MIT Academy of Engineering, Alandi, Pune
An Autonomous Institute affiliated to Savitribai Phule Pune University

CURRICULUM FRAMEWORK (ELECTRONICS ENGINEERING)
2020-22 PATTERN W.E.F 2020-21

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

COURSE DISTRIBUTION : TRIMESTER WISE										
S.N.	**TYPE OF COURSE**	**NO. OF COURSES/TRIMESTER**								**TOTAL**
		1	**2**	**3**	**4**	**5**	**6**			
1.	Program Core (PC)	2	1	1						**04**
2.	Discipline Core (DC)	1	2	2						**05**
3.	Department Elective (DE)				2					**02**
4.	Skill Development and Project (SDP)			1	1	1	1			**04**
TOTAL		**3**	**3**	**4**	**3**	**1**	**1**			**15**

CREDIT DISTRIBUTION : TRIMESTER WISE										
1 Lecture hour = 1 Credit		**2 Lab Hours = 1 Credit**			**1 Tutorial Hour = 1 Credit**					
S.N.	**TYPE OF COURSE**	**NO. OF CREDITS/TRIMESTER**							**TOTAL**	**%**
		1	**2**	**3**	**4**	**5**	**6**			
1.	Program Core (PC)	8	2	2					**12**	**18.75**
2.	Discipline Core (DC)	4	8	8					**20**	**31.25**
3.	Department Elective (DE)				6				**06**	**9.37**
4.	Skill Development and Project (SDP)			2	4	10	10		**26**	**40.62**
TOTAL		**12**	**10**	**12**	**10**	**10**	**10**		**64**	**100**

CREDITS				
1 Lecture hour = 1 Credit 2 Lab Hours = 1 Credit				
SL. NO.	YEAR	TRIMESTER			TOTAL
		1	**2**	**3**	
1.	First Year	12	10	12	**34**
2.	Second Year	10	10	10	**30**
TOTAL					**64**

CONTACT HOURS				
SL. NO.	YEAR	TRIMESTER			TOTAL
		1	**2**	**3**	
1.	First Year	13	12	16	41
2.	Second Year	14	20	20	54
TOTAL					**95**

ABBREVIATIONS		
1.	MCE	Mid-Course Exam
2.	ECE	End Course 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 (2020-2022)		
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**:**	**2020-21**
FIRST YEAR MASTER OF TECHNOLOGY IN ELECTRONICS ENGINEERING	**RELEASE DATE**	**:**	**01/06/2020**
	REVISION NO.	**:**	**1.0**

TRIMESTER: I

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
			Hour/Week			THEORY			PRACT		TOTAL	
TYPE	CODE	NAME	L	P	T	MCE	ECE	IA	T/P	DM		
PC1	AS502	Computing and Higher Mathematics	2	-	2	-	60	40	50	-	150	4
PC2	CS531	Management System	2	-	2	-	60	40	50	-	150	4
DC1	EX532	Modern Technologies	3	2	-	-	60	40	50	-	150	4
TOTAL			**07**	**02**	**04**	**-**	**180**	**120**	**150**	**-**	**450**	**12**

TRIMESTER: II

COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
			Hour/Week			THEORY			PRACT		TOTAL	
TYPE	CODE	NAME	L	P	T	MCE	ECE	IA	T/P	DM		
PC3	EX531	Research Methodology	2	-	-	-	50	25	-	-	75	2
DC2	EX541	Advance Embedded Architecture & Processor	3	2	-	-	60	40	-	50	150	4
DC3	EX542	CMOS Design	3	2	-	-	60	40	-	50	150	4
TOTAL			**08**	**04**	**-**	**-**	**170**	**105**	**-**	**100**	**375**	**10**

TRIMESTER: III											
COURSE			**TEACHING SCHEME**			**EXAMINATION SCHEME AND MARKS**					**CREDIT**
			Hour/Week			**THEORY**			**PRACT**		
TYPE	**CODE**	**NAME**	L	P	T	MCE	ECE	IA	T/P	DM	**TOTAL**	
PC4	EX533	Technical Writing	2	-	-	-	-	25	-	50	75	2
DC4	EX543	Real Time Operating Systems & Design	3	2	-	-	60	40	-	50	150	4
DC5	EX544	Embedded Signal Processor Architecture	3	2	-	-	60	40	-	50	150	4
SDP1	EX545	Project Work - I	-	4	-	-	-	-	-	50	50	2
TOTAL			**08**	**08**	**-**	**-**	**120**	**105**	**-**	**200**	**425**	**12**

MIT | Academy of Engineering **Autonomous Institute Affiliated to SPPU**	**COURSE STRUCTURE** **(2020-22)**		
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**:**	**2021-22**
SECOND YEAR MASTER OF TECHNOLOGY IN ELECTRONICS ENGINIEERING	**RELEASE DATE**	**:**	**01/07/2021**
	REVISION NO.	**:**	**1.0**

TRIMESTER: IV												
COURSE			**TEACHING SCHEME**			**EXAMINATION SCHEME AND MARKS**					**TOTAL**	**CREDIT**
			Hour/Week			**THEORY**			**PRACT**			
TYPE	**CODE**	**NAME**	L	P	T	MCE	ECE	IA	T/P	DM		
DE1	EX66#	Elective course I – Refer Annexure	3	-	-	-	60	40	-	-	100	3
DE2	EX67#	Elective course II – Refer Annexure	3	-	-	-	60	40	-	-	100	3
SDP2	EX651	Project Work - II	-	08	-	-	-	-	50	50	100	4
TOTAL			**06**	**08**	**-**	**-**	**120**	**80**	**50**	**50**	**300**	**10**

TRIMESTER: V												
COURSE			**TEACHING SCHEME**			**EXAMINATION SCHEME AND MARKS**					**TOTAL**	**CREDIT**
			Hour/Week			**THEORY**			**PRACT**			
TYPE	**CODE**	**NAME**	L	P	T	MCE	ECE	IA	T/P	DM		
SDP3	EX652	Project Work - III	-	20	-	-	-	-	150	50	200	10
TOTAL			**-**	**20**	**-**	**-**	**-**	**-**	**150**	**50**	**200**	**10**

TRIMESTER: VI												
COURSE			**TEACHING SCHEME**			**EXAMINATION SCHEME AND MARKS**					**TOTAL**	**CREDIT**
			Hour/Week			**THEORY**			**PRACT**			
TYPE	**CODE**	**NAME**	L	P	T	MCE	ECE	IA	T/P	DM		
SDP4	EX653	Project Work - IV	-	20	-	-	-	-	200	100	300	10
TOTAL			**-**	**20**	**-**	**-**	**-**	**-**	**200**	**100**	**300**	**10**

Annexure

Department Elective Course I : 1 Course		
Sl. No.	**Course Code**	**Course**
1	EX661	Computer Vision
2	EX662	ASIC Design
3	EX663	Open Elective

Department Elective Course II : 1 Course		
Sl. No.	**Course Code**	**Course**
1	EX671	Internet of Things
2	EX672	Hybrid and Electric Vehicle
3	EX673	Open Elective

MIT Academy of Engineering **(An Autonomous Institute Affiliated to SPPU)**	**COURSE SYLLABI** **(2020 – 2022)**	
SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2020 - 2021
FIRST YEAR MASTER OF TECHNOLOGY MECH/COMP/ETX ENGG	**COURSE NAME**	Computing and Higher Mathematics
	COURSE CODE	AS502
	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	TUTORIAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
2	2	NIL	60	40	50	NIL	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

AS502.CEO.1: To learn different numerical methods to solve differential equations and obtain the solution.

