KUMARAGURU college of technology character is life

DEPARTMENT OF BIOTECHNOLOGY

Action Taken Report - "Employers Feedback"
Academic Year 2018-19

Date: 15-Apr 2019

S.No	Suggestions	Action Taken
1.	Suggestion to include Autoimmune disorder in Molecular Genetics/ Immunology	Topics included in the U17BTI6204 Immunology (Unit 5)
2.	A course on Nextgen Sequencing to be offered	Topics covering the Next generation sequencing is included in U17BTI7204 Bioinformatics and in U17BTI6204 Biological Data Analysis
3.	Content on the Biosimilars to be included	Topics covering the biosimilars is included in the U17BTT6001 Biopharmaceutical Technology
4.	Numerical Methods to be included in the curriculum	Included in the curriculum U18MAT4102 -Numerical Methods in semester 4
5.	Require streamlines electives for more focussed skill development	Electives are regrouped based on the thrust areas and more focussed electives for skill development are included.
6.	From a perspective for IT support to a pharmaceutical company, to hire students under R & D; It requires more focus on Bioinformatics and R language.	R-programming is included in U18BTI6204 Bioilogical Data Analysis and concept of bioinformatics is dealt in U18BTI7204 Bioinformtics. Foudation of Programming is dealth in the First year - U18CSI1202 Problem Solving and programming in C and U18CSI2201 Python Programming

Prepared by
BOS Coordinator

Approved by
Chairman BOS

Proof: Topics on Autoimmune included in Immunology

List of Experiments **30 hour**

1. Media and Stock solution preparation and sterilization
2. Selection of explants and Induction of callus
3. Suspension culture and production of secondary metabolites
4. Micro propagation of commercial plant for economic importance (Potato / Banana / Bamboo / Jatropha etc.)
5. Establishment of primary culture from leaves and stem explants
6. Establishment of organogenesis from leaves and stem explants
7. Sterilization techniques, media and stock solution and sera preparation
8. Establishment of primary culture using chick embryo
9. Establishment of cell lines by using primary and / or secondary cell culture
10. Staining, Cell counting and viability (Tryphan Blue assay)
11. Preservation of cell line- Cryopreservation
12. Field visit : - Animal handling and care
    - Culture of virus in chick embryo

Theory: 45 hour Tutorial: 0 hour Practical: 30 hour Project: 0 hour Total Hour: 75

REFERENCES

1. Ian R Freshney (2011) Animal cell culture: A manual of basic technique and specialized applications, Wiley and sons.
2. Ranga,M.M (2007), Animal Biotechnology, fourth Edition, Agrobios India limited, Jodhpur.
3. Rama Dass,P.and Meera Rani S (2007) Text Book of Animal Biotechnology, Akshara Printers, New Delhi
4. Masters, J.R.W (2007) Animal Cell culture. Practical Approach, Oxford University Press, UK
5. Sant Saran Bhojwani and M. K. Razdan (1996) Plant Tissue Culture: theory and practice; Elsevier Science.

WEB REFERENCES

1. http://nptel.ac.in/courses/102103012/34
2. http://nptel.ac.in/courses/102103016/4

		L	T	P	J	C
U17BTI6204	**IMMUNOLOGY**	**3**	**0**	**2**	**0**	**4**

Course Objectives:

- To gain an in-sight into the cells and effectors of immune system and mechanisms of immunity.
- To learn the concept of antigen-antibody interactions and demonstrate the techniques for their evaluation.

Course Outcomes (COs):

After successful completion of this course, the students should be able to

CO1: Comprehend the general concepts of immune system and elaborate the cells and organs of the immune system.

CO2 Analyze and evaluate the properties of antigens and antibodies with special emphasis on haptens.

Signature of BOS chairman, BT

HYPERSENSITIVITY,AUTOIMMUNITY&TRANSPLANTATION IMMUNOLOGY 12 hour

Hypersensitivity: Types and mechanism of hypersensitive reactionsAutoimmunity: Mechanisms of induction of organ specific and systemic, autoimmune diseases (rare genetic disorders). Therapeutic approach. Transplantation immunology: Types of grafts, immunologic basis of graft rejection, properties and types of rejection, tissue typing, immunosuppressive therapy. Cancer Immunology: types of tumors, tumor antigens (TSTA and TATA), immune response to tumors. **Case study:** Immunotherapy of breast cancer.

LIST OF EXPERIEMENTS **30 hour**

1. Blood smear preparation and identification of leucocytes by Giemsa stain
2. Separation of Peripheral Blood Mononuclear cells(PBMC) and analysis of cell viability by Tryphan blue staining
3. Separation of leucocytes by dextran method
4. IgE estimation by myeloperoxidase assay
5. Cytokine assay by ELISA

   Assays for Antigen/antibody interactions
6. Determination of antigen/antibody concentration by Single radial immunodiffusion test.
7. Assay for antigen / antibody specificity- Ouchterlony Double Immuno Diffusion.
8. Assay for analysis of heterogeneity of antibody by Immuno-electrophoresis.
9. Determination of antigen concentration by rocket electrophoresis.
10. Determination of antigen/antibody concentration by ELISA

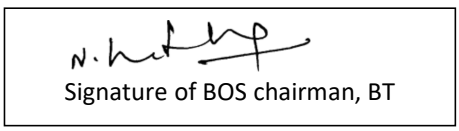
Theory: 45 hour Tutorial: 0 hour Practical: 30 hour Project: 0 hour Total Hour: 75

References:

1. Delves, P. J., Martin, S. J., Burton, D. R., & Roitt, I. M. (2017). *Essential immunology*. 13th edition. John Wiley & Sons.
2. Abbas. A., Lichman, A.H., Pillai, S. (2017).Cellular and Molecular Immunology, 9th edition, Elsevier Health Services
3. Owen, J. A., Punt, J., & Stranford, S. A. (2016). *Kuby immunology*. 7th edition, WH Freeman, New York
4. Pillai, A.(2008). *A Textbook of Immunology and Immunotechnology*. 1st edition, S.Chand & Co. New Delhi.
5. Tizard, R.I. (2007). *Immunology: An Introduction*, 4th Edition, Brooks/Cole publisher

Web References:

1. http://www.raymondcheong.com/Year1/immuno.html
2. http://ocw.mit.edu/courses/health-sciences-and-technology/hst-176-cellular-and-molecular-immunology-fall-2005/lecture-notes/
3. http://www.umich.edu/~bmsteach/lopatin/Immunology/Immunology.html



Proof: Topics on Next Generation sequencing included.

U17BTI6205	BIOLOGICAL DATA ANALYSIS	L	T	P	J	C
		2	0	2	0	3

Course Objectives:

- To introduce the concept of massive data mining from biological experiments.
- To identify basic experimental design principles in solving biological questions.
- To develop and test hypothesis statistically using data using R – programming.

Course Outcomes (COs):

After successful completion of this course, the students should be able to

CO1: Understand and apply the biological annotation for macromolecules; apply and interpret the structural analysis of macromolecules using high throughput experiment.

CO2 Apply and interpret the biological data through fundamental statistical analysis.

CO3: Apply and interpret biological data related with hypothesis testing

CO4: Explore and infer biological data using visualization.

CO5: Understand and apply R-programming for biological data analysis

CO6: Provide optimal solution and statistics to biological problems

Pre-requisite

1. U17MAT4105 Biostatistics

CO/PO Mapping
(S/M/W indicates strength of correlation)
S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S			S	S					M	S		S	S
CO2	S			S	S									
CO3	S			S	S									
CO4	S			S	S									
CO5	S			S	S									
CO6	S			S	S					S		M	S	S

Course Assessment methods:

Direct
1. Continuous Assessment Test
2. Assignment
3. End Semester Examination

Course Content

BIOINFORMATICS: MINING THE MASSIVE DATA FROM HIGH THROUGHPUT GENOMICS EXPERIMENTS **6 hour**

Introduction – Sequence alignment, Genome sequencing - Nanopore and illumina sequencing, gene annotation, RNA folding - RNAhybrid, protein structure prediction - Secondary structure information; Microarray analysis, proteomics, Protein-Protein Interaction

INTRODUCTION TO BIOSTATISTICAL ANALYSIS **6 hour**

Signature of BOS chairman, BT

Proof: Topic on NGS included

U17BTI7203 BIOINFORMATICS

L	T	P	PJ	C
3	0	2	0	4

Course Objectives:

- Introduce the student to biological data resources, algorithms and alignment tools
- Apply various algorithms and computational tools for protein structure and stability analysis.

Course Outcomes (COs):

After successful completion of the course, the students should be able to

CO1: To introduce the concept of biological sequence alignment and various genome sequence protocols.
CO2: To familiarize with various biological database searches, parameters and algorithm.
CO3: To apply, interpret and analyze multiple sequence alignments.
CO4: To construct, interpret and access molecular phylogenetic tree prediction .
CO5: To apply, interpret and analyze protein structures prediction algorithms.
CO6: To introduce the concept of computer-aided drug designing (CADD).

Pre-requisite:

1. U17BTI3204 Concepts in Biochemistry
2. U17BTI4203 Cell and Molecular Biology
3. U17BTI5202 Protein and Enzyme Technology

CO/ PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

	PROGRAMME OUTCOMES (Pos)												PSOs	
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	M		S	M										
CO2	S	S		M	S							M	M	M
CO3	S	S		M	S							S	S	S
CO4	S	M		M	S								S	S
CO5	S	S	M	M	M							M	S	S
CO6	S	S	M	M	M							M	M	M

Course Assessment Methods			
Direct		Indirect	
1	Internal Tests	1	Course end survey
2	Assignments		
3	End semester examination		

Course Content **60 hours**

1. **INTRODUCTION TO BIOINFORMATICS** **9 hours**

Introduction to Bioinformatics; Biological Sequences – Formats; Databases – types, architecture of Biological Databases; Sequence Identify and Similarity, Edit distance – Levenstein and Hamming Distance. Dot plot analysis.

2. **SEQUENCE ALIGNMENT** **12 hours**

Sequence alignment – Pairwise alignment; Gaps – Constant, Linear, Affine, Convex and Profile-based gaps; Dynamic Programming algorithm – Needleman and Wunch Algorithm, Smith-Waterman Algorithm; Scoring Matrices – PAM and BLOSSUM; BLAST. Limits of detection & significance. Advanced BLAST: PSI-BLAST & PHI-BLAST. Introduction to Next Generation Sequencing techniques and applications.

Case Study: NGS-based sequencing for infectious diseases.

Signature of BOS Chairman

Proof: Paper on Numerical Methods include in the R18 curriculum

6	U18BTI2202	Introduction to Biotechnology	Embedded	PC	2	0	2	0	3	Nil
7	U18INI2600	Engineering Clinics II	Embedded Lab & Project	ES	0	0	4	2	3	Nil
								Total Credits		24
								Total Contact Hours/week		29

Semester III										**Pre-requisite**
S.No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	
1	U18MAT3103	Probability and Statistics	Theory	BS	3	1	0	0	4	Nil
2	U18BTT3001	Bioorganic Chemistry	Theory	PC	3	0	0	0	3	Nil
3	U18BTT3102	Bioprocess Calculations	Theory	PC	3	1	0	0	4	Nil
4	U18BTI3203	Concepts in Biochemistry	Embedded Theory & Lab	PC	3	0	2	0	4	Nil
5	U18BTI3204	Microbiology	Embedded Theory & Lab	PC	3	0	2	0	4	Nil
6	U18INI3600	Engineering Clinics III	Embedded Lab & Project	ES	0	0	4	2	3	Nil
								Total Credits		22
								Total Contact Hours/week		25

Semester IV										**Pre-requisite**
S.No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	
1	UI8MAT4102	Numerical Methods	Theory	BS	3	1	0	0	4	Nil
2	U18BTT4001	Fluid and Particle mechanics in Bioprocess	Theory	PC	3	0	0	0	3	U18BTT3102
3	U18BTI4202	Protein and Enzyme Technology	Embedded Theory & Lab	PC	3	0	2	0	4	U18BTI3203

N. [illegible]
Signature of BOS chairman, BT

Proof: Electives regrouped as per thrust area

Programme Electives									
S.No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**
Food and Bioprocess technology									
1	U17BTE0001	Chemical Reaction Engineering	Theory	PE	3	0	0	0	3
2	U17BTE0002	Food Process Engineering	Theory	PE	3	0	0	0	3
3	U17BTE0003	Food Preservation Technology	Theory	PE	3	0	0	0	3
Biopharma and medical Technology									
1	U17BTE0004	Cancer Biology	Theory	PE	3	0	0	0	3
2	U17BTE0005	Vaccine Technology	Theory	PE	3	0	0	0	3
3	U17BTE0006	Molecular Diagnostics	Theory	PE	3	0	0	0	3
Research									
1	U17BTE0007	Nanobiotechnology	Theory	PE	3	0	0	0	3
2	U17BTE0008	Neurobiology and Cognitive sciences	Theory	PE	3	0	0	0	3
3	U17BTE0009	Membrane Technology	Theory	PE	3	0	0	0	3
General									
1	U17BTE0010	Bioentreprenership	Theory	PE	3	0	0	0	3
2	U17BTE0011	Industrial Biosafety and Bioethics	Theory	PE	3	0	0	0	3
3	U17BTE0012	Bioprocess Design and Economics	Theory	PE	3	0	0	0	3

List of One Credit Courses		
S.No	**Course code**	**Course Title**
1	U17BTI0101	Pharmacovigilance
2	U17BTI0202	Mushroom Production
3	U17BTI0203	Natural Products
4	U17BTI0204	Protein Purification using FPLC
5	U17BTI020-*	

* Any new course to be included after obtaining approval

Signature of BOS chairman, BT

Proof : Perspective of IT Support in Biotechnology - R Programming Included in the syllabus.

U17BTI6205	BIOLOGICAL DATA ANALYSIS	L	T	P	J	C
		2	0	2	0	3

Course Objectives:

- To introduce the concept of massive data mining from biological experiments.
- To identify basic experimental design principles in solving biological questions.
- To develop and test hypothesis statistically using data using R – programming.

Course Outcomes (COs):

After successful completion of this course, the students should be able to

CO1: Understand and apply the biological annotation for macromolecules; apply and interpret the structural analysis of macromolecules using high throughput experiment.

CO2 Apply and interpret the biological data through fundamental statistical analysis.

CO3: Apply and interpret biological data related with hypothesis testing

CO4: Explore and infer biological data using visualization.

CO5: Understand and apply R-programming for biological data analysis

CO6: Provide optimal solution and statistics to biological problems

Pre-requisite

1. U17MAT4105 Biostatistics

CO/PO Mapping
(S/M/W indicates strength of correlation)
S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S			S	S					M	S		S	S
CO2	S			S	S									
CO3	S			S	S									
CO4	S			S	S									
CO5	S			S	S									
CO6	S			S	S					S		M	S	S

Course Assessment methods:

Direct
1. Continuous Assessment Test
2. Assignment
3. End Semester Examination

Course Content

BIOINFORMATICS: MINING THE MASSIVE DATA FROM HIGH THROUGHPUT GENOMICS EXPERIMENTS **6 hour**

Introduction – Sequence alignment, Genome sequencing - Nanopore and illumina sequencing, gene annotation, RNA folding - RNAhybrid, protein structure prediction - Secondary structure information; Microarray analysis, proteomics, Protein-Protein Interaction

INTRODUCTION TO BIOSTATISTICAL ANALYSIS **6 hour**

Signature of BOS chairman, BT

Statistical methods in the context of biological research – Data exploration and Analysis - Arithmetic mean, standard deviation, coefficient of variation, standard error of mean, correlation analysis; regression analysis [Problems alone should be solved]

HYPOTHESIS TESTING **6 hour**

Introduction to general concepts; characteristics - Type I and II error; Student's t-test, chi-square test, One Way ANOVA (Kruskal–Wallis H test), Mann–Whitney U test; Wilcoxon signed-rank test

DATA EXPLORATION **6 hour**

Data visualization and summary statistics – variable types, Exploring categorical variable – Relative frequency and percentage, Bar graph, Pie chart; Exploring numerical variables – Histogram, Mean and median, Variance and Standard deviation, quantiles, Box plots; Data Preprocessing – Outliers, data transformation

BIOLOGICAL DATA ANALYSIS USING R PROGRAMMING **6 hour**

Overview – Variable, Data types, Operators, Useful Function, Data frames, Working with images and strings, Library functions.

