KUMARAGURUCOLLEGE OF TECHNOLOGY,

An autonomous Institution affiliated to Anna University, Chennai

COIMBATORE – 641 049.

B.TECH., INFORMATION TECHNOLOGY

REGULATIONS 2018

CURRICULUM AND SYLLABI

I to VIII Semesters

Department of Information Technology

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VISION

The department of Information Technology aspires to become a **school of excellence** in providing **quality education, constructive research** and **professional opportunities in Information Technology**.

MISSION

- To provide academic programs that engage, enlighten and empower the students to **learn technology through practice, service and outreach**
- To educate the students about **social responsibilities and entrepreneurship**
- To encourage **research through continuous improvement** in infrastructure, curriculum and faculty development in collaboration with industry and institutions

PROGRAMEDUCATIONAL OBJECTIVES (PEOs)

PEO1 : Graduates will have progressive learning and successful career in Information, Communication Technologies and their applications

PEO2 : Graduates will be leaders in their chosen field

PEO3 : Graduates will utilize the acquired technical skills and knowledge for the benefit of society

PROGRAMOUTCOMES (POs)

PO1 : **Engineering knowledge:**Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 : **Problem analysis:**Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 : **Design/development of solutions:**Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 : **Conduct investigations of complex problems:**Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

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PO5 : **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 : **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 : **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 : **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 : **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 : **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 : **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 : **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

1. Technical Skills: Apply the fundamental knowledge to **develop computer based solutions** in the areas related to information management and networking.

2. Leadership Skills: Demonstrate **professionalism and ethics** in managing academic/ non-academic activities as a team and an individual.

3. Social Responsibility: Develop attitude to understand the societal issues and apply the acquired professional skills to **provide feasible IT based solutions**

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KUMARAGURU COLLEGE OF TECHNOLOGY

COIMBATORE – 641 049

REGULATIONS 2018

B.TECH INFORMATION TECHNOLOGY

CURRICULUM

SEMESTER I										Pre-requisite
S.No	**Course Code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	
1	U18MAI1201	Linear Algebra and Calculus	Embedded - Theory & Lab	BS	3	0	2	0	4	-
2	U18CSI1201	Structured Programming using C	Embedded - Theory & Lab	ES	3	0	2	0	4	-
3	U18EEI1201	Basic Electrical and Electronics Engineering	Embedded - Theory & Lab	ES	3	0	2	0	4	-
4	U18ENI1201	Fundamentals of Communication I	Embedded - Theory & Lab	HS	2	0	2	0	3	-
5	U18INI1600	Engineering Clinic I	Embedded – Lab & Project	ES	0	0	4	2	3	-
								Total Credits	**18**	
								Total Periods per week	**25**	

SEMESTER – II										Pre-requisite
S.No	**Course Code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	
1	U18MAI2201	Advanced Calculus and Laplace Transforms	Embedded - Theory & Lab	BS	3	0	2	0	4	U18MAI1201
2	U18PHI2201	Engineering Physics	Embedded - Theory & Lab	BS	3	0	2	0	4	-
3	U18CSI2201	PythonProgramming	Embedded - Theory & Lab	ES	2	0	2	0	3	U18CSI1201
4	U18ITI2201	Digital Logic and Microprocessor	Embedded - Theory & Lab	PC	3	0	2	0	4	U18EEI1201
5	U18ENI2201	Fundamentals of Communication II	Embedded - Theory & Lab	HS	2	0	2	0	3	U18ENI1201
6	U18INI2600	Engineering Clinic II	Embedded - Lab& Project	ES	0	0	4	2	3	-
								Total Credits	**21**	
								Total Periods per week	**29**	

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SEMESTER – III										Pre-requisite
S.No	**Course Code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	
1	U18MAT3102	Discrete Mathematics	Theory	BS	3	1	0	0	4	-
2	U18ECT3011	Principles of Communication	Theory	ES	3	0	0	0	3	-
3	U18ITT3001	Computer Architecture	Theory	PC	3	0	0	0	3	-
4	U18ITI3202	Data Structures	Embedded - Theory & Lab	PC	3	0	2	0	4	-
5	U18ITI3203	Object Oriented Programming	Embedded - Theory & Lab	ES	3	0	2	0	4	U18CSI2201
6	U18INI3600	Engineering Clinic III	Embedded – Lab & Project	ES	0	0	4	2	3	-
Total Credits									**21**	
Total Periods per week									**26**	

SEMESTER – IV										Pre-requisite
S.No	**Course Code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	
1	U18MAI4201	Probability and Statistics	Embedded - Theory & Lab	BS	3	0	2	0	4	-
2	U18ITT4001	Operating Systems	Theory	PC	3	0	0	0	3	-
3	U18ITI4202	Design and Analysis of Algorithms	Embedded - Theory & Lab	PC	3	0	2	0	4	U18ITI3202
4	U18ITI4303	Data Base Management Systems	Embedded - Theory &Project	PC	3	0	0	2	4	-
5	U18ITI4204	Computer Networks	Embedded - Theory & Lab	PC	3	0	2	0	4	U18ECT3011
6	U18INI4600	Engineering Clinic IV	Embedded - Lab& Project	ES	0	0	4	2	3	-
Total Credits									**22**	
Total Periods per week									**29**	

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SEMESTER – V										Pre-requisite
S.No	**Course Code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	
1	U18MAT5101	Partial Differential Equations and Transforms	Theory	BS	3	1	0	0	4	-
2	U18ITI5201	Data Mining Techniques	Embedded - Theory & Lab	PC	3	0	2	0	4	U18ITI4303, U18MAI4201
3	U18ITT5002	Cryptography and Network Security	Theory	PC	3	0	0	0	3	U18ITI4204
4	U18ITI5203	Mobile and Pervasive Computing	Embedded - Theory & Lab	PC	3	0	2	0	4	U18ITI4204
5	U18ITI5304	Software Engineering	Embedded - Theory & Project	PC	3	0	0	2	4	-
6	U18INI5600	Engineering Clinic V	Embedded - Lab& Project	ES	0	0	4	2	3	-
	U18-------	Open Elective	Theory	PE	3	0	0	0	3	-
Total Credits									**25**	
Total Periods per week									**28**	

SEMESTER – VI										Pre-requisite
S.No	**Course Code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**	
1	U18ITT6001	Information Security	Theory	PC	3	0	0	0	3	U18ITT5002
2	U18ITT6002	Internet of Things – Architecture and Protocols	Theory	PC	3	0	0	0	3	U18ITI4204
3	U18ITI6203	Web Technology	Embedded - Theory & Lab	PC	3	0	2	0	4	U18ITI3203
4	U18ITI6304	Big Data Analytics	Embedded - Theory & Project	PC	3	0	0	2	4	U18ITI5201
5	U18ITE----	Professional Elective I	Theory	PE	3	0	0	0	3	-
6	U18-------	Open Elective	Theory	PE	3	0	0	0	3	-
Total Credits									**20**	
Total Periods per week									**24**	

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SEMESTER – VII										Pre-requisite
S.No	Course Code	Course Title	Course Mode	CT	L	T	P	J	C	
1	U18ITT7001	Social Media Marketing	Theory	HS	3	0	0	0	3	-
2	U18ITI7202	Cloud Computing	Embedded - Theory and Lab	PC	2	0	2	0	3	U18ITI4204
3	U18ITI7203	Machine Learning	Embedded - Theory and Lab	PC	3	0	2	0	4	U18ITI5201
4	U18ITE----	Professional Elective II	Theory	PE	3	0	0	0	3	-
5	U18ITE----	Professional Elective III	Theory	PE	3	0	0	0	3	-
6	U18ITP7704	Project Phase I	Project	PW	0	0	0	6	3	-
Total Credits									**19**	
Total Periods per week									**19**	

SEMESTER - VIII										Pre-requisite
S.No	Course Code	Course Title	Course Mode	CT	L	T	P	J	C	
1	U18ITP8701	Project Phase II	Project	PW	0	0	0	24	12	U18ITP7704
Total Credits									**12**	
Total Periods per week									**0**	

Total Credits: 158

LIST OF MANDATORY COURSES					
S.No	Couse Code	Course Title	Course Mode	CT	Semester
1	U18VEP1501	Human Excellence -Personal Values	Lab	HS	1
2	U18VEP2502	Human Excellence-Inter Personal values	Lab	HS	2
3	U18VEP3503	Human Excellence-Family Values	Lab	HS	3
4	U18CHT4000	Environmental Science and Engineering	Theory	MC	4
5	U18VEP4504	Human Excellence-Professional Values	Lab	HS	4
6	U18INT5000	Constitution of India	Theory	MC	5
7	U18VEP5505	Human Excellence-Social Values	Lab	HS	5
8	U18VEP6506	Human Excellence-National Values	Lab	HS	6
9	U18VEP7507	Human Excellence-Global Values	Lab	HS	7

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PROGRAMME ELECTIVES									
S.No	**Course Code**	**Course Title**	**Course Mode**	**CT**	**L**	**T**	**P**	**J**	**C**
Data Analytics									
1.	U18ITE0001	Artificial Intelligence	Theory	PE	3	0	0	0	3
2.	U18ITE0002	Deep Learning	Theory	PE	3	0	0	0	3
3.	U18ITE0003	Data Visualization	Theory	PE	3	0	0	0	3
4.	U18ITE0014	Business Intelligence	Theory	PE	3	0	0	0	3
5.	U18ITE0015	Natural Language Processing	Theory	PE	3	0	0	0	3
6.	U18ITE0016	Information Retrieval Techniques	Theory	PE	3	0	0	0	3
Cyber Security									
7.	U18ITE0004	Information Coding Techniques	Theory	PE	3	0	0	0	3
8.	U18ITE0005	Web Application Security	Theory	PE	3	0	0	0	3
9.	U18ITE0006	Biometric Systems	Theory	PE	3	0	0	0	3
10.	U18ITE0007	Blockchain Technology	Theory	PE	3	0	0	0	3
Network and IoT									
11.	U18ITE0008	Adhoc and Sensor Networks	Theory	PE	3	0	0	0	3
12.	U18ITE0009	Next Generation Networks	Theory	PE	3	0	0	0	3
13.	U18ITE0010	Software Defined Networks	Theory	PE	3	0	0	0	3
14	U18ITE0017	Security of Internet of Things	Theory	PE	3	0	0	0	3
Other Electives									
15.	U18ITE0011	Distributed Systems	Theory	PE	3	0	0	0	3
16.	U18ITE0012	Principles of Compiler Design	Theory	PE	3	0	0	0	3
17.	U18ITE0013	Graphics and Multimedia	Theory	PE	3	0	0	0	3
18.	U18ITE0018	Professional Readiness For Innovation, Employability And Entrepreneurship	Theory	PE	0	0	6	0	3

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SEMESTER I

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U18MAI1201 LINEAR ALGEBRA AND CALCULUS
(Common to All branches – 2018 batch only)

L	T	P	PJ	C
3	0	2	0	4

COURSE OUTCOMES

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

CO1: Identify eigenvalues and eigenvectors and apply Cayley Hamilton theorem.
CO2: Apply orthogonal diagonalisation to convert quadratic form to canonical form.
CO3: Solve first order ordinary differential equations and apply them to certain physical situations.
CO4: Solve higher order ordinary differential equations.
CO5: Evaluate the total derivative of a function, expand the given function as series and locate the maximum and minimum for multivariate function.
CO6: Determine Rank, Inverse, Eigenvalues, Eigenvectors of the given matrix, Maxima-Minima of the function and Solving Differential equations using MATLAB

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
CO1	S	S			M				M	M		M
CO2	S	S			M				M	M		M
CO3	S	S			M				M	M		M
CO4	S	S			M				M	M		M
CO5	S	S			M				M	M		M
CO6	S	S			M				M	M		M

COURSE ASSESSMENT METHODS:

DIRECT

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

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INDIRECT
1. Course-end survey

THEORY COMPONENT

MATRICES 6Hours

Rank of a matrix – Consistency of a system of linear equations - Rouche's theorem - Solution of a system of linear equations - Linearly dependent and independent vectors– Eigenvalues and Eigenvectors of a real matrix – Properties of eigenvalues and eigenvectors – Cayley Hamilton theorem (excluding proof)

DIAGONALISATION OF A REAL SYMMETRIC MATRIX6 Hours

Orthogonal matrices – Orthogonal transformation of a symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by orthogonal transformation.

FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS 11Hours

Leibnitz's equation – Bernoulli's equation – Equations of first order and higher degree - Clairauts form– Applications: Orthogonal trajectories.

HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS 11Hours

Linear equations of second and higher order with constant coefficients – Euler's and Legendre's linear equations – Method of variation of parameters – First order Simultaneous linear equations with constant coefficients – Applications.

FUNCTIONS OF SEVERAL VARIABLES 11Hours

Total derivative – Taylor's series expansion – Maxima and minima of functions of two variables – Constrained maxima and minima: Lagrange's multiplier method with single constraints – Jacobians.

REFERENCES

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 41st Edition, 2011.
2. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., New Delhi, 11th Reprint, 2010.
3. Kreyzig E., "Advanced Engineering Mathematics", Tenth Edition, John Wiley and sons, 2011.
4. Veerarajan T., Engineering Mathematics (for First Year), Tata McGraw Hill Pub. Co. Ltd., New Delhi, Revised Edition, 2007
5. Kandasamy P., Thilagavathy K., and Gunavathy K., "Engineering Mathematics",S. Chand & Co., New Delhi, (Reprint) 2008
6. Venkataraman M.K., "Engineering Mathematics", The National Pub. Co., Chennai,2003
7. Weir, MD, Hass J, Giordano FR: Thomas' Calculus, Pearson education 12th Edition, 2015

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8. P.Bali., Dr. Manish Goyal., Transforms and partial Differential equations, University Science Press, New Delhi, 2010
9. G.B.Thomas and R.L.Finney, Calculus and analytical geometry, 11th Edition, PearsonEducation, (2006)

LAB COMPONENT

List of MATLAB Programmes:

1. Introduction to MATLAB.
2. Matrix Operations - Addition, Multiplication, Transpose, Inverse
3. Rank of a matrix and solution of a system of linear equations
4. Characteristic equation of a Matrix and Cayley-Hamilton Theorem.
5. Eigenvalues and Eigenvectors of Higher Order Matrices
6. Curve tracing
7. Solving first order ordinary differential equations.
8. Solving second order ordinary differential equations.
9. Determining Maxima and Minima of a function of one variable.
10. Determining Maxima and Minima of a function of two variables.

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

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U18CSI1201 STRUCTURED PROGRAMMINGUSING C
(Common to CSE,ISE& IT)

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: Acquire knowledge on different problem solving techniques.
CO2: Use appropriate data types and control structures for solving a given problem.
CO3: Execute different array and string operations.
CO4: Experiment with the usage of pointers and functions.
CO5: Organize data using structures and unions.
CO6: Demonstrate data persistency using files**.**

Pre-requisites :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	S	M							L			
CO2	S	M							L	L		
CO3	S	L			L	L			L	L		L
CO4	M	L	M	L	L	L			L	L		M
CO5	M	L	M	L	L	L			L	L		M
CO6	L	L	M	L	L	L			L	L		L

COURSE ASSESSMENT METHODS

DIRECT

1. Continuous Assessment Test I, II (Theory Component)
2. Assignment (Theory Component)
3. Group Presentation (Theory Component)
4. Pre/Post - experiment Test/Viva; Experimental Report for each experiment (lab component)
5. Model examination (lab component)
6. End Semester Examination (Theory and lab component)

INDIRECT

1. Course-end survey

THEORY COMPONENT CONTENTS

STRUCTURED PROGRAMMING **7 Hours**

Algorithms, building blocks of algorithms (instructions/statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving.

ARRAYS AND STRINGS **11 Hours**

Introduction to C Programming – Operators and Expressions – Data Input and Output – Control Statements. Defining an array – Processing an array –Multidimensional Arrays Character

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Arithmetic – Defining a string – NULL character – Initialization of Strings – Reading and Writing Strings – Processing Strings –Searching and Sorting of Strings.

FUNCTIONS, STORAGE CLASSES **9 Hours**

Defining a function – Accessing a function – Function prototypes – Passing arguments to a function – Passing arrays to functions –Function with string - Recursion – Storage classes

POINTERS **9 Hours**

Pointer Fundamentals – Pointer Declaration – Passing Pointers to a Function – Pointers and one dimensional arrays – operations on pointers– Dynamic memory allocation

STRUCTURES, UNIONS AND FILES **9 Hours**

Structures and Unions: Defining a Structure – Processing a Structure – User defined data types (Typedef) – Unions

Files: Opening and Closing a Data File – Reading and writing a data file – Processing a data file – Unformatted data files – Concept of binary files – Accessing a file randomly using fseek

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

REFERENCES

1. Byron S Gottfried and Jitendar Kumar Chhabra, "Programming with C", Tata McGraw Hill Publishing Company, Third Edition, New Delhi, 2011.
2. PradipDey and ManasGhosh, "Programming in C", Second Edition, Oxford University Press, 2011.
3. Kernighan,B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2006
4. Ashok N. Kamthane, "Computer programming", Pearson Education, 2007.
5. ReemaThareja, "Programming in C", Second Edition, Oxford University Press, 2011.

LAB COMPONENT CONTENTS

LIST OF EXPERIMENTS

1. Writing algorithms, flowcharts and pseudo codes for simple problems.
2. Programs on expressions and conversions
3. Programs using if, if-else, switch and nested if statements
4. Programs using while, do-while, for loops
5. Programs on one dimensional arrays, passing arrays to functions and array operations
6. Programs using two dimensional arrays, passing 2D arrays to functions
7. Programs using String functions
8. Programs using function calls, recursion, call by value
9. Programs on pointer operators, call by reference, pointers with arrays
10. Programs using structures and unions.
11. Programs on file operations and modes.
12. Working with text files, random files and binary files

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

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U18EEI1201 **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**

(Common to CSE,IT,ISE)

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 Solving basic DC and AC circuits
CO2 Select suitable DC machine for given application
CO3 Select suitable AC machine for given application
CO4 Characterize logic gates, semiconductor devices according to their applications
CO5 Identify electronic components and use them to design simple circuits.

Pre-requisites :Nil

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	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	M	M										W		
CO2	M	M										W		
CO3	M	M										W		
CO4	M	M										W		
CO5	M	M										W		

COURSE ASSESSMENT METHODS

DIRECT
1. Continuous Assessment Test I, II (Theory Component) 2. Assignment (Theory Component) 3. Group Presentation (Theory Component) 4. Pre/Post - experiment Test/Viva; Experimental Report for each experiment (lab component) 5. Model examination (lab component) 6. End Semester Examination (Theory and lab component)
INDIRECT
1. Course-end survey

DC circuits: **9hrs**

Basic circuit elements and sources, Ohms law, Kirchhoff's laws, series and parallel connection of circuit elements, Node voltage analysis, Mesh current analysis.

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AC circuits: 9hrs
Alternating voltages and currents – SinglePhase Series RL, RC, RLC Circuits, Power in AC circuits –PowerFactor.

Electrical Machines: 9hrs
Construction, Working Principle andapplications of DC generators, DC Motors, single phase Transformers, three phase and single phase induction motors.

Semiconductor devices and Circuits: 9hrs
PN junction diode – Zener Diode – Half wave and Full wave rectifier-voltage regulators – Bipolar Junction transistors,JFET, MOSFET – characteristics

Digital Systems: 9hrs
Binary Number System – Logic Gates – Boolean algebra – Half and Full Adders -sbutractor– Multiplexer – Demultiplexer-decoder-flip flops.

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

TEXT BOOKS:
1. Mittle N., "Basic Electrical Engineering", Tata McGraw Hill Edition, New Delhi, 1990.
2. Sedha R.S., "Applied Electronics", S. Chand & Co., 2006.

REFERENCES
1. Muthusubramanian R, Salivahanan S and Muraleedharan K A, "Basic Electrical, Electronics and Computer Engineering", Tata McGraw Hill, Second Edition, 2017.
2. Nagsarkar T K and Sukhija M S, "Basics of Electrical Engineering", Oxford press 2005.
3. Mehta V K, "Principles of Electronics", Third Edition, S.Chand& Company Ltd, 1994.
4. Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, 2002.
5. Premkumar N, "Basic Electrical Engineering", Anuradha Publishers, 2003.

LABORATORY EXPERIMENTS
1. Measurementofelectricalquantities–voltage,current,power&power factor in RL, RC and RLC circuits.
2. Verification of Kirchoff's Voltage and Current Laws.
3. Verification of Mesh and Nodal analysis.
4. Load test on DC shunt motor.
5. Load test on single phase transformer.
6. Load test on single phase induction motor.
7. Verification of truth tables of OR, AND, NOT, NAND, NOR, EX-OR, EXNOR gates.
8. Full wave rectifier with and without filter.
9. Input and output Characteristics of BJT – CE configuration.
10. Characteristics of PN junction diode and Zener diode.

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

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L	T	P	J	C
2	0	2	0	3

U18ENI1201 – FUNDAMENTALS OF COMMUNICATION-I
(Common to all Branches of I Semester B.E/B/Tech Programmes)

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

CO1: Communicate in English with correct grammar
CO2: Communicate effectively (Oral and Written)
CO3: Use communication skills in the real world

Prerequisites: 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										S		S
CO2		M		W		W			M	S		S
CO3		M		M		W			M	S		S

Assessment Methods:

Direct
1. Continuous Assessment of Skills 2. Assignment 3. Written Test 4. End Semester Examination
Indirect
1. Course-end survey

No	Topic	Hours
	MODULE I - 12 Hrs	
1.1	Parts of Speech	2
1.2	Subject Verb Agreement	2
1.3	Speak up (Self Introduction, JAM)	4
1.4	Writing sentences using 'Be-forms'	3
1.5	Test	1
	MODULE II - 12Hrs	
2.1	Articles, Gerunds, Infinitives	2
2.2	Speak up (Greetings & Polite English)	4
2.3	Dialogue Writing	3
2.4	Skimming & Scanning	2
2.5	Listening Skills – I	1
	MODULE III - 12 Hrs	
3.1	Tenses & Voice	2

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No	Topic	Hours
3.2	Sentences & its kinds	2
3.3	Speak up (Narration & Description)	4
3.4	Summarizing & Note-making	3
3.5	Listening Skills - II	1
MODULE IV - 12 Hrs		
4.1	Framing Questions – 4 types	2
4.2	Speak up (Role play)	4
4.3	Letter writing – Formal and Informal & Email Writing	3
4.4	Reading Comprehension & Cloze test	2
4.5	Listening Skills - III	1
MODULE V - 12 Hrs		
5.1	Degrees of Comparison	2
5.2	Clauses	2
5.3	Speak up (Power Point Presentation)	4
5.4	Writing (Picture perception)	3
5.5	Test	1
Total		**60**

REFERENCES:

1. A Modern Approach to Non Verbal Reasoning (English, Paperback, Dr. R S Aggarwal)
2. The Power of Words(Bloomsbury, UK, 2012, Hyacinth Pink)
3. Word Power Made Easy: The Complete Handbook for Building a Superior Vocabulary (By Norman Lewis)
4. Effective Technical Communication Tata Mc Graw Hills Publications (Ashraf Rizvi)
5. English and Soft skills Orient Black Swan Publishers (S. P. Dhanavel)
6. Know Your Grammar: Trans.in Tamil & Malayalam –A Bilingual Approach (Bloomsbury, UK, 2012, Hyacinth Pink)

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L	T	P	J	C
0	0	4	2	3

U18INI1600 ENGINEERING CLINIC - I

COURSE OBJECTIVES

- To help the students look into the functioning of simple to complex devices and systems
- To enable the students to design and build simple systems on their own
- To help experiment with innovative ideas in design and team work
- To create an engaging and challenging environment in the engineering lab

COURSE OUTCOMES

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

CO1: Identify a practical problems and find a solution
CO2: Understand the project management techniques
CO3: Demonstrate their technical report writing and presentation skills

Pre-requisite:

Nil

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	PS O1	PS O2
CO1	S	S	S	S	S	M	W		S			S		
CO2											S			
CO3										S				

Course Assessment methods:

Direct
1. Project reviews 50% 2. Workbook report 10% 3. Demonstration& Viva-voce 40%
Indirect
1. Course Exit Survey

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Content:

The course will offer the students with an opportunity to gain a basic understanding of computer controlled electronic devices and apply the concepts to design and build simple to complex devices. As a practical project based embedded course, the students will be taught the concepts using a variety of reference material available in the public domain. While the course will start with formal instruction on hardware, programming and applications, the major portion of the course will provide the students with ample opportunity to be innovative in designing and building a range of products from toys to robots and flying machines.