AS502.CEO.2: To understand different sampling techniques, analyze the data and process it to obtain a quality product.

AS502.CEO.3: To learn mathematical methodologies, techniques and mathematical tools to obtain an optimal solution of the problems theoretically and also by ANOVA.

COURSE OUTCOMES :

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

AS502.CO.1: Identify the accurate solution method (minimizing the error) to solve the differential equation with given conditions and obtains the particular solution of the problem.

AS502.CO.2: Collect, categorize, analyze, processing mathematically the data, thereby to obtain a quality proven product.

AS502.CO.3: Understand the physical situation, identify the accurate mathematical model and solve the problem mathematically or with the use of Statistical tools available and finally interpret it in the original context.

CONTENTS:

Computational Methods for Ordinary Differential Equations: Eulers Method, Heuns Method, Mid- point Method, Runge-Kutta Method and Multi step Methods-Explicit Adams-Bash forth technique and Implicit Adams-Moulton techniques, Adaptive RK Method, Embedded RK Method, Higher Order Ordinary differential equation- Shooting Method.

Operations Research: Simplex method: Feasible solution to system of equations, reduction of feasible to basic feasible solution, solution of LPP: computational procedure, Penalty (Big M) method. Transportation problem: North-West corner method, Least-cost method, Vogels approximation method, Assignment Models: Hungerian Method.

Statistics and ANOVA: Central Tendency of data, Variance, Standard Deviation, Coefficient of Variance, Moments, Correlation, Coefficient of Correlation, Least Squares, Linear Regression, Inference in Linear Regression, Multiple Linear Regression, ANOVA for Regression

TUTORIAL NO.1		2 HOURS
Introduction to first order first degree Differential equation and its actual solution.		
TUTORIAL NO.02		**2 HOURS**
Eulers Method, Heuns Method, Mid- point Method, Runge-Kutta Method.		
TUTORIAL NO.03		**2 HOURS**
Adams-Bash forth technique and Implicit Adams-Moulton techniques.		
TUTORIAL NO.04		**2 HOURS**
Adaptive RK Method, Embedded RK Method, Shooting Method.		
TUTORIAL NO.05		**2 HOURS**
Solution of system of equations using simplex method (Feasible soln).		
TUTORIAL NO.06		**2 HOURS**
Solution of system of equations using simplex method (Feasible to basic feasible soln).		
TUTORIAL NO.07		**2 HOURS**
Transportation problem: North-West corner method, Least-cost method.		
TUTORIAL NO.08		**2 HOURS**
Transportation problem: Vogels approximation, Assignment problem: Hungerian method.		
TUTORIAL NO.09		**2 HOURS**
Central Tendency of data, Variance, Standard Deviation.		
TUTORIAL NO.10		**2 HOURS**
Moments, Correlation, Coefficient of Correlation.		
TUTORIAL NO.11		**2 HOURS**
Regression lines.		
TUTORIAL NO.12		**2 HOURS**
ANOVA for Regression.		

TEXT BOOK

1. Dr. B.V. Ramana, Higher Engineering Mathematics, 5 th edition, Tata McGraw Hill, 2017, ISBN: 978-0-07-063419-0
2. Peter W. Vik, Regression, ANOVA, and the General Linear Model: A Statistics Primer, First Edition, ISBN-13: 978-1412997355.

REFERENCE BOOK

1. B.S. Grewal, Higher Engineering Mathematics, 44 th edition, Khanna Publications, 2018, ISBN: 978-81-933284-9-1.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10 th edition, Wiley Eastern Ltd., 2015, ISBN: 13: 9788126554232
3. Amos Gilat, MATLAB: An Introduction with Applications, 4th edition, Wiley Publication, 2003, ISBN-13: 9788126537204, 8126537205.

SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2020 - 2021
FIRST YEAR MASTER OF TECHNOLOGY MECH/COMP/ETX ENGG	**COURSE NAME**	Management Systems
	COURSE CODE	CS531
	COURSE CREDITS	04
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	TUTORIAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
2	2	NIL	60	40	50	NIL	150

**PRE-REQUISITE : ** NIL

COURSE OBJECTIVES :

CS531.CEO.1: To expose the students to fundamental concepts of management and its processes in organizations.

CS531.CEO.2: To create scientific attitude towards solving a management problem and impart knowledge about tools available for carrying out research.

CS531.CEO.3: To inculcate a spirit of entrepreneurship by promoting inquisitiveness for technological innovations, their conversion into business ideas and evolving strategy for induction of new products in new markets for growth of their entrepreneurial projects.

CS531.CEO.4: To effectively use the latest technology to support ever growing business.

COURSE OUTCOMES :

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

CS531.CO.1: Describe and explain the Significance of Businesses in Society, their Management and linking these up with other relevant systems.

CS531.CO.2: Critically analyze the organizational structure, systems, competencies and identify the areas of improvement.

CS531.CO.3: The ability and confidence to tackle common environmental and financial problems of business.

CS531.CO.4: Build an awareness of ethical and social responsibilities to multi-cultural, team-oriented, rapidly changing environments.

CONTENTS:

Basics of Management: Nature and scope of management; Evolution of Management thought; -Scientific, Behavioral, Systems and Contingency Approaches, Social responsibility of an organization. Analysis for Managerial Decision Making, Corporate Image Building.

Organizational Behavior: Concepts of OB, Designing and Delegation of Authority, Decision Making Process, Management of Creativity and Relationships, Human Resource Management, Skillful use of Emotional Intelligence in conflict management. Techniques for Self Management and Stress Management for improving personal efficiency.

Economics and Financial Management: Demand and Business Forecasting, Economics of Information and Network Industries, Entrepreneurship and New Ventures, Finance function Scope and Significance, Capital Budgeting- Nature and Significance.

Project Management: Essentials of Project Management with use of Critical Path Method (CPM) and Programme Evaluation and Review Techniques (PERT), Functioning and growth of a Business Unit with understanding of Break-Even Analysis.

Information System: Business and Data Communications Networks, Technology Management with the help of Cyber Security, Data Mining, Enterprise Resource Planning, Industry 4.0 concepts, Business startups and growth in current Indian Environment.

TUTORIAL NO.1	Corporate management case presentation	4 HOURS

A corporate management case to be selected by students on their own choice, writing a Synopsis (2.5 Marks) and its Presentation before the class in 5 Minutes including answers to questions by class (2.5 Marks)

TUTORIAL NO.02	Entrepreneurial Business Plan presentation	6 HOURS

Preparation and submission of an innovative and entrepreneurial Business Plan of students own choice, submitting a Power Point Presentation to be evaluated by Faculty (2.5 Marks), and its presenting/ defending it before the class, to be evaluated by two peers on a Format to be given by Faculty (2.5 Marks).

TUTORIAL NO.03	Industry 4.0	6 HOURS

Understand the concept of Industry 4.0 and prepare a report using any of the technology to prove that use of this technology will improve the performance of the organization.