List of Experiments **15 hour**

1. Introduction to R installation, package management and basic operators
2. Bioconductor tools – Introduction & usage
3. Biological sequences and sequence analysis
4. Basic plot and customized plot using ggplot2
5. R for large biological datasets
6. Descriptive statistics and One-way ANOVA
7. Image analysis using EBImage
8. Case Study : Microarray data analysis using Bioconductor package [Demo only]

Theory: 30 hour **Tutorial: 0 hour** **Practical: 30 hour** **Project: 0 hour** **Total: 60 hour**

REFERENCES

1. Hartvigsen, G. (2014). A primer in biological data analysis and visualization using R. Columbia University Press.
2. O'Brien, C. M. (2013). Biostatistics with R: An Introduction to Statistics Through Biological Data by Babak Shahbaba. International Statistical Review, 81(3), 472-473.
3. McDonald, J. H. (2009). Handbook of biological statistics (Vol. 2, pp. 173-181). Baltimore, MD: sparky house publishing.
4. Whitlock, M. C., & Schluter, D. (2009). The analysis of biological data (No. 574.015195 W5).
5. Sanghamitra, B., Ujjwal, M., & TL, W. J. (Eds.). (2007). Analysis of biological data: a soft computing approach (Vol. 3). World Scientific.

Web References:

1. http://bioconductor.org/
2. https://onlinecourses.science.psu.edu/statprogram/r
3. http://www.r-tutor.com/r-introduction

Signature of BOS chairman, BT

KUMARAGURU
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Department of Electrical and Electronics Engineering

AY: 2018-19 **date: 11-12-2018**

Action taken report -Employers Feedback

S.No	Analysis	Action taken report
1.	LT SPICE tools can be included for simulation in Digital Electronics fifth module	Simulation tools Topic is Included in the course U17EEI4203 Digital Electronics module -5
2.	Application based Experiments to be included in Microprocessor and Microcontroller Lab	Suggestion is incorporated and application based experiments are included in R17 & R18 regulations
3.	ARM processor Programming are to be mapped with specific ICs in Embedded Systems	Included specific IC ARM LPC2148processor in the course U17EET6001, module 2,3
4.	Suggested that Students has to concentrate on data structure algorithms/ OOPS concepts	course on Data structures and Algorithms is Included in R17 & R18 regulations
5.	Communication skills of the students need to be improved	Two courses with lab component Fundamentals of Communication I & II are Included R18 regulation for enriching English Communication skills
6.	Students need exposure and hands on training to do mini projects	Included five courses in R18 regulations Engineering Clinic 1-5. These courses focus on the practical aspects and provide exposure and training to carry out mini project
7.	Students are Less interested and lack focus on programming skills	Problem solving and Programming using C & Python theory and practical course is included in R18 regulation

Prepared By,

Dr.V.Kandasamy

BoS Coordinator

Approved By,

11/12/18

Dr.K.Malarvizhi

BoS Chairman

Proof for Action Taken: 1 - Simulation tools Topic is Included in the course U17EEI4203 Digital Electronics module -5

U17EEI4203 DIGITAL ELECTRONICS

L	T	P	J	C
3	0	2	0	4

COURSE OUTCOMES

After successful completion of this course, the students will be able to

CO1	Understand the operation of basic logic gates and logic families	**K2**
CO2	Analyze, Design and Implement various combinational logic circuits	**K3**
CO3	Design counters and simple synchronous sequential logic circuits using Flip Flops	**K3**
CO4	Classify different semiconductor memories and identify suitable PLD for the applications	**K2**
CO5	Design, Simulate and Implement simple digital circuits using suitable software tools and hardware components.	**K3**

PRE-REQUISITE

1. Analog Electronics

CO/PO Mapping
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S												M	
CO2	W	S	S										S	
CO3		S	S										S	
CO4			W										M	
CO5		M	M		M				S				S	W

COURSE ASSESSMENT METHODS

Direct
1. Continuous Assessment Test I, II 2. Model Examination (For Practical Courses & Embedded Courses) 3. Assignment, Open Book Test, Cooperative Learning Report, Group Presentation, Problem based Learning, Project based Learning, Mini Projects, Project Report, Quiz, Role Play, Self-Explanatory Videos, Prototype or Product Demonstration etc. (as applicable) 4. End Semester Examination
Indirect
1. Course End Survey 2. Programme Exit Survey 3. Placement/Higher Education Record 4. Feedback (Students, Employers, Parents, Professional Body members, Alumni)

THEORETICAL COMPONENT CONTENTS

FUNDAMENTALS OF DIGITAL SYSTEMS **9 Hours**

Introduction to Digital Circuits, Logic Gates, Boolean Algebra, Number Systems: Binary, Signed Binary, Octal, Hexadecimal Number, Binary Arithmetic, One's and Two's Complements, Binary Codes: 8421, 2421, Gray Code, Excess 3 Code, Error detecting and Correcting Codes.

Standard representation for logic functions: SOP, POS, Canonical Form, Simplification of Logical functions using K-Map, Quine-McCluskey Method – Don't Care Conditions (upto 4 variables)

DESIGN OF COMBINATIONAL LOGIC CIRCUITS **9 Hours**

Design of Combinational Circuits - Adders, Subtractors, Parallel Adder, Carry Look Ahead Adder, Digital Comparator, Parity Generator/Checker, Code Converters, Encoders, Decoders, Multiplexer, De-Multiplexer, Implementation of Boolean function using Multiplexer.

Signature of the Chairman BOS EEE

SEQUENTIAL LOGIC CIRCUITS **11 Hours**

Latch, Flip Flops: SR, JK, T and D types – Characteristic Equation, Excitation Table, Types of Triggering, Master Slave JK Flip Flop, Applications of Flip Flops, Conversion of one flip flop into other flip flop, Counters: Synchronous & Ripple Counter - Modulo-N Counter, Counter Design using Flip Flops, Shift Registers: Types and Applications, Ring Counter.

SEQUENTIAL CIRCUIT DESIGN **7 Hours**

Classification of Sequential Circuits: Moore and Mealy Model, Design of Synchronous Sequential Circuit: State Diagram, State Table, State Reduction, State Assignment, Hazards in sequential circuits.

SEMICONDUCTOR MEMORIES AND DIGITAL INTEGRATED CIRCUITS **9 Hours**

Introduction to Memories: RAM, ROM, PROM, EEPROM, PLA, PAL, FPGA, Implementation of Combinational Logic using PLA and PAL.

Basic IC Terminologies, Characteristics of Digital Logic families: TTL and CMOS logic, Introduction to circuit design using Simulation Software tool.

PRACTICAL COMPONENT CONTENTS

LIST OF EXPERIMENTS

1. Verification of truth table for Logic Gates and Flip Flops.
2. Implementation of Boolean Function using Gates.
3. Design and implementation of Adder / Subtractor circuits.
4. Design of Code converters: Gray to Binary, Binary to Gray.
5. Design and implementation of Encoder and Decoder using Logic Gates.
6. Design of combinational circuit using MUX/DEMUX.
7. Design and implementation of 4 – bit Synchronous Counter.
8. Design and implementation of 4 – bit Asynchronous Counter.
9. Design and implementation of 4 – bit Shift Registers.
10. Design of simple combinational circuits using Simulation Software Tool.

TEXT BOOKS

1. M. Morris Mano, "Digital Logic and Computer Design", Pearson India Education Services Pvt. Ltd., New Delhi, 2016.
2. R. P. Jain, "Modern Digital Electronics", 4th Edition, Tata McGraw Hill Education Pvt Ltd., 2010.
3. A. Anand Kumar, "Fundamentals of Digital Circuits", 4th Edition, Prentice Hall India, 2016.

REFERENCES

1. Soumitra Kumar Mandal, "Digital Electronics: Principles and Applications", Tata McGraw Hill Education Pvt Ltd, 2010.
2. Thomas L. Floyd, "Digital Fundamentals", 11th Edition, Pearson Education Limited, 2014.
3. Raj Kamal, "Digital Systems: Principles and Design", 3rd Edition, Pearson Education Limited, 2009.
4. John M. Yarbrough, "Digital Logic: Applications and Design", West Publishing Company, 2002.
5. David J. Comer, "Digital Logic & State Machine Design", Oxford University Press, 2012.

Theory: 45 **Tutorial: 0** **Practical: 30** **Project: 0** **Total: 75 Hours**

Signature of the Chairman BOS EEE

Proof for Action Taken: 2 - Suggestion is incorporated and application-based experiments are included in R17 & R18 regulations

U17EEI5202	MICROPROCESSORS AND MICROCONTROLLERS	L	T	P	J	C
		3	0	2	0	4

COURSE OUTCOMES

After successful completion of this course, the students will be able to

CO1	Understand the architecture of Microprocessors and Microcontrollers.	**K2**
CO2	Understand the instructions of Microprocessors and Microcontrollers to write programs using assembly language and Embedded C.	**K2**
CO3	Apply the techniques to control the peripheral devices with Microcontrollers.	**K3**
CO4	Analyze the interfacing modules of microcontrollers using Embedded C in an IDE.	**K4**
CO5	Analyze the real time issues involved in end product design with solutions.	**K4**

PRE-REQUISITE

1. Digital Electronics

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO 1	S	M											M	
CO 2	S	M	M		M							M	M	
CO 3		S	M	M									M	
CO 4			S	S	S				M		M	M	M	M
CO 5			S	S	S				M		M	M	M	S

COURSE ASSESSMENT METHODS

Direct
1. Continuous Assessment Test I, II 2. Model Examination (For Practical Courses & Embedded Courses) 3. Assignment, Open Book Test, Cooperative Learning Report, Group Presentation, Problem based Learning, Project based Learning, Mini Projects, Project Report, Quiz, Role Play, Self-Explanatory Videos, Prototype or Product Demonstration etc. (as applicable) 4. End Semester Examination
Indirect
1. Course End Survey 2. Programme Exit Survey 3. Placement/Higher Education Record 4. Feedback (Students, Employers, Parents, Professional Body members, Alumni)

THEORETICAL COMPONENT CONTENTS:

INTRODUCTION **8 Hours**

Signature of the Chairman BOS EEE

Overview and comparison of microprocessors and microcontrollers - vendors in microprocessors and microcontrollers - 8085 architecture – pin diagram – addressing modes – instruction set – interrupts – memory and I/O interfacing – simple assembly language programming.

8051 MICROCONTROLLER **9 Hours**

8051 architecture – I/O pins – ports – addressing modes – instruction set– timers and counters – serial data communication – interrupts – memory organization – assembly language programming.

8051 PROGRAMMING USING EMBEDDED 'C' **10 Hours**

Port initialization – data types – time delay – logic operations – data conversion – data serialization – Interface Programming: relay – timer – serial communication – LED – 7 segment display – Keypad – Programming Tools: KEIL IDE.

PIC MICROCONTROLLER **8 Hours**

Architecture of PIC 16F8xx – FSR – Oscillator Circuit – Program Memory organization- Register File Structure - Addressing Modes – Instruction Set- Simple Assembly Language Programming.

PICPROGRAMMING USING EMBEDDED 'C' **10 Hours**

Port initialization – data types – time delay – logic operations - Internal structure and Programming: I/O ports –Interrupts –Timers – capture/compare/PWM module –LCD– ADC – SPI. Programming Tools: MPLABORATORY IDE.

PRACTICAL COMPONENT CONTENTS:
LIST OF EXPERIMENTS

8085, 8051 Program using Assembly Language

1. Programs for 8 bit arithmetic, control instructions using 8085 processor and 8051 microcontroller.
2. A/D interfacing and D/A interfacing with 8085 processor.
3. Stepper motor interfacing with 8051 microcontroller.

8051 Program using Embedded C

1.LED and Timer programming
2.LCD interface
3.Serial communication to PC
4.Temperature monitoring

PIC Program using Embedded C

1.LED and Timer programming
2.LCD interface
3.Serial communication to PC
4.Generation of PWM pulse, Motor control
5.RTC interface

TEXT BOOKS

1. Ramesh S Gaonkar, "Microprocessor architecture programming and application with 8085", 6th Edition, Penram International publication, New Delhi, 2011.
2. Muhammad Ali Mazidi, Janice GillispieMazidi, RolinD.Mckinlay, "The 8051 microcontroller and embedded systems using assembly and C", 2nd Edition, Pearson Education, 2011.
3. John B Peatman, "Designing with PIC Micro Controller", McGraw-Hill, 2013.

REFERENCES

1. Kenneth J Ayala, "The 8051 microcontroller architecture programming and application", Penram International publication, New Delhi, 2004.

Signature of the Chairman BOS EEE

U18EEI5202 **MICROPROCESSORS AND MICROCONTROLLERS**

L	T	P	J	C
3	0	2	0	4

COURSE OUTCOMES

After successful completion of this course, the students will be able to

CO1	Understand the fundamentals of Microprocessors.	**K2**
CO2	Understand the architecture and instructions of 8051 Microcontroller to write programs using assembly language and Embedded C.	**K2**
CO3	Apply the techniques to control the peripheral devices with Microcontrollers.	**K3**
CO4	Understand the architecture and instructions of PIC Microcontroller to write programs using Embedded C.	**K2**
CO5	Analyze the interfacing modules of microcontrollers using an IDE.	**K4**

PRE-REQUISITE

1. Digital Electronics

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S	M											M	
CO2	S	M	M		M							M	M	
CO3		S	M	M									M	
CO4			S	S	S				M		M	M	M	M
CO5			S	S	S				M		M	M	M	S

COURSE ASSESSMENT METHODS

Direct
1. Continuous Assessment Test I, II 2. Model Examination (For Practical Courses & Embedded Courses) 3. Assignment, Open Book Test, Cooperative Learning Report, Group Presentation, Problem based Learning, Project based Learning, Mini Projects, Project Report, Quiz, Role Play, Self-Explanatory Videos, Prototype or Product Demonstration etc. (as applicable) 4. End Semester Examination
Indirect
1. Course End Survey 2. Programme Exit Survey 3. Placement/Higher Education Record 4. Feedback (Students, Employers, Parents, Professional Body members, Alumni)

THEORETICAL COMPONENT CONTENTS:

INTRODUCTION **9 Hours**

Overview and comparison of microprocessors and microcontrollers - vendors in microprocessors and microcontrollers - Fundamentals of 8-bit and 16-bit microprocessors: Architectures – Pin diagrams – Pipelining concepts - Role of microprocessors and microcontrollers in embedded systems.

8051 MICROCONTROLLER **9 Hours**

8051 architecture – I/O pins – ports – addressing modes – instruction set– timers and counters – serial data communication – interrupts – memory organization – assembly language programming.

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8051 PROGRAMMING USING EMBEDDED 'C' **9 Hours**

Port initialization – data types – time delay – logic operations – data conversion – data serialization – Interface Programming: relay – timer – serial communication – LED – LCD – Programming Tools: KEIL IDE.

PIC MICROCONTROLLER **9 Hours**

Architecture of PIC 16F8xx – FSR – Oscillator Circuit – Program Memory organization- Register File Structure - Addressing Modes – Interrupts.

PICPROGRAMMING USING EMBEDDED 'C' **9 Hours**

Port initialization – data types – time delay – logic operations - Internal structure and Programming: I/O ports —Timers – capture/compare/PWM module – ADC - 7segment display – SPI. Programming Tools: MPLABORATORY IDE.

PRACTICAL COMPONENT CONTENTS:
LIST OF EXPERIMENTS

8051 Program using Assembly Language

1. Programs for 8-bit arithmetic, control instructions using 8051 microcontroller
2. Stepper motor interfacing with 8051 microcontroller

8051 Program using Embedded C

3. LED and Timer programming
4. Serial communication to PC

PIC Program using Embedded C

5. LED and Timer programming
6. Interfacing with LCD
7. Interfacing with Seven segment display
8. Analog to Digital conversion
9. Generation of PWM pulse
10. Interfacing with communication modules

TEXTBOOKS

1. Ramesh S Gaonkar, "Microprocessor architecture programming and application with 8085", 6th Edition, Penram International publication, New Delhi, 2011.
2. Muhammad Ali Mazidi, Janice GillispieMazidi, RolinD.Mckinlay, "The 8051 microcontroller and embedded systems using assembly and C", 2nd Edition, Pearson Education, 2011.
3. John B Peatman, "Designing with PIC Micro Controller", McGraw-Hill, 2013.

