOURS**

- Apply JavaScript on PRACTICAL NO.1 for validation. Use JSON and Array for storing the data, before saving the data validate it and show proper error message. This website will act as a single page application.

PRACTICAL NO. 3	**Front-End JavaScript Frameworks: AngularJS**	**8 HOURS**

- Re-Design, develop and deploy PRACTICAL NO. 2 using Angular JS

PRACTICAL NO. 4	**Server-side Development: NodeJS**	**8 HOURS**

- Re-Design, develop and deploy PRACTICAL NO. 2 using NodeJS

PRACTICAL NO. 5	**Web Application Framework: ExpressJS**	**6 HOURS**

- Re-Design, develop and deploy PRACTICAL NO. 4 using ExpressJS

PRACTICAL NO. 6	**RESTful API**	**8 HOURS**

- Create an API to perform CRUD operation in database and deploy the application on any web hosting provider and test the API's using Postman.

PRACTICAL NO. 7	**NoSQL Database**	**6 HOURS**

- Re-Design, develop and deploy PRACTICAL NO. 5 using NoSQL. Interact with NoSQL database from a Node application.

TEXT BOOK

1. Ralph Moseley, M.T. Savaliya, "Developing Web Applications ", Willy India, Second Edition, 2016,ISBN:9788126538676

REFERENCE BOOK

1. Aleksa Vukotic and James Goodwill, "Apache Tomcat 7", Apress, 2011.
2. Kogent Learning Solutions Inc , "Web Technology Black Book", Wiley, 2009.
3. Bryan Basham, Kathy Sierra, Bert Bates, "JSP: Passing the Sun Certified Web Component Developer Exam", O'Reilly Media, Second Edition, 2010.
4. B. M. Harwani, "Developing Web Applications in PHP and AJAX", Tata McGraw-Hill, 2010.
5. Michael Morrison, Lynn Beighley, "Head First PHP MySQL: A Brain-Friendly Guide", O'relly Media, Second Edition 2008.
6. Chuck Cavaness, "Programming Jakarta Struts", O'relly Media, Second Edition 2004.
7. Richard Monson-Haefel, "J2EE Web Services", Addison-Wesley Professional, First Edition, 2004.
8. Chirag Rathod, Jonathan Wetherbee, Peter Zadrozny, and Raghu R. Kodali, "Beginning EJB 3: Java EE 7 Edition", Apress, 2013.
9. Dan Rahmel, "Advanced Joomla!", Apress, First Edition, 2013.
10. Iwein Fuld, Marius Bogoevici, Mark Fisher, Jonas Partner", Spring Integration in Action", Manning, 2012.

REFERENCE WEBSITE

1. https://www.w3schools.com/
2. https://www.coursera.org/
3. https://getbootstrap.com/

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	**COURSE NAME**	Project Management
	COURSE CODE	CS361
	COURSE CREDITS	2
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

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

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SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY	**W.E.F**	**AY:** 2021 - 2022
THIRD YEAR BACHELOR OF TECHNOLOGY IN COMPUTER ENGINEERING	**COURSE NAME**	Project Design
	COURSE CODE	XX350
	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	MSE	ESE	IA			
NIL	4	NIL	NIL	25	NIL	50	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

XX350.CEO.1: To embrace innovation and creativity in project design while empathizing real world needs.

XX350.CEO.2: To acquaint with requirement analysis process and techniques.

XX350.CEO.3: To inculcate the agile project management tools for project design and planning.

XX350.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,

XX350.CO.1: Delineate the problem to be solved.

XX350.CO.2: Inculcate problem solving skills by critically analyzing real world needs, possible solutions and challenges.

XX350.CO.3: Carry out systematic literature review, planning and project design.

XX350.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 or academic 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.

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.