TEXT BOOK

1. Harold Koontz, Heinz Weihrich and Mark V Cannice, Management A Global and Entrepreneurial Perspective, Tata McGraw Hill Publications, 12th Edition, 2008.
2. Vachaspati Mishra, Management and Entrepreneurship in Indian Environment A Perspective through Joining the Dots, Himalaya Publishing House, First Edition, 2016

REFERENCE BOOK

1. Dr A Sivathanu Pillai; Technology Leadership A Revolution in the Making; Tata McGraw Hill Publishing Company Ltd, New Delhi, 2005
2. James A Alexander and Mark W Hordes; S-Business: Reinventing the Services Organisations, Select Books Inc Biztantra, 2006
3. Vohra ND, Quantitative Techniques in Management; Tata McGraw Hill Publishing Company Limited, Third Edition 2007
4. Nakkiran S and Karthikeyan M; Training Techniques for Management Development; Deep and Deep Publications Pvt Ltd; 2007

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2020 − 2022)		
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021	
FIRST YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Modern Technology	
	COURSE CODE	EX532	
	COURSE CREDITS	4	
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0	

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	-	60	40	50	-	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX532.CEO.1: To get familiar with advance software

EX532.CEO.2: To study the basic knowledge to electrical energy harvesting

EX532.CEO.3: To acquire the knowledge of Battery Management System

COURSE OUTCOMES :

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

EX532.CO.1: Understand the system requirements, design, analysis, verification and validation activities using modern advanced softwares.

EX532.CO.2: Apply knowledge of model based design, energy harvesting in different fields.

EX532.CO.3: Apply advance technologies in automotive industry.

THEORY COURSE CONTENT

Introduction to Modern Tools : MATLAB, SIMULINK verification and validation, computer Aided Engineering Tools (CAE), Automatic code generation tools; modelling and designing a dynamics system, signal processing design and simulation; Introduction and need of model based design concept; Mathematical modelling of a system: motor, battery; System design and validation.

Electric Energy Harvesting: Introduction to Piezo Electric Energy Harvesting-Electromagnetic, Thermal Energy harvesting- RF Energy harvesting, Introduction to Electric Vehicle, Role of battery in present technology era.

Battery Management System (BMS): Battery Boot Camp- important terminology used to describe battery cells, and principles of operation of standard electrochemical battery cells. Principal advantages of lithium-ion cells versus standard electrochemical battery cells, components, and working. BMS sensing and high-voltage control- BMS requirements, and the requirements for sensing and high-voltage control in detail. BMS requirements, studying requirements for protection, interface, performance management, and diagnostics in detail, lithium-ion cells are made and how they can fail.

PRACTICAL		
PRACTICAL NO.01	**Modelling Basics in MATLAB & SIMULINK**	**4 HOURS**

1. Different blocks, toolboxes used in Simulink for modelling
2. Signal Routing, Closed Loop Control System, Integrators & Derivatives
3. Subsystem creation
4. Used defined function in Simulink
5. Interface of MATLAB & Simulink
6. Automatic code generation

PRACTICAL NO.02	**System Design & validation**	**4 HOURS**

DC Motor and Batteries

PRACTICAL NO.03	**Energy harvesting wireless sensors**	**4 HOURS**

Case studies on Implanted medical devices- Bio-MEMS based applications, MEMS-based applications harvesting for RF sensors

PRACTICAL NO.04	**Battery Management System**	**2 HOURS**

Case study on Battery management system in Electric Vehicle

PRACTICAL NO.05	**Battery Application in E Mobility**	**2 HOURS**

Case Study on life cycle of batteries in E mobility

PRACTICAL NO.06	**Health of Batteries**	**2 HOURS**

Case study on Health Monitoring of batteries in E vehicle

PRACTICAL NO.07	**Charge Monitoring of Batteries**	**2 HOURS**

Case study on Charge Monitoring of batteries in E vehicle

TEXT BOOK

1. A. Wayne Wymore, Model-Based Systems Engineering, CRC Press, ISBN-13: 978-0849380129
2. Yen Kheng Tan, Mark Wong, Energy Harvesting Systems for IoT Applications: Generation, Storage, and Power Management, 1st Edition, CRC PRESS
3. Battery Management Systems, Volume 1: Battery Modeling Battery Modeling, Grogery.L Plett ISBN-13:978-1-63081-023-8

REFERENCE BOOK

1. Nicolescu Mosterman, Model-Based Design for Embedded Systems, Routledge, ISBN-13: 9781420067842, 2009.
2. Nasimul Alam Syed, Sanjib Islam, Saroj Kumar Patel, Advanced Guide to MATLAB: Practical Examples in Science and Engineering I K International Publishing House Pvt. Ltd., 2015, ISBN: 978-9384588359.
3. Shashank Priya, Daniel J. Inman, Energy Harvesting Technologies Springer US, 2009, ISBN:978-0-387-76464-1
4. Behaviour of Lithium-Ion Batteries in Electric Vehicles: Battery Health, Performance, Safety, and Cost, Springer science ISBN:978-3-319-69950-9
5. Lithium-Ion Battery: The Power of Electric Vehicles with Basics, Design, Charging technology & Battery Management Systems, Subodh Sarkar, sssNov 8, 2018, ISBN: 978-0-463-16024-4
6. Battery Management Algorithm for Electric Vehicles, Rui Xiong, Springer, Singapore,ISBN: 978-981-15-0248-4

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2020 – 2022)		
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021	
FIRST YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Research Methodology	
	COURSE CODE	EX531	
	COURSE CREDITS	2	
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0	

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX531.CEO.1: To understand the basic framework of research process

EX531.CEO.2: To identify various sources of information of survey and data collection

EX531.CEO.3: To Illustrate the use of documentation and evaluate its quality

COURSE OUTCOMES :

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

EX531.CO.1: Classify different types of Research , objective and paradigm of research process

EX531.CO.2: Explore the basics of research framework and Hypothesis

EX531.CO.3: Describe about different data collection methods.

EX531.CO.4: Explain the different stages of preparing scholarly writing proposals.

THEORY COURSE CONTENT

Introduction : What is research, Research definition, Objective & paradigm for the research, Identifying & defining the research problem, Literature & its analysis, Qualitative & quantitative research, development of theoretical and conceptual frame work.

Hypothesis and Data Processing : Ethical Issues concerning research participants, Ethical issues in data collection, Definition and functions of hypothesis, Processing operations, Problems in processing, Coding descriptive and quantitative data, Sampling techniques .

Statistics in research : Data collection methods use , types , examples , Multivariate analysis, Concept of regression,Establishing validity and reliability.

Research Documentation : Interpretation and its meaning, Readability of Manuscript, techniques, Contents, Report writing, structure, types of report, Procedure of writing research proposal, Writing as thinking, Habit of writing, Skills and thought process in technical writing, Role of computer in technical writing.