REFERENCES

1. Kenneth J Ayala, "The 8051-microcontroller architecture programming and application", Penram International publication, New Delhi, 2004.
2. MykePredko, "Programming and Customizing the PIC Microcontroller", McGraw-Hill, New York, 2007.
3. PIC16F87XA Data Sheet [Online] Available: http://www.wvshare.com/datasheet/Microchip_PDF/ PIC16F877A.PDF.

Theory: 45 **Tutorial: 0** **Practical: 30** **Project: 0** **Total: 75 Hours**

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Proof for Action Taken: 3 - Included specific IC ARM LPC2148 processor in the course U17EET6001, module 2,3

U17EET6001 **EMBEDDED SYSTEM**

L	T	P	J	C
3	0	0	0	3

COURSE OUTCOMES

After successful completion of this course, the students will be able to

CO1	Understand the fundamentals of Embedded systems and its communication protocols.	**K2**
CO2	Understand the architectural features of ARM processor.	**K2**
CO3	Apply the instructions to program ARM processor using Embedded C.	**K3**
CO4	Analyze the internal peripherals of ARM processor to design a product.	**K4**
CO5	Understand the basic concepts of RTOS in accessing shared resources for optimized CPU performance.	**K2**

PRE-REQUISITE

1. Microprocessors and Microcontrollers

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO 1	S	M											M	
CO 2	S	M											M	
CO 3		S	S	M	M				M		M	M	M	
CO 4			S	S	S				S		M	M	M	S
CO 5	S		M		M						M		M	M

COURSE ASSESSMENT METHODS

Direct
1. Continuous Assessment Test I, II 2. Assignment, Open Book Test, Cooperative Learning Report, Group Presentation, Problem based Learning, Project based Learning, Mini Projects, Project Report, Quiz, Role Play, Self-Explanatory Videos, Prototype or Product Demonstration etc. (as applicable) 3. End Semester Examination
Indirect
1. Course End Survey 2. Programme Exit Survey 3. Placement/Higher Education Record 4. Feedback (Students, Employers, Parents, Professional Body members, Alumni)

OVERVIEW OF EMBEDDED SYSTEMS **8 Hours**

Basics of Embedded Systems – I/O Devices: Types and Examples – Synchronous, Iso-synchronous and Asynchronous Communication – Serial Communication Devices – Serial Communication Protocols: I^2C, CAN, USB - Parallel Device Ports– Parallel Bus device Protocols: ISA, PCI, ARM bus.

ARM ARCHITECTURE **8 Hours**

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ARM Programmer's model -Registers – Processor modes - Pipeline - Interrupts – ARM organization - ARM processor families –Instruction set – Thumb instruction set – ARM Memory Management Unit.

ARM LPC2148 PROCESSOR PROGRAMMING **10 Hours**

Writing and optimizing the embedded C Code – Profiling and Cycle Counting – Instruction Scheduling –Register Allocation – Conditional Execution – Looping Constructs – Bit Manipulation - Timers and counters -Watchdog timer. Programming Tools: KEIL IDE.

ARM LPC2148 PROCESSOR PERIPHERALS **12 Hours**

SPI and I^2C – USB - UART– Analog to Digital conversion – temperature sensor – light sensor – accelerometer - Digital to Analog conversion –Digital sensors - PWM – Motor speed control.

RTOS FOR EMBEDDED SYSTEMS **7 Hours**

Introduction to RTOS - Task and Task Scheduler - Scheduling policies – Interrupt Service Routines - Interprocess communication mechanisms - Introduction to µC/ OS II.

TEXT BOOKS

1. Raj Kamal, "Embedded Systems – Architecture, Programming and Design", 2nd Edition, Tata McGraw Hill, New Delhi, 2013.
2. Andrew N. Sloss, Dominic Symes, Chris Wright, John Ray field 'ARM System Developer's Guide Designing and Optimizing System Software', Morgan Kaufmann Publishers, 2009.

REFERENCES

1. Steve Furber, "ARM System-on-Chip Architecture", Pearson Education, 2013.
2. Trevor Martin, 'The Insider's Guide to the Philips ARM7-Based Microcontrollers, An Engineer's Introduction To The LPC2100 Series' Hitex (UK) Ltd.,
3. David E Simon, "An Embedded Software Primer", Pearson Education India, New Delhi, 2013.
4. https://www.nxp.com/docs/en/data-sheet/LPC2141_42_44_46_48.pdf.

Theory: 45 **Tutorial: 0** **Practical: 0** **Project: 0** **Total: 45 Hours**

Signature of the Chairman BOS EEE

Proof for Action Taken: 4 – course on Data structures and Algorithms is Included in R17 & R18 regulations.

SEMESTER V										
S. No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	**Pre-requisite**
1	U17EET5001	Power Electronics	Theory	PC	3	0	0	0	3	U17EEI3203
2	U17EEI5202	Microprocessors and Microcontrollers	Embedded-Theory & Lab	PC	3	0	2	0	4	U17EEI4203
3	U17EEI5203	Control Systems	Embedded-Theory & Lab	PC	3	0	2	0	4	U17MAT3101
4	U17EET5004	Electrical Machine Design	Theory	PC	3	0	0	0	3	U17EEI3201 U17EEI4201
5	U17EEE****	Professional Elective I	Theory	PE	3	0	0	0	3	-
6	U17*******	Open Elective -I	Theory	OE	3	0	0	0	3	-
7	U17INI5600	Engineering Clinic 3	Embedded-Practical & Project	ES	0	0	4	2	3	U17INI4600
								Total Credits	**23**	
								Total Contact Hours/week	**28**	

SEMESTER VI										
S. No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	**Pre-requisite**
1	U17EET6001	Embedded System	Theory	PC	3	0	0	0	3	U17EEI5202
2	U17EET6002	Power System Protection and Switch Gear	Theory	PC	3	0	0	0	3	U17EET4002
3	U17EEI6203	Solid State Drives	Embedded-Theory & Lab	PC	3	0	2	0	4	U17EET5001
4	U17CSI6211	Data Structures and Algorithms	Embedded-Theory & Lab	ES	3	0	2	0	4	-
5	U17EEE****	Professional Elective II	Theory	PE	3	0	0	0	3	-
6	U17*******	Open Elective - II	Theory	OE	3	0	0	0	3	-
7	U17INI6600	Engineering Clinic 4	Embedded-Practical & Project	ES	0	0	4	2	3	U17INI5600
								Total Credits	**23**	
								Total Contact Hours/week	**28**	

Signature of the Chairman BOS EEE

SEMESTER V										
S. No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	**Pre-requisite**
1	U18EET5001	Power Electronics	Theory	PC	3	0	0	0	3	U18EEI4201
2	U18EEI5202	Microprocessors and Microcontrollers	Embedded-Theory & Lab	PC	3	0	2	0	4	U18EEI4203
3	U18EEI5203	Control Systems	Embedded-Theory & Lab	PC	3	0	2	0	4	U18MAT3101
4	U18EET5004	Electrical Machine Design	Theory	PC	3	0	0	0	3	U18EEI3201 U18EEI4201
5	U18EET5005	Digital Signal Processing	Theory	PC	3	0	0	0	3	U18MAT3101
6	U18EEE****	Professional Elective I	Theory	PE	3	0	0	0	3	-
7	U18*******	Open Elective-I	Theory	OE	3	0	0	0	3	-
8	U18INI5600	Engineering Clinic – Full design project	Embedded-Practical & Project	ES	0	0	4	2	3	U18INI4600
									Total Credits	**26**
									Total Contact Hours/week	**31**

SEMESTER VI										
S. No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	**Pre-requisite**
1	U18EEI6201	Embedded System	Embedded-Theory & Lab	PC	2	0	2	0	3	U18EEI5202
2	U18EET6002	Power system Protection and switch gear	Theory	PC	3	0	0	0	3	U18EET4002
3	U18EEI6203	Power system Analysis	Embedded-Theory & Lab	PC	3	0	2	0	4	U18MAT3101 U18EET4002 U18EEI4201
4	U18EEI6204	Solid state drives	Embedded-Theory & Lab	PC	3	0	2	0	4	U18EET5001
5	U18CSI6211	Data structures and Algorithms	Embedded-Theory & Lab	ES	3	0	2	0	4	
6	U18EEE****	Professional Elective –II	Theory	PE	3	0	0	0	3	-
7	U18*******	Open Elective-II	Theory	OE	3	0	0	0	3	-
									Total Credits	**24**
									Total Contact Hours/week	**26**

Signature of the Chairman BOS EEE

Proof for Action Taken: 5 – Two courses with lab component Fundamentals of Communication I & II are Included R18 regulation for enriching English Communication skills.

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SEMESTER I										
S. No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	**Pre-requisite**
1	U18MAI1201	Linear Algebra and Calculus	Embedded-Theory & Lab	BS	3	0	2	0	4	-
2	U18PHI1201	Engineering Physics	Embedded-Theory & Lab	BS	3	0	2	0	4	-
3	U18CSI1202	Problem solving and Programming using C	Embedded-Theory & Lab	ES	2	0	2	0	3	-
4	U18MEI1201	Engineering Graphics	Embedded-Theory & Lab	ES	2	0	2	0	3	-
5	U18ENI1201	Fundamentals of Communication-I	Embedded-Theory & Lab	HS	2	0	2	0	3	-
6	U18INI1600	Engineering Clinic 1	Embedded-Practical & Project	ES	0	0	4	2	3	-
								Total Credits		**20**
								Total Contact Hours/week		**28**

SEMESTER II										
S. No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	**Pre-requisite**
1	U18MAI2201	Advanced Calculus and Laplace Transforms	Embedded-Theory & Lab	BS	3	0	2	0	4	U18MAI1201
2	U18CHI2201	Engineering Chemistry	Embedded-Theory & Lab	BS	3	0	2	0	4	-
3	U18ENI2201	Fundamentals of Communication-II	Embedded-Theory & Lab	HS	2	0	2	0	3	-
4	U18CSI2201	Python Programming	Embedded-Theory & Lab	ES	2	0	2	0	3	-
5	U18EEI2201	Electric Circuit Analysis	Embedded-Theory & Lab	PC	3	0	2	0	4	-
6	U18INI2600	Engineering Clinic 2	Embedded-Practical & Project	ES	0	0	4	2	3	-
								Total Credits		**21**
								Total Contact Hours/week		**29**

Signature of the Chairman BOS EEE

Proof for Action Taken: 6 –
Included five courses in R18 regulations Engineering Clinic 1-5. These courses focus on the practical aspects and provide exposure and training to carry out mini project.

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SEMESTER I										
S. No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	**Pre-requisite**
1	U18MAI1201	Linear Algebra and Calculus	Embedded-Theory & Lab	BS	3	0	2	0	4	-
2	U18PHI1201	Engineering Physics	Embedded-Theory & Lab	BS	3	0	2	0	4	-
3	U18CSI1202	Problem solving and Programming using C	Embedded-Theory & Lab	ES	2	0	2	0	3	-
4	U18MEI1201	Engineering Graphics	Embedded-Theory & Lab	ES	2	0	2	0	3	-
5	U18ENI1201	Fundamentals of Communication-I	Embedded-Theory & Lab	HS	2	0	2	0	3	-
6	U18INI1600	Engineering Clinic 1	Embedded-Practical & Project	ES	0	0	4	2	3	-
								Total Credits	**20**	
								Total Contact Hours/week	**28**	

SEMESTER II										
S. No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	**Pre-requisite**
1	U18MAI2201	Advanced Calculus and Laplace Transforms	Embedded-Theory & Lab	BS	3	0	2	0	4	U18MAI1201
2	U18CHI2201	Engineering Chemistry	Embedded-Theory & Lab	BS	3	0	2	0	4	-
3	U18ENI2201	Fundamentals of Communication-II	Embedded-Theory & Lab	HS	2	0	2	0	3	-
4	U18CSI2201	Python Programming	Embedded-Theory & Lab	ES	2	0	2	0	3	-
5	U18EEI2201	Electric Circuit Analysis	Embedded-Theory & Lab	PC	3	0	2	0	4	-
6	U18INI2600	Engineering Clinic 2	Embedded-Practical & Project	ES	0	0	4	2	3	-
								Total Credits	**21**	
								Total Contact Hours/week	**29**	

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SEMESTER III										
S. No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	**Pre-requisite**
1	U18MAT3101	Partial Differential Equations and Transforms	Theory	BS	3	1	0	0	4	-
2	U18EEI3201	DC Machines and Transformers	Embedded-Theory & Lab	PC	3	0	2	0	4	-
3	U18EET3002	Electromagnetic Fields	Theory	PC	3	0	0	0	3	-
4	U18EEI3203	Analog Electronics and Linear Integrated Circuits	Embedded-Theory & Lab	PC	3	0	2	0	4	-
5	U18EET3004	Measurements and Instrumentation	Theory	PC	3	0	0	0	3	-
6	U18INI3600	Engineering Clinic 3	Embedded-Practical & Project	ES	0	0	4	2	3	-
								Total Credits		**21**
								Total Contact Hours/week		**26**

SEMESTER IV										
S. No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	**Pre-requisite**
1	U18MAT4101	Numerical Methods and Probability	Theory	BS	3	1	0	0	4	-
2	U18EEI4201	Induction and Synchronous Machines	Embedded-Theory & Lab	PC	3	0	2	0	4	U18EEI3201
3	U18EET4002	Generation, Transmission and Distribution	Theory	PC	3	0	0	0	3	U18EET3002
4	U18EEI4203	Digital Electronics	Embedded-Theory & Lab	PC	3	0	2	0	4	U18EEI3203
5	U18EET4004	Network and System	Theory	PC	3	0	0	0	3	U18EEI2200
6	U18EEI4205	PLC Automation	Embedded-Theory & Lab	PC	2	0	2	0	3	U18EEI3203
7	U18INI4600	Engineering Clinic 4	Embedded-Practical & Project	ES	0	0	4	2	3	U18INI3600
									Total Credits	**24**
									Total Contact Hours/week	**30**

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SEMESTER V										
S. No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	**Pre-requisite**
1	U18EET5001	Power Electronics	Theory	PC	3	0	0	0	3	U18EEI4201
2	U18EEI5202	Microprocessors and Microcontrollers	Embedded-Theory & Lab	PC	3	0	2	0	4	U18EEI4203
3	U18EEI5203	Control Systems	Embedded-Theory & Lab	PC	3	0	2	0	4	U18MAT3101
4	U18EET5004	Electrical Machine Design	Theory	PC	3	0	0	0	3	U18EEI3201 U18EEI4201
5	U18EET5005	Digital Signal Processing	Theory	PC	3	0	0	0	3	U18MAT3101
6	U18EEE****	Professional Elective I	Theory	PE	3	0	0	0	3	-
7	U18*******	Open Elective-I	Theory	OE	3	0	0	0	3	-
8	U18INI5600	Engineering Clinic – Full design project	Embedded-Practical & Project	ES	0	0	4	2	3	U18INI4600
								Total Credits	**26**	
								Total Contact Hours/week	**31**	

SEMESTER VI										
S. No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	**Pre-requisite**
1	U18EEI6201	Embedded System	Embedded-Theory & Lab	PC	2	0	2	0	3	U18EEI5202
2	U18EET6002	Power system Protection and switch gear	Theory	PC	3	0	0	0	3	U18EET4002
3	U18EEI6203	Power system Analysis	Embedded-Theory & Lab	PC	3	0	2	0	4	U18MAT3101 U18EET4002 U18EEI4201
4	U18EEI6204	Solid state drives	Embedded-Theory & Lab	PC	3	0	2	0	4	U18EET5001
5	U18CSI6211	Data structures and Algorithms	Embedded-Theory & Lab	ES	3	0	2	0	4	
6	U18EEE****	Professional Elective –II	Theory	PE	3	0	0	0	3	-
7	U18*******	Open Elective-II	Theory	OE	3	0	0	0	3	-
								Total Credits	**24**	
								Total Contact Hours/week	**26**	

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Proof for Action Taken: 7 - Problem solving and Programming using C & Python theory and practical course is included in R18 regulation.