In the first semester, students will focus primarily on IOT with C programming using Arduino.

GUIDELINES:

1. Practical based learning carrying credits.
2. Multi-disciplinary/ Multi-focus group of 5-6 students.
3. Groups can select to work on a specific tasks, or projects related to real world problems.
4. Each group has a faculty coordinator/Instructor who will guide/evaluate the overall group as well as individual students.
5. The students have to display their model in the 'Engineering Clinics Expo' at the end of semester.
6. The progress of the course is evaluated based on reviews and final demonstration of prototype.

Total Hours: 90

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LIST OF MANDATORY COURSES

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U18VEP1501 **PERSONAL VALUES** (Mandatory)

L	T	P	J	C
0	0	2	0	0

COURSE OUTCOMES

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

CO 1: Become an individual in knowing the self

CO 2: Acquire and express Gratitude, Truthfulness, Punctuality, Cleanliness &fitness.

CO 3: Practice simple physical exercise and breathing techniques

CO 4: Practice Yoga asana which will enhance the quality of life.

CO 5: Practice Meditation and get benefited.

CO 6: Procure Self Healing techniques for propagating healthy society

Pre-requisites : 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
CO2										S		
CO3						M						
CO4						S			M			
CO5										M		
CO6								W				S

COURSE ASSESSMENT METHODS

Direct
1. Group Activity / Individual performance and assignment 2. Assessment on Value work sheet / Test
Indirect
1. Mini project on values / Goodwill Recognition

VALUES THROUGH PRACTICAL ACTIVITIES:

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1.Knowing the self : Introduction to value education - Need & importance of Value education – Knowing the self – realization of human life – animal instinct vs sixth sense.

2. Mental Health : Evolution of senses – functioning steps of human mind – Body and Mind coordination - Analysis of thoughts – moralization of desires– autosuggestions – power of positive affirmations. – Meditation and its benefits.

3.Physical Health: Physical body constitution– Types of food - effects of food on body and mind – healthy eating habits – food as medicine– self healing techniques.

4.Core value : Self love& Self care Gratitude - Happiness - Optimistic –Enthusiasm – Simplicity – Punctual - Self Control - Cleanliness & personal hygiene - Freedom from belief systems.

5.Fitness: Simplified physical exercises – Sun salutation - Lung strengthening practices: Naadisuddhi pranayama – Silent sitting and listening to nature – Meditation.

Workshop mode

REFERENCES

1. KNOW YOURSELF — SOCRATES – PDF format at www.au.af.mil/au/awc/awcgate/army/rotc_self-aware.pdf

2. STEPS TO KNOWLEDGE: The Book of Inner Knowing – PDF format at www.newmessage.org/wp-content/uploads/pdfs/books/STK_NKL_v1.5.pdf

3. PROMOTING MENTAL HEALTH - World Health Organization – PDF format at www.who.int/mental_health/evidence/MH_Promotion_Book.pdf

4. LEARNING TO BE: A HOLISTIC AND INTEGRATED APPROACH TO VALUES – UNESCO PDF format at www.unesdoc.unesco.org/images/0012/001279/127914e.pdf

5. PERSONALITY DEVELOPMENT By SWAMI VIVEKANANDA www.estudantedavedanta.net/Personality-Development.pdf

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SEMESTER II

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U18MAI2201 **ADVANCED CALCULUS AND LAPLACE TRANSFORMS**
(Common to All branches)

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: Evaluate double and triple integrals in Cartesian coordinates and apply them to calculate area and volume.

CO2: Apply various integral theorems for solving engineering problems involving cubes and rectangular parallelepipeds.

CO3: Construct analytic functions of complex variables and transform functions from z-plane to w-plane and vice-versa, using conformal mappings.

CO4: Apply the techniques of complex integration to evaluate real and complex integrals over suitable closed paths or contours.

CO5: Solve linear differential equations using Laplace transform technique.

CO6: Determine multiple integrals, vector differentials, vector integrals and Laplace transforms using MATLAB.

Pre-requisites: U18MAI1201 – LINEAR ALGEBRA AND CALCULUS

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	S	S			M				M	M		M
CO2	S	S			M				M	M		M
CO3	S	S			M				M	M		M
CO4	S	S			M				M	M		M
CO5	S	S			M				M	M		M

COURSE ASSESSMENT METHODS

DIRECT

1. Continuous Assessment Test I, II (Theory component)
2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Presentation, Project report, Poster preparation, 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 component)

INDIRECT

1. Course-end survey

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THEORY COMPONENT

MULTIPLE INTEGRALS **9 Hours**

Double integration – Cartesian coordinates – Change of order of integration - Triple integration in Cartesian coordinates – Applications: Area as double integral and Volume as triple integral.

VECTOR CALCULUS **9 Hours**

Gradient, divergence and curl – Directional derivative – Irrotational and Solenoidal vector fields - Green's theorem in a plane, Gauss divergence theorem and Stoke's theorem (excluding proofs) – Verification of theorem and simple applications.

ANALYTIC FUNCTIONS **9 Hours**

Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy- Riemann equations in Cartesian coordinates and sufficient conditions (excluding proofs)– Properties of analytic function – Construction of analytic function by Milne Thomson method – Conformal mapping : $w = z + c$, cz , $1/z$ – Bilinear Transformation

COMPLEX INTEGRATION **9 Hours**

Cauchy's integral theorem –Cauchy'sintegral formula –Taylor's and Laurent's series – Singularities –Residues –Residue theorem –Application of residue theorem for evaluation of real integrals – Contour Integration (excluding poles on the real axis).

LAPLACE TRANSFORMS **9 Hours**

Definition - Properties: Superposition, Shift in t or Time Delay, Shift in s, Time Derivatives, Time Integral-Initial Value Theorem - Final Value Theorem - Transform of periodic functions - Inverse transforms - Convolution theorem – Applications:Solution of linear ordinary differential equations of second order with constant coefficients.

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

REFERENCES

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 41st Edition, 2011.
2. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., New Delhi, 11th Reprint, 2010.
3. Veerarajan T., Engineering Mathematics (for First Year), Tata McGraw Hill Pub. Co. Ltd., New Delhi, Revised Edition, 2007.
4. Kandasamy P., Thilagavathy K., and Gunavathy K., "Engineering Mathematics", S. Chand & Co., New Delhi, (Reprint) 2008.
5. Kreyzig E., "Advanced Engineering Mathematics", Tenth Edition, John Wiley and sons, 2011.
6. Venkataraman M.K., "Engineering Mathematics", The National Pub. Co., Chennai, 2003.
7. Weir, MD, Hass J, Giordano FR: Thomas' Calculus Pearson education 12th ED, 2015.

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LAB COMPONENT

List of MATLAB Programmes:

1. Evaluating double integral with constant and variable limits.
2. Area as double integral
3. Evaluating triple integral with constant and variable limits
4. Volume as triple integral
5. Evaluating gradient, divergence and curl
6. Evaluating line integrals and work done
7. Verifying Green's theorem in the plane
8. Evaluating Laplace transforms and inverse Laplace transforms of functions including impulse.
9. Heaviside functions and applying convolution.
10. Applying the technique of Laplace transform to solve differential equations.

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

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U18 PHI2201 Engineering Physics
(Common to AU, ECE, CE,IT, MEC, ME)

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: Understand the principles of motion and rotation of a rigid body in the plane.

CO2: Enhance the fundamental knowledge in properties of matter and its applications relevant to various streams of engineering and technology.

CO3: To introduce the phenomenon of heat and account for the consequence of heat transfer in engineering systems.

CO4: To apply the concepts of electrostatics and dielectrics for various engineering applications.

CO5: To understand the basics of magnetostatics.

CO6: To introduce and provide a broad view of the smart materials and Nano science to undergraduates.

Pre-requisites: High School Education

CO PO Mapping

COs	Programme Outcomes (POs)												PSO	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO1	PSO 2
CO1	S		M									M	M	
CO2	S		M									M	M	
CO3	S		M									M	M	
CO4	S		M									M		M
CO5	S		M									M		M
CO6	S		M	M								M		M

COURSE ASSESSMENT METHODS

Direct
1. Continuous Assessment Test I, II (Theory component) 2. Cooperative learning report, Assignment; Group Presentation, Project report, Poster preparation, 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 component)
Indirect
1. Course-end survey

THEORY COMPONENT CONTENTS

KINEMATICS & RIGID BODY MOTION 9 Hours

Definition and motion of a rigid body in the plane; Rotation in the plane; Kinematics in a coordinate system rotating and translating in the plane; Angular momentum about a point of a rigid body in planar motion; Euler's laws of motion, their independence from Newton's laws, and their necessity in describing rigid body motion; Examples.

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PROPERTIES OF MATTER **9 Hours**

Hooke's Law Stress - Strain Diagram - Elastic moduli - Relation between elastic constants - Poisson's Ratio - Expression for bending moment and depression - Cantilever - Expression for Young's modulus by Non-uniform bending and its experimental determination.

HEAT **9 Hours**

Specific heat capacity, thermal capacity. Temperature rise. Coefficient of linear thermal expansion. Methods of measurement of thermal expansion. Thermal stresses in composite structures due to non-homogeneous thermal expansion. Applications -The bimetallic strip. Expansion gaps and rollers in engineering structures. Thermal conductivity: differential equation of heat flow. Lee's disc apparatus for determination of thermal conductivity. Thermal Insulation. Convection and radiation. Applications to refrigeration and power electronic devices.

ELECTROSTATICS & MAGNETOSTATICS **9Hours**

ELECTROSTATICS : Maxwell's equation for electrostatics – E due to straight conductors, circular loop, infinite sheet of current - electric field intensity (D) - Electric potential - dielectrics - dielectric polarization - internal field – Clasious - Mosotti equation - dielectric strength - applications.

MAGNETOSTATICS: Maxwell's equation for magnetostatics - B in straight conductors, circular loop, infinite sheet of current - Lorentz force, magnetic field intensity (H) – Biot–Savart's Law – Ampere's Circuit Law –Magnetic flux density (B).

NEW ENGINEERING MATERIALS AND NANO TECHNOLOGY **9 Hours**

New Engineering Materials: Metallic glasses – preparation, properties and applications – Shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications - advantages and disadvantages of SMA.

Nano Materials: synthesis - Ball milling - Sol-gel - Electro deposition — properties of nano particles and applications. – Carbon Nano Tubes – fabrication by Chemical Vapour Deposition - structure, properties & applications.

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

REFERENCES

1. Essential University Physics, Vols. 1 and 2., Richard Wolfson, Pearson Education, Singapore, 2011.
2. Engineering Mechanics (2nd ed.), Harbola M. K., Cengage publications, New Delhi, 2009.
3. Concepts of Physics, H. C. Verma vol 1 and 2, Bharati Bhawan Publishers & Distributors; First edition (2017).
4. Engineering Electromagnetics, W. H. Hayt and John A. Buck, 6th Edition, Tata McGraw Hill, New Delhi, 2014.
5. Theory and Problems of Electromagnetic Schaum's Outline Series, 5th Edition, Joseph A. Edminister, Tata McGraw Hill Inc., New Delhi, 2010.
6. Engineering Physics, Rajendran V., Tata McGraw-Hill Education Pvt. Ltd., 2010

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7. Nano – the Essentials, Pradeep T., McGraw-Hill Education, Pvt. Ltd., 2007.

Lab component:

LIST OF EXPERIMENTS

1. Non-uniform bending – Determination of Young's modulus
2. Compound Pendulum – Determination of acceleration due to gravity
3. Spectrometer – Determination of wavelength of mercury source using grating
4. Air wedge - Determination of thickness of thin sheet
5. Semiconductor Laser:
    a. Determination of wavelength of laser
    b. Determination acceptance angle and numerical aperture of an optial fibre.
    c. Determination of particle size
6. Melde's string – Determination of frequency of a turing fork
7. Determination of band gap of a semiconductor
8. Ultrasonic interferometer – Determination of velocity of sound and compressibility of a liquid
9. Luxmeter – Determination of efficiency of solar cell
10. Lee's disc – Determination of thermal conductivity of a bad conductor

Experiments for Demonstration:

1. Hall effect
2. Hardness Test
3. Four probe experiment
4. Hysteresis curve

REFERENCES

1. Laboratory Manual of Engineering Physics, Dr. Y. Aparna & Dr. K. Venkateswara Rao, V.G.S Publishers.
2. Practical Physics, G.L. Squires, Cambridge University Press, Cambridge, 1985.
3. Great Experiments in Physics, M.H. Shamos, Holt, Rinehart and Winston Inc., 1959.
4. Experiments in Modern Physics, A.C. Melissinos, Academic Press, N.Y., 1966.

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

U18CSI2201 PYTHON PROGRAMMING

(Common to All Branches)

L	T	P	J	C
2	0	2	0	3

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COURSE OUTCOMES

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

CO1: Classify and make use of python programming elements to solve and debug simple logical problems.(K4,S3)

CO2: Experiment with the various control statements in Python.(K3,S2)

CO3: Develop Python programs using functions and strings.(K3,S2)

CO4: Analyze a problem and use appropriate data structures to solve it.(K4,S3)

CO5: Develop python programs to implement various file operations and exception handling.(K3,S2)

Pre-requisites :U18CSI1201 – Structured Programming Using C

CO/PO MAPPING (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak															
Cos	**PROGRAMME OUTCOMES (POs)**												**PSO**		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**	**PSO 3**
CO1		S			M					M		M			
CO2			M							M		M			
CO3			M							M		M		M	
CO4	S	S	M		M					M		M	M	M	
CO5			M							M		M			

COURSE ASSESSMENT METHODS

DIRECT
1. Continuous Assessment Test I, II (Theory component) 2. Open Book Test, Assignment 3. 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

THEORY COMPONENT CONTENTS

BASICS OF PYTHON PROGRAMMING **6 Hours**

Introduction-Python Interpreter-Interactive and script mode-Values and types, operators, expressions, statements, precedence of operators, Multiple assignments, comments.

CONTROL STATEMENTS AND FUNCTIONS IN PYTHON **6 Hours**

Conditional (if), alternative (if-else), chained conditional (if-elif-else)-Iteration-while, for, break, continue, pass – Functions-Introduction,inbuilt functions, user defined functions, passing parameters, return values, recursion, Lambda functions.

DATA STRUCTURES: STRINGS,LISTS and SETS **7 Hours**

Strings-String slices, immutability, string methods

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and operations -Lists-creating lists, list operations, list methods, mutability, aliasing, cloning lists, list and strings, list and functions-list processing-list comprehension, searching and sorting, Sets-creating sets, set operations.

DATA STRUCTURES: TUPLES, DICTIONARIES 5 Hours

Tuples-Tuple assignment, Operations on Tuples, lists and tuples, Tuple as return value-Dictionaries-operations and methods, Nested Dictionaries.

FILES, MODULES, PACKAGES 6 Hours

Files and Exception-Text files, reading and writing files, format Operator-Modules-Python Modules-Creating own Python Modules-packages, Introduction to exception handling.

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

REFERENCES

1. Ashok NamdevKamthane,Amit Ashok Kamthane, "Programming and Problem Solving with Python" , Mc-Graw Hill Education,2018.
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", Second edition, Updated for Python 3, Shroff / O'Reilly Publishers, 2016.
3. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach", Pearson India Education Services Pvt. Ltd., 2016.
4. Timothy A. Budd," Exploring Python", Mc-Graw Hill Education (India) Private Ltd., 2015.
5. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.
6. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem Solving Focus", Wiley India Edition, 2013.

E BOOKS AND ONLINE LEARNING MATERIALS

1. www.mhhe.com/kamthane/python
2. Allen B. Downey, Think Python: How to Think Like a Computer Scientist, Second edition, Updated for Python 3, Shroff / O'Reilly Publishers, 2016 (http://greenteapress.com/wp/think-python/)

LAB COMPONENT CONTENTS
LIST OF EXPERIMENTS

1. Implement simple python programs using interactive and script mode.
2. Develop python programs using id() and type() functions
3. Implementrange() function in python
4. Implement various control statements in python.
5. Develop python programs to perform various string operations like concatenation,slicing, Indexing.
6. Demonstrate string functions using python.
7. Implementuser defined functions using python.
8. Develop python programs to perform operations on list

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9. Implement dictionary and set in python
10. Develop programs to work with Tuples.
11. Create programs to solve problems using various data structures in python.
12. Implement python program to perform file operations.
13. Implement python programs using modules and packages.

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

ONLINE COURSES AND VIDEO LECTURES:

http://nptel.ac.in
https://www.edx.org/course/introduction-to-python-fundamentals-1
https://www.edx.org/course/computing-in-python-ii-control-structures-0
https://www.edx.org/course?search_query=Computing+in+Python+III%3A+Data+Structures

U18ITI2201	**DIGITAL LOGIC AND**	**L**	**T**	**P**	**J**	**C**

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MICROPROCESSOR

3	0	2	0	4

COURSE OUTCOMES

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

CO1: Demonstrate the knowledge of logic gates, Boolean algebra, minimization techniques and apply to design a combinational circuits

CO2: Analyse and design sequential circuits

CO3: Program 8086 for the given problems

CO4: Interface 8086 with peripheral devices

Pre-requisites :U18EEI1201 - BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
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	1	2	3
CO1	M	M	M		M							M	M		
CO2	M	M										M	M		
CO3	M	M	W		M							M	M		
CO4	M	M	W									M			

Course Assessment methods

Direct
1. Continuous Assessment Test I, II (Theory component) 2. Assignment, Group Presentation (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

Theory Component contents

COMBINATIONAL CIRCUITS **10 Hours**

Review of number systems - Logic gates: NAND, NOR gate as universal building blocks - Simplification of four-variable Boolean equations using Karnaugh maps - Half adder, Full adder, Half subtractor, Full subtractor - 4-bit parallel adder and subtractor - 3-bit binary decoder – Decimal to BCD encoder – 8-to-1 multiplexer, 1-to-8 Demultiplxer

SEQENTIAL LOGIC CIRCUITS **8 Hours**

Flip flops SR, JK, T, D and Master slave – Characteristic table and equation –Application table – Edge triggering –Level Triggering –Realization of one flip flop using other flip flops – Register – shift registers - Universal shift register .

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DESIGN OF SEQUENTIAL CIRCUITS **9 Hours**

Design of synchronous sequential circuits: state diagram - State table – State minimization – State assignment. Counters: Synchronous Binary counters – Modulo n counter - Decade - BCD counters, Asynchronous counter, Ring counters.

8086 MICROPROCESSOR ARCHITECTURE AND INSTRUCTION SET **10 Hours**

Pin diagram - CPU architecture - Memory segmentation - Internal operations - Addressing modes -Instruction formats - Assembler instruction formats: Data transfer instructions, Arithmetic instructions, Logical instructions, Branch-and-loop instructions – Interrupts: Software and Hardware interrupts, Software interrupt programming

PERIPHERAL CHIPS **8 Hours**

8255 (PPI), 8254 (Timer), 8257 (DMA), 8259 (PIC), 8251 (USART), 8279(Key Board Display Interface)

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

LAB COMPONENT:

LIST OF EXPERIMENTS **30 Hours**

I. Digital Electronics

1. Implementation of Logic Circuits
2. Adder and Subtractor
3. Combinational Circuit Design
   a) Design of Decoder and Encoder
   b) Design of Code Converter
   c) Design of multiplexers and de multiplexers
4. Sequential Circuit Design
   a) Implementation of Shift registers, Serial Transfer
   b) 4-bit Binary Counter
   c) BCD Counter

II. Microprocessors

5. ALP Arithmetic programming
   a) Write an ALP to find out factorial of a given hexadecimal number using 8086 MP Data: OAH, OFH, 1OH
   b) Write an ALP to perform 16 bit arithmetic operations (ADD, SUB, MUL, DIV)
   c) Write an ALP to generate the sum of first 'N' natural numbers using 8086 MP
6. Sorting and Data Movement
   a) Write an ALP to order give set of hexadecimal numbers in ascending and descending order. Data: 0AH, 0FH, 0DH, 10H, 02H
   b) Write an ALP to move block of data from locations 1200H-1205H to 2200H – 2205H
   c) Write an ALP to reverse the given string Data: WELCOME
7. Write an ALP to generate square wave using 8255 PPI
8. Write an ALP to display the given message using 8279 PKI
9. Write an ALP to interface analog to digital converter.

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

REFERENCES

1. M. Morris Mano, Digital Logic and Computer Design, 3rd Edition, Pearson Education, 2013.
2. Douglas V. Hall, Microprocessors and Interfacing, TMH, 2010.
3. Thomas L. Floyd, "Digital Fundamentals", Pearson Education, Inc, New Delhi, 2013
4. Yu-Cheng Liu, Glenn A. Gibson, Microcomputer Systems: The 8086/8088 Family, PHI, 2010.
5. Barry B. Brey, "The Intel Microprocessors: 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium 4 and Core2", Pearson, 2012.

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U18ENI2201 – FUNDAMENTALS OF COMMUNICATION - II

(Common to all branches of II Semester B.E/B/Tech Programmes)

L	T	P	J	C
2	0	2	0	3

COURSE OBJECTIVES:

1. To effectively use the basic language skills to imbibe technical language skills.
2. To hone written and spoken competencies leading to effective communication.
3. To comprehend, use and explain technical data and information.

COURSE OUTCOMES:

After the course the student will be able to:

CO1: Read, understand, and interpret material on technology.

CO2: Communicate knowledge and information through oral and written medium.

CO3: Compare, collate and present technical information according to the audience and purpose.

ASSESSMENT METHODS

Direct
1. Continuous Assessment of Skills 2. Assignment 3. Written Test 4. End Semester Examination
Indirect
1. Course-end survey

CO/PO Mapping:

CO/PO Mapping (S/M/W indicates strength of correlation)S-Strong, M-Medium, W-Weak														
COs	**Programme Outcomes(POs)**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO1		**W**		**S**					**S**	**S**		**S**		
CO2				**S**					**S**	**S**		**W**		
CO3				**M**					**S**	**S**		**S**		

No	**TOPIC**	
	MODULE I	**12 Hrs**
1.1	Introduction to Technical Writing Technical Definitions	2
1.2	Writing Instructions / Instruction Manual	2
1.3	Writing Recommendations	2
1.4	Speaking Activity I	6
	MODULE II	**12 Hrs**

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2.1	Process Writing	2
2.2	Review Writing I - Product	2
2.3	Review Writing II – Article	2
2.4	Speaking Activity II	6
	MODULE III	**12 Hrs**
3.1	Interpreting and Transcoding Graphics	2
3.2	Types of Report / Writing a Report	2
3.3	Reading & Responding to texts	2
3.4	Speaking Activity III	6
	MODULE IV	**12 Hrs**
4.1	Drafting a project proposal	2
4.2	Listening to technical talks	2
4.3	Preparing a survey Questionnaire	2
4.4	Speaking Activity IV	6
	MODULE V	**12 Hrs**
5.1	Writing Memos, Circulars, Notices	2
5.2	Writing Agenda and Minutes	2
5.3	Inferential Reading	2
5.4	Speaking Activity V	6
	Total	**60**

REFERENCE BOOKS:

1. Technical English Workbook, VRB Publishers Pvt. Ltd (Prof. Jewelcy Jawahar, Dr.P.Ratna)
2. Effective Technical Communication, Tata McGraw Hills Publications (Ashraf Rizvi)
3. Technical Communication – English Skills for Engineers, Oxford Higher Education (Meenakshi Raman, Sangeeta Sharma)

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L	T	P	J	C
0	0	4	2	3

U18INI2600 ENGINEERING CLINIC – II

COURSE OBJECTIVES

- To help the students look into the functioning of simple to complex devices and systems
- To enable the students to design and build simple systems on their own
- To help experiment with innovative ideas in design and team work
- To create an engaging and challenging environment in the engineering lab

COURSE OUTCOMES

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

CO1: Identify a practical problems and find a solution
CO2: Understand the project management techniques
CO3: Demonstrate their technical report writing and presentation skills

Pre-requisite: Nil

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	PS O1	PS O2
CO1	S	S	S	S	S	M	W		S			S		
CO2											S			
CO3										S				

COURSE ASSESSMENT METHODS:

Direct
1.Project reviews 50% 2.Workbook report 10% 3.Demonstration& Viva-voce 40%
Indirect
1. Course Exit Survey

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CONTENT:

The course will offer the students with an opportunity to gain a basic understanding of computer controlled electronic devices and apply the concepts to design and build simple to complex devices. As a practical project based embedded course, the students will be taught the concepts using a variety of reference material available in the public domain. While the course will start with formal instruction on hardware, programming and applications, the major portion of the course will provide the students with ample opportunity to be innovative in designing and building a range of products from toys to robots and flying machines.