TEXT BOOK

1. John W. Creswell, Research Design-Qualitative & Quantitative Approaches, SAGE publications, New Delhi ISBN: 0-8039-5254-6
2. C. R. Kothari, Research Methodology, Methods & Techniques, Second Edition, New Age International Publication ISBN: 978-81-224-1522-3

REFERENCE BOOK

1. Ranjit Kumar, Research Methodology A Step by Step Guide for Beginners, Second edition., Pearson publication, New Delhi ISBN: 978-81-317-0496-7
2. Hamdy A. Taha, Operation Research- An Introduction, 8th Edition, Pearson Publication , ISBN : 9780132729154
3. R. Panneerselvam Research Methodology, PHI Learning, Second edition , ISBN: 978-8120349469

<table>
<tr><td rowspan="3">MIT | Academy of Engineering
(An autonomouse Institute Affilated to SPPU)</td><td colspan="2">COURSE SYLLABI
(2020 – 2022)</td></tr>
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MIT | **Academy of Engineering** (An autonomouse Institute Affilated to SPPU)	**COURSE SYLLABI** **(2020 – 2022)**	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
FIRST YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Advanced Embedded Architecture & Processor
	COURSE CODE	EX541
	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**	**MCE**	**ECE**	**IA**	**PRACTICAL**	**DEMONSTRATION**	
3	2	-	60	40	-	50	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX541.CEO.1: To review basic organizational and architectural techniques.

EX541.CEO.2: To learn the performance metrics of microprocessors, memory, networks and disks

EX541.CEO.3: To exploit ILP using dynamic scheduling, multiple issue and speculation

COURSE OUTCOMES :

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

EX541.CO.1: Explain pipelining, instruction set architectures, memory addressing

EX541.CO.2: Propose various techniques to enhance a processors ability to exploit Instruction-level parallelism (ILP), and its challenges

EX541.CO.3: Describe multithreading by using ILP and supporting thread-level parallelism (TLP)

EX541.CO.4: Describe TI DSP processor family, Intel Atom Processor N2000

THEORY COURSE CONTENT

Architectural Techniques : Classification of set of architecture, basic parallel processing techniques, classification of parallel architecture, Instruction level parallelism, Dynamic scheduling, Dynamic scheduling using Tomasulos approach, Hierarchical memory organization, Virtual memory design, RAID, Practical approach of Interconnecting networks, Intel IA-64ILP, Multicore architecture.

Processors family: Vector processing, Graphics Processing units, Review of modern processor, LPC 17XX microcontroller, Programmable DSP (P-DSP) processor, TI DSP Family, TMS320C6000 series processors, on chip peripherals, Intel Xscale Atom Processor N2000, Interrupts, Overlays & Virtual memory.

PRACTICAL Perform at least 7 practicals using any controller of LPC17xx series:		
PRACTICAL NO.01		**6 HOURS**
Interfacing with RGB LED		
PRACTICAL NO.02		**2 HOURS**
Interfacing of ADC and display on LCD.		
PRACTICAL NO.03		**2 HOURS**
Generation of PWM signal and verify output using LED and Buzzer.		
PRACTICAL NO.04		**2 HOURS**
Interfacing of Graphical LCD.		
PRACTICAL NO.05		**2 HOURS**
Interface SD Card.		
PRACTICAL NO.06		**2 HOURS**
Interface EEPROM using I2C protocol.		
PRACTICAL NO.07		**2 HOURS**
Implement CAN Protocol.		
PRACTICAL NO.08		**2 HOURS**
Implement ETHERNET protocol..		
PRACTICAL NO.09	**Capstone mini projects**	**4 HOURS**
Case Study: Control the speed of Motor using PWM signal.		

TEXT BOOK

1. Hennessey and Patterson, "Computer Architecture: A quantitative Approach", 5th Edition, Morgan Kaufman Series , ISBN-13: 978-0123838728.
2. Kai Hwang, Faye A. Brigs., "Computer Architecture and Parallel Processing", , McGraw-Hill, Inc. New York, 1990, 1st Edition , ISBN: 0070315566
3. David Culler, J.P. Singh with Anoop Gupta, "Parallel Computer Architecture : A Hardware/Software Approach", Morgan Kaufman ,1998, ISBN 1-55860-343-3.

REFERENCE BOOK

1. Dezso Sima, Terence Fountain, Peter Kacsuk, "Advanced Computer Architectures: A Design Space Approach", Seventh Impression, Pearson Education, ISBN 978-81-317-0208-6
2. John P. Shen, Mikko Lipasti, "Modern Processor Design: Fundamentals of Superscalar Processors", Waveland PrInc,2013, ISBN 13: 978-1478607830
3. Geoffrey C. Fox, Roy D. Williams, Paul C. Messina, "Parallel Computing Works", 1st Edition, Morgan Kaufman, 1994,ISBN-13: 978-1558602533

SCHOOL OF ELECTRICAL ENGINEERING		**W.E.F**	**AY:** 2020 - 2021
FIRST YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**		CMOS Design
	COURSE CODE		EX542
	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	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	-	60	40	-	50	150

PRE-REQUISITE : VLSI Design

COURSE OBJECTIVES :

EX542.CEO.1: To understand the fundamental in Analog and digital CMOS domain.

EX542.CEO.2: To show skill in CMOS domain.

EX542.CEO.3: To aware design tool in IC technology.

COURSE OUTCOMES :

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

EX542.CO.1: Design analog circuits using CMOS.

EX542.CO.2: Demonstrate Circuit design using backend software tool.

EX542.CO.3: Compare ideal & Non ideal MOS cell behavior.

THEORY COURSE CONTENT	
UNIT 1	**Analog CMOS Sub circuits and Amplifier**

Non ideal characteristics of MOSFET & it's effect on CMOS design. Introduction to Analog Integrated Circuit Design , MOSFET as switch, diode and active resistor , MOS Small-signal Models, Common Source Amplifier, Current sinks and sources; Current mirrors; Current and voltage references, band gap reference. Inverters, cascode and differential amplifiers; Output amplifier; Opamp, high speed opamp, micro power opamp, low noise opamp.
Self Study: Basic MOS semiconductor fabrication Process

UNIT 2	**DCMOS Design**

ASIC Design Flow , MOSFET Structure & behavior , Issue in Digital Integrated Circuit Design , Quality metrics of a Digital Design, Static CMOS inverter. Switching threshold and noise margin concepts and their evaluation. Stick diagram. Design Rule Check (DRC), CMOS parasitic. Technology scaling, Lambda parameters.
Self Study: Static, dynamic and short circuit power dissipations.

PRACTICAL: Perform following experiments using XILINX or Open source software	
PRACTICAL NO. 01	**4 HOURS**

To design cascade current mirror for output current of 100 A. Prepare layout and simulate. Comment on output resistance

PRACTICAL NO. 02	**4 HOURS**

To design, prepare layout and simulate CMOS differential amplifier for CMRR of 40 dB. Comment on ICMR

PRACTICAL NO. 03	**4 HOURS**

List the sources of cross talk. Explore in detail, the existence of cross talk in each case. What are the mitigation techniques? Prepare case study for one of them. Verify the cross talk and its mitigation through simulation

PRACTICAL NO. 04	**4 HOURS**

To design, prepare layout and simulate CMOS Inverter for the given specifications of load capacitance, propagation delay, power dissipation, foundry etc.

PRACTICAL NO. 05	**4 HOURS**

To design CMOS logic for $F = A + B(C + D) + EFG$ and prepare layout .