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SEMESTER I										
S. No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	**Pre-requisite**
1	U18MAI1201	Linear Algebra and Calculus	Embedded-Theory & Lab	BS	3	0	2	0	4	-
2	U18PHI1201	Engineering Physics	Embedded-Theory & Lab	BS	3	0	2	0	4	-
3	U18CSI1202	Problem solving and Programming using C	Embedded-Theory & Lab	ES	2	0	2	0	3	-
4	U18MEI1201	Engineering Graphics	Embedded-Theory & Lab	ES	2	0	2	0	3	-
5	U18ENI1201	Fundamentals of Communication-I	Embedded-Theory & Lab	HS	2	0	2	0	3	-
6	U18INI1600	Engineering Clinic 1	Embedded-Practical & Project	ES	0	0	4	2	3	-
								Total Credits	**20**	
								Total Contact Hours/week	**28**	

SEMESTER II										
S. No	**Course code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	**Pre-requisite**
1	U18MAI2201	Advanced Calculus and Laplace Transforms	Embedded-Theory & Lab	BS	3	0	2	0	4	U18MAI1201
2	U18CHI2201	Engineering Chemistry	Embedded-Theory & Lab	BS	3	0	2	0	4	-
3	U18ENI2201	Fundamentals of Communication-II	Embedded-Theory & Lab	HS	2	0	2	0	3	-
4	U18CSI2201	Python Programming	Embedded-Theory & Lab	ES	2	0	2	0	3	-
5	U18EEI2201	Electric Circuit Analysis	Embedded-Theory & Lab	PC	3	0	2	0	4	-
6	U18INI2600	Engineering Clinic 2	Embedded-Practical & Project	ES	0	0	4	2	3	-
								Total Credits	**21**	
								Total Contact Hours/week	**29**	

Signature of the Chairman BOS EEE

KUMARAGURU
college of technology
character is life

Department of Information Technology

AY: 2018-19

Date:15.04.2019

Action taken report -Employers Feedback

S.No	Analysis	Action taken report
1.	Curriculum should provide the students to enrich the knowledge in current technologies	
2.	To provide the knowledge of full stack development	Full stack development added as one credit course in R15 regulation

Prepared By,

BoS Coordinator

Approved By,

BoS Chairman

Proof for Action taken 1 & 2 :-

ONE CREDIT COURSES									
1.	U15ITIN01	Innovation and Entrepreneurship	EEC	1	1	0	0	1	-
2.	U15ITIN02	ERP and Business Applications	EEC	1	1	0	0	1	-
3.	U15ITIN03	Agile Software Development	EEC	1	1	0	0	1	ITT501
4.	U15ITIN04	UX/UI Design	EEC	1	1	0	0	1	-
5	U15ITIN05	Mobile Application Development	EEC	1	0	0	2	1	ITT402, ITT502
6	U15ITIN06	Front End Design	EEC	1	1	0	0	1	-
7	U15ITIN08	CCNA- Routing And Switching Configuration	EEC	1	0	0	2	1	-
8	U15ITIN09	Data Analytics	EEC	1	0	0	2	1	-
9	U15ITIN10	Graphics Design using Photoshop	EEC	1	0	0	2	1	-
10	U15ITIN11	Professional Skills	EEC	1	1	0	0	1	-
11	U15ITIN12	Python Programming	EEC	1	0	0	2	1	-
12	U15ITIN13	Progressive Web apps	EEC	1	1	0	0	1	-
13	U15ITIN15	Full Stack Development	EEC	1	0	0	2	1	-

U15ITIN15	FULL STACAK DEVELOPMENT	L	T	P	PJ	C
		1	0	0	0	1

Course Outcomes:

After successful completion of this course, the students should be able to

CO1	Develop a web application using Front End technologies like HTML, CSS, JavaScript	K3
CO2	Implement MVC responsive design to scale across PC, tablet, and Mobile Phone	K3
CO3	Create responsive web pages	K3

Pre-requisite:

1. NIL

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M			M					M		
CO2	M	M			M					M		
CO3	M	M			M					M		

Course Assessment methods:

Direct	Indirect
1. Project and Presentation	1. Course Exit Survey

HTML **5 hours**

Introduction to HTML – Basics – Elements – Attributes – Formatting – Lists – Headings – Paragraph – Layout – frames – HTML forms

Cascading Style Sheets (CSS) **5 hours**

Introduction to CSS – syntax – colors – backgrounds – borders – text – font – list – tables – images – tooltips - filters

JavaScript **5 hours**

Introduction to JavaScript – Basics – Objects – Events – Strings – Numbers - Forms

Theory: 15 Hrs **Tutorial: 0 hour** **Total Hours:15**

REFERENCES

1. Deitel & Deitel, et.al "Internet & World Wide Web - How To Program", Pearson Education, Fifth Edition, 2011.
2. Robert W. Sebesta, "Programming the World Wide Web", Eighth edition, Pearson pulications,2015.

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Department of Aeronautical Engineering

AY: 2018-19 **Date: 15.04.2019**

Action taken report -Employer Feedback

S.No	Analysis	Action taken report
1.	Open elective courses can be introduced related to Structures, Propulsion, Indian Space Program, Satellite Launch Vehicles, Missiles developed by DRDO, India and ISRO.	Will be considered for next revision
2.	In 'Satellite System and Application' course (open elective), topics has to be added related to Satellite Launch vehicles of India.	Will be considered for next revision
3.	In 'Aircraft Maintenance Practices' course, under Aircraft Manual heading, MIL-STD specifications can be included	MIL-STD specifications will be obviously discussed in the Aircraft Maintenance Practices Class under Aircraft Manual
4.	Environmental issues related to composites can be added in 'Composite Materials and Structures' course.	"Environmental effects on composites" has been added.

Prepared By,

BoS Coordinator

Approved By,

BoS Chairman

Proof for Action Taken: 4 "Environmental effects on composites" has been added.

U18AEE0007	COMPOSITE MATERIALS AND STRUCTURES	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

After successful completion of this course, the students will be able to

CO1: Identify the properties of fiber and matrix materials used in commercial composite materials.

CO2: Determine the material properties of composites.

CO3: Apply the conventional failure theories to composite materials.

CO4: Design a laminate for a given load condition.

CO5: Identify the most appropriate manufacturing process for fabricating composite components based on its requirement.

Pre-requisites : -

CO-PO and CO-PSO Mapping:

	CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													
COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		M											M	
CO2		S											M	
CO3			S										M	
CO4	S												M	
CO5			M										M	

Course Assessment methods

Direct
1. Continuous Assessment Test I, II. 2. Journal paper review, Assignment, Group Presentation 3. End Semester Examination.
Indirect
1. Course-end survey

Theory Component contents

STRESS-STRAIN RELATION — 6 Hours

Introduction – Advantages, disadvantages and application of composite materials, reinforcements and matrices – Generalised Hooke's Law – Elastic constants for anisotropic, orthotropic and isotropic materials.

METHODS OF ANALYSIS — 12 Hours

Micromechanics – Mechanics of materials approach, Elasticity approach to determine material properties – Macro mechanics – Stress-Strain relations with respect to natural axis and arbitrary axis – Experimental characterization of lamina.

LAMINATED PLATES — 10 Hours

Governing differential equation for a general laminate, symmetric, balanced, angle ply and cross ply laminates – Failure theory for composites.

SANDWICH CONSTRUCTIONS 10 Hours

Basic design concepts of sandwich construction – Materials used for sandwich construction – Failure modes of sandwich panels – Flexural rigidity of Sandwich beams and plates.

FABRICATION PROCESS 7 Hours

Various open and closed mould processes – Manufacture of fibres – Types of resins and properties and applications – Netting analysis – Environmental effects on composites.

Theory: 45	Tutorial: 0	Practical: 0	Project: 0	Total: 45 Hours

REFERENCES

1. Autar K. Kaw, 'Mechanics of Composite Materials', Second Edition, First Indian Reprint, CRC Press, 2009.
2. Jones, R.M., 'Mechanics of Composite Materials', McGraw-Hill, Kogakusha Ltd., Tokyo, 1999.
3. Lalit Gupta, 'Advanced Composite Materials', Revised Edition, Fourth Reprint, Himalayan Books, 2007.
4. Alan Baker, Stuart Dutton, and Donald Kelly, 'Composite Materials for Aircraft Structures', Second Edition, AIAA, 2004.
5. Krishan K. Chawla, 'Composite Materials: Science and Engineering', Third Edition, Springer, 2013.
6. Ever J. Barbero, "Introduction to Composite Materials Design", CRC Press, Second Edition 2010.

WEBSITE REFERENCES

1. https://nptel.ac.in/courses/101104010/
2. http://www.ae.iitkgp.ac.in/ebooks/chapter1.html
3. https://www.youtube.com/watch?v=0kB0G6WKhKE&list=PLSGws_74K01-bdEEUElQ9-obrujIKGEhg

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Department of Textile Technology

AY: 2018-19 **Date: 15.04.2019**

Action taken report -Employers Feedback

S.No	Analysis	Action taken report
1.	New course on Electrical and electronics application in textiles can be introduced	Course code: U14MCT605 Course Name: Control And Instrumentation for Textile Technology
2.	Innovative teaching in lab can be practised	Proto type model machine and cut model machine installed in labs

Approved by

Dr.Bharathi Dhurai

BoS Chair person

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Department of Textile Technology

AY: 2018-19 **Date: 15.04.2019**

Action taken report -Employers Feedback

S.No	Analysis	Action taken report
1.	New course on Electrical and electronics application in textiles can be introduced	Course code: U14MCT605 Course Name: Control And Instrumentation for Textile Technology
2.	Innovative teaching in lab can be practised	Proto type model machine and cut model machine installed in labs

Proof

Course code: U14MCT605
Course Name: Control And Instrumentation for Textile Technology

U14MCT605	Control and Instrumentation for Textile Technology	L	T	P	C
		3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Classify the measuring instruments by explaining their static characteristics and use basic statistical methods for measurements. (K2, K3)

CO2: Describe the working principle, characteristics of non electrical transducers Such as displacement, velocity, temperature, pressure, humidity, force and light. (K2)

CO3: Explain the working principles of fiber testing methods and machines.

CO4: Choose appropriate transducer for a given textile application. (K3)

CO5: Distinguish manual systems and automation. (K2)

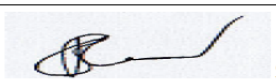
CO6: Summarize various components of automatic control system and write process equation for simple operations related to material handling and feeding systems. (K2, K3)

CO7: Distinguish and describe the architecture, I/O and memory of PLCs with conventional controllers. (K2)

CO8: Write simple PLC program by using logic and special functions. (K3, K5)

Pre-requisites :

1. U14TXT401/Yarn Manufacturing Technology II
2. U14TXT303/ Woven Fabric Manufacturing Technology



Signature of BOS chairman, TXT

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
COs	Programme Outcomes(POs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	S											
CO2	S	S										
CO3	S	S										
CO4	S	S										
CO5												
CO6			M									
CO7				M	M							
CO8				M	M							

Course Assessment methods

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment/ Seminar/ Tutorial 5. End Semester Examination	1. Course end survey

INTRODUCTION TO MEASUREMENT SYSTEMS **5 Hours**

Functional Elements of Measuring Instruments – Classification of measuring instruments and transducers- Static Characteristics of instruments – General working principles of Resistive, capacitive and inductive type transducers with governing equations.

MEASUREMENT OF NON ELECTRICAL PARAMETERS-1* **8 Hours**

Linear and angular displacement : Resistive, capacitive, inductive types and Optics (encoders), proximity sensors

Velocity measurement: tachometers and resolvers

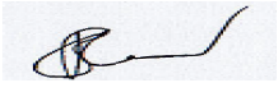
Temperature measurement : only contact type : Bimetallic, RTD, Thermocouple and Thermistor

Humidity: Capacitive and resistive and hot and wet bulbs.

Self study: Fire, smoke and metal detectors.

MEASUREMENT OF NON ELECTRICAL PARAMETERS-2* **7 Hours**

Force measurement: Resistive type strain gauges, Load cells, Universal testing machine and Fiber optic strain gauge- Piezo electric transducers



Signature of BOS chairman, TXT

Pressure measurements : Bellows, diaphragms, capsules and pressure switches
Light : UV, IR, Light emitter and detector
Self Study: Fiber testing : Volume, Evenness, strength (single yarn and fabric) and density

CONTROL SYSTEMS **8 Hours**

Elements of automated control system - Open loop and closed loop systems- process parameter definition- discontinuous controller and continuous controller (P, PID) Comparison of controllers based on relays, electronic circuits and computers- Integration of simple mechanical systems and electrical systems with computer : Material handling Systems, automatic feeding assembly and transfer lines for textile.

PROGRAMMABLE LOGIC CONTROLLERS **8 Hours**

Digital Logic gates - History of PLCs- Types of PLCs - Architecture of PLC - Processor- Memory Units- I/O modules : I/O processing and module selection – Signal processing – Power supply

PLC PROGRAMMING **9 Hours**

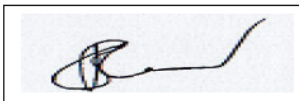
Introduction to IEC 61131 - System functions – sequence control – ladder logic – programming sequences – limitation of ladder programming – logic instruction sets – standard PLC functions – special function relays – data handling instructions – arithmetic instructions – data manipulation – program subroutines – simple programming examples with respect to textile process.

*Emphasis to be given on how these sensors are used in textile industry along with their principles, characteristics and selection.

Theory: 45 Hours **Total: 45 Hours**

REFERENCES

1. Doebelin E O, "Measurement System: Application and Design", McGraw Hill Pub., New York, 1995.
2. Sawhney.A.K, "A course in Electrical and Electronics Measurements and Instrumentation, DhanpatRai and Sons, New Delhi, 2005.
3. Curtis D. Johnson, "Process Control: Instrumentation Technology,"



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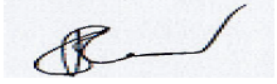
Prentice Hall, 2006
4. Frank D. Petruzella, "Programmable Logic Controllers", McGraw-Hill Companies, 3rd Edition, 2013.
5. Krishna Kant, "Computer – Based Industrial Control", PHI Learning Pvt Ltd, 2nd edition, New Delhi, 2011.
6. Venkatachalam. A and Ashok Kumar L, Monograph on " Instrumentation & Textile Control Engineering" – Nov 05
7. Nalura B C. "Theory and Applications of Automation Controls", New Age International (P) Ltd Pub, 1998.



Signature of BOS chairman, TXT

Proof

Proto type machines and Cut model machine installed in lab

AUTO CONER

Lab Model spinning

Cut model drafting

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Department of Automobile Engineering

AY: 2018-19

Date: 15.04.2019

Action taken report -Employers Feedback

S.No	Analysis	Action taken report
1	Summer internship must be included.	Internship coordinator arranges internships regularly.
2	Periodic visits by faculty and students to industries and get industry projects for students & faculty.	Arranged local visits. Set of students visited Auto Show in Delhi. Faculty visits industries regularly for networking.

Prepared by,

BoS Coordinator

Approved by,

BoS Chairman

Internship/ Student field project/Student exchange / faculty exchange

3.7.1.1:Total number of Collaborative activities per year for research/ faculty exchange/ student exchange/ internship/ on –the-job training/ project work

Sl. No.	Title of the collaborative activity	Name of the collaborating agency with contact details	Name of the participant	Year of collaboration	Duration	Nature of the activity
1	Job Internship	Propel Industries Pvt.Ltd	MUHSINUL ISLAM M M	2020-2021	14.10.2020	Internship
2	Internship on Webinar Mode	National Design and Research Forum, Dr. Ambedkar Veedhi, Bengaluru	Praison Abe Francis S.P	2020-2021	03.08.2020 to 14.08.2021	Internship
3	Workshop Training in Service department	Suryabala Motors & Wheels Pvt. Ltd, Trichy Road, Singanallur, Coimbatore	Thamilarasu PA	2020-2021	23.11.2020 to 10.12.2020	Workshop Training
4	Workshop Training in Service department	Suryabala Motors & Wheels Pvt. Ltd, Trichy Road, Singanallur, Coimbatore	Arvind K R	2020-2021	23.11.2020 to 10.12.2020	Workshop Training
5	Workshop Training in Service department	Suryabala Motors & Wheels Pvt. Ltd, Trichy Road, Singanallur, Coimbatore	Mukilan S	2020-2021	23.11.2020 to 10.12.2020	Workshop Training

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Department of Civil Engineering

AY: 2018-19 **15.04.2019**

Action taken report - Employer Feedback

S.No	Analysis	Action taken report
1.	The course on 'Environmental Sciences and Engineering' must be handled by a Civil Engineering Faculty instead of a first-year faculty.	Suggestion is recorded for implementation in next academic year.
2.	Course contents must be revised to match with the current industrial needs.	All the suggestions and discussions happened during the Board Of Studies are recommended. Periodic seminars/webinars on industry trends ... like, BIM Concept, Modern Construction Methods are conducted .
3.	Levelling concepts especially in the course on U17CEI3202/Surveying may be removed	The topic on Levelling is removed from theory and is offered in practical component.
4.	Lab component or demo experiments can be included in the course on GIS	Theory contents were replaced with application-oriented content.