In the second semester, students will focus primarily on Raspberry pi based controllers with Python programming .

GUIDELINES:

1. Practical based learning carrying credits.
2. Multi-disciplinary/ Multi-focus group of 5-6 students.
3. Groups can select to work on a specific tasks, or projects related to real world problems.
4. Each group has a faculty coordinator/Instructor who will guide/evaluate the overall group as well as individual students.
5. The students have to display their model in the 'Engineering Clinics Expo' at the end of semester.
6. The progress of the course is evaluated based on reviews and final demonstration of prototype.

Total Hours: 90

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LIST OF MANDATORY COURSES

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U18VEP2502 **INTERPERSONAL VALUES** (Mandatory)

L	T	P	J	C
0	0	2	0	0

COURSE OUTCOMES

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

CO 1: Develop a healthy relationship & harmony with others
CO 2: Practice respecting every human being
CO 3: Practice to eradicate negative temperaments
CO 4: Acquire Respect, Honesty, Empathy, Forgiveness and Equality
CO 5: Practice Exercises and Meditation to lead a healthy life
CO 6: Manage the cognitive abilities of an Individual

PRE-REQUISITES :

1. U18VEP1501 / PERSONAL VALUES

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										S		
CO2									S			
CO3											M	S
CO4						M						
CO5												M
CO6											M	

Course Assessment methods

Direct
1.Group Activity / Individual performance and assignment 2.Assessment on Value work sheet / Test
Indirect
1. Mini project on values / Goodwill Recognition

Values through Practical activities:

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1. Introduction: Introduction to interpersonal values – Developing harmony with others – Healthy relationship – Need & importance of interpersonal values for dealing with others and team - Effective communication with others.

2. Maneuvering the temperaments: From Greed To Contentment - Anger To Tolerance - Miserliness To Charity – Ego To Equality - Vengeance To Forgiveness.

3. Core value : **Truthfulness -**Honesty –Helping–Friendship – Brotherhood – Tolerance – Caring & Sharing – Forgiveness – Charity –Sympathy — Generosity – Brotherhood - Adaptability.

4.Pathway to Blissful life :
Signs of anger – Root cause – Chain reaction – Evil effects on Body and Mind – Analyzing roots of worries – Techniques to eradicate worries.

5.Therapeutic measures: Spine strengthening exercises - Nero muscular breathing exercises - Laughing therapy - Mindfulness meditation.

Workshop mode

REFERENCES

1. INTERPERSONAL SKILLS Tutorial (PDF Version) - TutorialsPoint
   www.tutorialspoint.com/interpersonal_skills/interpersonal_skills_tutorial.pdf
2. INTERPERSONAL RELATIONSHIPS AT WORK - KI Open Archive - Karolinska
   www. publications.ki.se/xmlui/bitstream/handle/10616/39545/thesis.pdf?sequence=1
3. VALUES EDUCATION FOR PEACE, HUMAN RIGHTS, DEMOCRACY – UNESCO
   www.unesdoc.unesco.org/images/0011/001143/114357eo.pdf
4. MANEUVERING OF SIX TEMPERAMENTS - Vethathiri Maharishi
   www.ijhssi.org/papers/v5(5)/F0505034036.pdf
5. THE BLISS OF INNER FIRE: HEART PRACTICE OF THE SIX ... - Wisdom Publications - www.wisdompubs.org/sites/.../Bliss%20of%20Inner%20Fire%20Book%20Preview.pd...

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SEMESTER III

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U18MAT3102 DISCRETE MATHEMATICS
(Common to CSE, IT, ISE)

L	T	P	PJ	C
3	1	0	0	4

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

CO1: Have a better understanding of sets and application of set theory.
CO2: Apply the knowledge of relations, equivalence relation and their properties.
CO3: Understand different kinds of functions.
CO4: Apply the knowledge of Combinatorics
CO5: Understand logical arguments and constructs simple mathematical proofs.
CO6: Know various graphs and learn different algorithms.

Pre-requisite courses: 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	S	M										
CO2	S	M										
CO3	S	M										
CO4	S	S	M									
CO5	S	S	M									
CO6	S	S	M									

COURSE ASSESSMENT METHODS:

Direct

1. Continuous Assessment Test I, II
2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Presentation, Project report, Poster preparation, Prototype or Product Demonstration etc. (as applicable)
3. End Semester Examination

Indirect

1. Course-end survey

TOPICS COVERED:

SET THEORY **9+3 Hours**

Algebra of sets – The power set – Ordered pairs and Cartesian product – principle of inclusion and exclusion.

Relations on sets –Types of relations and their properties - Equivalence relations –Relational matrix and the graph of relation – Operations on relations.

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FUNCTIONS **9+3 Hours**

Functions – Classification of functions –Type of functions – Injective, surjective and bijective functions –Composition of functions – Inverse functions –Permutation functions.

COMBINATORICS **9+3 Hours**

Mathematical induction- The basics of counting–Permutations and combinations-Recurrence relations-Solving linear recurrence relations

LOGIC **9+3 Hours**

Propositions- Logical operators- Normal forms –Rules of inference-Consistency and inconsistency-Propositional logic- Proofs-Predicates- Quantifiers- Universe of discourse – Logical equivalences and implications for quantified statements-Rules of specification and generalization – Validity of arguments.

GRAPH THEORY **9+3 Hours**

Graphs- Types of graphs- Matrix representation of graphs- Graph isomorphism- Walk - Path- Cycles- Eulerian graphs -Hamiltonian graphs- Planar graphs- Euler formula- Shortest path algorithms.

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

REFERENCES

1. Liu C.L, "Elements of Discrete Mathematics, Second Edition, McGraw Hill 1985.
2. Mott J.L, Kandel A. and Baker T.P.,"Discrete Mathematics for Computer Scientists and Mathematicians, Second Edition, Prentice Hall India, 1986.
3. J.P.Trembly, R. Manohar, Discrete Mathematical Structures with applications to Computer Science, TMHInternational Edition (Latest Edition).
4. NarsinghDeo, Graph Theory with Applications to Engineering and Computer Science, Prentice – Hall, Engle Cliffs, N. J.
5. Harary F, Graph Theory, Narosa, 1969.
6. Thomas H.C., A Leiserson C.E., Rivest R.L, Stein C.A., "Introduction to a Algorithms(2nd Edition),MIT press and McGraw-Hill.2001.

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U18ECT3011 PRINCIPLES OF COMMUNICATION

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: Describe the fundamental concepts of communication systems
CO2: Compare analog modulation schemes.
CO3: Explain digital modulation schemes.
CO4: Classify standard base band data transmission techniques.
CO5: Paraphrase the spread spectrum techniques and multiple access techniques

Pre-requisite: Nil

CO/PO Mapping												
COs	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S											
CO2	M	W										
CO3	M	W	W									
CO4	M											
CO5	M	W										

COURSE ASSESSMENT METHODS:

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

Topics covered:

INTRODUCTION TO COMMUNICATION SYSTEMS 3 Hours
Basics of Communication System– Electromagnetic Spectrum – Need for Modulation.

ANALOG MODULATION: 12 Hours
Principles of amplitude modulation - AM envelope, Frequency spectrum and bandwidth, Modulation index and percent modulation, AM power distribution – AM Modulator and Demodulator, AM transmitter and receivers - TRF, Super heterodyne receivers. Angle Modulation - FM and PM, Mathematical representation, waveform, Bandwidth, FM modulators and Demodulators, Direct and Indirect FM transmitters.

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DIGITAL MODULATION TECHNIQUE **10 Hours**

Introduction, Binary ASK, PSK, QPSK and Binary FSK, Concepts of M-ary Modulation schemes.

BASEBAND DATA TRANSMISSION **10 Hours**

Sampling theorem, Reconstruction of message from its samples, PCM, line coding techniques DPCM, DM, ADM, ISI, Time Division multiplexing, Digital Multiplexers.

SPREAD SPECTRUM AND MULTIPLE ACCESS TECHNIQUES **10 Hours**

Introduction, Pseudo-noise sequence, DS spread spectrum with coherent binary PSK, Processing gain, Probability of error, FH spread spectrum, multiple access techniques

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

REFERENCES

1. Wayne Tomasi, ―Electronic Communication Systems: Fundamentals through Advanced, Pearson Education, 2001.
2. Simon Haykin, ―Digital Communications, John Wiley & Sons, 2003
3. Simon Haykin, ―Communication Systems, John Wiley & Sons, 4th edn., 2001.
4. Taub & Schilling, ―Principles of Communication Systems, TMH, 2nd edn., 2003
5. Blake, ―Electronic Communication Systems, Thomson Delman, 2nd edn., 2002.

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U18ITT3001 COMPUTER ARCHITECTURE

L	T	P	J	C
3	0	0	0	3

COURSE OBJECTIVES:

- To understand the basic structure of a digital computer.
- To discuss the operation of various components of computing systems.
- To study the different ways of communicating with I/O devices
- To enhance the processor operation by employing pipelining

COURSE OUTCOMES:

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

CO1 Explain micro level operations of computer using the concepts of hardware and software coordination.

CO2 Compare different types of memories and their performances.

CO3 Apply the knowledge of binary arithmetic operations to understand the design of hardware components

CO4 Enumerate various control methodologies using programming and their effect on the hardware components

CO5 Describe the performance enhancement techniques for data handling and I/O handling

Pre-requisite: Nil

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
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	1	2	3
CO 1	S												M		
CO 2	M	M										M	M		
CO 3	S												M		
CO 4	S	M											M		
CO 5		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

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THEORY COMPONENT CONTENTS

BASIC STRUCTURE OF COMPUTERS **7 Hours**

Functional Units - Basic Operational Concepts - Bus Structures - Software Performance - Memory Locations and Addresses - Memory Operations - Instruction and Instruction Sequencing - Addressing Modes - Assembly Language - Basic I/O Operations - Stacks and Queues.

BASIC PROCESSING UNIT **8 Hours**

Fundamental Concepts - Execution of a Complete Instruction - Multiple Bus Organization - Hardwired Control – Micro programmed Control – Microinstructions- Micro program Sequencing- Wide Branch Addressing

ARITHMETIC UNIT **11 Hours**

Addition and Subtraction of Signed Numbers - Design of Fast Adders - Multiplication of Positive Numbers - Signed Operand Multiplication and Fast Multiplication - Integer Division - Floating Point Numbers and Operations.

MEMORY SYSTEM **9 Hours**

Basic Concepts - Semiconductor RAM- Internal Organization of Memory Chips- Static Memories- ROM- Speed, Size and Cost - Cache Memories - Performance Considerations - Virtual Memory

PIPELINING AND I/O ORGANIZATION **10 Hours**

Pipelining - Basic Concepts - Data Hazards - Instruction Hazards -Superscalar operation- Out –of-Order Execution- Interrupts - Direct Memory Access.

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

REFERENCES:

1. Carl Hamacher, ZvonkoVranesic and SafwatZaky, “Computer Organization”, 5th Edition McGraw-Hill, 2014.
2. R.D.Dowsing, F.W.D.Woodhams and Ian Marshall, “Computers From Logic To Architecture”, Mcgraw Hill Publishing Company, UK, 2000
3. Ian East, “Computer Architecture And Organization”, Pitman Publishing, (A Division Of Longman Group UK Limited), Taylor & Francis E-Library, 2005
4. William Stallings, “Computer Organization and Architecture - Designing for Performance”, 9th Edition, Prentice Hall, 2012.
5. David A.Patterson and John L.Hennessy, “Computer Organization and Design: The hardware / software interface”, 4th Edition, Morgan Kaufmann, 2008.
6. John P.Hayes, “Computer Architecture and Organization”, 3rd Edition, McGraw Hill, 2002.

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U18ITI3202 **DATA STRUCTURES**

L	T	P	J	C
3	0	2	0	4

COURSE OBJECTIVES:

- Master the implementation of linked data structures such as stack, queues, linked lists, trees etc.
- To choose the appropriate data structure and algorithm design method for a specific application

COURSE OUTCOMES:

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

CO1 Explain various sorting algorithms.
CO2 Explain various searching algorithms.
CO3 Explain the concepts of List, Stack and queue
CO4 Explain the concepts of trees and graphs
CO5 Implement the given problem using Linear and Non-Linear Data Structures
CO6 Identify and Demonstrate the usage of various data structures using simple applications.

Pre-requisites: Nil

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
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	1	2	3
CO1	M	M											M		
CO2	M	M											M		
CO3	M	M											M		
CO4	M	M											M		
CO5	S	S		M								M	M		
CO6	S	S	M	M						M		S	M		

COURSE ASSESSMENT METHODS:

Direct
1. Continuous Assessment Test I, II (Theory component) 2. Assignment, Group Presentation (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

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THEORY COMPONENT CONTENTS

SORTING AND SERACHING **9 Hours**

Basics of data structures-Types-Time and space complexity-Selection-sort- Bubble sort - Insertion sort - Quick sort, Shell sort, Merge sort- External sorting Searching techniques: Sequential search, Binary search. Hashing - Hash Functions- Collision Resolution strategies.

LINKED LIST AND STACK **9 Hours**

Array list-Review of Pointers- Linked lists –Types- Operations - Creation, Insertion, Deletion, Modification, Merging, Splitting, Traversal – Applications: Polynomial operations, Set operations, Hash table implementation

Stacks – Operations –Applications of Stack - Infix to Postfix Conversion, Expression Evaluation – Tower of Hanoi problem, Maze Problems

QUEUES **9 Hours**

Queues - Operations on Queues, Queue Applications- Job scheduling, Circular Queue- Operations- Round robin scheduling, Dequeue. Priority Queues with Binary Heaps- - Binary Heap Implementation -The Structure Property- The Heap Order Property- Heap Operations

TREES **9 Hours**

General Trees Representation - Tree Traversals- -Binary Search Tree- Threaded Binary Tree - Balanced Binary Search Trees- AVL Tree - AVL Tree Implementation -Applications of trees- Directory structure – Expression tree –B Trees

GRAPHS **9 Hours**

Graphs and their representation: BFS, DFS– Shortest Path Algorithms – Dijkstra's Algorithm- Minimum Spanning tree- Kruskal's Algorithm – Prims algorithm- Topological Sorting

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

REFERENCES:

1. M.A.Weiss, "Data Structures and Algorithm Analysis in C", Second edition, Pearson Education Asia, 2007.
2. Ellis Horowitz, Sartaj Sahni and SanguthevarRajasekaran, "Fundamentals of Computer Algorithms", Second Edition, Universities Press, Hyderabad, 2008.
3. Jean Paul Tremblay and Paul G. Sorenson, An introduction to data structures with applications 2nd edition, Tata McGraw-Hill, 20014
4. Gilberg and Ferouzan, Data Structures using C, Pearson Education 2004.
5. Robert L. Kruse, Clovis L. Tondo, Bruce P. Leung, 'Data Structures and Program Design in C', PHI, 1996.
6. Alfred V. Aho, John E. Hopcroft and Jeffry D. Ullman, Data Structures &Algorithms, Pearson Education, New Delhi, 2009.

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LAB COMPONENTS:

LIST OF EXPERIMENTS

1. Implementing searching algorithms – linear and binary
2. Implementing sorting algorithms – selection sort, insertion sort, quick sort
3. Implementing Set operations using Linked List
4. Implementing stack using array and Linked List
5. Implementing stack applications(Balancing Paranthesis, Infix to postfix conversion)
6. Implementing queue applications(Job scheduling- FIFO, Round Robin)
7. Implementing priority queue
8. Implementing Binary Search trees
9. Implementing AVL trees
10. Implementing BFS and DFS algorithms

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

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U18ITI3203 **OBJECT ORIENTED PROGRAMMING**

L	T	P	J	C
3	0	2	0	4

COURSE OBJECTIVES:

- Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
- Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- Be aware of the important topics and principles of software development.
- Write computer programs to solve specified problems.
- Use the Java SDK environment to create, debug and run simple Java programs.

COURSE OUTCOMES:

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

CO1 : Interpret the need of various OOPS concept
CO2 : Apply the OOPS concepts for developing application
CO3 : Apply the concepts of packages and interfaces to write simple applications
CO4 : Explore the importance of strings and stream classes
CO5 : Summarize the importance of exception handling and threads
CO6 : Apply the concepts of collections for handling data

Pre-requisites : Nil

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
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	1	2	3
CO1	M	M											W		
CO2	S	M	M		M							M	M	M	
CO3	S	M	M		M								M		S
CO4	M	M											M		
CO5	M	M											M		
CO6	S	M	M	M								M	M		

COURSE ASSESSMENT METHODS:

Direct
1. Continuous Assessment Test I, II (Theory component)
2. Assignment, Group Presentation (Theory component)
3. Pre/Post - experiment Test/Viva (Lab component)
4. Model examination (Lab component)
5. End Semester Examination (Theory and Lab components)
Indirect
1. Course-end survey

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THEORY COMPONENT CONTENTS

Object Oriented Programming basics **9 Hours**

Introduction to OOP – Attributes, Methods, Modelling Real World using OOP - Data types - Variables and Arrays – Operators – Control Statements – Classes and Objects – Constructors.

Inheritance & Polymorphism **9 Hours**

Inheritance – types of inheritance –Method overriding – Polymorphism – Method overloading – constructor overloading – Dynamic Method Dispatch - Packages – defining and packages – interfaces – implementing and extending interfaces

I/O and Strings **9 Hours**

I/O basics: Streams – Byte streams and Character streams – Files – String handling – String operations – String methods – Wrapper classes

Exceptions & Multithreading **9 Hours**

Exception Handling – Using try and catch – Built-in Exceptions – User-defined Exception. Threading – Life cycle of a thread – Thread Implementation – Synchronization – Inter-thread Communication

Collections **9 Hours**

Overview of Collections Interfaces, List Interface and its implementations, Generics, List looping, Stack, Priority Queues, Map in Java

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

REFERENCES:

1. Herbert Schildt, "The Complete Reference– Java", Tata McGraw Hill, Ninth edition,2014
2. Deitel and Deitel, "Java: How to Program", Ninth Edition, Prentice Hall, Tenth Edition,2014
3. Bruce Eckel , "Thinking in Java", Fourth Edition, Pearson Education, 2006
4. Cay S. Horstmann, Gary Cornell, "Core Java, Volume I—Fundamentals", Eighth Edition, Sun Microsystems, 2011.

LAB COMPONENTS

List of Experiments:

1. Basic programs
2. Working with classes and objects
3. Programs in inheritance
4. Programs in polymorphism
5. String Handling
6. Programs in Exception handling
7. Programs in multithreading
8. Stack and Queue implementation using collection interfaces

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

U18INI3600 ENGINEERING CLINIC III

L	T	P	J	C
0	0	4	2	3

Course objectives

- To help the students look into the functioning of simple to complex devices and systems
- To enable the students to design and build simple systems on their own
- To help experiment with innovative ideas in design and team work
- To create an engaging and challenging environment in the engineering lab

Course Outcomes

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

CO1: Identify a practical problems and find a solution
CO2: Understand the project management techniques
CO3: Demonstrate their technical report writing and presentation skills

Pre-requisite:

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	PS O1	PS O2
CO1	S	S	S	S	S	M	W		S			S		
CO2											S			
CO3										S				

COURSE ASSESSMENT METHODS:

Direct
1. Project reviews 50% 2. Workbook report 10% 3.Demonstration& Viva-voce 40%
Indirect
1. Course Exit Survey

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Content:

The course will offer the students with an opportunity to gain a basic understanding of computer controlled electronic devices and apply the concepts to design and build simple to complex devices. As a practical project based embedded course, the students will be taught the concepts using a variety of reference material available in the public domain. While the course will start with formal instruction on hardware, programming and applications, the major portion of the course will provide the students with ample opportunity to be innovative in designing and building a range of products from toys to robots and flying machines.

In the III semester, students will focus primarily on Design project combining concepts learnt in Engineering clinics I and II

GUIDELINES:

1. Practical based learning carrying credits.
2. Multi-disciplinary/ Multi-focus group of 5-6 students.
3. Groups can select to work on a specific tasks, or projects related to real world problems.
4. Each group has a faculty coordinator/Instructor who will guide/evaluate the overall group as well as individual students.
5. The students have to display their model in the 'Engineering Clinics Expo' at the end of semester.
6. The progress of the course is evaluated based on reviews and final demonstration of prototype.

Total Hours: 90

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LIST OF MANDATORY COURSES

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U18VEP3503 **FAMILY VALUES** (Mandatory)

L	T	P	J	C
0	0	2	0	0

Course Outcomes

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

CO 1: Develop skills in maintaining the harmony in the family.
CO 2: Create impulsive activities for healthy family
CO 3: Be receptive to troubled Individuals
CO 4: Gain healthy life by practicing Kundalini Yoga & Kayakalpa
CO 5: Possess Empathy among family members.
CO 6: Reason the life and its significance

Pre-requisites :

1. U18VEP1501 / PERSONAL VALUES
2. U18VEP2502 / INTERPERSONAL VALUES

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									S			
CO2							M					
CO3										M		
CO4												S
CO5						S						
CO6								M				

COURSE ASSESSMENT METHODS

Direct
1.Group Activity / Individual performance and assignment 2.Assessment on Value work sheet / Test
Indirect
1. Mini project on values / Goodwill Recognition

Values through Practical activities:

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1. Family system: Introduction to Family Values – elements of family values - Adjustment, Tolerance, Sacrifice - Family structure in different society – work life balance.

2. Peace in Family : Family members and their responsibility - Roles of parents, children, grant parents -. Respectable women hood

3. Core value:Empathy: Unconditional love - Respect - Compassion - sacrifice–Care &share - helping – emotional support- hospitality – cleanliness

4. Blessing: Blessing - methods - Vibration effect - Benefits - Reason for misunderstanding in the Family and resolution through blessings.

5. Healthy Family: Good relationship with neighbors - Counseling - Simplified Kundalini Yoga - Kaya Kalpa Yoga

Workshop mode

REFERENCES

1. FAMILY - www.download.nos.org/331courseE/L-13%20FAMILY.pdf

2. FRAMEWORK FOR ACTION ON VALUES EDUCATION IN EARLY CHILDHOOD – UNESCO – PDF –www.unesdoc.unesco.org/images/0012/001287/128712e.pdf

3. TRUE FAMILY VALUES Third Edition - Tparents Home www.tparents.org/Library/Unification/Books/TFV3/_TFV3.pdf

4. FAMILY VALUES IN A HISTORICAL PERSPECTIVE - The Tanner Lectures on www.tannerlectures.utah.edu/_documents/a-to-z/s/Stone95.pdf

5. PROBLEMS OF INDIA'S CHANGING FAMILY AND STATE ... - the United Nations - www.un.org/esa/socdev/family/docs/egm09/Singh.pdf

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SEMESTER IV

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U18MAI4201 **PROBABILITY AND STATISTICS**
(Common to CSE, IT, ISE)

L	T	P	PJ	C
3	0	2	0	4

Course Outcomes

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

CO1: Compute the statistical measures of correlation and regression.