TEXT BOOK

1. P. E. Allen and D. R. Holberg, "CMOS Analog Circuit Design", Second Edition, Oxford University Press, ISBN: 9780195116441
2. Thomas Lee, "The Design of CMOS Radio - Frequency Integrated Circuits", Second edition, Cambridge, ISBN: 9780521835398
3. J P Rabaey, A P Chandrakasan and B Nikolic, "Digital Integrated circuits: A design perspective", Prentice Hall electronics and VLSI series, Second Edition, ISBN: 978-0130909961

REFERENCE BOOK

1. B. Razavi, "Design of Analog CMOS Integrated Circuits", McGraw-Hill ISBN: 9780070529038
2. Neil H. E. Weste and David Money Harris, "CMOS VLSI Design: A Circuits and Systems Perspective", ISBN: 9788131762653

SCHOOL OF ELECTRICAL ENGINEERING		W.E.F	AY: 2020 - 2021
FIRST YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING		COURSE NAME	Technical Writing
		COURSE CODE	EX533
		COURSE CREDITS	2
RELEASED DATE : 01/07/2020		REVISION NO	1.0

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

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX533.CEO.1: To share the skills and finer aspects of scientific and technical writing with the research students of the Institute order to prepare technical documents clearly, concisely, consistently, and effectively, following internationally accepted standards.

EX533.CEO.2: Students will be made to evaluate the correct & error-free writing by being well versed in rules of English grammar and cultivate relevant technical style of communication & presentation at their work place and also for academic uses.

EX533.CEO.3: To provide overview of technical English for research paper writing with a special focus on research methods typical for classroom based studies of pedagogical innovations.

COURSE OUTCOMES :

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

EX533.CO.1: Creates substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as comprehension, reading, writing and speaking etc.

EX533.CO.2: Find information about scientific and technical publications using two premier analytic information resources: the Web of Science platform and Derwent Innovation Index for the patent information discovery.

EX533.CO.3: Identify plagiarism and explain how to prevent it.

COURSE OUTCOMES :

EX533.CO.4:	Read and analyze several articles to form your own opinion on a topic - make connections between several articles.
EX533.CO.5:	Write a 7- 8-page research paper / review paper by using source material correctly with MLA format.

THEORY COURSE CONTENT

Unit 01

Introduction to Technical Communication : Reading Skill, Basics of English Grammar.

Introduction to Effective Writing: Effective writing as an art, principles of effective writing, types and stages of effective writing, notions of correctness and appropriateness, essentials of academic writing

Technical Instructions : Purpose, Content & Structure: Understanding the Audience

Creative Writing : Use of tools, Guidelines for Technical Writing, Microsoft Word, Text Editor for Drafting Content, The Role of Visuals in Technical Instructions, the features of Authorizing Tool, Adobe Frame maker, Desktop Publishing and Help Publishing Tool, Snag IT, Image Capturing Tool MS-Visio Image Drawing Tool.

Unit 02

Role of Ethics in Technical Instructions

Understanding the subject : formulating ideas for the paper, developing a thesis statement

Preparing the anatomy of the paper : Literature review, research methodology, Writing the results, analysis of the results, discussion and conclusion, apply correct citation, formatting, write the first draft, revise, edit and proofread

Use of tools for research paper help : Grammar checkers, plagiarism checkers, citation generators.

Selecting a journal/conference : Targeting a high impact factor journal in Elsevier, IEEE, Springer, Wiley etc., Introduction to the Web of Science, Science Citation Index (SCI)/SCI Expanded (SCIE) and Scopus, preparing the manuscript according to the chosen journal's requirements, submis- sion ethics, and use of peer review comments in a constructive way, submission, revision and galley proof. Proposal writing, the Web of Science platform and Derwent Innovation Index for the patent information discovery, Patent Searching, Drafting and Filing

IA Activities		
Activity No.01	**Preparing the document on**	**6 HOURS**
1. A representative official correspondence. 2. Work progress report 3. Technical brochures and newsletters 4. Instruction Manual 5. Demo patent writing		
Activity No.02	**Technical discussions**	**2 HOURS**
Graded technical discussions will be planned online and in class		
Activity No.03	**Quiz**	**2 HOURS**
Quiz on every major component of the course.		

Activity No.04	Writing gist	2 HOURS
Writing gist from a set of related papers		
Activity No.05	Writing the technical blogs	2 HOURS
Writing the technical blogs		

Demonstration/Presentation

Students will have to submit and present :

1. Project proposal to be submitted to the funding agencies of repute (Peer review)
2. Review paper / Research paper or research letter.

TEXT BOOK

1. Kenneth G. Budinski, Writing Engineers' Guide to Technical, ASM internationals, ISBN: 978-0-87170-693-5
2. Gerald. J. Alred, Charles. T.Brusaw, and Walter. E. Oliu, Handbook of Technical Writing, St. Martin's Press, New York, Ninth Ed., ISBN 1250004411, 2008
3. Hofmann, A. Angelika, Scientific Writing and Communication, Oxford University Press, Oxford., ISBN 0199947562 2014

REFERENCE BOOK

1. Meenakshi Raman and Sangeeta Sharma, Technical Communication Principles and Practices, Oxford Univ. Press, 2016
2. NPTEL/Swayam Course : Technical English for engineers Dated : 22nd May 2020

	COURSE SYLLABI (2020 – 2022)
(An autonomouse Institute Affilated to SPPU) MIT Academy of Engineering	

SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021	
FIRST YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Real Time Operating Systems & Design	
	COURSE CODE	EX543	
	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	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	2	-	60	40	-	50	150

PRE-REQUISITE :

1: Advanced Embedded Architecture & Processor

COURSE OBJECTIVES :

EX543.CEO.1: Learn Real time operating system services and issues

EX543.CEO.2: Know different programming languages for real time programming

EX543.CEO.3: Understand impact of the computer architecture on design considerations of real time system

EX543.CEO.4: Understand real time operating system design and functions

COURSE OUTCOMES :

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

EX543.CO.1: Identify Real time operating system services and issues

EX543.CO.2: Select programming languages to develop real time system

EX543.CO.3: Analyze Impact of the computer architecture on design considerations of real time system

EX543.CO.4: Identify real time operating systems are design and functions

THEORY COURSE CONTENT
Fundamentals of Real-Time Systems : Terminology, Multidisciplinary Design Challenges, Birth and Evolution of Real-Time Systems, Common Misconceptions.
Hardware for Real-Time Systems: Basic Processor Architecture, Memory Technologies, Architectural Advancements, Peripheral Interfacing, Microprocessor versus Microcontroller, Distributed Real-Time Architectures, Enhancing Performance.
Real-Time Operating Systems: Real-Time Kernels, Theoretical Foundations of Scheduling, System Services for Application Programs, Memory Management Issues, Selecting Real-Time Operating Systems, Case Study: POSIX
Programming Languages for Real-Time Systems: Coding of Real-Time Software, Assembly Language, Procedural Languages, Object-Oriented Languages, Overview of Programming Languages, Automatic Code Generation, Compiler Optimizations of Code
Requirements Engineering Methodologies: Requirements Engineering for Real-Time Systems, Formal Methods in System Specification, Semiformal Methods in System Specification, The Requirements Document, Case Study in Software Requirements
Software Design Approaches: Qualities of Real-Time Software, Software Engineering Principles, Procedural Design Approach, Object-Oriented Design Approach, Life Cycle Models, Case Study in Designing Real-Time