Prepared by,

BoS Coordinator

Approved by,

BoS Chairman

U18CEI3202	ENGINEERING SURVEY	L	T	P	J	C
		3	0	2	0	4

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Carry out area and volume measurements for the given land.
CO2: perform angular measurement, elevation and distance of an object.
CO3: Set out the curves
CO4: Conduct survey works using total station
CO5: Apply the concepts of satellite and characteristics of different platforms of GPS surveying

Course Objectives

- Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering and surveying activities
- Translate the knowledge gained for the implementation of Civil infrastructure facilities
- Relate the knowledge on Surveying to the new frontiers of science like Hydrographic surveying, Electronic Distance Measurement, Global Positioning System, Photogrammetry and Remote Sensing

Pre-requisites : Nil

COs	Programme Outcomes(POs)												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	S	M										M		
CO2		M	S			M								
CO3					S	M								M
CO4					S	M				M			S	M
CO5					S					M				

Course Assessment methods

1. Continuous Assessment Test I, II
2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Discussion.
3. End Semester Examination

BASIC SURVEYING	9 Hours

Principles, Linear measurements – Conversions - Chain – Tape – Ranging. Compass surveying – types – Error Corrections. Introduction to Levelling- Contours- Areas and volume calculation.

THEODOLITE AND TACHEOMETRY SURVEYING	9 hours

Theodolite survey: Measurement of horizontal angle, vertical angle and distance; Horizontal and vertical control -triangulation - Signals. Baseline - Tacheometric surveying- types

CURVES & HYDROGRAPHIC SURVEY	9 Hours

Signature of the Chairman
BOS/Civil Engineering

Elements of simple curve, compound curve, Reverse curve, Transition curve and Vertical curves - Methods of setting out of simple curve - Introduction to hydrographic surveying- Tides-MSL- Sounding methods- Three-point problem.

MODERN FIELD SURVEY SYSTEMS	**9 Hours**

Principle of Electronic Distance Measurement, Modulation, and Types of EDM instruments, Total Station – Parts of a Total Station – Accessories –Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey. Care and maintenance of Total Station instruments.

GPS SURVEYING	**9 Hours**

Basic concepts – Different segments- space, control and user segments-satellite configuration- signal structure- orbit determination and representation -Task of control segment- Hand held and Geodetic receivers-data processing-Traversing and triangulation. Fundamentals of Photogrammetry and Remote sensing.

Practical Work:

1. Setting out of Foundation by Ranging and Chaining.
2. Find the Reduced level of points using Fly levelling
3. Find the Reduced level of points using Check levelling
4. Measurement of horizontal angles by Reiteration and Repetition Method
5. Determination of gradient of line by Tacheometric surveying - Tangential system - Stadia system
6. Setting out of Simple curve (right/left-handed).
7. Determine the area of the given location using Total station
8. Determine the height and distance of the point by Single plane method and Double plane method using Total Station
9. Mark the column points in the field by using Total Station

Theory: 45 Tutorial: 0 Practical:30 Project: 0 Total: 75Hours

REFERENCES

1. Dr. B.C. Punmia, Ashok Kumar Jain, Ashok Kr. Jain, Arun Kr. Jain, Surveying (Volume –I and II), Lakshmi Publications, 17th Edition, 2016
2. Duggal S K., Surveying, Vol-I and II, MCGraw Hill Education(India) Private Limited, 4th Edition, 2013.
3. Basak N N, Surveying& Levelling, Tata McGraw-Hill Education,2nd Edition, 2014
4. Madhu, N, Sathiskumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2nd Edition, 2017.
5. Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011
6. Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2nd Edition, 2016
7. Anji Reddy, M., Remote sensing and Geographical information system, B.S. Publications, 4th Edition, 2012.

Signature of the Chairman
BOS/Civil Engineering

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Department of Computer Science and Engineering

AY: 2018-19 **Date: 15.04.2019**

Action Taken Report -Employers Feedback

S.No	Analysis	Action Taken Report
1.	Employer suggested to include Data migration software along with RPA. The student must be equipped to practice Agile software development.	Data Migration included in U18CSI6203 - Data warehousing and Data Mining course. Syllabus updated in the course U17CSI4204- Software Engineering course is modified with emphasis on practical component and tools.
2.	Domain specific inputs, case studies and field work shall be encouraged as a part of course duration.	Projects based on case studies are given in U17CSI4204-Software Engineering course.

Prepared By

(Feedback/BoS Coordinator)

(Dr. D. Chandrakala)

Approved By

(Signature of Bos Chairman)

(Dr. J. Cynthia)

Professor & Head
Department of
Computer Science and Engineering
Kumaraguru College of Technology
COIMBATORE-641 006. INDIA

Proof for ATR. Pt. 1

U18CSI6203 DATA WAREHOUSING AND DATA MINING

L	T	P	J	C
3	0	2	0	4

COURSE OUTCOMES

AFTER SUCCESSFUL COMPLETION OF THIS COURSE, THE STUDENTS SHOULD BE ABLE TO

CO1: Demonstrate data warehouse schema and process of data retrieval for real time applications. [K3]

CO2: Identify necessity of data pre-processing and apply the appropriate procedure. [K4, S2]

CO3: Design and deploy appropriate Classification/ Clustering techniques for various problems with high dimensional data using modern tools. [K5, S2]

CO4: Apply the association rules for real life mining applications. [K4, S2]

CO5: Synthesize various mining techniques and work in teams to develop project on complex data objects. [K5, S3]

Pre-requisite: U18CSI5203/No SQL Databases

CO/PO MAPPING (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													CO/PSO Mapping		
COs	PROGRAMME OUTCOMES (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	S	S		M		S		S		M	S	M		M	
CO2	S	M		S	M					M		M		M	
CO3	S	S	M	S	S		S		M	M	S	M		M	
CO4	S	M			M					M		M		M	
CO5		S		S	S			S	S	M	S	M	M	M	M

COURSE ASSESSMENT METHODS

DIRECT
1. Continuous Assessment Test I, II (Theory component)
2. Open Book Test, Assignment; Journal Paper Review, Group Presentation, Project Report, Poster Preparation, Case Study, Prototype or Product Demonstration etc (as applicable) (Theory component)
3. Pre/Post - Experiment Test/Viva; Experimental Report for each Experiment (lab Component)
4. Model Examination (lab component)
5. End Semester Examination (Theory and lab components)
INDIRECT
1. Course-end survey

S. Sheela.

Signature of BOS chairman, CSE

THEORY COMPONENT CONTENTS

DATA MINING INTRODUCTION AND PREPROCESSING 9 Hours

KDD Process – Kinds of data can be mined – Kind of data can be mined – Technologies used – Kinds of Applications targeted – Issues in data mining - Data Objects and Attribute Types - Data preprocessing overview – Data Cleaning – Data Integration – Data Reduction – Data Transformation and Discretization.

DATA WAREHOUSING AND ONLINE ANALYTICAL PROCESSING 9 Hours

Data warehouse – Basic Concepts –Modeling - Data cube and OLAP – Data warehouse Design and Usage – Implementation - Data Generalization by Attribute Oriented Induction.

ASSOCIATION AND CLASSIFICATION 10 Hours

Frequent Pattern Mining – Basic Concepts – Frequent Itemset Mining methods - Classification Basic Concepts – Decision Tree Induction – Bayesian Classification – Rule Based Classification – Model Evaluation and Selection - Support Vector Machine - Lazy Learners – Other classification methods.

CLUSTERING AND OUTLER ANALYSIS 8 Hours

Cluster Analysis – Partitioning Methods - Hierarchical Methods – Density Based Methods – Grid Based Methods – Evaluation of Clustering - Outlier Analysis – Outlier detection Methods.

MINING COMPLEX DATA TYPES 9 Hours

Business Intelligence in the Era of Big Data and Cognitive Business - Time Series and Sequence Mining – Mining graphs and networks – Web Mining – Spatial Mining – Text Mining – Multimedia Mining – Data Mining Applications.

Theory: 45	Tutorial: 0	Practical: 0	Project: 0	Total: 45 Hours

REFERENCES

1. Jiawei Han, Micheline Kamber, Jain Pei "Data Mining: Concepts and Techniques", Third edition, Elsevier, Morgan Kaufmann Publishers, 2012.
2. Alex Berson and Stephen J. Smith "Data Warehousing, Data Mining & OLAP", Tata McGraw– Hill Edition, Tenth Reprint 2007.
3. Steve Williams, "Business Intelligence Strategy and Big Data Analytics", First Edition, Elsevier, Morgan Kaufmann Publishers, 2016.
4. K.P. Soman, Shyam Diwakar and V. Ajay "Insight into Data mining Theory and Practice",Easter Economy Edition, Prentice Hall of India, 2006.
5. Hand.D, Mannila H, Smyth.P, "Principles of Data Mining", MIT press, USA,2001.
6. Dunham M, "Data Mining: Introductory and Advanced Topics", Prentice Hall, New Delhi, 2002.

S. Murali.

Signature of BOS chairman, CSE

E BOOKS AND ONLINE LEARNING MATERIALS

1. www.db.standford.edu/`ullman/mining/mining.html
2. ocw.mit.edu/ocwweb/slon-School-ofmanagement/15-062DataMiningSpring2003/course home/index.htm
3. https://cs.nyu.edu/courses/spring03/G22.3033-015/
4. https://www.cs.purdue.edu/homes/clifton/cs490d/
5. https://freevideolectures.com/course/3609/data-warehousing
6. https://www.elsevier.com/books/business-intelligence-strategy-and-big-data-analytics/williams/978-0-12-809198-2
7. https://www.sciencedirect.com/science/article/pii/B9780128091982000026

LAB COMPONENT CONTENTS

30 Hours

LIST OF EXPERIMENTS

1. Data Migration(Informatica)
2. Identification and Retrieval of dataset. (Kaggle/UCI Repository)
3. Statistical Descriptions of Data (R/Python)
4. Pre-processing of datasets using data mining tools. (Weka)
5. Implementation of Classification Algorithms (Python)
6. Implementation of Clustering Algorithms (Python)
7. Exercise on Discovering Association Rules (Python)
8. Comparison of classifiers model, evaluating and improving accuracy of models using data mining tool. (Weka/R)
9. Evaluation of various clustering methods using data mining tool. (Weka/R)
10. Build prediction/recommender data mining applications for real time problems.

Theory: 0	Tutorial: 0	Practical: 30	Project: 0	Total: 30 Hours

ONLINE COURSES AND VIDEO LECTURES:

1. https://www.edx.org/learn/data-mining
2. https://www.class-central.com/subject/data-mining\
3. https://www.edx.org/course/introduction-to-r-for-data-science
4. https://www.coursera.org/learn/data-mining-project
5. https://www.futurelearn.com/courses/data-mining-with-weka
6. https://www.datacamp.com/courses/intro-to-python-for-data-science

S. Sheela.

Signature of BOS chairman, CSE

Proof for ATR PT. 2 & 1

U17CSI4204 **SOFTWARE ENGINEERING**

L	T	P	J	C
3	0	2	0	4

COURSE OUTCOMES

AFTER SUCCESSFUL COMPLETION OF THIS COURSE, THE STUDENTS WILL BE ABLE TO:

CO1	Design an application using UML modeling.	**[K4,S2]**
CO2	Test the given application with various test case using a testing tool	**[K4,S2]**
CO3	Create an application with all the stages of software engineering lifecycle	**[K5,S3]**
CO4	Apply project management and change management	**K3**

Pre-requisite: U17CSI3202 - Object Oriented Programming

CO/PO MAPPING (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												CO/PSO Mapping		
COs	PROGRAMME OUTCOMES (POs)												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	S				M				M			M		
CO2	M	M	S						M	M		M	M		
CO3	M		M						M	M	M	M	M		
CO4	M										S	M			

COURSE ASSESSMENT METHODS

DIRECT
1. Continuous Assessment Test I, II
2. Assignment; Project Demo and Presentation
3. End Semester Examination
INDIRECT
1. Course-end survey

THEORY COMPONENT CONTENTS

INTRODUCTION TO SOFTWARE ENGINEERING AND UML **9 Hours**

The Nature of Software -Software Engineering Failures- Software Engineering - Software Process Structure - Software Lifecycle Models - Agile Development - Scrum - Prototyping- Modeling with UML -Modeling Concepts

S. Sheriali.

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PROJECT MANAGEMENT AND REQUIREMENTS ANALYSIS **9 Hours**

Project Organization Concepts - Project Communication Concepts - UML Activity Diagram- Requirements Elicitation - Usability - Requirement Analysis - UML Use Case Diagram - UML Analysis Object Class Diagram

DESIGN **9 Hours**

System Design Concepts-System Design Activities: From Objects to Subsystems- Patterns - Architectural Patterns - UML Component and Deployment Diagram - Object Design - Design Patterns - UML Class and Communication Diagram

MAPPING MODELS TO CODE & TESTING **9 Hours**

Mapping Models to Code- Overview of Mapping - Mapping Concepts- Mapping Activities - Managing Implementation-Testing- Overview of Testing- Testing Concepts-Faults, Erroneous States, Failures-Test Cases-Test Stubs and Drivers- Corrections-Testing Activities- Component Inspection – Usability Testing-Unit Testing-Integration Testing-System Testing-Managing Testing-Planning Testing-Documenting Testing-Assigning Responsibilities-Regression Testing-Automating testing

MANAGING CHANGE **9 Hours**

Rationale Management- Overview of Rationale - Rationale Concepts- Rationale Activities: from Issues To Decisions-Managing Rationale- Configuration Management Concepts- Configuration Management Activities - Managing Configuration Management

Theory: 45	Tutorial: 0	Practical: 0	Project: 0	Total: 45 Hours

REFERENCES

1. Bernd Bruegge & Allen H. Dutoit, "Object-Oriented Software Engineering", Third Edition, 2014.
2. R.S. Pressman, "Software Engineering – A Practitioner"s Approach", Eighth Edition, McGraw Hill International Edition, 2015
3. Ivar Jacobson, "Object-Oriented Software Engineering", Pearson Education, Revised Edition 2009.
4. Stephen R.Schach, "Object-Oriented Classical Software Engineering", Mcgraw Hill, Eighth Edition 2010.
5. S. Thangasamy, "Essentials of Software Engineering", Wiley India, First Edition, 2012.
6. Yogesh Singh, "Object-Oriented Software Engineering", 2012.
7. M. Blaha and J. Rumbaugh, "Object Oriented Modeling and Design with UML", Second Edition, Prentice-Hall India, 2007.

S. Srinath.

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LAB COMPONENT CONTENTS

LIST OF EXPERIMENTS **30 Hours**

To choose a real use case-based software development project, design, develop and test the software system with following milestones.