CO2: Understand the concept of probability and its role in engineering.

CO3 : Construct probabilistic models for observed phenomena through distributions, which play an important role in many engineering applications.

CO4 : Carry out hypothesis testing and interpret the results

CO5: Understand the principles of design of experiments and perform analysis of variance.

CO6: Sketch control charts and outlines the process control.

Pre-requisites: 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	S	S							M	M		M
CO2	S	S							M	M		M
CO3	S	S							M	M		M
CO4	S	S							M	M		M
CO5	S	S							M	M		M
CO6	S	S							M	M		M

Course Assessment methods

DIRECT
1. Continuous Assessment Test I, II (Theory component) 2. Open Book Test; Cooperative Learning Report, Assignment; Journal Paper Review, Group Presentation, Project Report, Poster Preparation, Prototype or Product 3. Demonstration etc (as applicable) (Theory component) 4. Pre/Post - Experiment Test/Viva; Experimental Report for each Experiment (lab Component) 5. Model Examination (lab component) 6. End Semester Examination (Theory and lab components)
INDIRECT
1. Course-end survey

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THEORY COMPONENT

CORRELATION AND REGRESSION 6 Hours

Correlation – Karl Pearson's Correlation coefficient – Spearman's Rank Correlation – Regression lines.

PROBABILITY AND RANDOM VARIABLES 12 Hours

Axioms of probability - Conditional probability – Total probability – Bayes' theorem - Random variable – Distribution function – properties – Probability mass function – Probability density function – moments- moment generating functions.

NORMAL DISTRIBUTION 5 Hours

Normal distribution – Moments, Moment Generating functions and properties.

TESTING OF HYPOTHESIS 9 Hours

Small samples tests based on t and F distributions (single mean, difference of means, paired *t*- test and variance ratio test) – Chi-square test for independence of attributes and goodness of fit

DESIGN OF EXPERIMENTS 8 Hours

Analysis of Variance (ANOVA) – Completely Randomized Design (CRD) – Randomized Block Design (RBD) – Latin Square Design (LSD).

STATISTICAL QUALITY CONTROL 5 Hours

Concept of process control - Control charts for variables – Mean and Range charts – Control charts for attributes – p, np, c – charts.

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

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REFERENCES

1. Veerarajan T., Probability, Statistics and Random Processes, Tata McGraw Hill, 3rd edition, 2008.
2. Gupta S. P, "Statistical Methods", Sultan Chand & Sons Publishers, 2014.
3. Johnson R. A., Miller & Freund's "Probability and Statistics for Engineers", Sixth Edition, Pearson Education, Delhi, 2000.
4. Gupta.S.C and Kapoor.V.K, Fundamentals of Mathematical Statistics, 11th extensively revised edition, Sultan Chand & Sons, 2007.
5. Walpole R. E., Myers S.L. & Keying Ye, "Probability and Statistics for Engineers and Scientists", Pearson Education Inc, 9th edition, 2012.
6. Gupta S.C, and KapurV.K "Fundamentals of Applied Statistics", Sultan Chand, New Delhi, 4th Edition, 2014.
7. Charles Henry Brase and Corrinne Pellillo Brase "Understandable Statistics", D.C. Heath and Company, Toronto, 9th edition, 2007.

LAB COMPONENT : Using R Studio

1. Introduction to R programming
2. Application of descriptive statistics – Mean, Median, Mode and standard deviation
3. Applications of Correlation and Regression
4. Application of Normal distribution
5. Application of Student – t test
6. Application of F test
7. Application of Chi-square test
8. ANOVA – one way classification
9. ANOVA - two way classification
10. Control charts for variables (mean and range chart)

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

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L	T	P	J	C
3	0	0	0	3

U18ITT4001 OPERATING SYSTEMS

COURSE OBJECTIVES:

- To learn the fundamentals of Operating Systems and various computing environment.
- To learn the mechanisms of OS to handle processes and threads and their communication
- To learn the mechanisms involved in file, disk and memory management in contemporary OS

COURSE OUTCOMES:

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

CO1 Experiment with various CPU scheduling algorithms with the understanding of operating system concepts
CO2 Apply the methods for process coordination
CO3 Apply the various memory management strategies
CO4 Illustrate the various file management strategies
CO5 Apply the disk scheduling policies

Pre-requisite: Nil

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
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	1	2	3
CO1	S	M										M	M		
CO2	S	M										M	M		
CO3	S	M										M	M		

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CO4	S	M										M	M		
CO5	S	M										M	M		

COURSE ASSESSMENT METHODS:

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

THEORY COMPONENT CONTENTS:

INTRODUCTION AND PROCESS MANAGEMENT 9 Hours

Introduction: Operating System Structure – Operating System Operations – Process Management – Memory Management – Storage Management

System Structures: Operating System Services – System Calls – Types of System Calls – System Programs – Process Concept- Process Scheduling – Operations on Processes – Inter-process Communication–**Multithreaded Programming:** Overview – Multithreading Models – Threading Issues.

Process Scheduling: Basic Concepts – Scheduling Criteria – Scheduling Algorithms

PROCESS COORDINATION 11 Hours

Synchronization: The Critical-Section Problem – Peterson's Solution – Synchronization Hardware – Mutex Locks - Semaphores – Classic problems of Synchronization – Monitors–**Deadlocks:** System Model – Deadlock Characterization – Methods for Handling Deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlock

MEMORY MANAGEMENT 10 Hours

Memory-Management Strategies: Swapping – Contiguous Memory Allocation – Paging – Structure of the Page Table – Segmentation.

Virtual-Memory Management: Demand Paging – Copy-on-Write – Page Replacement – Allocation of Frames – Thrashing

FILE MANAGEMENT 8 Hours

File System: File Concept – Access Methods – Directory and Disk Structure –Protection

File System Implementation: File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free-space Management.

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L	T	P	J	C
3	0	2	0	4

SECONDARY-STORAGE MANAGEMENT **7 Hours**

Mass Storage Structure: Disk Structure – Disk Scheduling – Disk Management – Swap-Space Management

Case Study: Linux system, Windows 7

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

REFERENCES:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", John Wiley & Sons (Asia) Pvt. Ltd, Ninth Edition, 2014.
2. Andrew S. Tanenbaum, "Modern Operating Systems", 4th edition Prentice Hall of India Pvt. Ltd, 2014.
3. William Stallings**, "**Operating Systems: Internals and Design Principles",Pearson
4. Harvey M. Deitel, "Operating Systems", Pearson Education Pvt. Ltd, Third Edition, 2003.

U18ITI4202 DESIGN AND ANALYSIS OF ALGORITHMS

COURSE OBJECTIVES:

- Analyze the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations.

COURSE OUTCOMES:

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

CO1	Explain the fundamentals of analysis of algorithm
CO2	Explain mathematical analysis for recursive and non-recursive Algorithms
CO3	Explain the design techniques Brute force, Divide and Conquer, Decrease and Conquer, Dynamic programming
CO4	Explain the design techniques Greedy algorithms, back tracking, Branch and Bound
CO5	Explain the concepts of NP complete problems
CO6	Implement various algorithms design techniques suitable for real world applications.

Pre-requisites: U18ITI3202 - DATA STRUCTURES

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CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													PSO		
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	1	2	3
CO1	M	W										M	M		
CO2	M	W	M									M	M		
CO3	M	W										M	M		
CO4	M	W										M	M		
CO5	M	W										M	M		
CO6	S	S	M	M						M		S	M		

COURSE ASSESSMENT METHODS:

Direct
1. Continuous Assessment Test I, II (Theory component) 2. Assignment, Group Presentation (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

THEORY COMPONENT CONTENTS

INTRODUCTION TO ALGORITHM ANALYSIS 9 Hours

Notion of Algorithm - Fundamentals of Algorithmic Problem Solving - Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency: Analysis Framework - Asymptotic Notations and Basic Efficiency Classes. Mathematical Analysis of Non-recursive Algorithms and Recursive Algorithms.

BRUTE FORCE AND DIVIDE AND CONQUER 9 Hours

Brute Force Method - Sequential Search and Brute Force string matching, Exhaustive search. Divide and Conquer – Merge Sort, Decrease and Conquer-Josephus problem

DYNAMIC PROFRAMMING AND GREEDY 9 Hours

Dynamic Programming - Warshall's and Floyd's Algorithm- Greedy Technique - Knapsack problem – Job sequencing with deadlines, Huffman trees

BACKTRACKING AND BRANCH AND BOUND 9 Hours

Backtracking - N-Queen's Problem – Sum of subsets-Hamiltonian Circuit problem- Branch and Bound- Assignment Problem-Traveling Salesman Problem

NP COMPLETE 9 Hours

Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook's theorem, Standard NP-complete problems

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REFERENCES:

1. Anany Levitin, “Introduction to the Design and Analysis of Algorithms”, Third Edition, Pearson Education Asia, 2008.
2. Ellis Horowitz, Sartaj Sahni and SanguthevarRajasekaran, “Fundamentals of Computer Algorithms”, Second Edition, Universities Press, Hyderabad, 2008.
3. Thomas H Cormen, Charles E Leiserson, Ronald L Rivest and Clifford Stein, “Introduction to Algorithms”, Second Edition, Prentice Hall of India,New Delhi, 2007
4. Narasimha Karumanchi, “Data Structure and Algorithmic Thinking with Python”,Carrer Monk publications,2017
5. Brad Miller and David Ranum, “Problem Solving with Algorithms and Data Structures using Python” , Franklin Beedle, 2014.
6. https://www.tutorialspoint.com/python/

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

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LAB COMPONENTS:

LIST OF EXPERIMENTS

1. Implementing Dijikstra's algorithm
2. Implementing Prim's algorithm
3. Implementing Brute force string Matching Algorithm
4. Implementing Josephus problem
5. Implementing 8- queen problem
6. Implementing Knight tour problem
7. Implementing Merge Sort Quick Sort
8. Implementing Floyd's and Warshall's Algorithms
9. Implementing Huffman trees

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

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U18ITI4303 **DATABASE MANAGEMENT SYSTEMS**

L	T	P	J	C
3	0	0	2	4

COURSE OBJECTIVES:

- To understand the different issues involved in the design and implementation of a database system.
- To study the physical and logical database designs, database and relational modeling
- To understand and use data manipulation language to query, update, and manage a database
- To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency,
- To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS situation.

COURSE OUTCOMES:

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

CO1 Outline an ER model for a defined problem
CO2 Explain the basic concepts of query processing and query optimization algorithms.
CO3 Describe the concepts of transaction and storage management.
CO4 Explain the basic concepts of database security and NoSQL
CO5 Design a database for a given problem.
CO6 Develop an RDBMS application

Pre-requisites: **Nil**

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
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	1	2	3
CO1	S	M					M						M		
CO2	M	M											M		
CO3	M	M											M		
CO4	M								M				M		
CO5	S	M			M		M		S	S		M	M	M	M
CO6	S	M			M		M		S	S		M	M	M	M

COURSE ASSESSMENT METHODS:

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Direct
1. Continuous Assessment Test I, II (Theory component) 2. Assignment, Group Presentation (Theory component) 3. Project report (Project Component) 4. Project Review and Presentation (Project Component)
Indirect
1. Course-end survey

THEORY COMPONENT CONTENTS

INTRODUCTION **9 Hours**

Database system Architecture: Data Abstraction – Data Independence – Data Definition Language – Data Manipulation Language.

Data Models: E-R model - network model – relational and object oriented data models – integrity constraints – data manipulation operations.

DATABASE DESIGN **9 Hours**

Relational query languages: Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DMK constructs, Open source and Commercial DBMS – MYSQL, ORACLE, DB2, SQL server.

Relational Database Design: Domain and data dependency - Armstrong's axioms - Normal forms – Dependency preservation – Lossless design.

DATA STORAGE AND QUERYING **9 Hours**

Data Storage: Overview of Physical Storage Media – RAID - File Organization - Organization of Records in Files - Data Dictionary Storage.

Data Indexing and Hashing: Basic Concepts - Ordered Indices - B+ Tree Index Files - Multiple Key Access - Static and Dynamic Hashing.

Query Processing: Evaluation of relational algebra expressions – Query equivalence – Join Strategies – Query optimization algorithms.

TRANSACTION MANAGEMENT **9 Hours**

Transaction processing: Transaction Concept - Transaction Model – ACID property – Serializability.

Concurrency Control: Lock Based Protocols - Time Stamped Based Protocols - Deadlock Handling.

Recovery System: Failure Classification – Storage - Log Based Recovery - Shadow Paging.

ADVANCED TOPICS **9 Hours**

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Database Security: Authentication - Authorization and access control - DAC, MAC and RBAC models – Intrusion detection – SQL injection.
NoSQL: Working with Column oriented Databases – Hbase distributed storage architecture – Document store internals – Understanding Key-Value Stores in Memcache and Redis – Eventually consistent Non-Relational Databases – Performing CRUD operations: Creating Records, Accessing Data, updating and deleting Data

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

REFERENCES:

1. Abraham Silberschatz, Henry Korth, and S. Sudarshan, Database System Concepts, Sixth edition, McGraw-Hill.2011.
2. R. Elmasri and S. Navathe, Fundamentals of Database Systems, Sixth Edition, Pearson Education,2011
3. Thomas M. Connolly and Carolyn E. Begg, "Database Systems - A Practical Approach to Design, Implementation, and Management", fifth edition, Pearson Education, 2010.
4. C.J.Date, A. Kannan and S. Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.
5. Tiwari, Shashank. Professional NoSQL. John Wiley & Sons, 2011.(Unit V)

Online Courses and Video Lectures:

1. http://nptel.ac.in

PROJECT COMPONENTS:

LIST OF EXPERIMENTS

1. DDL and DML commands
2. Transaction control commands and aggregate functions
3. Joins and Nested Queries
4. Constraints and Views
5. High level programming language extensions (Control structures, Procedures and Functions).
6. Cursors and Triggers
7. Embedded SQL
8. Sample projects like
   i. Hospital Management
   ii. Railway Ticket Reservation
   iii. Student Mark List Processing
   iv. Employee Pay Roll Processing
   v. Inventory Control

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

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L	T	P	J	C
3	0	2	0	4

U18ITI4204 COMPUTER NETWORKS

COURSE OBJECTIVES:

- Learn the data communication system and the importance of layered architecture
- Describe the various network and data link layer protocols.
- Make use of the network layer concepts to solve a problem.
- Explain the functions of transport layer and application layer protocols.

COURSE OUTCOMES:

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

CO1 Outline the data communication system and the purpose of layered architecture

CO2 Explain the data link layer protocols.

CO3 Outline the network layer protocols.

CO4 Apply the network layer concepts to solve a problem.

CO5 Illustrate the functions of transport layer protocols.

CO6 Summarize the application layer protocols.

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Pre-requisite : U18ECT3011 – PRINCIPLES OF COMMUNICATION

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
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	1	2	3
CO 1	M												M		
CO 2	S	W	W							W	W		M		
CO 3	S	W								W	W		M		
CO 4	S	M	M							W	W	W	M		
CO 5	S	W	W							W	W		M		
CO 6	M									W	W		M		

COURSE ASSESSMENT METHODS:

Direct
1. Continuous Assessment Test I, II (Theory component) 2. Assignment, Group Presentation (Theory component) 3. Pre/Post - experiment Test/Viva (Lab component) 4. Model examination (Lab component) 5. End Semester Examination (Theory and Lab components)
Indirect
1. Course-end survey

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THEORY COMPONENT CONTENTS:

DATA COMMUNICATIONS **5 Hours**

Data Communication– Networks–The OSI Model– Layers in the OSI Model – TCP/IP Protocol Suite – Addressing – Transmission Media

DATA LINK LAYER **10 Hours**

Encoding - Framing – Error Detection – Reliable Transmission – IEEE 802.3 – IEEE 802.5 – IEEE 802.11 – IEEE 802.15.1

NETWORK LAYER **10 Hours**

Circuit Switching – Packet Switching – Switching and Bridging – Cell Switching - Internetworking -Sub netting – IPv6 – Routing Techniques: Distance vector (RIP) – Link state (OSPF) — Interdomain Routing (BGP).

TRANSPORT LAYER **10 Hours**

UDP – TCP – Congestion Control and Resource Allocation: TCP Congestion Control – Congestion Avoidance Mechanisms – Quality of Service: Integrated Services – Differentiated Services.

APPLICATION LAYER **10 Hours**

Domain Name System – Electronic Mail (SMTP, MIME, IMAP) – File Transfer (FTP) – WWW (HTTP) – Network Management (SNMP).

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

REFERENCES:

1. Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Fifth Edition, Morgan Kaufmann Publishers Inc., 2011.
2. William Stallings, "Data and Computer Communications", Tenth edition, Pearson Education, 2013.
3. Behrouz A Forouzan, "Data Communications and Networking", Fifth edition, Tata McGraw–Hill, New Delhi, 2013.
4. James F. Kurose, Keith W. Ross, "Computer Networking, A Top–Down Approach Featuring the Internet", Sixth edition, Pearson Education, 2012.

LAB COMPONENTS:

List of Experiments:

1. Develop client server based TCP applications using UNIX socket programming functions.
2. Develop client server based UDP applications using UNIX socket programming functions.
3. Implementation of HTTP or DNS and ARP or RARP protocols.
4. Implementation of sliding window and CRC protocols.
5. Implementation of distance vector / link state routing protocols.

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6. Study of network simulation tools such as NS3/QUALNET/OPNET/Packet Tracer.
7. Performance analysis of routing protocols using Wireshark.
8. Performance analysis of TCP and UDP protocol using simulation tool
9. Demonstrate the working of network tools such as Ping, TCPDump, Traceroute, Netstat, IPconfig.

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

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U18INI4600 ENGINEERING CLINIC IV

L	T	P	J	C
0	0	4	2	3

COURSE OBJECTIVES

- To help the students look into the functioning of simple to complex devices and systems
- To enable the students to design and build simple systems on their own
- To help experiment with innovative ideas in design and team work
- To create an engaging and challenging environment in the engineering lab

COURSE OUTCOMES

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

CO1: Identify a practical problems and find a solution
CO2: Understand the project management techniques
CO3: Demonstrate their technical report writing and presentation skills

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	PO 12	PSO 1	PSO 2
CO1	S	S	S	S	S	M	W		S			S		
CO2											S			
CO3										S				

COURSE ASSESSMENT METHODS:

Direct
1.Project reviews 50% 2.Workbook report 10% 3.Demonstration& Viva-voce 40%
Indirect
1. Course Exit Survey

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Content:

The course will offer the students with an opportunity to gain a basic understanding of computer controlled electronic devices and apply the concepts to design and build simple to complex devices. As a practical project based embedded course, the students will be taught the concepts using a variety of reference material available in the public domain. While the course will start with formal instruction on hardware, programming and applications, the major portion of the course will provide the students with ample opportunity to be innovative in designing and building a range of products from toys to robots and flying machines.

In the IV semester, students will focus primarily on Reverse engineering project to improve performance of a product

GUIDELINES:

1. Practical based learning carrying credits.
2. Multi-disciplinary/ Multi-focus group of 5-6 students.
3. Groups can select to work on a specific tasks, or projects related to real world problems.
4. Each group has a faculty coordinator/Instructor who will guide/evaluate the overall group as well as individual students.
5. The students have to display their model in the 'Engineering Clinics Expo' at the end of semester.
6. The progress of the course is evaluated based on reviews and final demonstration of prototype.

Total Hours: 90

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LIST OF MANDATORY COURSES

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U18VEP4504 **PROFESSIONAL VALUES** (Mandatory)

L	T	P	J	C
0	0	2	0	0

Course Outcomes

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

CO 1: Develop the ethical values in both professional and personal life
CO 2: Develop ability to take decision to reinforce professional life
CO 3: Rational in professional skills required for diverse society
CO 4: Excel in ingenious attitude to congregate professional life
CO 5: Research into the professional stand
CO 6: Spruce an Individual with decorum to achieve professional life

Pre-requisites :

1. U18VEP1501 / PERSONAL VALUES
2. U18VEP2502 / INTERPERSONAL VALUES
3.U18VEP3503 / FAMILY VALUES

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								S				
CO2				M								
CO3			S									
CO4												S
CO5								M				
CO6										M		

Course Assessment methods

Direct
1.Group Activity / Individual performance and assignment 2.Assessment on Value work sheet / Test
Indirect
1. Mini project on values / Goodwill Recognition

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Values through Practical activities:

1.Professional skills With Values: Positive Attitude, Adaptability, Responsibility, Honesty and Integrity, Self Esteem, & Self Confidence

2.Building Innovative work cultures: Creative thinking, Critical thinking, Conflict Resolution, Problem Solving, & Decision making

3.Professional Work Ethics: Types of Ethics, Etiquette, personality Grooming, Emotional quotient, Human Dignity, Safety & Role of Professional in Social Responsibility

4.Engineering Ethics: Engineering Council of India - Objectives - Code of Ethics - Social responsibility -Professional Quality - Ethical issues - Effects - Strategy – Corruption, Consequences, Cures

5.Case studies in engineering ethics: Discussion of case studies relating to Public safety, health, welfare, Quality of product, Improper conduct by management, Product responsibility, Intellectual property

Workshop mode

REFERENCES

1. LEARNING TO DO SOURCEBOOK 3 - UNESCO-UNEVOC -PDF
www.unevoc.unesco.org/fileadmin/user_upload/pubs/LearningToDo.pdf

2. DECLARATION OF PROFESSIONAL VALUES AND ETHICAL STANDARDS
www.garda.ie/Documents/User/declarationvalues.pdf

3. KARMA YOGA - SWAMI VIVEKANANDA
www.vivekananda.net/PDFBooks/KarmaYoga.pdf

4. PROFESSIONAL ETHICS IN ENGINEERING - Sasurie College of Engineering
www.sasurieengg.com/.../GE2025%20Professional%20Ethics%20in%20Engineering.

5. ENGINEERING ETHICS CASE STUDY; Challenger

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www.ucc.ie/en/processeng/staff/academic/ebyrne/.../PE1006PptNotesLect7.pdf

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U18CHT4000 **Environmental Science and Engineering**
(Common to All branches)

L	T	P	C
3	0	0	0

COURSE OUTCOMES

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

CO 1: Analyze the impact of engineering solutions in a global and societal context.
CO 2: Discuss contemporary issues that results in environmental degradation and would attempt to provide solutions to overcome those problems.
CO 3: Highlight the importance of ecosystem and biodiversity.
CO 4: Consider issues of environment and sustainable development in his/her personal and professional undertakings.
CO 5: Paraphrase the importance of conservation of resources.
CO 6: Play an important role in transferring a healthy environment for future generations.

PRE -REQUISITE: NIL

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
CO 1		M					S		M			
CO 2						M				M		
CO 3							M					
CO 4						M	S					
CO 5							S					
CO 6			W				S					M

COURSE ASSESSMENT METHODS

Direct	Indirect
1. Internal Test I 2. Internal Test II 3. Assignment 4. Group presentation 5. End Semester Exam	Course end survey

INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES **14 Hours**

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Definition, scope and importance – Need for public awareness – Forest resources: Use and over-exploitation, deforestation, case studies – Timber extraction, mining, dams and their effects on forests and tribal people.
Water resources: Use and overutilization of surface and ground water, conflicts over water, dams – benefits and problems – Water conservation, rain water harvesting, watershed management.
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, case studies.
Energy resources: Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources, case studies.
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification, Wasteland reclamation – Role of an individual in conservation of natural resources.