PRACTICAL		
PRACTICAL NO.01		**2 HOURS**
Development of Task Management		
PRACTICAL NO.02		**4 HOURS**
Implementation of time delay and interval		
PRACTICAL NO.03		**4 HOURS**
Exploring Multitasking features		
PRACTICAL NO.04		**2 HOURS**
Implementation of Semaphore Services		
PRACTICAL NO.05		**2 HOURS**
Exploring Mutex Services		
PRACTICAL NO.06		**2 HOURS**
Exploring Message Queue Services		
PRACTICAL NO.07		**2 HOURS**
Demonstrate ISR		

PRACTICAL NO.08		**2 HOURS**
Real Time Application Development		

TEXT BOOK

1. Phillip A. Laplante and Seppo J. Ovaska, Real-Time Systems Design and Analysis, 4th Ed., IEEE Press, A John Wiley & Sons, Inc., Publication, 2012, ISBN 978-0-470-76864-8
2. J.E. Cooling, Software Design for Real-time Systems, Springer Science Business Media, B.V., 1991, ISBN 978-0-442-31174
3. Jean Labrosse, MicroC/OS-II The Real Time Kernel, CMP Books, 2nd Edition, ISBN-13-97891578201037

REFERENCE BOOK

1. Jane W. S. Liu, Real-Time Systems, Pearson Education, 2000, ISBN-13: 978-0130996510
2. Getting Started for ARM Processor Based Microcontrollers Building Applications with RL-ARM, by Keil Tools by ARM (Keils Online support Document)
3. Frank Vahid and Tony Givargis, Embedded System Design: A Unified Hardware/Software Approach, 3rd edition, Wiley
4. Jonathan Valvano, Embedded Systems:Real Time Operating Systems for the ARM Cortex-M3, Create space Independent Publishing Platform, 4th edition (2012). ISBN-13-1466468863

<table>
<tr><td rowspan="4">MIT | Academy of Engineering
(An autonomouse Institute Affilated to SPPU)</td><td colspan="3">COURSE SYLLABI
(2020 – 2022)</td></tr>
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	COURSE SYLLABI **(2020 – 2022)**	
MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)		
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021
FIRST YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Embedded Signal Processor Architectures
	COURSE CODE	EX544
	COURSE CREDITS	4
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
LECTURE	PRACTICAL	THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		MCE	ECE	IA			
3	2	-	60	40	-	50	150

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX544.CEO.1: To impart knowledge on the practical aspects of signal analysis and processing

EX544.CEO.2: To explore DSP processor architectures

EX544.CEO.3: To understand DSP algorithms in view of embedded architectures

EX544.CEO.4: To elaborate real world DSP applications

COURSE OUTCOMES :

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

EX544.CO.1: Implementing FIR and IIR filters with various combinations

EX544.CO.2: Port DSP algorithms on DSP processor platform.

EX544.CO.3: Explain real world applications of DSP.

THEORY COURSE CONTENT

Signal Analysis and Processing: Discrete Fourier Transform, Fast Fourier Transform, Design of FIR Filters using windowing technique, Design of IIR Filters through Impulse invariance and bilinear transformation technique, Introduction to Adaptive filters.

Introduction to Texas Digital signal processing systems: MAC, Barrel shifter, ALU, Multipliers, Dividers, DSP processor architecture, Software developments, Selections of DSP processors, Hardware interfacing, DSP processor architectures: TMS 320C54XX, TMS 320C67XX, Blackfin processor: Architecture overview, memory management, I/O management, Real time implementation Considerations, Memory System and Data Transfer, Code Optimization.

Representations of the DSP algorithms: Block diagrams, Signal flow graph, Data-flow graph, Dependence graph. Iteration bounds: Critical Path, Loop Bound, Algorithm to compute iteration bound, Longest Path Matrix (LPM).

DSP Applications: Audio Coding and Audio Effects, Digital Image Processing, Two-Dimensional Filtering - Image Enhancement, DTMF generation and detection, Wavelet algorithms, Adaptive algorithm applications like: system identification, inverse modelling, noise cancellation, prediction.

PRACTICAL		
PRACTICAL NO.01	**Performance evaluation of digital filters**	**4 HOURS**
Performance comparison of different filter structures (for example designing FIR LFP using various windows other combination can also be taken). Implementation can be done using MATLAB/Python/R/C or any other suitable platform.		
PRACTICAL NO.02	**Algorithm implementation on DSP processor**	**4 HOURS**
Design and simulate N point DFT/FFT and implement it on DSP processor platform.		
PRACTICAL NO.03	**Audio Signal Processing**	**4 HOURS**
Record a speech file in your own voice with sampling frequency of 8000 Hz. Design a system to decompose a speech signal using Daubechies wavelet using wavelet packet decomposition. Write a program to implement the system and plot the speech signal passed via each wavelet filter. Implementation can be done using MATLAB/Python/R/C or any other suitable platform.		
PRACTICAL NO.04	**Implementation of Adaptive filter**	**2 HOURS**
Implement an adaptive filter for any simple application (either of these: inverse modelling/noise cancellation/prediction or any other). Implementation can be done using MATLAB/Python/R/C or any other suitable platform.		
PRACTICAL NO.05	**Paper Critics**	**2 HOURS**
Choose a quality paper in the domain of signal processing. (2-3 journal papers are in the list below. Other paper can also be taken). Write its summary also write critics for it. Paper needs to be chosen by the student in consultation with the guide and should be approved by the subject teacher.		

TEXT BOOKS

1. Proakis J G, Manolakis D G, Digital Signal Processing ,Principles, Algorithms and Applications, Fourth Edition, Prentice-Hall, ISBN-10: 0131873741, ISBN-13: 978-0131873742.
2. Sen-Maw Kuo, Woon-Seng Gan, Digital Signal Processors: Architectures, Implementations and Applications, Prentice-Hall, ISBN-10 0131277669, ISBN-13: 9780131277663.
3. Keshab K. Parhi, VLSI Digital Signal Processing System, Wiley Publication, ISBN-10: 9788126510986 ISBN-13: 978-8126510986.
4. I. Kuroda and T. Nishitani, "Multimedia processors," in Proceedings of the IEEE (Journal), vol. 86, no. 6, pp. 1203-1221, June 1998, doi: 10.1109/5.687835.

REFERENCE BOOKS

1. Woon-SengGan, Sen M. Kuo, Embedded Signal Processing With the Micro Signal Architecture, Wiley-IEEE Press, ISBN-10: 9780471738411, ISBN-13: 978-0471738411
2. Lawrence R. R, Bernard Gold, Theory and Application of Digital signal Processing, Prentice-Hall, ISBN-10: 0139141014, ISBN-13: 978-0139141010.
3. S. Sigtia, E. Benetos and S. Dixon, "An End-to-End Neural Network for Polyphonic Piano Music Transcription," in IEEE/ACM Transactions on Audio, Speech, and Language Processing, vol. 24, no. 5, pp. 927-939, May 2016, doi: 10.1109/TASLP.2016.2533858.
4. Q. Yan, R. Yang and J. Huang, "Detection of Speech Smoothing on Very Short Clips," in IEEE Transactions on Information Forensics and Security, vol. 14, no. 9, pp. 2441-2453, Sept. 2019, doi: 10.1109/TIFS.2019.2900935.
5. Moir, T.J. FIR system identification for correlated noise using the convolution matrix, an investigation. Springer Signal Image and Video Processing (SIViP) 10, 10491054 (2016). https://doi.org/10.1007/s11760-015-0857-2

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2020 – 2022)		
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2020 - 2021	
FIRST YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Project Work I	
	COURSE CODE	EX545	
	COURSE CREDITS	2	
RELEASED DATE : 01/07/2020	**REVISION NO**	1.0	

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
-	4	-	-	-	-	50	50

PRE-REQUISITE :

1: Research Methodology
2: Technical Writing

COURSE OBJECTIVES :

EX545.CEO.1: To Manage the selection and initiation of individual projects.
EX545.CEO.2: To conduct project planning activities that accurately forecast project costs, timelines, and quality.