Milestones

1 Identify a application and model it using UML Use-Case Diagrams.(Star UML/ArgoUML/..)
2 Software Requirement Specification & UML Analysis Object Design Diagram
3 Module Description, Design & UML Component Diagram
4 Detailed Design & UML Deployment Diagram
5 Implementation & UML Object Design Class Diagram
6 Testing (Selenium tool/SonarQube/…)

Theory: 0	Tutorial: 0	Practical: 30	Project: 0	Total: 30 Hours

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KUMARAGURU COLLEGE OF TECHNOLOGY, COIMBATORE-641049

(An Autonomous Institution affiliated to Anna University, Chennai)

Action Taken Report -Employer Feedback

Department of Electronics and Communication Engineering

Academic Year: 2018 – 2019

Date: 15.04.2019

S.No	Feedback	Action Taken
1.	Radar and Navigational aids need to be introduced instead of GPS	GPS course was replaced with U17ECE0005-RADAR and Navigational Aids
2.	Optical communication syllabus to be revised with optical networking concepts.	Optical networking concepts were included in U17ECI7203-Optical Communication course
3.	Options for Internship/Industry projects to be included in the curriculum.	Internship with industry project was included in the P18COP3701-Project Phase I and P18COP4701-Project Phase II

Prepared By,

BoS Coordinator

Approved By,

BoS Chairman

Proof for Action Taken 1: GPS course was replaced with U17ECE0005-RADAR and Navigational Aids

Professional Electives									
S.No	Course code	Course Title	Course Mode	CT	L	T	P	J	C
Communication System									
1	U17ECE0001	Cognitive Radio	Theory	PE	3	0	0	0	3
2	U17ECE0002	Satellite Communication	Theory	PE	3	0	0	0	3
3	U17ECE0003	MIMO systems	Theory	PE	3	0	0	0	3
4	U17ECE0004	Advanced Wireless Communication	Theory	PE	3	0	0	0	3
5	U17ECE0005	RADAR and Navigational Aids	Theory	PE	3	0	0	0	3
Signal Processing									
1	U17ECE0011	Digital Image Processing	Theory	PE	3	0	0	0	3
2	U17ECE0012	Multimedia and Compression	Theory	PE	3	0	0	0	3
3	U17ECE0013	Biomedical Signal Processing	Theory	PE	3	0	0	0	3
4	U17ECE0014	Machine Learning	Theory	PE	3	0	0	0	3
5	U17ECE0015	Statistical Signal processing	Theory	PE	3	0	0	0	3
Communication Networks									
1	U17ECE0021	Adhoc wireless networks.	Theory	PE	3	0	0	0	3
2	U17ECE0022	High speed networks.	Theory	PE	3	0	0	0	3
3	U17ECE0023	Network security	Theory	PE	3	0	0	0	3
4	U17ECE0024	Wireless system and standards	Theory	PE	3	0	0	0	3
5	U17ECE0025	Graph theory and its applications.	Theory	PE	3	0	0	0	3
RF and Antenna									
1	U17ECE0031	RF MEMS	Theory	PE	3	0	0	0	3
2	U17ECE0032	RF System Design	Theory	PE	3	0	0	0	3
3	U17ECE0033	Electromagnetic Interference and Compatibility	Theory	PE	3	0	0	0	3
4	U17ECE0034	Computational Electromagnetics	Theory	PE	3	0	0	0	3
VLSI									
1	U17ECE0041	VLSI testing and testability	Theory	PE	3	0	0	0	3
2	U17ECE0042	System design with FPGA	Theory	PE	3	0	0	0	3
3	U17ECE0043	System on Chip	Theory	PE	3	0	0	0	3
4	U17ECE0044	Nano Electronics	Theory	PE	3	0	0	0	3
5	U17ECE0045	Low power VLSI	Theory	PE	3	0	0	0	3
Embedded System									
1	U17ECE0051	Industrial Robotics	Theory	PE	3	0	0	0	3
2	U17ECE0052	Industrial Automation	Theory	PE	3	0	0	0	3
3	U17ECE0053	Virtual Instrumentation	Theory	PE	3	0	0	0	3
4	U17ECE0054	Real time Embedded Systems	Theory	PE	3	0	0	0	3
5	U17ECE0055	Automotive Electronics	Theory	PE	3	0	0	0	3

Signature of BOS chairman, ECE

Proof for Action Taken 2: Optical networking concepts were included in U17ECI7203-Optical Communication course

U17ECI7203 **OPTICAL COMMUNICATION**

L	T	P	J	C
3	0	2	0	4

Course Outcomes (COs):

After successful completion of this course, the students should be able to

CO1: Discuss optical fiber communication link structure, characteristics of fiber and fabrication techniques (K2).

CO2: Measureand analyzethe propagation characteristics of an optical signal in different types of fibers (K4,S3).

CO3: Analyze the characteristics of different optical sources (K3,S3).

CO4: Inspect the optical receivers and amplifiers of an optical transmission system (K3,S3).

CO5: Analyze optical fiber transmission system(K4,S3).

CO6: Outline basic optical network concepts and components involved (K2).

Pre-requisites: -

CO/PO Mapping:
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	PROGRAMME OUTCOMES													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		S							S					M
CO2	S	M	M						S					S
CO3		S	M						S					S
CO4		S	M						S					S
CO5		S	M						S					M
CO6		S	M						S					M

Course Assessment Methods

DIRECT
Continuous Assessment Test I, II (Theory Component) Assignment (Theory Component) Pre/Post - experiment Test/Viva; Experimental Report for each experiment (Lab component) Model examination (Lab component) End Semester Examination (Theory and Lab component)
INDIRECT
Course-end survey

Signature of BOS chairman, ECE

THEORY COMPONENT CONTENT:

INTRODUCTION TO OPTICAL FIBERS **08 Hours**

Introduction to Optical Communication – key elements of an Optical Fiber system–Ray Optics–Optical Fiber Modes and Configurations–Overview of Modes–Power flow in Step index fibers- Single Mode Fibers -Graded Index fibers- Optical fiber fabrication techniques – Passive optical components – Optical couplers and isolators.

SIGNAL DEGRADATION IN OPTICAL FIBERS **11 Hours**

Attenuation –Core and Cladding losses, Signal Distortion in Optical Fibers-Information Capacity determination – Group Delay–Material Dispersion–Waveguide Dispersion– Signal distortion in Single Mode fibers – Polarization Mode dispersion, Design optimization of Single Modefibers, special fibers.

FIBER OPTICAL SOURCES AND COUPLING **10 Hours**

Direct and indirect Band gap materials -LED structures –Light source materials–Quantum efficiency and LED power– Modulation of LED, laser Diodes-Modes and Threshold condition–External modulation– Quantum-well laser, Laser sources for free space communication.

FIBER OPTICAL RECEIVERS AND AMPLIFIERS **08 Hours**

PIN– avalanche photodiode *(APD),*Photodetectornoise–SNR, Avalanche Multiplication Noise — Fundamental Receiver Operation –digital receiver performance – probability of error- quantum limit, Receiver sensitivity, Optical amplifier -erbium-doped fiber amplifier *(EDFA).*

OPTICAL TRANSMISSION SYSTEM AND NETWORK **08 Hours**

Point-to-Point links- system considerations–Link Power budget –Rise time budget, Networking Concepts: SONET/SDH optical networks, WDM optical networks, layered optical network architecture.

REFERENCES:

1. GerdKeiser, "Optical FiberCommunications" Tata McGraw–Hill education private Limited, NewDelhi, fifth Edition, 2013.
2. Rajiv Ramaswami and Kumar.N.Sivarajan, "Optical networks: A practical perspective", Morgan Kaufmann, Third Edition, 2009.
3. J.Senior, "Optical Communication Principles and Practice", Prentice Hall of India, third Edition,2004.
4. J. Gower, "Optical Communication System", Prentice Hall ofIndia, 2001.
5. Yarvi. A. "Quantum Eletronics",JohnWiley, 4th edition, 1995.
6. Max Ming–Kang Liu, "Principles and applications of Optical communications" Tata McGraw Hill, 1996.

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Proof for Action Taken 3: Internship with industry project was included in the P18COP3701-Project Phase I and P18COP4701-Project Phase II

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REGULATIONS 2018

M.E. COMMUNICATION SYSTEMS
CURRICULUM

SEMESTER I							
Course Code	**Course Title**	**Course Mode**	**L**	**T**	**P**	**J**	**C**
P18INT0001	Research Methodology and Statistics	Theory	3	0	0	0	3
P18COT1001	RF and Microwave Integrated Circuits	Theory	3	0	0	0	3
P18COI1202	Advanced Signal Processing	Embedded	3	0	2	0	4
P18COI1203	Advanced Digital Communication Techniques	Embedded	3	0	2	0	4
P18MAT0101	Applied Mathematics	Theory	3	1	0	0	4
						Total Credits	**18**
						Total Hours per week	**20**
SEMESTER-II							
Course Code	**Course Title**	**Course Mode**	**L**	**T**	**P**	**J**	**C**
P18COT0004	High Performance Networks	Theory	3	0	0	0	3
P18COT2001	Wireless Sensor Networks	Theory	3	0	0	0	3
P18COI2202	Advanced Radiation Systems	Embedded	3	0	2	0	4
P18COI2203	Wireless Communication Systems	Embedded	3	0	2	0	4
P18COE____	Professional Elective I	Theory	3	0	0	0	3
						Total Credits	**17**
						Total Hours per week	**19**
SEMESTER-III							
Course Code	**Course Title**	**Course Mode**	**L**	**T**	**P**	**J**	**C**
P18COE____	Professional Elective II	Theory	3	0	0	0	3
	Audit Course						
P18COP3701	Project Phase I / Industry Project	Project	0	0	0	24	12
						Total Credits	**15**
						Total Hours per week	**27**
SEMESTER-IV							
Course Code	**Course Title**	**Course Mode**	**L**	**T**	**P**	**J**	**C**
P18COP4701	Project Phase II/ Industry Project	Project	0	0	0	36	18
						Total Credits	**18**
						Total Hours per week	**36**

Grand Total Credits: 68

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Department of Electronics & Instrumentation Engineering

AY: 2018-19 15.04.2019

Action taken report -Employers Feedback

S.No	Analysis	Action taken report
1.	Change the title of the elective U18EIE0007 - Sensor and data fusion into sensor and data analytics.	Shall be considered in future.
2.	Remove the word technology from the title of the course U18EIE0004 "Robotics technology and flexible Automation"	Incorporated.
3.	Include digital transformation concepts like artificial intelligence and machine learning.	Incorporated in the syllabus
4.	Professional communication can be offered in every semester as students getting placed in software industries lack in communication skills	This point could not be incorporated as the number of credits will increase.
5.	Industrial visit can be planned for the course U18EIT4004 - MEMS and Sensor design.	Will be incorporated based on feasibility
6.	Intellisuite Educational version shall be purchased to help students learn about the design of micro pumps, micro gears and design based on cantilever beam.	Shall be incorporated based on feasibility

Prepared by

V. Manimekalai AP/EIE

BoS Coordinator

Approved by

BoS Chairman

Proof for ATR point No 2

U18EIE0004 **ROBOTICS AND FLEXIBLE AUTOMATION**

L	T	P	J	C
3	0	0	0	3

Course Outcomes (CO):

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

CO1: Describe the major concepts, components and applications of robotics (K2)

CO2: Analyze the transformation in different types of robots.(K4)

CO3: Apply the fundamental concepts of robotics path planning & work space.(K3)

CO4: Describe the technology and evaluation strategies (K2)

Pre-requisite: Nil

COs	PO												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	M	L												
CO2	S		M										M	
CO3	S	M												
CO4	S												M	

Course Assessment Methods:	
Direct	**Indirect**
• Internal Tests • Assignment • End semester exams	• Course Exit Survey

Course Content:

CONCEPT OF ROBOTICS **9 Hours**

Introduction – types of robots – classification and specifications – various manipulators – elements of robots – different kinds of actuators – types of transmissions – purpose of sensors – encoders – tachometers – force & torque sensor – vision sensor – robot end effectors.

CO-ORDINATE TRANSFORMATION **9 Hours**

Direct knematic problem in robotics – geometry based direct kinematic analysis co-ordinate & vector transformation using matrices – direct & inverse kinematic analysis for Four axis SCARA robot – five and six articulated robots – homogeneous transformation.

WORK SPACE ANALYSIS AND TRACJECTORY INTERPOLATION **9 Hours**

Work envelope of a four axis SCARA robot and five axis Articulate robot – the pick and place operation – the necessity of interpolations – the tracjectory planning – structure of interpolators.

FLEXIBLE AUTOMATION TECHNOLOGY **9 Hours**

Introduction to Flexible Automation (FA) – FA tools – FA vs robotic technology – flexibility of robotization plan – group technology – grouping methods – data acquisitions – evaluation strategies – planning for robot installation.

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ROBOT APPLICATIONS **9 Hours**

Robot applications in manufacturing – material transfer and loading/unloading – processing operation like welding & painting – assembly operation – inspection automation – robot cell layouts – multiple robots & machine interference – social aspects of robotics – future applications.

Theory Hours: 45	Practical Hours: 0	Total Hours: 45

REFERENCES:

1. Automation, Production System & Computer Integrated Manufacturing Groover Prentice Hall India
2. Principles of Automation & Automated Production Process Malov and Ivanov Mir Publication
3. Automation in Production Engineering Oates and Georgy Newness -
4. Stochastic Models of Manufacturing Systems Buzacott & shanty Kumar Prentice Hall India
5. Robotics K.S. Fu, R.C. Gonzalez, C.S.G. Lee McGraw Hill
6. Robotics J.J. Craig Addison-Wesely
7. Robot Engineering: An Integrated Approach R.D. Klafter, t.a. Chmielewski and M. Negin Prentice
8. Robotics & Control – R.K. Mittal & I.J. Nagrath – TMH Publications
9. Robotics for engineers - Yoram Korean- McGrew Hill Co.
10. Industrial Robotics Technology programming and Applications - M.P.Groover, M.Weiss, R.N.Nagel, N.G.Odrey.
11. Robotics Technology and flexible automation, S.R. Deb, TataMcGraw-Hill Education., 2009

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Proof for ATR point 2

PROFESSIONAL ELECTIVE
GENERAL

U17EIE0013 ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

L	T	P	J	C
3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to:

CO1: Able to understand the practical aspects of data science and its evolution and apply the concepts and methods to solve problems in real-world contexts.

CO2: Able to understand and code basic programs in Python language that pertains to the use of machine learning and related algorithms, Gain knowledge about basic concepts of Machine Learning.

CO3: Develop scaling up machine learning techniques and associated computing techniques and technologies for various applications integrating with the standard ML Libraries.

CO4: Able to understand the deep learning techniques and develop a basic DNN using Tensor flow.

COs	Programme Outcomes (POs)												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1 (K2)	S	M	S	S			M			M		M		M
CO2 (K3)	M	M	S	M		M						M		M
CO3 (K3)	M	S	W	W			S			S				S
CO4 (K3)	M	M	S	S				S			S	M		S

S-Strong M-Medium L-Low

Course Assessment methods:

Direct	Indirect
Continuous assessment tests Assignments End Semester Exam	Course exit survey

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Course content

Introduction to Artificial Intelligence and Machine learning Basics **9 Hrs**

Terminologies and differences between them – Artificial Intelligence, Machine Learning, Deep Learning. Data Analytics, Data Science & AI – The Connection, History of AI (evolution of AI) Real world use cases of AI.

Types of Machine Learning – Supervised, Unsupervised and Reinforcement, Basic ML process, Cost functions, Bias and Variance, Regularization

Python for ML and ML algorithms **12 Hrs**

Introduction to python, Variables, Data types, List and Tuple operations, Import, Conditional statements, Functions.

Linear Regression, Logistic Regression, Support Vector Machines, K-Nearest Neighbours, Decision Tree, Random Forest

ML Libraries and Case studies **19 Hrs**

Numpy (key operations), Pandas (Series, DataFrame, key operations), Matplotlib (basic plotting), Seaborn (key plots), Scikit-learn(key algorithms and operations). Case study - Regression problem, Classification problem

Deep Learning **5 Hrs**

Introduction, Forward propagation, Back propagation, Optimizers, Types - Dense Neural Networks (DNN), Convolutional Neural Networks (CNN), Recurrent Neural Networks (RNN), Introduction to Tensor flow, Building a basic DNN using Tensorflow.

TEXT BOOKS:

1 S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approachl, Prentice Hall, Third Edition, 2009.

2 I. Bratko, —Prolog: Programming for Artificial Intelligencel, Fourth edition, Addison-Wesley Educational Publishers Inc., 2011.

3. Tom M. Mitchell, Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.

4. Stephen Marsland, Machine Learning: An Algorithmic Perspective, CRC Press, 2009.

BOS Chairman

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Department of Fashion Technology

AY: 2018-19

Action taken report -Employers Feedback

Date : 15.04.2019

S.No	Analysis	Action taken report
1.	Two hours lab should be extended to 4 hours (2 credits) for important lab courses.	The lab component is provided with one credit. Extra time is provided to the students to complete the experiments.
2.	A new course on home textiles can be provided in the curriculum	The course on U18FTE0011 home furnishings is given as elective course in apparel technology track.
3.	Boutique management can be given to the students to make them as an entrepreneur.	U18FTE0004 Boutique management is added in the curriculum under fashion design track.
4.	To provide more knowledge on Indian traditional designs, a new course on "traditional Indian textiles and crafts" can be provided in the curriculum.	As an elective course, U18FTE0005 traditional Indian textiles and crafts are added under fashion design track.