ECOSYSTEMS AND BIODIVERSITY **9 Hours**

ECOSYSTEM: Concept of an ecosystem – Structure and function of an ecosystem: Producers, consumers and decomposers, Food chain, Food web, Energy flow in the ecosystem and Ecological pyramids – Ecological succession – Introduction, types, characteristic features, structure and function of the (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).
BIODIVERSITY: Introduction to Biodiversity – Definition: genetic, species and ecosystem diversity – Bio geographical classification of India – Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic values – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

ENVIRONMENTAL POLLUTION **8 Hours**

Definition – Causes, effects and control measures of: (a) Air pollution – Organic and inorganic pollution – cyclone separator, electrostatic precipitator (b) Water pollution (c) Heavy metal pollution (d) Noise pollution (e) Thermal pollution (f) Nuclear hazards – Role of an individual in prevention of pollution – Pollution case studies – Solid waste and hazardous Management: Causes, effects and control measures from factories, small scale and large scale industries – Waste minimization – Disaster management: floods, earthquake, cyclone and landslides.

SOCIAL ISSUES AND THE ENVIRONMENT **7 Hours**

From Unsustainable to Sustainable development – Urban problems related to energy – Resettlement and rehabilitation of people; its problems and concerns, case studies – Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion – Environment Production Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Human Rights.

HUMAN POPULATION AND THE ENVIRONMENT **7 Hours**

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Population growth and explosion – Welfare Program – Environment and human health – Communicable disease – Role of Information Technology in Environment and human health – Case studies.

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

REFERENCES

1. G. Tyler Miller and Scott Spoolman, 'Environmental Science', Fourteenth Edition, Brooks Cole, 2012.
2. Gilbert M. Masters and Wendell P. Ela, 'Introduction to Environmental Engineering and Science', Third Edition, Pearson Education, 2013.
3. BharuchaErach, 'The Biodiversity of India', Mapin Publishing Pvt. Ltd., Ahmedabad, 2002.
4. Trivedi R.K and P.K.Goel, 'Introduction to Air Pollution', Techno-Science Publications, 2003.
5. Trivedi R.K., 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media, 1996.
6. Cunningham, W.P.Cooper and T.H.Gorhani, 'Environmental Encyclopedia', Jaico Publication House, Mumbai, 2001.
7. Wager K.D., 'Environmental Management', W.B. Saunders Co., Philadelphia, USA, 1998.
8. Colin R. Townsend, Michael Begon and John L. Harper, 'Essentials of Ecology', Third Edition, Blackwell Publishing, 2008.

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SEMESTER V

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U18MAT5101 **PARTIAL DIFFERENTIAL EQUATIONS AND TRANSFORMS**

L	T	P	PJ	C
3	1	0	0	4

(IT)

Course Outcomes (COs):

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

CO1: Form partial differential equations and solve certain types of partial differential equations.

CO2: Know how to find the Fourier Series and half range Fourier Series of a function

CO3: To know how to solve one dimensional wave equation, one dimensional heat equation in steady state using Fourier series.

CO4: Apply Fourier series to solve the steady state equation of two dimensional heat equation in Cartesian coordinates.

CO5: Apply the Fourier transform, Fourier sine and cosine transform to certain functions and use Parseval's identity to evaluate integrals..

CO6: Evaluate Z – transform for certain functions. Estimate Inverse Z – transform of certain functions and to solve difference equations using them.

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
CO1	S	M			M				M	M		S
CO2	S	M		M								
CO3	S	S	S		S				M	M		S
CO4	S	M	M									M
CO5	S	M	M		S							
CO6	S	S			S				M	M		S

COURSE ASSESSMENT METHODS:

Direct

1. Continuous Assessment Test I, II
2. Open book test; Cooperative learning report, Assignment; Journal paper review, Group Presentation, Project report, Poster preparation, Prototype or Product Demonstration etc. (as applicable)
3. End Semester Examination

Indirect

1. Course-end survey

PARTIAL DIFFERENTIAL EQUATIONS **9+3 Hours**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions - Solution of PDE by variable separable method – Solution of standard types of first order partial differential equations (excluding reducible to standard types) – Lagrange's linear equation – Linear Homogeneous partial differential equations of second and higher order with constant coefficients.

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FOURIER SERIES **9+3 Hours**

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Parseval's identity – Harmonic Analysis.

BOUNDARY VALUE PROBLEMS – ONE DIMENSIONAL EQUATIONS 5+2 Hours

Classification of second order quasi linear partial differential equations – Formulation of wave and heat equations using physical laws - Solutions of one dimensional wave equation – One dimensional heat equation (excluding insulated ends)

BOUNDARY VALUE PROBLEMS – TWO DIMENSIONAL EQUATIONS 4+1 Hours

Steady state solution of two-dimensional heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

FOURIER TRANSFORM **9+3 Hours**

Fourier Integral Theorem – Representation of Functions – Infinite Fourier transforms – Sine and Cosine Transforms – Properties – Transforms of simple functions – convolution theorem – Parseval's identity.

Z –TRANSFORM **9+3 Hours**

Z-transform - Elementary properties – Convolution theorem- Inverse Z – transform (by using partial fractions, residue methods and convolution theorem) – Solution of difference equations using Z - transform.

Theory: 45 Tutorial: 15 Practical: 0 Project: 0 Total: 60 Hours

References:

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition. 2014.
2. Veerarajan. T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., New Delhi, Second reprint, 2012.
3. Kandasamy P., Thilagavathy K. and Gunavathy K., "Engineering Mathematics Volume III", S.Chand & Company ltd., New Delhi, 2006.
4. Ian Sneddon., "Elements of partial differential equations", McGraw – Hill, New Delhi, 2003.
5. Arunachalam T., "Engineering Mathematics III", Sri Vignesh Publications, Coimbatore 2009.

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U18ITI5201 **DATA MINING TECHNIQUES**

L	T	P	J	C
3	0	2	0	4

COURSE OBJECTIVES:

- Identify the scope and necessity of Data Mining algorithms for the society.
- To understand various tools of Data Mining and their techniques to solve the real time problems.
- To develop further interest in research and design of new Data Mining techniques.

COURSE OUTCOMES:

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

CO1 Summarize the data pre - processing process
CO2 Explain the association rule Mining algorithm for correlation analysis
CO3 Apply decision tree algorithm for classification
CO4 Apply and analyze Bayesian networks algorithm for classification
CO5 Apply various clustering algorithms for different datasets
CO6 Model a simple application with data mining tools.

Pre-requisite: U18ITI4303 - DATABASE MANAGEMENT SYSTEM,U18MAI4201 – PROBABILITY AND STATISTICS

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
COs	**Programme Outcomes(POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	1	2	3
CO1	M	M											M		
CO2	M	M											M		
CO3	S	M											M		
CO4	S	S	M			M							M		
CO5	S	M	M			M							M		
CO6	S	S	M	M	M	M	M		M	M		M	M	M	M

COURSE ASSESSMENT METHODS:

Direct
1. Continuous Assessment Test I, II (Theory component) 2. Assignment, Group Presentation (Theory component) 3. Model examination (Lab component) 4. End Semester Examination (Theory and Lab components)
Indirect
1. Course-end survey

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THEORY COMPONENT CONTENTS

INTRODUCTION TO DATA MINING **9 Hours**

Data mining - Related technologies - Machine Learning, DBMS, OLAP, Statistics - Data Mining Goals - Stages of the Data Mining Process - Data Mining Techniques - Knowledge Representation Methods – Applications

DATA PRE PROCESSING **9 Hours**

Data preprocessing-Data mining primitives – Data mining query language - Concept description – Data generalization and characterization – Analytical characterization – Mining descriptive statistical measures in large databases- Mining frequent patterns, Associations, and Correlations

CLASSIFICATION AND PREDICTION **9 Hours**

Introduction – Decision tree induction – Bayesian classification – Back propagation – Lazy learners – Other classification methods – Prediction – Evaluating the accuracy-Case study in social media analysis

CLUSTERING TECHNIQUES **9 Hours**

Similarity and distance measures – Hierarchical algorithms – Partition algorithms – Outlier analysis -Case study in social media analysis

APPLICATIONS OF DATA MINING **9 Hours**

Web mining – Web content mining – Structure and Usage mining – Spatial mining – Time series and sequence mining – Graph mining

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

REFERENCES:

1. J. Han, MKamber, "Data Mining: Concepts and Techniques", Third edition, Elsevier, New Delhi, 2011.
2. Dunham M, "Data Mining: Introductory and Advanced Topics", Prentice Hall, New Delhi, 2002.
3. Trevor Hastie, Robert Tibshirani, Jerome Friedma, "The Elements of Statistical Learning: Data Mining, Inference and Prediction", Prentice Hall, New Delhi, Second Edition, 2009.
4. Hand.D, Mannila H, Smyth.P, "Principles of Data Mining", MIT press, USA,2001.

LAB COMPONENT:

Perform the following experiments on any one of the data mining tools like RapidMiner, WEKA,R-Programming, Orange, Dendrogram (Hierarchal clustering) for any real time applications

1. Discover Association Rule Mining
2. Classification algorithms-Decision Tree, CART, Random Forest,J48,ZeroR
3. Clustering algorithms-K-Means, K-Medoids , Hierarchal clustering

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

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U18ITT5002 CRYPTOGRAPHY AND NETWORK SECURITY

L	T	P	J	C
3	0	0	0	3

COURSE OBJECTIVES:

- To understand the fundamentals of Cryptography
- To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
- To understand the various key distribution and management schemes.
- To understand how to deploy encryption techniques to secure data in transit across data networks

COURSE OUTCOMES:

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

CO1 Explain security attacks and issues in computer systems and networks.
CO2 Apply the mathematics. symmetric and asymmetric algorithms related to cryptography
CO3 Explain the purpose and working of authentication and system level security algorithms
CO4 Apply the appropriate security mechanism for different computing environment
CO5 Apply appropriate security methods to solve real life applications

Pre-requisite: U18ITI4204 - COMPUTER NETWORKS

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
COs	**Programme Outcomes(POs)**														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	1	2	3
CO1	M	M										M	M		
CO2	S	M										M	M		
CO3	M	M										M	M		
CO4	S	M			M			M				M			M
CO5	M	M						S				M			M

COURSE ASSESSMENT METHODS:

Direct
1. Continuous Assessment Test I, II 2. Assignment, Group Presentation 3. End Semester Exam
Indirect
1. Course Exit Survey

THEORY COMPONENT CONTENTS

INTRODUCTION **10 Hours**

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OSI Security Architecture - Classical Encryption Techniques – CipherPrinciples– DataEncryptionStandard–BlockCipherDesignPrinciples and Modes of Operation– Evaluation Criteria for AES–AES Cipher– Triple DES– Placement of Encryption Function–Traffic Confidentiality.

PUBLICKEYCRYPTOGRAPHY **9 Hours**

Introduction to Number Theory -Key Management - Diffie-Hellman Key Exchange – Elliptic Curve Architecture and Cryptography – Confidentiality using Symmetric Encryption– Public Key Cryptography and RSA.

AUTHENTICATIONANDHASHFUNCTION **9 Hours**

Authentication Requirements – Authentication Functions – Message Authentication Codes–Hash Functions–Security of Hash Functions and MACs – Secure Hash Algorithm – HMAC Digital Signatures – Authentication Protocols–Digital Signature Standard.

NETWORKSECURITY **9 Hours**

Authentication Applications: Kerberos – X.509 Authentication Service– Electronic Mail Security–PGP–S/MIME-IP Security–Web Security- Practical implementation of security using GPG Suite.

SYSTEMLEVELSECURITY **8 Hours**

Intrusion Detection —Firewall Design Principles–Trusted Systems. Case study: Biometric authentication and Ethical Hacking

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

REFERENCES:

1. WilliamStallings, "Cryptography and Network Security – Principles and Practices", Sixth edition, Prentice Hall of India, 2014.
2. AtulKahate, "Cryptography and Network Security", 2nd Edition, Tata McGraw Hill, 2008
3. Bruce Schneier, "Applied Cryptography", JohnWiley&SonsInc, 2001.
4. CharlesPfleeger and Shari Lawrence P fleeger, "Security in Computing", Fourth edition, PearsonEducation,2015.

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U18ITI5203 MOBILE AND PERVASIVE COMPUTING

L	T	P	J	C
3	0	2	0	4

COURSE OBJECTIVES:

- To make students familiar with fundamentals of mobile communication systems.
- To study the working principles of wireless LAN and its standards
- To build skills in working with Wireless Networking Protocols

COURSE OUTCOMES

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

CO 1: Outline the basic concepts and principles in mobile computing.
CO 2: Explain GSM architecture and protocols.
CO 3: Analyze characteristics of different types of wireless LAN network protocols
CO 4: Explain the principles of 4G networks.
CO 5: Identify the pervasive and ubiquitous computing characteristics as well as context-aware computing and their applications.
C0 6: Design and develop mobile applications using android platform.

Pre-requisite: U18ITI4204-COMPUTER NETWORKS

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
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	1	2	3
CO 1	M												M		
CO 2							M		M				M		
CO 3	M	M			S	M				M		M	M		
CO 4	M												M		
CO 5		M			S		M		M			M	M		
CO 6	S	S		S	S	M		M	M			M	S	M	M

Direct
1. Continuous Assessment Test I, II (Theory component) 2. Assignment, Group Presentation (Theory component) 3. Model examination (Lab component) 4. End Semester Examination (Theory and Lab components)
Indirect
1. Course-end survey

THEORY COMPONENT CONTENTS

WIRELESS COMMUNICATION **9 Hours**

Cellular systems- Frequency Management and Channel Assignment- Types of Handoff and their Characteristics -Dropped Call Rates & their Evaluation - MAC - SDMA - FDMA - TDMA - CDMA - Cellular Wireless Networks.

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MOBILE COMMUNICATION SYSTEMS **9 Hours**

GSM – Architecture -Location Tracking and Call Setup - Mobility Management- Handover- Security - GSM SMS –International roaming for GSM- call recording functions-subscriber and service data management –Mobile Number portability - GPRS –Architecture-GPRS procedures-attach and detach procedures - PDP context procedure-combined RA/LA update procedures-Billing.

WIRELESS NETWORKS **10 Hours**

Introduction to wireless LANs - IEEE 802.11 WLANs - Physical Layer- MAC sublayer - Introduction - Mobile IP - IP packet delivery - Agent discovery -Tunnelling and Encapsulation - IPV6 - Mobile ad-hoc network – Routing - Destination Sequence distance vector - Dynamic source routing TCP enhancements for wireless protocols - Traditional TCP - Congestion control - fast retransmit/fast recovery -Implications of mobility - Classical TCP improvements - Indirect TCP, Snooping TCP - Mobile TCP - Time out freezing - Selective retransmission - Transaction oriented TCP .

OVERVIEW OF A MODERN 4G TELECOMMUNICATIONS SYSTEM **9 Hours**

Introduction – LTE - A System Architecture - LTE RAN - OFDM Air Interface - Evolved Packet Core- LTE Requirements - LTE-Advanced - LTE-A in Release - OFDMA – Introduction - OFDM Principles - LTE Uplink – SC - FDMA - Summary of OFDMA.

PERVASIVE COMPUTING **8 Hours**

Pervasive Computing- Principles, Characteristics- Interaction Transparency, Context aware, Automated Experience Capture. Architecture for Pervasive Computing- Pervasive Devices- Embedded controls- Smart Sensors and Actuators -Context Communication and Access Services.

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

REFERENCES:

1. Jochen H. Schller, ― Mobile Communications, Second Edition, Pearson Education, New Delhi, 2007.
2. JuhaKorhonen, ― Introduction to 4G Mobile Communications, Artech House Publishers, 2014.
3. M. Bala Krishna, Jaime LloretMauri, ― Advances in Mobile Computing and Communications: Perspectives and Emerging Trends in 5G Networks, CRC 2016
4. SengLoke, “Context-Aware Computing Pervasive Systems”, Auerbach Pub., New York, 2007.
5. UweHansmannetl , “Pervasive Computing”, Springer, New York, 2001.
6. William Stallings, “Wireless Communications and Networks”, Pearson Education, 2009.
7. KavehPahlavan, PrasanthKrishnamoorthy, “Principles of Wireless Networks”, First Edition, Pearson Education, 2003.
8. Andreas F. Molisch, “Wireless Communications”, 2nd Edition, Wiley 2010.
9. SengLoke, “Context-Aware Computing Pervasive Systems”, Auerbach Pub., New York, 2007.

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LAB COMPONENT:

List of Experiments:

1. Create an android application using Layouts, Widgets and Event listeners.
2. Create an android application using Activities, Indents, Fragments and Notifications.
3. Create an android application using Menus.
4. Create an android application Storage, Media and Animations.
5. Create an android application using Location and Google Map.
6. Create an android application using Database Framework.
7. Create an android application using Localization and Sensors.

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

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U18ITI5304 **SOFTWARE ENGINEERING**

L	T	P	J	C
3	0	0	2	4

COURSE OBJECTIVES:

- Knowledge of basic SW engineering methods and practices, and their appropriate application.
- Describe software engineering layered technology and Process frame work.
- A general understanding of software process models such as the waterfall and evolutionary models.

COURSE OUTCOMES:

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

CO1 Apply software engineering principles and techniques
CO2 Translate end-user requirements in to software requirements
CO3 Develop, maintain and evaluate large-scale software systems
CO4 Implement an efficient, reliable, robust and cost-effective software solutions
CO5 Identify software project planning & Management activities
CO6 Model a simple application following software engineering principles.

Pre-requisite: Nil

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
COs	Programme Outcomes(POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	1	2	3
CO1	M	M											M		
CO2	M	M	M	M									M		
CO3	M	M	M	M	W								M		
CO4											M	W	M		
CO5	S	S							M				M	M	M
CO6	S	S								M			M	M	M

COURSE ASSESSMENT METHODS:

Direct
1. Continuous Assessment Test I, II (Theory component) 2. Assignment, Group Presentation (Theory component) 3. End Semester Examination (Theory) 4. Project report (Project Component) 5. Project Review and Presentation (Project Component)
Indirect
1. Course-end survey

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THEORY COMPONENT CONTENTS

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INTRODUCTION **9 Hours**

Software Engineering Discipline, Software, Generic vs. Custom-made software products-distinctive characteristics of software products. **Software Development Models:** Life cycle models-Linear ,Sequential, Evolutionary, Unified models, Agile development -Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven development, Lean Software Development, Design and development practices in Agile projects, Test Driven Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing, Case study in agile processing model.

REQUIREMENTS ENGINEERING **9 Hours**

Classification of Requirements-System Requirements and Software Requirements, Functional and Non-Functional requirements, Requirement Engineering Tasks.

System Models: Domain Analysis and Modeling, Data Models, Functional Models-Structured Analysis Model, Object Oriented Models- Cloud, State, Use Case Models, Sequence and Activity diagrams, Relationship among the Object Oriented Models, Building Object Oriented Analysis Models

SOFTWARE DESIGN AND IMPLEMENTATION **9 Hours**

Architectural Design-Decomposition strategy, Partitions and Layers, Structured System Design-Use of Heuristics for Design Refinements, Object-Oriented Design- User Interface Design-Reusable Components, Patterns, Frame works, Coding – Choice of Programming Language, Coding Standards

SOFTWARE TESTING **9 Hours**

Software Testing: Conventional Testing and SDLC Testing, Formal Technical Reviews, Walkthroughs, Inspections, Black-Box vs. Glass-Box Testing, Testing Strategies ,Quality Dimensions, Process Quality and Product Quality, Quality Assurance Planning, Quality Measurements, Software Configuration Management.

SOFTWARE PROJECT MANAGEMENT **9 Hours**

Software Projects, Project Feasibility Study, Project Planning, Project Organization, Estimation of Project Effort-Measuring Software Attributes and Productivity, COCOMO for Effort Estimation. Risk Management, Project Scheduling, Measurement during Software Projects.

Software Maintenance: Planning for Maintenance, maintenance Activities, Reengineering

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

REFERENCES:

1. R.S. Pressman, “Software Engineering – A Practitioner’s Approach”, Eighth edition, McGraw Hill International Edition, 2014.
2. Stephen Schach, “Software Engineering”, Seventh edition, TMH, New Delhi, 2007.
3. PankajJalote, “An Integrated Approach to Software Engineering”, Third edition, NarosaPublishing House, 2005.
4. M.Blaha and J.Rumbaugh, “Object Oriented Modeling and Design with UML”, Second edition, Prentice-Hall India, 2006.
5. I Sommerville, “Software Engineering”, Seventh edition, Pearson Education, 2004

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6. “Agile Software Development with Scrum”By Ken Schawber, Mike Beedle,Publisher: Pearson
7. “ Agile Testing: A Practical Guide for Testers and Agile Teams”,By Lisa Crispin, Janet Gregory,Publisher: Addison Wesley

PROJECT COMPONENT:
Make use of tools like Trello, DevOps
List of Projects

1. A Car Rental System
2. Accounts Management Software
3. Airline Reservation System
4. Army Management System
5. ATM System
6. Auto Repair Shop Management System
7. Automotive Store Management System
8. Banking System
9. Bus Ticket Reservation
10. Cafeteria Ordering System
11. Car Insurance System
12. Clothing Store Management
13. College Management System
14. Ebook Shopping
15. Enterprise Resource Planning System
16. Event Organizing, Planning and Management System
17. Gym Workout Application
18. Hospital Management System
19. Hostel Accommodation System
20. Hotel Management System

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

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L	T	P	J	C
0	0	4	2	3

U18INI5600 ENGINEERING CLINIC - V

COURSE OBJECTIVES

- To help the students look into the functioning of simple to complex devices and systems
- To enable the students to design and build simple systems on their own
- To help experiment with innovative ideas in design and team work
- To create an engaging and challenging environment in the engineering lab

COURSE OUTCOMES

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

CO1: Identify a practical problems and find a solution
CO2: Understand the project management techniques
CO3: Demonstrate their technical report writing and presentation skills

Pre-requisite: Nil

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	PS O1	PS O2
CO1	S	S	S	S	S	M	W		S			S		
CO2											S			
CO3										S				

COURSE ASSESSMENT METHODS:

Direct
1. Project reviews 50% 2. Workbook report 10% 3. Demonstration& Viva-voce 40%
Indirect
1. Course Exit Survey

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Content:

The course will offer the students with an opportunity to gain a basic understanding of computer controlled electronic devices and apply the concepts to design and build simple to complex devices. As a practical project based embedded course, the students will be taught the concepts using a variety of reference material available in the public domain. While the course will start with formal instruction on hardware, programming and applications, the major portion of the course will provide the students with ample opportunity to be innovative in designing and building a range of products from toys to robots and flying machines.
In the V semester, students will focus primarily on Design and developing a Prototype

GUIDELINES:

1. Practical based learning carrying credits.
2. Multi-disciplinary/ Multi-focus group of 5-6 students.
3. Groups can select to work on a specific tasks, or projects related to real world problems.
4. Each group has a faculty coordinator/Instructor who will guide/evaluate the overall group as well as individual students.
5. The students have to display their model in the 'Engineering Clinics Expo' at the end of semester.
6. The progress of the course is evaluated based on reviews and final demonstration of prototype.

Total Hours: 90

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LIST OF MANDATORY COURSES

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U18VEP5505 **SOCIAL VALUES** (Mandatory)

L	T	P	J	C
0	0	2	0	0

COURSE OUTCOMES

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

CO 1: Understand the transformation from self to society
CO 2: Acquire knowledge about disparity among Human Beings
CO 3: Realize the new ethics in creating a more sustainable Society
CO 4: Develop skills to manage challenges in social issues
CO 5: Acquire the skills for Management of Social work & HolisticSociety
CO 6: Validate the social liabilities at dissimilar situations

Pre-requisites :

1. U18VEP1501 / Personal Values
2. U18VEP2502 / Interpersonal Values
3.U18VEP3503 / Family Values
4.U18VEP4504 / Professional Values

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						S						
CO2							S					
CO3								M				
CO4											S	
CO5												S
CO6									M			

Course Assessment methods

Direct
1.Group Activity / Individual performance and assignment 2.Assessment on Value work sheet / Test
Indirect
1. Mini project on values / Goodwill Recognition

Values through Practical activities:

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1. Self and Society: Relation between self and society – Different forms of society - Elements of Social structures – Realization of Duties and Responsibilities of Individual in the Society

2. Social Values: Tolerance – Responsibility – Sacrifice – Sympathy - Service – peace-nonviolence - right conduct- Unity – forgive – dedication – Honest

3. Social issues : Disparity among Human beings- Poverty-Sanitation -corruption- un employment-superstition – religious intolerance & castes – terrorism.