COURSE OUTCOMES :

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

EX545.CO.1: Identify important concepts / real time problems from the knowledge of current trends /survey.
EX545.CO.2: Develop effective communication and presentation skills.
EX545.CO.3: Describe the time needed to successfully complete a project, considering factors such as task dependencies and task lengths.

Description

Project work is divided in to four stages namely Project Stage I, Project Stage II, Project Stage III and Project Stage IV.

Project Stage is entirely related with selection of topic/problem by the students related to thrust areas identified by respective departments. Synopsis submission and Mid trimester presentation will be conducted by department based on following points,

- Literature survey

- Motivation and Problem Statement

- Goals and Objectives

- Problem statement

- System Architecture

- Proposed Algorithm

Final Project Stage I Report submission and Presentation shall be conducted at the end of the trimester. End-Trimester Assessment (ETA) presentation shall be conducted in front of eminent expert from Academics or Industry.

<table>
<tr><td rowspan="2">MIT | Academy of Engineering
(An autonomouse Institute Affilated to SPPU)</td><td colspan="2">COURSE SYLLABI
(2020 – 2022)</td></tr>
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SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022	
SECOND YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Computer Vision	
	COURSE CODE	EX661	
	COURSE CREDITS	3	
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0	

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
LECTURE	PRACTICAL	THEORY			TUTORIAL/ PRACTICAL	PRESENTATION/ DEMONSTRATION	TOTAL
		MCE	ECE	IA			
3	-	-	60	40	-	-	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX661.CEO.1: To get exposure to image formation and imaging systems.

EX661.CEO.2: To acquire concepts of edge detection and segmentation

EX661.CEO.3: To become familiar with the technical approaches for motion and shape analysis

COURSE OUTCOMES :

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

EX661.CO.1: Understand image formation and camera models.

EX661.CO.2: Describe edge detection principles and segmentation approaches.

EX661.CO.3: Explain methods for motion estimation and shape analysis.

THEORY COURSE CONTENT

Digital Image formation : Computer Vision - Low-level, Mid-level, High-level, Overview of Diverse Computer Vision Applications, Fundamentals of image formation, Monocular and Binocular imaging systems, Orthographic and Perspective projections, Camera model and Camera Calibration, 3D Model, Auto calibration.

Feature Extraction and Segmentation: Image representation, Edge detection principles, Segmentation, Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, Texture Segmentation; Object detection

Motion Estimation and Shape Analysis: Optical flow computation, Stereo Vision, Spatio-Temporal Analysis, Dynamic Stereo; Motion parameter estimation , Structure from motion, Shape representation, Shape from Texture, Colour, Motion and Edges.

TEXT BOOKS

1. Richard Szeliski, Computer Vision: Algorithms and Applications, Springer-Verlag London Limited 2011, ISBN: 978-1-84882-934-3
2. Computer Vision: A Modern Approach, D. A. Forsyth, J. Ponce, Pearson Education, 2003, ISBN: 978-0-13-608592-8

REFERENCE BOOK

1. R.C. Gonzalez and R.E. Woods, Digital Image Processing, Addison- Wesley, 1992. ISBN: 978-0133356724.
2. Richard Hartley and Andrew Zisserman, Multiple View Geometry in Computer Vision, Second Edition, Cambridge University Press, March 2004, ISBN: 978-0521540513.
3. K. Fukunaga; Introduction to Statistical Pattern Recognition, Second Edition, Academic Press, Morgan Kaufmann, 1990, ISBN:978-0122698514

MIT | **Academy of Engineering** **(An autonomouse Institute Affilated to SPPU)**	**COURSE SYLLABI** **(2020 – 2022)**	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022
SECOND YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	ASIC Design
	COURSE CODE	EX662
	COURSE CREDITS	3
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	-	-	60	40	-	-	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX662.CEO.1: To acquire adequate knowledge about partitioning, floor planning, placement and routing including circuit extraction of ASIC.

EX662.CEO.2: To know about different high-performance algorithms and its applications in ASICs.

EX662.CEO.3: To get aware of design tools in IC technology

COURSE OUTCOMES :

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

EX662.CO.1: Explore the fundamentals of CMOS Technology & skills of designing analog and digital ASICs.

EX662.CO.2: Defining the strategies of modernization for carrying out FPGA and ASIC.

EX662.CO.3: Model Application Specific Digital Circuits using VHDL Verilog.

THEORY COURSE CONTENT

ASIC Synthesis & Circuit Extraction : Comparison between ASIC technologies, ASIC Cell libraries, Physical layout, Behavioral model, A cell icon, Wire-load model, Routine Model, Full custom & Semicustom ASIC, Pipeline & latency in CMOS logic, Data depth, Standard cell & gate, Resistance per square of layers, introduction to IP cores, system case studies, Dynamic Wrap processors, VHDL & logic synthesis, Testing techniques in ASIC like ATPG (Automatic test Pattern Generation), Series & Parallel convertors using EDA tools.

System Partitioning, Routings & Tools: Hierarchical layout and design of single chip, 32 bit CPU, Floor Planning & placement, Global routing, Time driven routing objectives, Clock-net widths, power-bus widths in routings PLA Tools, EDIF-CFI design representation, fault simulation, Automatic test pattern generation, Apex & Cyclone FPGAs. Design flow technology - mapping for FPGAs, Programmable ASIC logic cell, Programmable ASIC I/O cell.

TEXT BOOK

1. Michael Smith, Application Specific Integrated Circuits, ISBN- 978-0321602756, Pearson Education Asia, 1st. Edition
2. Douglas J. Smith, HDL Chip Design, Madison, AL, USA: Doone Publications, 1996

REFERENCE BOOK

1. Farzad Nekoogar and Faranak Nekoogar, From ASICs to SOCs: A Practical Approach, Prentice Hall PTR, 2003.
2. F. Nekoogar. Timing Verification of Application-Specific Integrated Circuits (ASICs). Prentice Hall PTR, 1999.
3. P.K.Chan & S. Mourad, Digital Design Using Field Programmable Gate Array, Prentice Hall, 1994.
4. Wayne Wolf, FPGA-Based System Design, Prentice Hall PTR, 2004.