PreparedBy,

BoS Coordinator

Approved By,

BoS Chairman

Sl.No:2 – A new course U18FTE0011 home furnishings is introduced in electives.

Apparel Technology									
1	U18FTE0007	Clothing science for Apparel Engineering	Theory	PE	3	0	0	0	3
2	U18FTE0008	Apparel Finishing and Care	Theory	PE	3	0	0	0	3
3	U18FTE0009	Functional Clothing	Theory	PE	3	0	0	0	3
4	U18FTE0010	ERP and MIS in Apparel Industry	Theory	PE	3	0	0	0	3
5	U18FTE0011	Home Furnishings	Theory	PE	3	0	0	0	3
6	U18FTE0012	Garment Trims and Accessories	Theory	PE	3	0	0	0	3

U18FTE0011 HOME FURNISHINGS

Course Outcomes

After successful completion of this course, the students should be able to

CO1	Generalize knowledge about the varieties of home furnishing materials and finishing methods	K3
CO2	Developing skills in the selection of different varieties of home furnishing materials in terms of sizes, shapes and patterns and construction methods	K4
CO3	Analyze the knowledge on suitability of furnishings and coverings for living room.	K4
CO4	Analyze the knowledge on suitability of various types of linens and its end uses	K4
CO5	Analyze the knowledge on suitable care & maintenance of home furnishing materials.	K4
CO6	Assess the varieties of home furnishing products and its end uses	K4

Pre Requisite : Nil

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	M												S	M
CO2		S	M											
CO3	M	M											M	M
CO4		M	M										M	
CO5			M											
CO6			M										M	M

Course Assessment methods

Direct	Indirect
1. Internal tests 2. Assignment 3. Group Presentation 4. End Semester Exam	1.Course Exit Survey

Course Content

INTRODUCTION **9 Hours**

Definition & introduction to textile furnishings. Different type of furnishing materials – woven and nonwoven. Factors affecting selection of home furnishing – fiber, yarn, fabric & finishes. Finishes for home furnishings – soil repellency, mosquito repellency, flame proofing, dust repellency, anti microbial finish.

WINDOW TREATMENT **9 Hours**

Doors and Windows - types. Window treatment –exterior, interior - hard and soft. Curtains and Draperies – types, parts, factors for selection and construction, accessories used.

LIVING ROOM FURNISHING **4 Hours**

Living Room furnishings - sofa cover, cushion, cushion cover, bolster, bolster cover, teapoy cover. Wall coverings – types.

FLOOR COVERING **5 Hours**

Floor covering – types – Hard floor covering, resilient floor coverings, and soft floor coverings -carpet, rugs, mats.

BED AND BATH LINEN **9 Hours**

Bed linens– types– bed sheets, blankets, blanket covers, comforters, comforter covers, bed spreads, mattress and mattress covers, pads, pillows and pillow covers. Care and maintenance of bedlinen.

Bathlinen & its types- towel, mats. Care and maintenance of bathlinen.

KITCHEN LINEN **4 Hours**

Kitchen linens – types - dish cloth, towels, fridge cover, fridge handle cover, mixie cover, and grinder cover, napkin, apron.

TABLE LINEN **5 Hours**

Table Linen – Types - tablemats, table cloth, hand towel, doilies, runners. Cleaning materials – wipes andmops. Care and maintenance of kitchen and table linen.

Theory: 45 Hours **Total: 45 Hours**

REFERENCES

1. Jay Diamond and Ellen Diamond, "Fashion Apparel, Accessories, Home Furnishings",PearsonPrenticeHall,NewJersey,2007.
2. Hamlym, "Bed and Table linen", Octopus Publishing Group Ltd, Newyork 2001.
3. David Holloway, "The Essential Book of Home Improvement Techniques", Marshals Publications, London, 2000.
4. Emma Callery, "The Home Decorator's Colour Source Book", Apple Press Ltd, London, 2006.
5. Heather Luke, "Design and Make Cushions", Silverdale Books Ltd, Leicester, 2001.
6. Hamlym, "Curtains and Blinds", Octopus Publishing Group Ltd, Newyork, 2001.
7. Susie Johns, "A Cornucopia of Cushions", Apple Press Ltd, London, 1997.
8. James Merrell, "Living with Decorative Textiles, "Thames and Hudson ltd, London,1995.
9. Caroline Lebea, "Fabrics the Decorative Art of Textiles", Thames and Hudson Ltd, London, 1994

Sl.No:3 – A new course U18FTE0004 Boutique management is added in the curriculum under fashion design track

Programme Electives									
S.No	Course code	Course Title	Course Mode	CT	L	T	P	J	C
Fashion designing									
1	U18FTE0001	Apparel Product Development	Theory	PE	3	0	0	0	3
2	U18FTE0002	Surface Ornamentation	Theory	PE	3	0	0	0	3
3	U18FTE0003	Visual Merchandising	Theory	PE	3	0	0	0	3
4	U18FTE0004	Fashion Boutique Management	Theory	PE	3	0	0	0	3
5	U18FTE0005	Traditional Indian Textiles and Crafts	Theory	PE	3	0	0	0	3

U18FTE0004 FASHION BOUTIQUE MANAGEMENT

Course Outcomes
After successful completion of this course, the students should be able to

CO1	Acquire knowledge on creating a business plan	K3
CO2	Analyze the factors affecting boutique design and development	K4
CO3	Acquire knowledge on boutique operations management	K3
CO4	Create new strategies for marketing and promotion	K6
CO5	Understand the procedure for financial planning and startup formalities	K5
CO6	Develop project proposal to start a Fashion Boutique	K6

Pre Requisite : Nil

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak														
COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO12	PSO 1	PSO 2
CO1	M			S			S						M	
CO2		M	S		S	S	S			S		M	W	
CO3		S	S		S	S	S	S		S		S	S	S
CO4		M		S	M				S	S		S	S	S
CO5		S									S	M	S	
CO6				S					M	M	S		S	

Course Assessment methods:

Direct	Indirect
1. Internal tests 2. Assignment 3. Group Presentation 4. End Semester Exam	1. Course Exit Survey

Course Content

Business plan **9 Hours**

Scope for boutiques – creation of business plan for starting a boutique- parts of a business plan – components of a business plan – types of business plans – Competitive analysis & case study analysis -Assessment of Feasibility (Technical, Financial & Marketing) - finding the right plan

Boutique design & development **9 Hours**

Location decision- importance, levels and determining factors. Types of location, types of consumer goods and location decision. Exterior Design, Store Layout & Space management, Atmospherics, colour planning, physical materials in store designing, atmospherics in the context of internet retailing.

Boutique Operations Management **9 Hours**

Business Model – online & offline - store design, visual merchandising & display, customer service, budgeting & accounting, money and credit handling, shoplifting prevention, premises maintenance, systems & staff management, inventory optimization and management, administration and supply chain management

Marketing & Promotion **9 Hours**

New marketing strategies – loyalty programs -sales promotion through advertising, public relations, direct marketing, personal selling, promotion mix; digital marketing, social media leverage – email & influencer marketing – future trends

Financial Planning & Project Management **9Hours**

Formats in business ownership- registration & licensing- financial support from Government and institutions- Taxes - government incentives (financial &non financial) – Steps and formalities to start a boutique – evaluation and sickness prevention activities

Theory : 45 Hours **Total: 45 Hours**

REFERENCES

1. Stewart B., “Opening Boutique Guide”, Bull City Publishing, 2016.
2. https://www.bizmove.com/starting-business/how-to-start-a-boutique-business.pdf
3. Wright C, “Business Boutique”, Ramsey Press, Tennessee, 2017.
4. https://www.thebalancesmb.com/department-store-mission-statements-4068552
5. https://www.entrepreneur.com/article/38290
6. https://www.smartsheet.com/store-layout
7. https://www.smartsheet.com/retail-store-operations
8. https://www.shopkeep.com/blog/promotion-ideas-for-retail-stores

Sl.No:4 -A new course U18FTE0005 Traditional Indian textiles and crafts are added under fashion design track

Programme Electives									
S.No	Course code	Course Title	Course Mode	CT	L	T	P	J	C
Fashion designing									
1	U18FTE0001	Apparel Product Development	Theory	PE	3	0	0	0	3
2	U18FTE0002	Surface Ornamentation	Theory	PE	3	0	0	0	3
3	U18FTE0003	Visual Merchandising	Theory	PE	3	0	0	0	3
4	U18FTE0004	Fashion Boutique Management	Theory	PE	3	0	0	0	3
5	U18FTE0005	Traditional Indian Textiles and Crafts	Theory	PE	3	0	0	0	3

U18FTE0005 TRADITIONAL INDIAN TEXTILES AND CRAFTS

L	T	P	J	C
3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1	Understand the various century's costumes and traditional textiles in India	K1
CO2	Acquire knowledge on the concepts on colour, motif and specialization in different state costumes of India	K2
CO3	Classify regional embroideries of India	K3
CO4	Identify a specific embroidery style of India on the basis of colours, motifs and layout	K4
CO5	Identify the influencing factors for development and evolution of a specific embroidered textile.	K4
CO6	Choose and utilize traditional accessories in costumes	K5

Pre Requisite : U18 FTI3202 Concepts of Fashion and Design

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak														
COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1														
CO2														
CO3														
CO4														
CO5														
CO6														

Course Assessment methods

Direct	Indirect
1. Internal tests 2. Assignment 3. Group Presentation 4. End Semester Exam	1. Course Exit Survey

Course Content

INTRODUCTION **9 Hours**

Evolution of clothing – Origin & functions of clothing – beginning of civilization – Greek, Roman and Egyptian. Study of Historical designs of different countries – Persian, Mughal, Chinese, Japanese and American.

NORTHERN TRADITIONAL TEXTILES **9 Hours**

Traditional Woven textiles of North India – Brocades of Banaras, Balucheri, Chanderi and Tanchoi.

Traditional Embroideries of North India – Kashida, Phulkari, Chambarumal and Chikankari.

Traditional costumes of North States of India – Jammu & Kashmir, Punjab, Himachal Pradesh, Haryana, Uttaranchal and Uttar Pradesh.

SOUTHERN TRADITIONAL TEXTILES **9 Hours**

Traditional woven textiles of Southern states of India – Paithani and Pitamber, Pochampalli, Kancheevaram, Himrus, Kalamkari, Pipli, Mysore silk, Aarni Silk.

Traditional embroideries of South India – Thoda embroidery, Kasuti of Karnataka and Aari embroidery.

Traditional costumes of Southern states of India – Tamil Nadu, Kerala, Karnataka and Andhra Pradesh.

EASTERN TRADITIONAL TEXTILES **9 Hours**

Traditional woven textiles of Eastern states of India – Dacca muslin, Applique work of Bihar.

Traditional embroideries of East India – Kantha of Bengal, Sujaini embroidery, Manipuri embroidery and Nagaland embroidery.

Traditional costumes of Eastern states of India – West Bengal, Bihar, Jaharkand, Arunachal Pradesh, Assam, Sikkim, Nagaland, Manipur, Mizoram, Meghalaya and Tirupura.

WESTERN TEXTILES **9 Hours**

Traditional woven textiles of Western states of India – Maheshwari sarees of Madhya Pradesh, Patola, Bandhini and Amrus.

Traditional embroideries of Western India – Sindhi embroidery – Kutch, Ari Bharath, Kanbi Bharath, Mochi Bharath, Shisha embroidery.

Traditional costumes of Western states of India – Rajasthan, Gujarat, Maharastra, Madhya Pradesh, Chhattisgarh and Goa.

Theory: 45 Hours **Total: 45 Hours**

REFERENCES

1. John Gillow & Nicholas Barnad, “Traditional Indian Textiles”. Thames & Hudson, 1993
2. Rta Kapur chishti & Amba Sanyal, “Saris of India – Madhya Pradesh,” Wiley Eastern Ltd. 1989
3. The Guide to Historic Costumes, Karen Baclawski, Drama Publishers (1995)

4. Ancient Indian Costume, Roshen Alkazi, Art Heritage (1983)
5. Martand Singh, " Saris' of India – Bihar & West Bengal", Wiley Eastern Ltd. 1993
6. Costumes and textiles of Royal India – Ritu Kumar Published by Christie's Books.
7. Impressions – a classic collection of Indian textiles design (with cd) Prakasha. K
8. Traditional Embroideries of India Shailaja D. Naik

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Department of Textile Technology

AY: 2018-19/ 2 **Date: 15.04.2019**

Action taken report -Employers Feedback

S.No	Analysis	Action taken report
1.	Suggested to introduce Basic textile subjects Spinning/Weaving/Chemical Processing can be introduced in II year parallelly in a semester	Basic textile subjects Spinning/Weaving/Chemical Processing introduced in II year parallelly in a semester
2.	Computer Application in Textiles (CAT) subject can be moved to electives	Computer Application in Textiles (CAT) subject moved to professional elective Course Code: U18TXE0004 Course Name:Computer Applications in Textiles

Approved by,

Dr.J Srinivasan

BoS Chairman

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Department of Textile Technology

AY: 2018-19/ 2 **Date: 15.04.2019**

Action taken report -Employers Feedback

S.No	Analysis	Action taken report
1.	Suggested to introduce Basic textile subjects Spinning/Weaving/Chemical Processing can be introduced in II year parallelly in a semester	Basic textile subjects Spinning/Weaving/Chemical Processing introduced in II year parallelly in a semester
2.	Computer Application in Textiles (CAT) subject can be moved to electives	Computer Application in Textiles (CAT) subject moved to professional elective Course Code: U18TXE0004 Course Name:Computer Applications in Textiles

Approved by,

Dr.J Srinivasan

BoS Chairman

Proof

Basic textile subjects Spinning/Weaving/Chemical Processing introduced in II year parallelly in a semester

Semester III										Pre-requisite
S.No	Course code	Course Title	Course Mode	CT	L	T	P	J	C	
1	U18MAT3103	Probability and Statistics	Theory & Tutorial	BS	3	1	0	0	4	-
2	U18EII3203	Measurements and Instrumentation	Embedded - Theory & Lab	PC	3	0	2	0	4	-
3	U18TXT3001	Physical Properties of Textile Fibres	Theory	PC	3	0	0	0	3	-
4	U18TXI3202	Yarn Manufacturing Technology I	Embedded - Theory & Lab	PC	3	0	2	0	4	-
5	U18TXT3003	Fabric Manufacture-I	Theory	PC	3	0	0	0	3	-
6	U18TXP3504	Fabric Manufacture I Lab	Lab	PC	0	0	2	0	1	-
7	U18INI3600	Engineering Clinic III	Practical & Project	ES	0	0	4	2	3	-
								Total Credits	22	
								Total Contact Hours/week	28	

Semester IV										Pre-requisite
S.No	Course code	Course Title	Course Mode	CT	L	T	P	J	C	
1	U18MAT4102	Numerical Methods	Theory and Tutorial	BS	3	1	0	0	4	-
2	U18MET4007	Basics of Mechanical Engineering	Theory	ES	3	0	0	0	3	-
3	U18TXT4001	Yarn Manufacturing Technology II	Theory	PC	3	0	0	0	3	U18TXI3202
4	U18TXI4202	Fabric Manufacture-II	Embedded - Theory & Lab	PC	3	0	2	0	4	U18TXT3003
5	U18TXI4203	Woven Fabric Structure and Design	Embedded - Theory & Lab	PC	3	0	2	0	4	U18TXT3003
6	U18TXP4504	Yarn Manufacturing Technology Lab	Lab	PC	0	0	2	0	1	U18TXI3202
7	U18INI4600	Engineering Clinic IV	Practical & Project	ES	0	0	4	2	3	U18INI3600
								Total Credits	22	
								Total Contact Hours/week	28	