4. Emerging Ethics for Sustainable Society: Unison of Men in Society - Positive Social Ethics - Cause and Effect - Ensuring an Equitable Society- Effect of Social Media in society - development of Education and Science in the Society

5. Social Welfare:Social welfare Organization - Programme by Government and NGO's - Benefits of Social Service - Balancing the Family and Social Life – Development of Holistic Society

Workshop mode

REFERENCES

1. SOCIAL PROBLEMS IN INDIA - ForumIAS.com – PDF discuss.forumias.com/uploads/File upload/.../711b18f321d406be9c79980b179932.pd...

2. INVESTING IN CULTURAL DIVERSITY AND INTERCULTURAL DIALOGUE: UNESCO ...
www.un.org/en/events/culturaldiversityday/pdf/Investing_in_cultural_diversity.pdf

3. INDIAN SOCIETY AND SOCIAL CHANGE - University of Calicut
www.universityofcalicut.info/SDE/BA_sociology_indian_society.pdf

4. CULTURE, SOCIETY AND THE MEDIA - E-classwww.eclass.uoa.gr/.../MEDIA164/.../%5BTony_Bennett,_James_Curran,_Michael_G

5. SOCIAL WELFARE ADMINISTRATION - IGNOU
www.ignou.ac.in/upload/Bswe-003%20Block-2-UNIT-6-small%20size.pdf

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U18INT5000 **CONSTITUTION OF INDIA**
(Mandatory course)

L	T	P	J	C
2	0	0	0	0

COURSE OUTCOMES:

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

CO 1: Gain Knowledge about the Constitutional Law of India
CO 2: Understand the Fundamental Rights and Duties of a citizen
CO 3: Apply the concept of Federal structure of Indian Government
CO 4: Analyze the Amendments and Emergency provisions in the Constitution
CO 5: Develop a holistic approach in their life as a Citizen of India

Pre-requisites :NIL

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

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

COURSE ASSESSMENT METHODS

Direct
1. Group Activity / Quiz/ Debate / Case studies 2. Class test / Assignment
Indirect
Surveys

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THEORY COMPONENT:

Module.1: Introduction to Indian Constitution **4 hours**
Meaning of the constitution law and constitutionalism - Historical perspective of the Constitution - Salient features and characteristics of the Constitution of India

Module.2:Fundamental Rights **8 hours**
Scheme of the fundamental rights - Right to Equality - Fundamental Right under Article 19 - Scope of the Right to Life and Liberty - Fundamental Duties and its legal status - Directive Principles of State Policy – Its importance and implementation

Module.3:Federal Structure **8 hours**
Federal structure and distribution of legislative and financial powers between the Union and the States - Parliamentary Form of Government in India - The constitutional powers and status of the President of India

Module.4:Amendment to Constitution **6 hours**
Amendment of the Constitutional Powers and Procedure - The historical perspectives of the constitutional amendments in India

Module.5:Emergency Provisions **4 hours**
National Emergency, President Rule, Financial Emergency
Local Self Government – Constitutional Scheme in India

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

REFERENCES

1.Constitution of India - Ministry of Law & Justice – PDF format
awmin.nic.in/coi/coiason29july08.pdf
2. Introduction to the Constitution of India by DurgadasBasu
3. The Constitution of India – Google free material - www.constitution.org/cons/india/const.html
4. Parliament of India – PDF format
download.nos.org/srsec317newE/317EL11.pdf
5. The Role of the President of India – By Prof.Balkrishna
6. Local Government in India – E Book - Pradeep Sachdeva
https://books.google.com/books/.../Local_Government_in_In...

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SEMESTER – VI

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U18ITT6001 **INFORMATION SECURITY**

L	T	P	J	C
3	0	0	0	3

COURSE OBJECTIVES:

- To learn various types of security threats, attacks and its issues
- To understand the principles, major issues and basic approaches in information security
- To gain knowledge on various security models and policies

COURSE OUTCOMES:

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

CO1 Describe threats to information security and security SDLC.
CO2 Identify the security threats and attacks.
CO3 Analyze the mechanism to assess and control risk.
CO4 Describe the types of security policies and standards.
CO5 Identify security issues related to personnel decisions, and qualifications of security personnel.

Pre-requisite: U18ITT5002 – CRYPTOGRAPHY AND NETWORK SECURITY

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
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	1	2	3
CO1	M					M		M					M		M
CO2	M					M		M				M	M		M
CO3	M					M		S				M			M
CO4	M					M		S							M
CO5	M				S	M		S				M			M

COURSE ASSESSMENT METHODS:

Direct
1. Continuous Assessment Test I, II 2. Assignment/Case studies, Group Presentation 3. End Semester Exam
Indirect
1. Course Exit Survey

THEORY COMPONENT CONTENTS

INTRODUCTION **9 Hours**

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History - Information Security - Critical characteristics of information - NSTISSC security model - Components of an information system - Securing the components - Balancing security and access - The SDLC - The security SDLC.

SECURITY INVESTIGATION **9 Hours**

Need for security - Business needs - Threats – Attacks – Legal - Ethical and professional issues.

SECURITY ANALYSIS **9 Hours**

Risk management: Identifying and assessing risk - Assessing and controlling risk .

LOGICAL DESIGN **9 Hours**

Blueprint for security - Information security policy - Standards and practices - ISO 17799/BS 7799 – NIST models - VISA international security model - Design of security architecture - Planning for continuity - Data Protection and Information Security in India.

PHYSICAL DESIGN **9 Hours**

Security technology – IDS - Scanning and analysis tools –Access control devices - Physical security - Security and personnel.

Case studies on HIPAA, PCI, SOX

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

REFERENCES:

1. Michael E Whitman and Herbert J Mattord, “Principles of Information Security”, Fourth Edition, Thomson Publishing, India Edition, 2011.
2. Micki Krause, Harold F. Tipton, “Handbook of Information Security Management”, Vol 1-3 CRC Press LLC, 2004.
3. Stuart McClure, et al., “Hacking Exposed”, Tata McGraw- Hill, Sixth edition2009.
4. Matt Bishop, “Computer Security Art and Science”, Pearson/PHI, 2002.

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U18ITT6002 **INTERNET OF THINGS – ARCHITECTURE AND PROTOCOLS**

L	T	P	J	C
3	0	0	0	3

COURSE OBJECTIVES:

- To understand the architecture of IoT
- To understand the protocols related with IoT
- To understand the relationship of IoT with other domains

COURSE OUTCOMES:

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

CO1 Explain the architectural overview of IoT

CO2 Describe the IoT Reference Architecture and real-world design constraints

CO3 Discuss the various protocols for IoT

CO4 Explain the Security constraints behind IoT

CO5 Analyze IoT applications in real time scenario.

CO6 Describe the relationship of IoT with other domains

Pre-requisite: U18ITI4204 - COMPUTER NETWORKS

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
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	1	2	3
CO1	M												M		
CO2	M	M											M		M
CO3	M		W										M		
CO4	M							M					M		
CO5	M	S		M			M					M	M		M
CO6	M				M		M						M		

COURSE ASSESSMENT METHODS:

Direct
1. Continuous Assessment Test I, II 2. Assignment, Group Presentation 3. End Semester Exam
Indirect
1. Course Exit Survey

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THEORY COMPONENT CONTENTS **9 Hours**

OVERVIEW

IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management

REFERENCE ARCHITECTURE **9 Hours**

IoT Architecture State of the Art – Introduction, State of the art, Reference Model and architecture, IoT reference Model - IoT Reference Architecture. Real-World Design Constraints- Introduction, Technical Design constraints, Data representation and visualization, Interaction and remote control.

PROTOCOLS **9 Hours**

PHY/MAC Layer -Wireless HART, Z-Wave, Bluetooth Low Energy, Zigbee Smart Energy, Network Layer-IPv4, IPv6, 6LoWPAN, Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)(TLS, DTLS) – Session Layer-HTTP, CoAP, XMPP, AMQP, MQTT

SERVICE LAYER PROTOCOLS & SECURITY **9 Hours**

Service Layer -oneM2M, ETSI M2M, OMA, BBF – Security in IoT Protocols – MAC 802.15.4 , 6LoWPAN, RPL, Application Layer

IOT IN CLOUD AND DATA ANALYTICS **9 Hours**

Connecting IoT to cloud – Cloud Storage for IoT – Data Analytics for IoT – Software & Management Tools for IoT. CASE STUDIES: Various Real time applications of IoT- Home Automation – Environment – Energy –Agriculture – Industry - Health care applications

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

REFERENCES:

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1. "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press)
2. "Internet of Things: A Hands-on Approach", by ArshdeepBahga and Vijay Madisetti (Universities Press)
3. Marco Schwartz, “Internet of Things with the Arduino Yun”, Packt Publishing, 2014.
4. Bernd Scholz-Reiter, Florian Michahelles, “Architecting the Internet of Things”, ISBN 978-3- 642-19156-5 e-ISBN 978-3-642-19157-2, Springer
5. Daniel Minoli, “Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications”, ISBN: 978-1-118- 47347-4, Willy Publications
6. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014
7. Peter Waher, “Learning Internet of Things”, PACKT publishing, BIRMINGHAM – MUMBAI
8. https://onlinecourses.nptel.ac.in/noc17_cs22/course
9. https://www.coursera.org/specializations/internet-of-things
10. http://www.cse.wustl.edu/~jain/cse570-15/ftp/iot_prot/index.html

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U18ITI6203 WEB TECHNOLOGY

L	T	P	J	C
3	0	2	0	4

COURSE OBJECTIVES:

- To create interactive web pages using HTML and JavaScript.
- To learn the importance of client side and server side technologies
- To develop client /server based applications using different technologies
- To learn the importance of web services

COURSE OUTCOMES :

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

CO1 Understand and build dynamic and interactive web sites
CO2 Interpret the role of XML and AJAX in web applications
CO3 Develop applications using PHP and MySQL
CO4 Develop interactive web applications using Node js and MongoDB
CO5 Make use Java based technologies (JSP and Servlet) to develop applications.
CO6 Develop Rest based web services

Pre-requisite: U18ITI3203 – OBJECT ORIENTED PROGRAMMING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
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	1	2	3
CO1	M	M								M		M	M		
CO2	M	M											M		
CO3	S	S	M		M				M	M		M	M		
CO4	S	S	M		M				M	M		M	S	M	M
CO5	S	S								M		M	S	M	M
CO6	S	S								M		M	S	M	M

COURSE ASSESSMENT METHODS:

Direct
1. Continuous Assessment Test I, II (Theory component) 2. Assignment, Group Presentation (Theory component) 3. Pre/Post - experiment Test/Viva(Lab component) 4. Model examination (Lab component) 5. End Semester Examination (Theory and Lab components)
Indirect
1. Course-end survey

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THEORY COMPONENT CONTENTS

CLIENT SIDE TECHNOLOGIES **9 Hours**

Introduction to HTML- Introduction to Cascading Style Sheets -Client-Side Programming: Introduction to JavaScript – Functions – Objects – Arrays – Built - in Objects –Using JSON to represent Objects-DOM –Event Handling.

CLIENT SIDE TECHNOLOGIES:XML , AJAX, ANGULAR JS **9 Hours**

XML: Documents and Vocabularies –XML DTD-XML Schema-XSLT-XML parsers-AJAX: AJAX Framework.

Introduction to AngularJS –Features of AngularJS -Expressions and Data Biding -Working with Directives-Controllers-Filters-Modules-Forms

SERVER SIDE TECHNOLOGIES–PHP **9 Hours**

PHP Basics-Arrays-Functions-Form handling with data- Pattern Matching -–Storing the data in DB

SERVER SIDE TECHNOLOGIES: Node js and MongoDB **9 Hours**

Node js – Introduction - Advantages of Node JS -HTTP module – Building APIs using modules, events and packages.

MongoDb –Introduction –create database-Manipulating Mongo Db documents from Node.js-accessing MongoDB from node.js.

WEBSERVICES **9 Hours**

Servlet - JSP - Restful Based Web services: Architecture-java. API for Restful Based Web Services-Developing and consuming Restful based web services in Java - Introduction to enterprise beans-types-Lifecycle of enterprise beans

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

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REFERENCES

1. Deitel&Deitel, et.al "Internet & World Wide Web - How To Program", Pearson Education, Fifth Edition, 2011.
2. Marty Hall and Larry Brown “Core Servlets and Java Server Pages, Volume1”,Prentice Hall Education, Second Edition,2006.
3. Robert W. Sebesta, "Programming the World Wide Web", Eighth edition, Pearson pulications,2015.
4. Frank P.Coyle, “XML, Web Services and the Data Revolution”,Addison-Wesley,2002.
5. Brad Dayley, Brendan Dayley, Caleb Davley “Node.js, MongoDB and Angular Web Development”, second edition, Addison Wesely,2018.
6. Ken Williamson, “Learning AngularJS: A Guide to AngularJS Development”, O’Reilly Medisa Inc., 2015
7. www.w3schools.com
8. https://nodejs.org/en/docs/guides/
9. https://www.tutorialspoint.com

LAB COMPONENTS:

List of Experiments:

1. To create a simple html file to demonstrate the use of different tags.
2. Client side scripts for validating web form controls and creating events using Java Script
3. Program using JSON and Javascript
4. Program using XML Schema
5. Program using XSLT/XSL and AJAX
6. Web application development using PHP
7. Web application development using JSP with JDBC
8. Creation of Restful based web services and consume it an application
9. Web application development using Node js and MongoDB
10. Creation of web enabled applications using Struts/Spring Framework

Theory: 0 **Tutorial: 0** **Practical: 30** **Project: 0** **Total hours: 30**

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U18ITI6304 **BIG DATA ANALYTICS**

L	T	P	J	C
3	0	0	2	4

COURSE OBJECTIVES:

- Understand the Big Data Platform and its use cases
- Provide an overview of Hadoop architecture
- Develop data analytics solutions using python

COURSE OUTCOMES:

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

CO1: Outline the big data technologies used for storage, analysis and manipulation of data
CO2: Explain Big Data eco system and its components
CO3: Analyze the Big Data stored in HDFS using Hadoop Map Reduce framework
CO4: Understand the Pig scripting and HBase architecture
CO5: Apply the Hive concepts, Hive Data types, loading and querying for Big Data
CO6: Explain the MongoDB architecture and its operations

Pre-requisites: U18ITI5201 – DATA MINING TECHNIQUES

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
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	1	2	3
CO 1	M								M				M		
CO 2	M				S							M	M		
CO 3	M	M		M	S	M	M					M	S		
CO 4	M								M				M		
CO 5	S		M	M	S	M						M	S		S
CO 6	S	M			M								M		

COURSE ASSESSMENT METHODS:

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Direct
1. Continuous Assessment Test I, II (Theory component) 2. Assignment, Group Presentation (Theory component) 3. End Semester Examination (Theory) 4. Project report (Project Component) 5. Project Review and Presentation (Project Component)
Indirect
1. Course-end survey

THEORY COMPONENT CONTENTS

INTRODUCTION **9 Hours**

Introduction to Big Data - Big Data Challenges - Big Data Architecture - Hadoop & its Features - Hadoop Ecosystem - Hadoop 2.x Core Components - Hadoop Storage: HDFS (Hadoop Distributed File System) - Hadoop Processing: MapReduce Framework - Different Hadoop Distributions

HADOOP COMPONENTS **9 Hours**

Hadoop 2.x Cluster Architecture - Hadoop Cluster Modes -Common Hadoop Shell Commands - Hadoop 2.x Configuration Files - Single Node Cluster & Multi-Node Cluster set up -Basic Hadoop Administration - Traditional way vs MapReduce way - Why MapReduce - YARN Components - YARN Architecture - YARN MapReduce Application Execution Flow - YARN Workflow - Anatomy of MapReduce Program -Input Splits, Relation between Input Splits and HDFS Blocks – MapReduce: Combiner &Partitioner

PIG and HBase **9 Hours**

Introduction to Apache Pig – MapReduce vs Pig - Pig Components & Pig Execution - Pig Data Types & Data Models in Pig - Pig Latin Programs - Shell and Utility Commands - Pig UDF & Pig Streaming - Testing Pig scripts with Punit - Aviation use-case in PIG

Apache HBase: Introduction to NoSQL Databases and HBase - HBase v/s RDBMS - HBase Components - HBase Architecture - HBase Run Modes - HBase Configuration - HBase Cluster Deployment

HIVE **9 Hours**

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Introduction to Apache Hive - Hive vs Pig - Hive Architecture and Components - Hive Metastore - Limitations of Hive - Comparison with Traditional Database - Hive Data Types and Data Models - Hive Partition - Hive Bucketing - Hive Tables (Managed Tables and External Tables) - Importing Data - Querying Data & Managing Outputs - Hive Script & Hive UDF

MONGODB **9 Hours**

Introduction to MongoDB – Architecture – Schema Design and Modelling – CRUD operations - Integration of MongoDB with Hadoop and Data Migration MongoDB with Hadoop (MongoDB to Hive)

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

REFERENCES:

1. Tom White, "HADOOP: The definitive Guide", O Reilly 2012.
2. Chris Eaton, Dirk deroos et al., "Understanding Big Data ", McGraw Hill, 2012.
3. Kyle Banker, Peter Bakkum, et al.," MongoDB in Action", Second Edition, Manning Publications, 2016
4. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015.
5. Wes McKinney, "Python for Data Analysis", O'Reilly Media.2012
6. Sebastian Raschka, "Python Machine Learning", Packpub.com,2015

PROJECT COMPONENTS:

LIST OF PROJECTS

1. Twitter data sentimental analysis using Hive.
2. Health care Data Management using Apache Hadoop ecosystem
3. Stock Market Data Processing using Big Data.
4. Retail data analysis using Hadoop.
5. Climatic Data analysis using Hadoop.
6. Facebook data analysis using Hadoop and Hive.
7. Air line on time performance using Hadoop.

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

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LIST OF MANDATORY COURSES

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U18VEP6506 **NATIONAL VALUES**
(Mandatory)

L	T	P	J	C
0	0	2	0	0

COURSE OUTCOMES

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

CO 1: Acquire knowledge on the **Essence of Indian Knowledge Tradition**
CO 2: Know the great Indian personalities and follow their trail
CO 3: Understand the specialty of democracy
CO 4: Disseminate our Nation and its values to propagate peace
CO 5: Contribute with their energy and effort for a prosperous India
CO 6: Propagate the youth and the contribution for development of our Nation

Pre-requisites :

1. U18VEP1501 / PERSONAL VALUES
2. U18VEP2502 / INTERPERSONAL VALUES
3.U18VEP3503 / FAMILY VALUES
4.U18VEP4504 / PROFESSIONAL VALUES
5.U18VEP5505 / SOCIAL VALUES

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						S						
CO2									M			
CO3							M					
CO4								S				
CO5											S	
CO6												M

COURSE ASSESSMENT METHODS

Direct
1.Group Activity / Individual performance and assignment 2.Assessment on Value work sheet / Test
Indirect
1. Mini project on values / Goodwill Recognition

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Values through Practical activities:

1. Essence of Indian Knowledge Tradition:
Basic structure of Indian Knowledge System - Modern Science and Indian Knowledge System - Yoga and Holistic Health care - Case studies - Philosophical Tradition - Indian Linguistic Tradition - Indian Artistic Tradition.

2. Great Indian Leaders : Ancient rulers - Freedom fighters - Social reformers -Religious and Spiritual leaders - Noble laureates -Scientists – Statesman.

3. Largest Democracy : Socialist -Secular - Democratic and Republic – special features of Indian constitution – Three pillar of Indian democracy - Fundamental rights – Duties of a citizen – centre state relationship.

4. India's Contribution to World peace : Nonaligned Nation – Principle of Pancha Sheela – Mutual respect, non-aggression, non-interference, Equality and cooperation – Role of India in UNO -Yoga India's gift to the world.

5. Emerging India : World's largest young work force - Stable Economic development - Labor market & Achievement in space technology – Value based Social structure. Emerging economic superpower.

Workshop mode

REFERENCES

1. KNOWLEDGE TRADITIONS AND PRACTICES OF INDIA, *CBSE Publication* *cbseacademic.nic.in/web_material/Circulars/2012/68_KTPI/Module_6_2.pdf*

2. CULTURAL HERITAGE OF INDIA - SCERT Kerala
www.scert.kerala.gov.in/images/2014/HSC.../35_Gandhian_Studies_unit-01.pdf

3. LEARNING TO DO: VALUES FOR LEARNING AND WORKING TOGETHER - UNESCO
www.unesdoc.unesco.org/images/0014/001480/148021e.pdf

4. INDIA AFTER GANDHI.pdf - Ramachandra Guha - University of Warwick
www2.warwick.ac.uk/fac/arts/history/students/modules/hi297/.../week1.pdf

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5. INDIA'S CONTRIBUTION TO THE REST OF THE WORLD - YouSigma
www.yousigma.com/interesting facts/indiasgifttotheworld.pdf

6. INDIA AS AN EMERGING POWER - International Studies Association
web.isanet.org/Web/Conferences/.../11353cac-9e9b-434f-a25b-a2b51dc4af78.pdf

SEMESTER - VII

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U18ITT7001 **SOCIAL MEDIA MARKETING**

L	T	P	J	C
3	0	0	0	3

COURSE OBJECTIVES:

- Explain how to develop effective social media marketing strategies for various types of industries and businesses.
- Describe the major social media marketing portals that can be used to promote a company, brand, product, service or person.
- Discuss the evolution of social media marketing and identify related ethical issues to communicate its impact on businesses

COURSE OUTCOMES:

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

CO1: Identify and describe the different social media services, tools, and platforms.
CO2: Demonstrate understanding and evaluate new tools and social media platforms.
CO3: Develop skills in using the predominant social media tools for business marketing.

CO4: Discover innovative uses for social media in a variety of business areas and processes.
CO5: Develop a strategic plan for identifying opportunities for using social media.

Pre-requisites: Nil

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
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	1	2	3
CO1	S									M		M		M	
CO2	S	S			S					M		M		M	
CO3	S		S							M		M		M	
CO4	S									M		M		M	
CO5	S	S	S		S	S			M	M	S	M		M	

COURSE ASSESSMENT METHODS:

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

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INDIRECT
1. Course-end survey

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THEORY COMPONENT CONTENTS

Understanding Facebook and leveraging Facebook for Marketing 8 Hours

Introduction to basic FB terminologies-Creating a powerful personal profile for business-Marketing applications of Face book- Fundamentals of creating and maintaining fan pages-Creating groups for marketing-Face book marketing checklist.

Introduction to Twitter as a Marketing Tool 10 Hours

Setting up a Twitter profile- Fundamental of Twitter: Tweet, direct messages, replies and Trending topics-Managing your Twitter experience- Fundamentals of Tweet Deck-Managing multiple Twitter accounts- Tweet management- Twitter Grader- Twitter Counter-Tweet burner-Twitter marketing checklist- Tree induction techniques.

Fundamentals of YouTube for Creating Compelling Online Presence 10 hours

Fundamentals of video marketing- Creating a YouTube channel- Creating your own Internet TV channel for marketing

Using LinkedIn for Marketing 8 Hours

LinkedIn for B2b marketing- creating a profile in LinkedIn Powerful corporate searches and connections - Recommendations and testimonials.