	COURSE SYLLABI (2020 – 2022)
**MIT	Academy of Engineering** (An autonomouse Institute Affilated to SPPU)	
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F** **AY:** 2021 - 2022
SECOND YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME** Internet of Things
	COURSE CODE EX671
	COURSE CREDITS 3
RELEASED DATE : 01/07/2021	**REVISION NO** 1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	-	-	60	40	-	-	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX671.CEO.1: To understand the fundamentals of Internet of Things

EX671.CEO.2: To Make use of devices, gateways and data management in IoT

EX671.CEO.3: To explain IoT reference model and its architecture

EX671.CEO.4: To identify sensors, actuators for IoT applications

EX671.CEO.5: To explain basic need of security and privacy in IoT

COURSE OUTCOMES :

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

EX671.CO.1: Analyze IoT platform design methodology

EX671.CO.2: Explain IoT reference models and its architecture

EX671.CO.3: Analysis the protocols used in IoT

EX671.CO.4: Distinguish between IoT and M2M communication

EX671.CO.5: Explain the needs of security and privacy in IoT

THEORY COURSE CONTENT	
UNIT 1	**Introduction to Internet of Things**

Introduction: Definition and Characteristics of IoT, History and Evolution of IoT, Physical and logical Design of IoT, Introduction to IoT Platform, Design methodology, Domain specific applications of IoT's

UNIT 2	**IoT Architecture**

Architecture reference model: Introduction, Reference model and architecture, IoT Reference model, M2M to IoT- an architectural overview: Building architecture, Main design principles and needed capabilities, State of the art, Standards considerations

UNIT 3	**Communication Protocols**

IEEE 802.11, IEEE 802.15, Wireless HART, Z Wave, BLE, Zigbee Smart Energy, HTTP, CoAP , AMQP, MQTT, NFC, LoRa

UNIT 4	**IoT and M2M Communications**

Introduction to M2M, Difference between IoT and M2M , Software Defined Networks, Network Function Virtualization, difference between SDN and NFV for IoT

UNIT 5	**Security, Privacy and Governance in IoT**

Elements of Internet of Things security, Privacy In IoT Networks: Secure Data Aggregation, Privacy In Beacons, Overview on Governance in IoT

TEXT BOOK

1. Arshdeep Bahga and Vijay Madisetti, "Internet of Things: A Hands-on Approach", 1st edition 2015, University Press, ISBN: 978-81-7371- 954-7
2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stamatis Karnouskos, Stefan Avesand and David Boyle, "From Machine-to-Machine to the Internet of Things", Academic Press, Elsevier, 2014, ISBN: 978-0-12-407684-6

REFERENCE BOOK

1. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6:The Evolving World of M2M Communications", Willy Publication, ISBN: 978-1-118-47347-4
2. Adrian McEwen and Hakim Cassimally, "Designing the Internet of Things", Wiley, 2014, ISBN 978-1-118-43062-0
3. Parikshit N. Mahalle and Poonam N. Railkar, "Identity Management for Internet of Things", River Publishers, ISBN: 978-87-93102-90-3
4. Rajkumar Buyya and Amir Vahid Dastjerdi, "Internet of Things Principles and Paradigms", Elsevier, 2016, ISBN: 978-0-12-805395-9
5. H. S. Kalsi, "Electronic Instrumentation", 3rd edition 2010, Mcgraw Higher Ed, ISBN: 9780070702066
6. Ramon Pallas-Areny and John G. Webster, "Sensors and Signal Conditioning", 2nd edition 2012, Wiley, ISBN: 9780470054574
7. Karen Rose, Scott Eldridge and Lyman Chapin, "The Internet of Things: An Overview", Internet Society, 2015

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COURSE SYLLABI (2020 – 2022)

SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022	
SECOND YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Hybrid and Electric Vehicle	
	COURSE CODE	EX672	
	COURSE CREDITS	3	
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0	

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
3	-	-	60	40	-	-	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

EX672.CEO.1: To get familiar with hybrid and electric vehicle

EX672.CEO.2: To study the propulsion system for hybrid and electric vehicle

EX672.CEO.3: To acquire the energy storage requirement in HEV and EV.

COURSE OUTCOMES :

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

EX672.CO.1: Illustrate the architecture and dynamics of hybrid and electric vehicle.

EX672.CO.2: Interpret the working of motors and drives as a propulsion system.

EX672.CO.3: Analyze the energy storage and charging infrastructure for hybrid and electric vehicle.

THEORY COURSE CONTENT

Introduction to Electric Vehicles-History Advantages-Architectures of HEVs, State of the Art of HEVs, Challenges and Key Technologies Vehicle Mechanics-Electric Propulsion- EV consideration- DC motor drives and speed control, Induction motor drives, Permanent Magnet Motor Drives, Switch Reluctance Motor Drive for Electric Vehicles, Configuration and control of Drives- Power Electronics in HEVs - Energy Storage-Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles- Charging Infrastructure-Case study.

TEXT BOOKS

1. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.
2. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, Modern Electric,Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design,CRC Press, 2004.
3. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.

REFERENCE BOOKS

1. Chris Mi, M. Abul Masrur, David Wenzhong Gao, Hybrid Electric Vehicles Principles and Applications with Practical Perspectives, 2011, Wiley publication.
2. Dharmeja Sandeep,(2000) Electric vehicle battery systems Newnes.
3. Pillai S.K., A first course on Electrical drives,New age International (P) Ltd.
4. M. H. Rashid, Power Electronics Devices, Circuits and Applications, 3rd ed., Pearson, 2004
5. C. C. Chan and K. T. Chau, Modern Electric Vehicle Technology, Oxford Science Publication, 2001

MIT Academy of Engineering (An autonomouse Institute Affilated to SPPU)	COURSE SYLLABI (2020 – 2022)		
SCHOOL OF ELECTRICAL ENGINEERING	**W.E.F**	**AY:** 2021 - 2022	
SECOND YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Project Work II	
	COURSE CODE	EX651	
	COURSE CREDITS	4	
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0	

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
-	8	-	-	-	50	50	100

PRE-REQUISITE : NIL

COURSE CONTENT

- Literature survey

- Motivation and Problem Statement

- Goals and Objectives

- Problem statement

- Block Diagram

- Proposed Algorithm

- Expected Outcome and Result

SCHOOL OF ELECTRICAL ENGINEERING		**W.E.F**	**AY:** 2021 - 2022
SECOND YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING		**COURSE NAME**	Project Work III
		COURSE CODE	EX652
		COURSE CREDITS	10
RELEASED DATE : 01/07/2021		**REVISION NO**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
-	20	-	-	-	150	50	200

PRE-REQUISITE : NIL

COURSE CONTENT

- Literature survey

- Motivation and problem statement

- Goals and objectives

- Problem statement

- Block diagram

- Proposed algorithm

- Expected outcome and result

- Publication details of review paper on literature survey

SCHOOL OF ELECTRICAL ENGINEERING		**W.E.F**	**AY:** 2021 - 2022
SECOND YEAR MASTER OF TECHNOLOGY ELECTRONICS ENGINEERING	**COURSE NAME**	Project Work IV	
	COURSE CODE	EX653	
	COURSE CREDITS	10	
RELEASED DATE : 01/07/2021	**REVISION NO**	1.0	

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			TUTORIAL/	PRESENTATION/	TOTAL
LECTURE	PRACTICAL	MCE	ECE	IA	PRACTICAL	DEMONSTRATION	
-	20	-	-	-	200	100	300

PRE-REQUISITE : NIL

COURSE CONTENT

- Literature survey

- Motivation and problem statement

- Goals and objectives

- Problem statement

- Block diagram

- Proposed algorithm

- Methodology

- Implementation

- Results

- Result analysis

- Publication details of review paper on literature survey

- Publication details of paper on result analysis