Semester V										Pre-requisite
S.No	Course code	Course Title	Course Mode	CT	L	T	P	J	C	
1	U18TXT5001	Mechanics of Textile Machinery	Theory	ES	3	0	0	0	3	U18MET4007
2	U18TXT5002	Textile and Apparel Quality Evaluation	Theory	PC	3	0	0	0	3	U18TXI4202
3	U18TXT5003	Textile Chemical Processing-I	Theory	PC	3	0	0	0	3	U18TXI4202
4	U18TXT5004	Knitting Technology	Theory	PC	3	0	0	0	3	-
5	U18TXP5505	Textile Chemical Processing Lab-I	Lab	PC	0	0	2	0	1	U18TXI4202
6	U18TXE….	Professional Elective-I	Theory	PE	3	0	0	0	3	-
7	U18TXO5….	Open Elective-I	Theory	OE	3	0	0	0	3	-
8	U18TXP5506	Textile and Apparel Quality Evaluation Lab	Lab	PC	0	0	2	0	1	U18TXI4202
9	U18INI5600	Engineering Clinic V	Practical & Project	ES	0	0	4	2	3	U18INI4600
								Total Credits	23	
								Total Contact Hours/week	28	

Computer Application in Textiles (CAT) subject moved to professional elective

Course Code: U18TXE0004

Course Name: Computer Applications in Textiles

Programme Electives									
S.No	Course code	Course Title	Course Mode	CT	L	T	P	J	C
Fibres, Yarn & Fabric									
1	U18TXE0001	Manufactured Fiber Technology	Theory	PE	3	0	0	0	3
2	U18TXE0002	High Performance Fibers	Theory	PE	3	0	0	0	3
3	U18TXE0003	Manufacture of Specialty Yarns and Fabrics	Theory	PE	3	0	0	0	3
4	U18TXE0004	Computer Applications in Textiles	Theory	PE	3	0	0	0	3

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Department of Computer Applications

AY: 2018-19

Action taken report -Employers Feedback

S.No	Analysis	Action taken report
1.	Syllabus to incorporate current topics in Programming with Java (P18CAI3204) course.	TopicLambda were included in the syllabus.
2.	Syllabus was found to be heavy in Software Engineering course (P18CAI2304) and has to be revised.	Software Reengineering topic was removed in R20 Software Engineering course (P20CAT2001).
3.	More soft skill training to be given to students.	A course on Soft skills (P20CAC0203) was introduced to focus on interpersonal skills and team work.
4.	More lab exercises to be included in Programming in Java lab (P18CAI3204)	The number of lab exercise problems were increasedand Application development exercises were introduced in Programming with Java lab (P20CAP1503) course

Prepared By,

BoS Coordinator

Approved By,

BoS Chairman

1.Proof for Action Taken:

P20CAT1004	PROGRAMMING WITH JAVA	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Apply the fundamental core java, packages, database connectivity for computing.
CO2: Implement Java programs.
CO3: Make use of hierarchy of Java classes to provide a solution to a given set of requirements.
CO4: Use the frameworks JSP, Hibernate, Spring.
CO5: Design and implement server-side programs using Servlets and JSP.

Pre–requisite :Nil

Cos	PROGRAMME OUTCOMES (POs) (S/M/W Indicates Strength of Correlation) S-Strong, M-Medium, W- Weak											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	S		M		M					
CO2	S		S		M							
CO3	S		M		M							
CO4	S		M		S							M
CO5			M		M							M

COURSE ASSESSMENT METHODS

DIRECT

1. Continuous Assessment Test I, II
2. Assignment
3. Demonstration etc (as applicable)
4. End Semester Examination

INDIRECT

1.Course-end survey

JAVA FUNDAMENTALS — **9 Hours**

Java features – Java Platform – Java Fundamentals – Expressions, Operators, and Control Structures – Classes, Methods – Inheritance - Packages and Interfaces – Boxing, Unboxing – Variable-Length Arguments (Vararg), Exception Handling.

COLLECTIONS AND ADVANCE FEATURES — **9 Hours**

Utility Packages- Introduction to Collection –Hierarchy of Collection Framework – Generics, Array list, LL, HashSet, Tree-set, HashMap – Comparators – Java annotations – Pre-main method.

ADVANCED JAVAPROGRAMMING — **9 Hours**

Input Output Packages – Inner Classes – Java Database Connectivity - Introduction JDBC Drivers - JDBC Connectivity with MySQL/Oracle -Prepared Statement and Result Set – JDBC Stored Procedures Invocation - Servlets - RMI – Lambda Expressions.

2.

R18 Software Engineering Syllabus

P18CAI2304	SOFTWARE ENGINEERING	L	T	P	J	C
		3	0	0	2	4

Course Outcomes

After successful completion of this course, the students should be able to

CO1	Get an insight into the processes of software development.	K2
CO2	Understand the principles and practices associated with the agile development methods.	K2
CO3	Understand the problem domain, model and design software products.	K2
CO4	Apply the business process reengineering techniques to solve problems.	K3
CO5	Implement software quality management concepts.	K3

Pre–requisite : Nil

DIRECT

1. Continuous Assessment Test I, II (Theory component)
2. Assignment (Theory component)
3. Viva(Project)
4. End Semester

INDIRECT

1.Course-end survey

INTRODUCTION	**8 Hours**
Introduction to Software Engineering – A Generic Process Model – Prescriptive Process Models: Waterfall, Incremental, Prototyping, and Spiral Model – The Unified Process.	
AGILE DEVELOPMENT	**4 Hours**
Agile Process – Extreme Programming (XP) – Adaptive Software Development – Scrum.	
MODELING	**9 Hours**
Understanding Requirements – Scenario Based Requirements Modeling, Data Modeling Concepts, Class Based Requirements Modeling – Case Studies.	
SOFTWARE DESIGN	**10 Hours**
Design Concepts – Design Models – Architectural Design: Software Architecture – Architectural Styles – Architectural Design – Component Level Design: Component – Designing Class Based Components.	
QUALITY MANAGEMENT	**9 Hours**
Quality Concepts – Achieving Software Quality – Review Techniques – Software Configuration Management (SCM) – SCM Repository – SCM Process – Software Maintenance and Supportability.	
REENGINEERING	**5 Hours**
Reengineering – Business Process Reengineering – Software Reengineering – Reverse Engineering – Restructuring – Case studies.	
Theory: 45 Hrs **Tutorial: -** **Total Hours: 45 Hrs**	

R20 - Software Engineering Syllabus

P20CAT2001	SOFTWARE ENGINEERING METHODOLOGIES AND QUALITY ASSURANCE	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Get an insight into the processes of software development.
CO 2: Understand the problem domain and modeling.
CO 3: Apply design techniques software products.
CO 4: Implement software quality management concepts.
CO 5: Apply software testing techniques for information systems development

Pre–requisite : Nil

Cos	PROGRAMME OUTCOMES (POs) (S/M/W Indicates Strength of Correlation) S-Strong, M-Medium, W- Weak											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M			M		W				M	
CO2	M	S			M						W	
CO3	M		S		S						M	
CO4	S		M								M	
CO5		M			S						M	

COURSE ASSESSMENT METHODS

DIRECT

1. Continuous Assessment Test I, II
2. Assignment; Group Presentation
3. End Semester Examination

INDIRECT

1.Course-end survey

INTRODUCTION — **9 Hours**

Introduction to Software Engineering – A Generic Process Model – Prescriptive Process Models: Waterfall, Incremental, Prototyping, and Spiral Model – The Unified Process – Introduction to Agile and Scrum methodologies.

MODELING — **9 Hours**

Understanding Requirements – Scenario Based Requirements Modeling, Data Modeling Concepts, Class Based Requirements Modeling.

SOFTWARE DESIGN — **9 Hours**

Design Concepts – Design Models – Architectural Design: Software Architecture – Architectural Styles – Architectural Design – Component Level Design: Component – Designing Class Based Components

QUALITY MANAGEMENT — **9 Hours**

Quality Concepts – Achieving Software Quality – Review Techniques – Software Configuration Management (SCM) – SCM Repository – SCM Process – Software Maintenance and Supportability.

SOFTWARE TESTING — **9 Hours**

Unit Testing – Integration Testing – System Testing: Performance, Load, Stress, Security, Recoverability, Compatibility Testing – Regression Testing – Installation Testing – Usability Testing – Acceptance Testing – Alpha Testing and Beta Testing – Static vs. Dynamic Testing – Manual vs. Automatic Testing – Black Box Testing – White Box Testing.

Theory: 45 Hours **Tutorial: -** **Total Hours: 45 Hours**

REFERENCES

1. Roger Pressman S, "Software Engineering: A Practitioner's Approach", 8th Edition, Tata McGraw Hill, 2019.
2. Shari Lawrence Pfleeger & Joanne M. Atlee, "Software Engineering", Pearson Education, 2010.
3. Ron Patton, "Software Testing", 2nd Edition, Pearson Education, 2009.
4. Carlo Ghezzi, Mehdi Jazayari& Dino Mandrioli, "Fundamentals of Software Engineering", Prentice Hall of India, 2010.
5. Ian Sommerville, "Software Engineering", 10th Edition, Pearson Education, 2015.
6. Watts S. Humphrey, "Managing the Software Process", Addison Wesley, 1999

3. Soft skills

P20CAC0203	SOFT SKILLS
Course Outcomes	
After successful completion of this course, the students should be able to	
CO 1: Perform well in a team and positively resolve conflict in timely manner. CO 2: Set realistic goals and manage stress well.	
SELF ANALYSIS & INTERPERSONAL SKILLS	
Self Analysis: SWOT Analysis – Who Am I – Attributes – Importance of Self Confidence– Self Esteem. Attitude: Factors Influencing Attitude – Challenges – Lessons from Attitude – Motivation: Factors of Motivation – Self Talk – Intrinsic and Extrinsic Motivators. Goal Setting: Wish List – Smart Goals – Blue Print for Success – Short Term – Long Term – Life Time Goals.	
Interpersonal Skills: Understanding the Relationship between Leadership Networking and Team Work – Necessity of Team Work – Stress Management: Causes of Stress and its Impact – How to Manage Distress – Understanding the Circle of Control – Stress Busters. Decision Making: Importance and Necessity of Decision Making – Process of Decision Making – Practical Way of Decision Making – Weighing Positives and Negatives.	
Theory: 15 Hours	**Tutorial: -** **Total: 15 Hours**
REFERENCES	
1. Barun K. Mitra, "Personality Development and Soft Skills", Oxford Publisher, 2011. 2. Nitin Bhatnagar, "Effective Communication and Soft Skills", Pearson Education India 2012.	

4.Programming with Java – Additional Experiments introduced in R20 Syllabus.

List of experiments in R18 Syllabus

P18CAI3204	PROGRAMMING WITH JAVA	L	T	P	J	C
		3	0	2	0	4

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Apply the fundamental core java, packages, database connectivity for computing
CO2: Implement Java programs.
CO3 :Make use of hierarchy of Java classes to provide a solution to a given set of requirements found in the Java API
CO4:Use the frameworks JSP, Hibernate, Spring
CO5: Design and implement server side programs using Servlets and JSP.

LIST OF EXPERIMENTS

1. Program to illustrate declaration and access control
2. Program to illustrate assignments
3. Program to illustrate the use of operators
4. Program to illustrate flow control
5. Program to implement various OOPS concepts
6. Program to illustrate APIs like collection, I/O etc.
7. Program to implement the concept of interfaces and packages
8. Program to implement exceptions handling mechanism
9. Program using applets
10. Program to illustrate the use of RMI (Remote Method Invocation)

Total Hours: 30Hrs

Increased List of experiments in R20 Syllabus.

P20CAP1503	PROGRAMMING WITH JAVA LAB	L	T	P	J	C
		0	0	4	0	2

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Implement object-oriented features using Java.
CO2: Create interfaces, packages and apply exception handling.
CO3: Implement RMI and servlet programs.
CO4: Create applications using JDBC, JSP and Frameworks.

Pre–requisite : Nil

Cos	PROGRAMME OUTCOMES (POs) (S/M/W Indicates Strength of Correlation) S-Strong, M-Medium, W- Weak											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	M				S	M				
CO2	M	M	M		M		S					
CO3	M	M	M	M	M			M				
CO4	M	S	S	S	S							

COURSE ASSESSMENT METHODS

DIRECT

1. Pre/Post - Experiment Test/Viva; Experimental Report for each Experiment
2. Model Examination
3. End Semester Examination

INDIRECT

1.Course-end survey

LIST OF EXPERIMENTS:

1. Program to illustrate declaration and access control.
2. Program to illustrate assignments.
3. Program to illustrate the use of operators.
4. Program to illustrate flow control.
5. Program to implement various OOPS concepts.
6. Program to illustrate APIs like collection, I/O etc.
7. Program to implement the concept of interfaces and packages.
8. Program to implement exceptions handling mechanism.
9. Program using applets.
10. Program to illustrate the use of RMI (Remote Method Invocation).
11. Create an applications using Servlet.
12. Perform database connectivity using JDBC.
13. Use JSP tag to create an application.
14. Illustrate an application using Spring.
15. Develop applications using Hibernate.

Total : 60 hours

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Department of Mechatronics Engineering

AY: 2018-19 **Date:(23.04.18)**

Action taken report Employer's Feedback

S.No	Analysis	Action taken report
1.	ROS topic is include in U17MCI6201 Robotics Engineering Course	In U17MCI6201/ U18MCI6201Robotics Engineering Course ROS content included.
2.	IMU Sensor topic is requested to include in U17MCI6201 Robotics Engineering Course	Included in the U17MCI6201/ U18MCI6201Robotic Course
3.	Member suggested to have Machine vision and image processing course instead of Digital signal processing	U17MCT7002 Image Processing and Computer Vision is included in R18

Prepared By,

BoS Coordinator

Approved By,

BoS Chairman

KUMARAGURU college of technology
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Department of Mechatronics Engineering

AY: 2018-19 **Date: (23.04.18)**

Action taken report Employer's Feedback(Proof)

Proof 1:

protocols and connections	
END EFFECTORS	**4 Hours**
End effectors and Different types of grippers, vacuum and other methods of gripping - Grippers force analysis-Gripper Design-Simple problems	
ROBOT PROGRAMMING	**4 Hours**
Robot programming: Introduction; On-line programming: Manual input, lead through programming, teach pendant programming: Off-line programming languages. Simulation.	

Proof 2:

INTRODUCTION	**6 Hours**
Brief History, Types of robots, Overview of robot subsystems, resolution, repeatability and accuracy, Degrees of freedom of robots, Robot configurations and concept of workspace, Mechanisms and transmission - Applications.	
KINEMATICS OF ROBOTS	**9 Hours**
Introduction - Matrix Representation - Homogeneous transformation matrices – Forward and Inverse kinematics Equations: Position and Orientation -Denavit- Hardenberg Representation of forward kinematics equations of robots- Degeneracy and Dexterity.	
DYNAMICS OF ROBOTS	**11 Hours**

Proof 3:

2	U17MCT7001	Vehicle	Theory	PC	3	0	0	0	3	U17MCI0202
3	U17MCT7002	Image Processing and Computer Vision	Theory	PC	3	0	0	0	3	-
4	U17MCE00**	Professional Elective III	Theory	PE	3	0	0	0	3	-
5	U17MCE00**	Professional Elective IV	Theory	PE	3	0	0	0	3	-

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Department of Mechanical Engineering

AY: 2018-19 **Date: 15 – 04 – 2019**

Employers Feedback

1. Industry nominee suggested to motivate the students to undertake internships in the core industries. In this regard he came forward to assist the department to arrange internships.
2. Industry nominee suggested to explore possibilities to include credits for internships.

Prepared By,

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Approved By,

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Department of Mechanical Engineering

AY: 2018-19 **Date: 15 – 04 – 2019**

Employers Feedback Analysis Report

1. Industry nominee suggested to motivate the students to undertake internships in the core industries. In this regard he came forward to assist the department to arrange internships – The input from the industrial nominee is received and Internship coordinator was intimated to make use of the suggestion by the industrial nominee.
2. Industry nominee suggested to explore possibilities to include credits for internships – The inputs were considered, and department will explore the possibility of offering it as mandatory credited or non-credited course in future.

Prepared By,

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Action taken report -Employers Feedback

S.No	Analysis	Action taken report
1.	Industry nominee suggested to motivate the students to undertake internships in the core industries. In this regard he came forward to assist the department to arrange internships.	Students will be motivated to undergo industrial internship.
2.	Industry nominee suggested to explore possibilities to include credits for internships.	The industrial nominee suggestion is noted for further discussion and subsequent approval.

Prepared By,

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Approved By,

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