Understanding Content Marketing and Using Blogs to build and engage audience 9 Hours

Basics of inbound marketing-Webinars and tele- seminars-Podcasting basics- creating blogs and building a following White papers and info graphics- Fundamentals of content curation

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

REFERENCES:

1. Liana Li Evans, “Social Media Marketing :Strategies for Engaging in Facebook, Twitter & Other Social Media”, Que Press; Ed 2010
2. Andrew Macarthy,” 500 Social Media Marketing Tips: Essential Advice, Hints and Strategy for Business: Facebook, Twitter, Pinterest, Google+, YouTube, Instagram, LinkedIn, and More!” ,Springer 2017
3. Ann Handley, “Content Rules: How to Create Killer Blogs, Podcasts, Videos, Ebooks, Webinars (and More) That Engage Customers and Ignite Your Business “,Johnwiley and sons,2012
4. Barker, “Social Media Marketing: A Strategic Approach” ,Cengage; 1 edition 2013

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U18ITI7202 **CLOUD COMPUTING**

L	T	P	J	C
2	0	2	0	3

COURSE OBJECTIVES:

- To understand cloud computing challenges and services
- To acquire knowledge about various cloud tools
- To develop different optimization algorithm for cloud environment

COURSE OUTCOMES:

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

CO1 Develop private cloud using tools
CO2 Identify cloud service and its applications
CO3 Illustrate functions of web service with cloud service
CO4 Apply virtualization concepts for real time problems
CO5 Develop Economic based scheduling algorithm
CO6 Create algorithm using different Queuing model

Pre-requisite: U18ITI4204-COMPUTER NETWORKS

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												**PSO**		
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	1	2	3
CO1	M	M			S							M	M		
CO2	M	M			S							M	M		
CO3	M	M			S							M	M		
CO4	M	M			S							M	M		
CO5	S	S			S							S	S		
CO6	S	S			S							S	S		

COURSE ASSESSMENT METHODS:

Direct
1. Continuous Assessment Test I, II (Theory component) 2. Assignment, Group Presentation (Theory component) 3. Pre/Post - experiment Test/Viva(Lab component) 4. Model examination (Lab component) 5. End Semester Examination (Theory and Lab components
Indirect
1 Course Exit Survey

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THEORY COMPONENT CONTENTS

CLOUD INTRODUCTION **7 Hours**

Cloud Computing Fundamentals: Cloud Computing definition, Types of cloud, Cloud services: Benefits and challenges of cloud computing, Evolution of Cloud Computing , usage scenarios and Applications , Business models around Cloud – Major Players in Cloud Computing - Issues in Cloud - Eucalyptus - Nimbus - Open Nebula, CloudSim

CLOUD SERVICES AND FILE SYSTEM **8 Hours**

Types of Cloud services: Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service - Monitoring as a Service – Communication as services. Service providers- Google App Engine, Amazon EC2, Microsoft Azure, Sales force. Introduction to Map Reduce, GFS, HDFS, Hadoop Framework

COLLABORATING WITH CLOUD **7 Hours**

Collaborating on Calendars, Schedules and Task Management – Collaborating on Event Management, Contact Management, Project Management – Collaborating on Word Processing, Databases – Storing and Sharing Files- Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Collaborating via Social Networks – Collaborating via Blogs and Wikis

VIRTUALIZATION FOR CLOUD **8 Hours**

Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization – System Vm, Process VM, Virtual Machine monitor – Virtual machine properties - Interpretation an and binary translation, HLL VM - Hypervisors – Xen, KVM , VMWare, Virtual Box, Hyper-V

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

LIST OF EXPERIMENTS

1.Study and compare various simulators in cloud computing.
2.Setup a Private Cloud Using Open Stack or Eucalyptus.
3.Develop Market oriented cloud computing model using Aneka toolkit
4.Compare energy conscious algorithm using green cloud simulator
5.Develop Economic based scheduling algorithm for cloud computing
6.Create algorithm using different Queuing model for cloud computing

REFERENCES

1. Bloor R., Kanfman M., Halper F. Judith Hurwitz ―Cloud Computing for Dummies‖ (Wiley India Edition),2010
2. John Rittinghouse & James Ransome, ―Cloud Computing Implementation Management and Strategy‖, CRC Press, 2010.

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3. Antohy T Velte ,Cloud Computing : ―A Practical Approach‖, McGraw Hill,2009
4. Michael Miller, Cloud Computing: ―Web-Based Applications That Change the Way You Work and Collaborate Online‖, Que Publishing, August 2008.
5. James E Smith, Ravi Nair, ―Virtual Machines‖, Morgan Kaufmann Publishers, 2006.
6. http://cloud-standards.org/wiki/index.php?title=Main_Page

Theory:0 Tutorial: 0 Practical: 30 Project: 0

Total: 30 Hours

L	T	P	J	C
3	0	2	0	4

U18ITI7203 MACHINE LEARNING

COURSE OBJECTIVES:

- To understand the need for machine learning for various problem solving
- To study the various supervised, semi-supervised and unsupervised learning algorithms in machine learning
- To understand the latest trends in machine learning
- To design appropriate machine learning algorithms for problem solving

COURSE OUTCOMES:

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

CO1 Differentiate between supervised, unsupervised, semi-supervised machine learning approaches

CO2 Discuss the decision tree algorithm and identity and overcome the problem of overfitting

CO3 Discuss and apply the back-propagation algorithm and genetic algorithms to various problems

CO4 Apply the Bayesian concepts to machine learning

CO5 Analyse and suggest appropriate machine learning approaches for various types of problems

Pre-requisite: U18ITI6304- BIG DATA ANALYTICS

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
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	1	2	3
CO1	S	S											M		
CO2	M	M											M		
CO3	M	M	M										M		
CO4	M	M	M										M		
CO5	M	M	M	M	M				M			M	M	M	M

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COURSE ASSESSMENT METHODS:

Direct
1. Continuous Assessment Test I, II (Theory component) 2. Assignment, Group Presentation (Theory component) 3. Pre/Post - experiment Test/Viva(Lab component) 4. Model examination (Lab component) 5. End Semester Examination (Theory and Lab components)
Indirect
1. Course-end survey

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THEORY COMPONENT CONTENTS

INTRODUCTION **9 Hours**

Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

NEURAL NETWORKS AND GENETIC ALGORITHMS **9 Hours**

Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

BAYESIAN AND COMPUTATIONAL LEARNING **9 Hours**

Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

INSTANT BASED LEARNING **9 Hours**

K- Nearest Neighbour Learning – Locally weighted Regression – Radial Basis Functions – Case Based Learning.

ADVANCED LEARNING **9 Hours**

Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning

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

REFERENCES:

1. Tom M. Mitchell, ―Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.
2. EthemAlpaydin, ―Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
3. Stephen Marsland, ―Machine Learning: An Algorithmic Perspective, CRC Press, 2009.
4. Kevin P. Murphy , Machine Learning A Probabilistic Perspective, The MIT Press,2012
5. Jason Bell, ―Machine learning – Hands on for Developers and Technical Professionals, First Edition, Wiley, 2014
6. Peter Flach, ―Machine Learning: The Art and Science of Algorithms that Make Sense of Data, First Edition, Cambridge University Press, 2012.

LAB COMPONENT:

List of Projects:

1.Supervised and Unsupervised learning

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2.Social Media Analysis
3.Sentimental Analysis
4.Recommender Systems
5.Prediction algorithms

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

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LIST OF MANDATORY COURSES

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U18VEP7507 **GLOBAL VALUES**
(Mandatory)

L	T	P	J	C
0	0	2	0	0

COURSE OUTCOMES

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

CO 1: Aware of the concept of Universal Brotherhood and support the organizations which areworking for it

CO 2: Follow the path of Ahimsa in every aspect of their life

CO 3: Uphold the Universal declaration of Human Rights

CO 4: Understand the unequal distribution of wealth in the World and bestow their efforttowards inclusive growth

CO 5: Sensitize the environmental degradation and work for the sustainable development

CO 6: Amalgamate harmony through Non-violence and edify the nation headed for upholdingdevelopment

Pre-requisites :

1. U18VEP1501 / PERSONAL VALUES
2. U18VEP2502 / INTERPERSONAL VALUES
3. U18VEP3503 / FAMILY VALUES
4. U18VEP4504 / PROFESSIONAL VALUES
5. U18VEP5505 / SOCIAL VALUES
6. U18VEP6506 / NATIONAL VALUES

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					
CO2								S				
CO3									M			
CO4						S						
CO5											M	
CO6												S

COURSE ASSESSMENT METHODS

Direct
1.Group Activity / Individual performance and assignment 2.Assessment on Value work sheet / Test
Indirect
1. Mini project on values / Goodwill Recognition

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Values through Practical activities:

1. Universal Brotherhood : Meaning of Universal Brotherhood- Functioning of Various organization for Universal human beings -Red Cross, UN Office for Humanitarian Affairs – Case study on humanitarian problems and intervention - Active role of Students/Individual on Universal Brotherhood.

2. Global Peace, Harmony and Unity : Functions of UNO - Principal Organizations - Special organization – Case study relating to disturbance of world peace and role of UNO – Participatory role of Students/Individual in attaining the Global peace and Unity.

3. Non-Violence : Philosophy of nonviolence- Nonviolence practiced by Mahatma Gandhi – Global recognition for nonviolence - Forms of nonviolence - Case study on the success story of nonviolence– Practicing nonviolence in everyday life.

4. Humanity and Justice: Universal declaration of Human Rights - Broad classification - Relevant Constitutional Provisions– Judicial activism on human rights violation - Case study on Human rights violation– Adherence to human rights by Students/Individuals.

5. Inclusive growth and sustainable development : Goals to transform our World: No Poverty - Good Health - Education – Equality - Economic Growth - Reduced Inequality – Protection of environment – Case study on inequality and environmental degradation and remedial measures.

Workshop mode

REFERENCES

1. TEACHING ASIA-PACIFIC CORE VALUES OF PEACE AND HARMONY – UNICEF www.unicef.org/.../pdf/Teaching%20Asia-Pacific%20core%20values.pdf

2. THREE-DIMENSIONAL ACTION FOR WORLD PROSPERITY AND PEACE- IIM Indore - www.iimidr.ac.in/.../Three-Dimensional-Action-for-World-Prosperity-and-Peace-Glo...

3. MY NON-VIOLENCE - MAHATMA GANDHI
www.mkgandhi.org/ebks/my_nonviolence.pdf

4. HUMAN RIGHTS AND THE CONSTITUTION OF INDIA 8th ... - India Juris
www.indiajuris.com/uploads/.../pdf/l1410776927qHuman%20Rights%20080914.pdf

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5. THE ETHICS OF SUSTAINABILITY – Research Gate
www.researchgate.net/file.PostFileLoader.html?id...assetKey..

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ELECTIVE COURSES

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U18ITE0001 ARTIFICIAL INTELLIGENCE

L	T	P	J	C
3	0	0	0	3

COURSE OBJECTIVES:

- To introduce artificial intelligence (AI) principles and approaches.
- Develop a basic understanding of the building blocks of AI

COURSE OUTCOMES:

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

CO1 Demonstrate the awareness of intelligent agents and problem solving using different search algorithms
CO2 Interpret the use of different knowledge representation methods.
CO3 Make use of uncertain knowledge for planning and reasoning in AI applications
CO4 Explain the basics of decision making.
CO5 Apply the knowledge of machine learning methods in AI applications

Pre-requisite: U18MAT3102 - DISCRETE MATHEMATICS

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
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	1	2	3
CO1	S	M	M										M		
CO2	M	M											M		
CO3	S	M	M							M			M		
CO4	M												M		
CO5	M	M										M	M		

COURSE ASSESSMENT METHODS:

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

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THEORY COMPONENT CONTENTS

INTRODUCTION AND PROBLEM SOLVING **10 Hours**

Intelligent Agents. forward and backward, state-space, blind, heuristic, problem-reduction, A, A*, AO*, minimax, constraint propagation, neural, stochastic, and evolutionary search algorithms

KNOWLEDGE REPRESENTATION AND REASONING **8 Hours**

Ontologies, foundations of knowledge representation and reasoning, representing and reasoning about objects, relations, events, actions, time, and space; predicate logic, situation calculus, description logics, reasoning with defaults, reasoning about knowledge

PLANNINGAND REASONING WITH UNCERTAIN KNOWLEDGE **10 Hours**

Planning as search, partial order planning, construction and use of planning graphs, probability, connection to logic, independence, Bayes rule, Bayesian networks, probabilistic inference

DECISION-MAKING **8 Hours**

Basics of utility theory, decision theory, sequential decision problems, elementary game theory

MACHINE LEARNING AND KNOWLEDGE ACQUISITION **9 Hours**

Learning from memorization, examples, explanation, and exploration. learning nearest neighbour, naive Bayes, and decision tree classifiers, Q-learning for learning action policies, applications.

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

REFERENCES:

1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", 3rd Edition, Pearson Education / Prentice Hall of India, 2015.
2. Judith Hurwitz, Marcia Kaufman, "Cognitive Computing and Big Data Analytics", Wiley Publication, April 2015
3. Elaine Rich, Kevin Knight, ShivashankarB.Nair, "Artificial Intelligence", Tata McGraw Hill Publishing Company Limited. Third Edition , 2009
4. Nils J. Nilsson, "Artificial Intelligence: A new Synthesis", Harcourt Asia Pvt. Ltd.,2000.
5. George F. Luger, "Artificial Intelligence-Structures and Strategies For Complex Problem Solving", Pearson Education / PHI, 2002
6. David L. Poole, Alan K. Mackworth, Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010.

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U18ITE0002 **DEEP LEARNING**

L	T	P	J	C
3	0	0	0	3

COURSE OBJECTIVES:

- To acquire knowledge on the basics of neural networks.
- To implement neural networks using computational tools for variety of problems.
- To explore various deep learning algorithms

COURSE OUTCOMES:

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

CO1: Explain the fundamental principles, theory and approaches for learning with deep neural networks

CO2: Explain the main variants of deep learning and their typical applications

CO3: Analyze the key concepts, issues and practices when training and modeling with deep architectures

CO4: Analyze the learning tasks

CO5: Apply deep learning in the context of other ML approaches

Pre-requisite: U18ITI7203 - MACHINE LEARNING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
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	1	2	3
CO1	S	M	M										M		
CO2	M	M											M		
CO3	S	M	M							M			M		
CO4	M												M		
CO5	M	M										M	M		

COURSE ASSESSMENT METHODS

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

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THEORY COMPONENT CONTENTS

Introduction to Deep learning **9 Hours**
Linear Regression -Nonlinear Regression- Logistic Regression Activation

Convolutional Neural Networks (CNN) **9 Hours**
CNN History- Understanding CNNs- CNN Application

Recurrent Neural Networks (RNN) **9 Hours**
Intro to RNN Model Long Short-Term memory (LSTM) Recursive Neural Tensor Network Theory Recurrent Neural Network Model

Unsupervised Learning **9 Hours**
Applications of Unsupervised Learning-Restricted Boltzmann Machine-Collaborative Filtering with RBM

Autoencoders **9 Hours**
Introduction to Autoencoders and Applications- Autoencoders- Deep Belief Network

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

REFERENCE BOOKS:

1. Ian Goodfellow, YoshuaBengio and Aaron Courville, "Deep Learning", The MIT Press
2. Rajiv Chopra, Deep Learning: A Practical Approach, Khanna Publication
3. Adam Gibson, Deep Learning: A Practitioner's Approach, O'Reilly Media,August 2017
4. MOOC, Deep Learning By Google, https://in.udacity.com/course/deep-learning--ud730
5. MOOC, Deep Learning https://www.coursera.org/specializations/deep-learning

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L	T	P	J	C
3	0	0	0	3

U18ITE0003 DATA VISUALIZATION

COURSE OBJECTIVES:

- To introduce visual perception and core skills for visual analysis.
- To understand visualization for time-series analysis. Ranking analysis, deviation analysis
- To understand visualization for distribution, correlation and multivariate analysis
- To understand issues and best practices in information dashboard design.

COURSE OUTCOMES:

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

CO1 Explain principles of visual perception

CO2 Apply core skills for visual analysis

CO3 Explain visualization for time-series analysis and ranking analysis.

CO4 Outline visualization for deviation ,distribution , correlation and multivariate analysis

CO5 Demonstrate the skills in information dashboard design

Pre-requisite: Nil

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
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	1	2	3
CO1	S	M	M										M		
CO2	M	M											M		
CO3	S	M	M							M			M		
CO4	M												M		
CO5	M				M					M		M	M		M

COURSE ASSESSMENT METHODS:

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

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THEORY COMPONENT CONTENTS

CORE SKILLS FOR VISUAL ANALYSIS **9 Hours**

Information visualization – effective data analysis – traits of meaningful data – visual perception –making abstract data visible – building blocks of information visualization – analytical interaction – analytical navigation – optimal quantitative scales – reference lines and regions – trellises and crosstabs – multiple concurrent views – focus and context – details on demand – over-plotting reduction – analytical patterns – pattern examples.

TIME-SERIES, RANKING, AND DEVIATION ANALYSIS **9 Hours**

Time-series analysis – time-series patterns – time-series displays – time-series best practices – part-to-whole and ranking patterns – part-to-whole and ranking displays – best practices – deviation analysis – deviation analysis displays – deviation analysis best practices.

DISTRIBUTION, CORRELATION ANALYSIS **9 Hours**

Distribution analysis – describing distributions – distribution patterns – distribution displays – distribution analysis best practices – correlation analysis – describing correlations – correlation patterns – correlation displays – correlation analysis techniques and best practices

MULTIVARIATE ANALYSIS **9 Hours**

Multivariate analysis – multivariate patterns – multivariate displays – multivariate analysis techniques and best practices.

INFORMATION DASHBOARD DESIGN **9 Hours**

Information dashboard – Introduction– dashboard design issues and assessment of needs – Considerations for designing dashboard-visual perception – Achieving eloquence.

REFERENCES:

1. Ben Fry, "Visualizing data: Exploring and explaining data with the processing environment", O'Reilly, 2008.
2. Edward R. Tufte, "The visual display of quantitative information", Second Edition, Graphics Press, 2001.
3. Evan Stubbs, "The value of business analytics: Identifying the path to profitability", Wiley, 2011.
4. Gert H. N. Laursen and JesperThorlund, "Business Analytics for Managers: Taking business intelligence beyond reporting", Wiley, 2010.
5. Nathan Yau, "Data Points: Visualization that means something", Wiley, 2013.
6. Stephen Few, "Information dashboard design: Displaying data for at-a-glance monitoring", second edition, Analytics Press, 2013.
7. Stephen Few, "Now you see it: Simple Visualization techniques for quantitative analysis", Analytics Press, 2009.
8. Tamara Munzner, Visualization Analysis and Design, AK Peters Visualization Series, CRC Press, Nov. 2014

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

L	T	P	J	C
3	0	0	0	3

U18ITE0004 INFORMATIONCODING TECHNIQUES

COURSE OBJECTIVES:

- To understand Information properties and source coding techniques
- To acquire knowledge about error coding techniques for efficient transmission
- To understand various compression algorithms for data, Image and video

COURSE OUTCOMES:

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

CO1 Apply the suitable codingschemes for information.

CO2 Make use of codingschemesfortext compression .

CO3 Illustrate thecompression schemesfor video and image.

CO4 Utilize the various types of error controlcodes.

CO5 Construct thecodetreeand state diagram for errorcontrol codes

Pre-requisite: Nil

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
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	1	2	3
CO1	M	M										M	M		
CO2	M	M										M	M		
CO3	M	M										M	M		
CO4	M	M										M	M		
CO5	M	M										M	M		

COURSE ASSESSMENT METHODS:

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

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THEORY COMPONENT CONTENTS

INFORMATIONTHEORY **9 Hours**

Information–Entropy-Informationrate-classificationofcodes-KraftMcMillaninequality-Sourcecodingtheorem–Shannon – Fanocoding – Huffmancoding–ExtendedHuffmancoding – Jointandconditionalentropies-Mutualinformation-Discrete memory lesschannels–BSC-BEC – Channel capacity-Shannon limit.

SOURCECODING:TEXT,AUDIOANDSPEECH **9 Hours**

Text:AdaptiveHuffmanCoding – ArithmeticCoding – LZWalgorithm–Audio:Perceptual coding-Maskingtechniques – PsychoacousticmodelMEGAudiolayersI,II,III,DolbyAC3-Speech: Channel Vocoder-Linear Predictive Coding.

SOURCECODING:IMAGEANDVIDEO **9 Hours**

ImageandVideoFormats–GIF–TIFF– SIF–CIF – QCIF–Imagecompression:READ- JPEG – Video Compression: Principles-I, B, P frames - Motion estimation - Motion compensation - H.261 -MPEG standard.

ERRORCONTROLCODING:BLOCKCODES **9 Hours**

Definitions and Principles: Hammingweight-Hammingdistance-Minimum distancedecoding –Singleparitycodes – Hammingcodes – Repetitioncodes – Linearblockcodes – Cycliccodes – Syndromecalculation-Encoder and decoder– CyclicRedundancycheck codes.

ERRORCONTROLCODING:CONVOLUTIONALCODES **9 Hours**

Convolutionalcodes–codetree–trellis-statediagram-Encoding–Decoding:Sequential searchand Viterbi algorithm– Principleof Turbocoding.

REFERENCE BOOKS:

1. SimonHaykin,–CommunicationSystems,fourthedition,JohnWiley&Sons,2014.
2. Bose.R,–Information Theory, Coding And Cryptography, TMH 2011
3. FredHalsall, –MultimediaCommunications: Applications, Networks, Protocols And Standards, Pearson Education Asia, 2011
4. Sayood.K, –Introduction To Data Compression, Fourthedition, Elsevier, 2014.
5. Gravano. S, –Introduction To ErrorControl Codes, Oxford UniversityPress, 2010.

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

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U18ITE0005 **WEB APPLICATION SECURITY**

L	T	P	J	C
3	0	0	0	3

COURSE OBJECTIVES:

- Understand foundations of Web application paradigm
- Introduce the idea of penetration testing strategies
- Understand in detail about the vulnerabilities and defence mechanism

COURSE OUTCOMES:

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

CO1 Explain the architecture web application architecture
CO2 Demonstrate Core Defence Mechanisms
CO3 Explain the authenticated attacking mechanism
CO4 Explain various process of attacking user
CO5 Design attacking mechanism for Native Software Vulnerabilities

Pre-requisite: U18ITT5001 - CRYPTOGRAPHY AND NETWORK SECURITY, U18ITI6203 - WEB TECHNOLOGY

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												**PSO**		
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	1	2	3
CO1	M	M										M	M		
CO2	M	M										M	M		M
CO3	M	M						S				M	M		M
CO4	M	M						S				M	M		M
CO5	M	M										M	M		M

COURSE ASSESSMENT METHODS:

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

THEORY COMPONENT CONTENTS

WEB APPLICATION ARCHITECTURE **9 Hours**

Web Application Insecurity, Core Defense Mechanisms, Web Application Technologies, Mapping and Analyzing the Application

DEFENSEMECHANISMS **9 Hours**

Bypassing Client Side Controls, Attacking Authentication, Attacking Session Management, Attacking Access Controls

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ATTACKING MECHANISMS **9 Hours**

Attacking Data Stores, Attacking Back-End Components, Attacking Application Logic

ATTACKING USERS **9 Hours**

Attacking Users: Cross Site Scripting, Other Techniques, Automating Customized Attacks, Exploiting Information Disclosures

NATIVE SOFTWARE VULNERABILITIES **9 Hours**

Attacking Native Compiled Applications, Attacking Application Architecture, Attacking the Application Server, Finding Vulnerabilities in the Source Code-Approaches and Signatures of Common Vulnerabilities

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

REFERENCES

1. DafyddStuttard and Marcus Pinto, " The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws" , 2nd edition, Wiley, 2011
2. Michael Cross , "Developer's Guide to Web Application Security" 1st Editiosyngress,2007
3. OWASP Top 10 Vulnerabilities at https://www.owasp.org/images/7/72/OWASP_Top_10-2017_%28en%29.pdf.pdf
4. https://www.udemy.com/topic/web-security

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U18ITE0006 **BIOMETRIC SYSTEMS**

L	T	P	J	C
3	0	0	0	3

COURSE OBJECTIVES:

- To understand the basics of Biometrics and its functionalities
- To expose the concept of IRIS and sensors
- To expose the context of Biometric Applications
- To learn to develop applications with biometric security

COURSE OUTCOMES:

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

CO1 Identify the various Biometric technologies.
CO2 Explain the role of biometric in the organization
CO3 Design of an IRIS recognition system
CO4 Develop simple applications based on behavioral biometrics
CO5 Summarize the need for biometric system in the society

Pre-requisites: Nil

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
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	1	2	3
CO1	M	M										M	M		
CO2	S	M										M	M		
CO3	M	M	M									M	M		
CO4	S	M						M				M			M
CO5	M	M						S				M			M

COURSE ASSESSMENT METHODS:

Direct
1. Continuous Assessment Test I, II 2. Assignment, Group Presentation 3. End Semester Examination
Indirect
1. Course Exit Survey

THEORY COMPONENT CONTENTS

INTRODUCTION **9 Hours**

Person Recognition – Biometric systems –Biometric functionalities: verification, identification –Biometric systems errors - The design cycle of biometric systems – Applications of Biometric systems– Security and privacy issues

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FINGER PRINT AND FACIAL RECOGNITION **9 Hours**

FINGERPRINT : Introduction – Friction ridge pattern- finger print acquisition :sensing techniques, image quality –Feature Extraction –matching –indexing. FACE RECOGNITION: Introduction –Image acquisition: 2D sensors,3D sensors- Face detection- Feature extraction -matching.

IRIS AND OTHER TRAITS **9 Hours**

Design of an IRIS recognition system-IRIS segmentation- normalization – encoding and matching IRIS quality –performance evaluation –other traits- ear detection –ear recognition – gait feature extraction and matching –challenges- hand geometry –soft biometrics.

BEHAVIORAL BIOMETRICS **9 Hours**

Introduction –Features- classification of behavioral biometrics –properties of behavioral biometrics –signature –keystroke dynamics –voice- merits –demerits –applications- error sources-types –open issues –future trends.

APPLICATIONS AND TRENDS **9 Hours**

Application areas: surveillance applications- personal applications –design and deployment – user system interaction-operational processes – architecture –application development – design validation disaster recovery plan-maintenance-privacy concerns.

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

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REFERENCES:

1. James wayman,Anilk.Jain,ArunA.Ross,KarthikNandakumar, ―Introduction to BiometricsSpringer, 2011
2. John Vacca "Biometrics Technologies and Verification Systems" Elsevier 2007
3. James Wayman,AnilJain,DavidMAltoni,DasioMaio(Eds) "Biometrics SystemsTechnology", Design and Performance Evalution.Springer 2005
4. Khalid saeed with MarcinAdamski, TapalinaBhattasali, Mohammed K. Nammous, Piotrpanasiuk, mariusz Rybnik and soharabH.Sgaikh, ―New Directions in Behavioral Biometrics,CRC Press 2017
5. Paul Reid "Biometrics For Network Security "Person Education 2004
6. Shimon K.Modi , Biometrics in Identity Management :concepts to applications, Artech House 2011

U18ITE0007 BLOCKCHAIN TECHNOLOGY

L	T	P	J	C
3	0	0	0	3

COURSE OBJECTIVES

- To acquire the basic knowledge and understandings of Bitcoin
- To understand the mechanisms of Bitcoin, Ethereum, Hyperledger
  To understand the current trends of Blockchain

COURSE OUTCOMES:

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

CO1 Discover the secure and efficient transactions with Bitcoin.

CO2 Identify and analyze the applications of Bitcoin script

CO3 Experiment with Bitcoin mining

CO4 Develop private Blockchain environment and develop a smart contract on Ethereum

CO5 Build the Hyperledger architecture and the consensus mechanism applied in the Hyperledger

Pre-requisite: U18ITT5002 - CRYPTOGRAPHY AND NETWORK SECURITY

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												**PSO**		
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	1	2	3

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CO1	S	M	M	M								M	M		
CO2	S	M	M										M		
CO3	S	M	M												M
CO4	S	S	M	M								M			M
CO5	S	M	M									M			M

COURSE ASSESSMENT METHODS:

Direct
1. Continuous Assessment Test I, II 2. Assignment, Group presentation 3. End Semester Exam
Indirect
1.Course Exit Survey

THEORY COMPONENT CONTENTS

CRYPTOCURRENCY AND BLOCKCHAIN- INTRODUCTION 9 Hours

Cryptography and Cryptocurrency- Anonymity and Pseudonymity in CryptocurrenciesDigital Signatures-Cryptocurrency Hash Codes. Distributed networks-Blockchain- An Introduction Distinction between databases and Blockchain- Distributed ledgerBlockchain ecosystem-Blockchain structure- Blockchain technology- Working - Permission and permission-less Blockchain

BITCOIN AND BLOCKCHAIN 9 hours

Bitcoin – history- Bitcoin- usage, storage, selling, transactions, working- Invalid Transactions- Parameters that invalidate the transactions- Scripting language in BitcoinApplications of Bitcoin script- Nodes and network of Bitcoin- Bitcoin ecosystem

BITCOIN MINING 9 hours

Purpose of mining- Algorithm used in mining- Mining hardware- Bitcoin mining poolscloud mining of Bitcoin -Mining Incentives-Security and centralizations

ETHEREUM 9 hours

The Ethereum ecosystem, DApps and DAOs - Ethereum working- Solidity- Contract classes, functions, and conditionals- Inheritance & abstract contracts- Libraries- Types & optimization of Ether- Global variables- Debugging- Future of Ethereum- Smart Contracts on Ethereum- different stages of a contract deployment- Viewing Information about blocks in Blockchain- Developing smart contract on private Blockchain- Deploying contract from web and console

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HYPERLEDGER **9 hours**

Hyperledger Architecture- Consensus- Consensus & its interaction with architectural layers- Application programming interface- Application model -Hyperledger frameworks- Hyperledger Fabric -Various ways to create Hyperledger Fabric Blockchain network- Creating and Deploying a business network on Hyperledger Composer Playground- Testing the business network definition- Transferring the commodity between the participants

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

REFERENCES:

1. Mastering Bitcoin: Unlocking Digital Cryptocurrencies, by Andreas M Antonopoulos 2018
2. Ethereum: Blockchains, Digital Assets, Smart Contracts, Decentralized Autonomous Organizations-2016.

OTHER ONLINE COURSES:

1. https://www.coursera.org/learn/ibm-blockchain-essentials-for-developers
2. https://www.coursera.org/learn/blockchain-basics

U18ITE0008 ADHOC AND SENSOR NETWORKS

L	T	P	J	C
3	0	0	0	3

COURSE OBJECTIVES

- Understand the design issues and challenges in ad hoc and sensor networks.
- Learn the differenttypes of MAC and routing protocols of ad hoc networks.
- Learn the architecture and protocols of wireless sensor networks

COURSE OUTCOMES:

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

CO1 Explain the concept of ad hoc and sensor networks, their applications and typical node and network architectures.

CO2 Explain the working of different types of adhoc routing protocols.

CO3 Compare wireless routing protocol's function and their implications on network performance

CO4 Explain the sensor network characteristics, sensor databases and query processing.

CO5 Explain various security threats to ad hoc networks and describe proposed solutions

Pre-requisite: U18ITI4204- COMPUTER NETWORKS

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

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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	1	2	3
CO1	M												M		
CO2	M			W									M		
CO3	M		M										M		
CO4	M										W	M	M		
CO5	M	W		M		W	M						M		

COURSE ASSESSMENT METHODS:

Direct
1. Continuous Assessment Test I, II 2. Assignment, Group presentation 3. End Semester Exam
Indirect
1.Course Exit Survey

THEORY COMPONENT CONTENTS

INTRODUCTION **9 Hours**

Characteristics of wireless channel - Wireless local loop - IEEE 802.16 standard – HIPERACCESS -Ad hoc wireless networks: Introduction and issues - MAC protocols: Design issues - Goals and classification - MACAW: A media access protocol for wireless LANs- Distributed packet reservation multiple access protocol-Distributed priority scheduling and Medium access in Ad hoc networks- MAC protocol using directional antennas.

ROUTING PROTOCOLS **9 Hours**

Design issues – Classification – Wireless routing protocol - Location aided routing- Zone routing protocol - Hierarchical state routing protocol - Power aware routing protocol – Operation of multicast routing protocols - Classification of multicast routing protocols – Application-Dependent multicast routing

SECURITY IN AD HOC NETWORKS **9 Hours**

Security in ad hoc wireless networks – Network security requirements - Issues and challenges in security provisioning – Network security attacks – key management – secure routing in Ad hoc networks

WIRELESS SENSOR NETWORKS **9 Hours**

Architecture - Data dissemination - Date gathering - MAC protocols - Location discovery - Quality of sensor networks - Case study

SENSOR NETWORK DATABASE **9 Hours**

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Sensor database challenges – Querying the physical environment – Query interfaces - High level database organization – In-Network aggregation – Temporal data – Emerging Applications.

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

REFERENCES:

1. Siva Ram Murthy. C and Manoj B.S, "Ad hoc Wireless Networks: Architectures And Protocols ", Prentice Hall PTR, 2004
2. Toh C.K., "Ad hoc Mobile Wireless Networks: Protocols And Systems", Prentice Hall PTR, First edition 2002
3. Mohammad Ilyas, "The Handbook Of Ad hoc Wireless Networks", CRC press, 2002
4. Charles E. Perkins, "Ad hoc Networking", Addison –Wesley,2000
5. Stefano Basagni , et al " Mobile Ad hoc Networking", Wiley –IEEE press,2004
6. Zhao, Guibas "Wireless Sensor Networks" ,Morgan Kaufmann Publications,2004

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U18ITE0009 NEXT GENERATION NETWORKS

L	T	P	J	C
3	0	0	0	3

COURSE OBJECTIVES

- To learn the technical, economic and service advantages of next generation networks.
- To learn the evolution of technologies of 4G and beyond.
- To learn Software defined Mobile Network issues and integrating challenges with LTE.
- To explore the NGN framework catering the services of end user with QoS provisioning.
- To learn about the NGM management and standards.

COURSE OUTCOMES:

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

CO1 Describe the issues and challenges of wireless domain in future generation network design

CO2 Explain the evolution of technologies of 4G and beyond

CO3 Explore the LTE concepts and technologies

CO4 Outline the process of integrating SDN with LTE

CO5 Explain the NGN architectures, management and standardizations

Pre-requisite: U18ITI4204- COMPUTER NETWORKS

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
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	1	2	3
CO1	M												M		
CO2	M												M		
CO3	M			M									M		
CO4	M	M		M								W	M		M
CO5	M					W		W				M	M	M	

COURSE ASSESSMENT METHODS:

Direct
1. Continuous Assessment Test I, II 2. Assignment, Group presentation 3. End Semester Exam
Indirect
1. Course Exit Survey

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THEORY COMPONENT CONTENTS

INTRODUCTION **9 Hours**

Evolution of public mobile services -motivations for IP based services, Wireless IP network architecture –3GPP packet data network architecture. Introduction to next generation networks - Changes, Opportunities and Challenges, Technologies, Networks, and Services, Next Generation Society, future Trends.

4G AND BEYOND **9 Hours**

Introduction to LTE-A –Requirements and Challenges, network architectures –EPC, E-UTRAN architecture-mobility management, resource management, services, channel -logical and transport channel mapping, downlink/uplink data transfer, MAC control element, PDU packet formats, scheduling services, random access procedure.

SDMN-LTE INTEGRATION **9 Hours**

SDN paradigm and applications, SDN for wireless-challenges, Leveraging SDN for 5G network subiquitous connectivity-mobile cloud-cooperative cellular network-restructuring mobile networks to SDN-SDN/LTE integration benefits.

NGN ARCHITECTURE **9 Hours**

Evolution towards NGN-Technology requirements, NGN functional architecture- Transport stratum, service stratum, service/ content layer and customer terminal equipment function. NGN entities, Network and Service evolution -fixed, mobile, cable and internet evolution towards NGN.

NGN MANAGEMENT AND STANDARDIZATION **9 Hours**

NGN requirements on Management-Customer, third party, Configuration, Accounting, performance, device and information management. Service and control management- End-to-End QoS and security. ITU and GSI-NGN releases, ETSI-NGN concept and releases, NGMN alliance and NGMN.

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

REFERENCES:

1. Jingming Li Salina, Pascal Salina "Next Generation Networks-perspectives and potentials" Wiley, January 2008.
2. MadhusangaLiyanage, Andrei Gurtov, Mika Ylianttila, "Software Defined Mobile Networks beyond LTE Network Architecture", Wiley, June 2015.
3. Martin Sauter,"3G,4G and Beyond bringing networks, devices and web together", Wiley, 2nd edition-2013.
4. Savo G Glisic," Advanced Wireless Networks- Technology and Business models", Wiley, 3rd edition- 2016.
5. Thomas Plavyk, ―Next generation Telecommunication Networks, Services and Management‖, Wiley & IEEE Press Publications, 2010.

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U18ITE0010 SOFTWARE DEFINED NETWORKS

L	T	P	J	C
3	0	0	0	3

COURSE OBJECTIVES:

- To learn the fundamentals of software defined networks.
- To understand the separation of the data plane and the control plane.
- To study about the SDN Programming and applications.

COURSE OUTCOMES:

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

CO1 Describe the integration of SDN with LTE

CO2 Explain the evolution and components of software defined networks

CO3 Explain the use of SDN in the current networking scenario

CO4 Design and develop various applications of SDN

CO5 Make use of Tools and Languages for programming SDN.

Pre-requisite: U18ITI4204- COMPUTER NETWORKS

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
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	1	2	3
CO1	M									M			M		
CO2	M									M			M		
CO3	M			W						M			M		
CO4	M	M	M							M			M	M	
CO5	M	M	M		M					M		M	M	M	M

COURSE ASSESSMENT METHODS:

Direct
1. Continuous Assessment Test I, II 2. Assignment, Group presentation 3. End Semester Exam
Indirect
1. Course Exit Survey

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THEORY COMPONENT CONTENTS

INTRODUCTION **9 Hours**

History of Software Defined Networking (SDN) – Modern Data Center – Traditional Switch Architecture – Why SDN – Evolution of SDN – How SDN Works – Centralized and Distributed Control and Date Planes.

OPEN FLOW & SDN CONTROLLERS **9 Hours**

Open Flow Specification – Drawbacks of Open SDN, SDN via APIs, SDN via Hypervisor-Based Overlays – SDN via Opening up the Device – SDN Controllers – General Concepts

DATA CENTERS **9 Hours**

Multitenant and Virtualized Multitenant Data Center – SDN Solutions for the Data Center Network – VLANs – EVPN – VxLAN – NVGRE

SDN PROGRAMMING **9 Hours**

Programming SDNs: Northbound Application Programming Interface, Current Languages and Tools, Composition of SDNs – Network Functions Virtualization (NFV) and Software Defined Networks: Concepts, Implementation and Applications

SDN **9 Hours**

Juniper SDN Framework – IETF SDN Framework – Open Daylight Controller – Floodlight Controller – Bandwidth Calendaring – Data Center Orchestration

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

REFERENCES

1. Paul Goransson and Chuck Black, ―Software Defined Networks: A Comprehensive Approach, First Edition, Morgan Kaufmann, 2014.
2. Thomas D. Nadeau, Ken Gray, ―SDN: Software Defined Networks, O'Reilly Media, 2013.
3. SiamakAzodolmolky, ―Software Defined Networking with Open Flow, Packet Publishing, 2013.
4. Vivek Tiwari, ―SDN and Open Flow for Beginners‖, Amazon Digital Services, Inc., 2013.
5. Fei Hu, Editor, ―Network Innovation through Open Flow and SDN: Principles and Design, CRC Press, 2014.

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OTHER ELECTIVES

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U18ITE0011 **DISTRIBUTED SYSTEMS**

L	T	P	J	C
3	0	0	0	3

COURSE OBJECTIVES:

- Understand the foundations of Distributed Systems.
- Introduce the idea of peer to peer services and file system.
- Understand in detail the system level and support required for distributed system.
- Understand the issues involved in process and resource management.

COURSE OUTCOMES:

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

CO1 Explain the architecture of distributed systems
CO2 Demonstrate remote method invocation and objects.
CO3 Explain the distributed file system tools
CO4 Explain various process synchronization methods & ways to achieve its consistency
CO5 Design process and resource management systems

Pre-requisite: U18ITT4001 - OPERATING SYSTEM

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
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	1	2	3
CO1	M	M										M	M		
CO2	M	M										M	M		
CO3	M	M										M	M		
CO4	M	M										M	M		
CO5	M	M							M			M	M		

COURSE ASSESSMENT METHODS:

Direct
1. Continuous Assessment Test I, II 2. Assignment, Group Presentation 3. End Semester Examination
Indirect
1. Course Exit Survey

THEORY COMPONENT CONTENTS

INTRODUCTION **9 Hours**

Examples of Distributed Systems–Trends in Distributed Systems – Focus on resource sharing – Challenges. Case study: World Wide Web.

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COMMUNICATION IN DISTRIBUTED SYSTEM **9 Hours**

System Model – Inter process Communication - the API for internet protocols – External data representation and Multicast communication. Network virtualization: Overlay networks. Case study: MPI Remote Method Invocation and Objects: Remote Invocation – Introduction - Request-reply protocols - Remote procedure call - Remote method invocation. Case study: Java RMI - Group communication - Publish-subscribe systems - Message queues - Shared memory approaches -Distributed objects - Case study: Enterprise Java Beans from objects to components.

PEER TO PEER SERVICES AND FILE SYSTEM **9 Hours**

Peer-to-peer Systems – Introduction - Napster and its legacy - Peer-to-peer – Middleware - Routing overlays. Overlay case studies: Pastry, Tapestry- Distributed File Systems –Introduction - File service architecture – Andrew File system. File System: Features-File model -File accessing models - File sharing semantics Naming: Identifiers, Addresses, Name Resolution – Name Space Implementation – Name Caches – LDAP.

SYNCHRONIZATION AND REPLICATION **9 Hours**

Introduction - Clocks, events and process states - Synchronizing physical clocks- Logical time and logical clocks - Global states – Coordination and Agreement – Introduction - Distributed mutual exclusion – Elections – Transactions and Concurrency Control– Transactions -Nested transactions – Locks – Optimistic concurrency control - Timestamp ordering – Atomic Commit protocols -Distributed deadlocks – Replication – Case study – Coda.

PROCESS & RESOURCE MANAGEMENT **9 Hours**

Process Management: Process Migration: Features, Mechanism - Threads: Models, Issues, Implementation. Resource Management: Introduction- Features of Scheduling Algorithms –Task Assignment Approach – Load Balancing Approach – Load Sharing Approach.

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

REFERENCES:

1. George Coulouris, Jean Dollimore, Tim Kindberg, , "Distributed Systems: Concepts and Design", 5th Edition, Pearson Education, 2011.
2. A.tS. Tanenbaum and M. V. Steen, "Distributed Systems: Principles and Paradigms", Second Edition, Prentice Hall, 2006.
3. MukeshSinghal and N. G. Shivaratri, ―Advanced Concepts in Operating Systems‖, 1st Edition, McGraw-Hill, 2011.
4. Liu M.L., “Distributed Computing, Principles and Applications”, Pearson Education, 2004.
5. Nancy A Lynch, “Distributed Algorithms”, Morgan Kaufman Publishers, USA, 2003.

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U18ITE0012 PRINCIPLES OF COMPILER DESIGN

L	T	P	J	C
3	0	0	0	3

COURSE OBJECTIVES:

- To introduce the major concept areas of language translation and compiler design.
- To enrich the knowledge in various phases of compiler ant its use, code optimization techniques, machine code generation, and use of symbol table.
- To extend the knowledge of parser by parsing LL parser and LR parsers.

COURSE OUTCOMES:

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

CO1 Explain the various phases of a compiler
CO2 Construct DFA from a given regular expression
CO3 Outline the top-down and bottom-up parsing techniques
CO4 Develop the intermediate codes
CO5 Identify various types of optimizations on intermediate code and generate assembly code

Pre-requisite: Nil

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												**PSO**		
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	1	2	3
CO1	M	W											M		
CO2	S	M											M		
CO3	M	M										W	M		
CO4	M	M											M		
CO5	M	M								M			M		

COURSE ASSESSMENT METHODS:

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

THEORY COMPONENT CONTENTS

INTRODUCTION AND LEXICAL ANALYSIS **9 Hours**

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Language Processors – The Structure of Compiler – Applications of Compiler Technology – Programming Language Basics. Lexical Analysis – The Role of the Lexical Analyzer – Input Buffering – Specification of Tokens – Recognition of Tokens – The Lexical-Analyzer Generator - LEX– Finite Automata – From Regular Expression to Automata – Design of a Lexical-Analyzer Generator – Optimization of DFA-based Pattern Matchers.

SYNTAX ANALYSIS **9 Hours**

Introduction – Context-Free Grammars – Writing a Grammar – Top-Down Parsing – Recursive-Descent Parsing and Predictive Parsers - Bottom-up Parsing – Shift-Reduce Parsing and Operator Precedence Parsing - Introduction to LR Parsing: Simple LR – More Powerful LR Parsers – Canonical LR and LALR Parsers.

INTERMEDIATE CODE GENERATION **9 Hours**

Variants of Syntax Trees – Three-Address Code – Types and Declarations – Translation of Expressions – Type Checking – Control Flow – Back patching – Switch-Statements – Intermediate Code for Procedures.

CODE GENERATION **9 Hours**

Issues in the Design of a Code Generator – The Target Language – Addresses in the Target Code – Basic Blocks and Flow Graphs – Optimization of Basic Blocks – A Simple Code Generator – Peephole Optimization.

CODE OPTIMIZATION AND RUN-TIME ENVIRONMENT **9 Hours**

The Principal Sources of Optimization – Introduction of Data-Flow Analysis – Loops in Flow Graphs Run-Time Environments – Storage Organization – Stack Allocation of Space – Heap Management.

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

REFERENCES:

1. Alfred V. Aho et al “Compilers Principles, Techniques and Tools”, Second edition, Pearson Education,2011.
2. Allen I. Holub, “Compiler Design in C”, Prentice Hall of India, 2003.
3. Fischer C.N. and LeBlanc R.J. “Crafting a Compiler with C”, Benjamin Cummings, 2003.
4. Bennet J.P. “Introduction to Compiler Techniques”, Second edition, Tata McGraw-Hill, 2003.
5. Kenneth C. Louden, “Compiler Construction: Principles and Practice”, Thompson Learning, 2003.

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U18ITE0013 GRAPHICS AND MULTIMEDIA

L	T	P	J	C
3	0	0	0	3

COURSE OBJECTIVES:

- To know the basics of computer graphics output primitives.
- To appreciate illumination and color models
- To gain knowledge about graphics hardware devices and software used
- To understand the 2D and 3D concepts with modeling.
- To know the basics of multimedia, compression, file handling and hypermedia.

COURSE OUTCOMES

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

CO1: Explain graphics output primitives and color models.
CO2: Apply 2D and 3D geometric transformations on objects.
CO3: Summarize the graphics modeling process.
CO4: Describe the basics of multimedia, compression, file handling and hypermedia.
CO5: Model a simple application with animation.

Pre-requisites: Nil

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	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	M	M													
CO2	S	M			M								M		
CO3	M	M													
CO4	M	M													
CO5	S	S			S	S			S	S	S	S	M		M

Course Assessment methods

Direct
1. Continuous Assessment Test I, II 2. Assignment 3. Mini Project 4. End Semester Examination
Indirect
1. Course-end survey

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THEORY COMPONENT CONTENTS

ILLUMINATION AND COLOR MODELS **11 Hours**

Light sources - basic illumination models – halftone patterns and dithering techniques; Properties of light - Standard primaries and chromaticity diagram; Intuitive color concepts - RGB color model - YIQ color model - CMY color model - HSV color model - HLS color model; Color selection. Output primitives – points and lines, line drawing algorithms, loading the frame buffer, line function; circle and ellipse generating algorithms; Pixel addressing and object geometry, filled area primitives.

TWO-DIMENSIONAL GRAPHICS **7 Hours**

Two dimensional geometric transformations – Matrix representations and homogeneous coordinates, composite transformations; Two dimensional viewing – viewing pipeline, viewing coordinate reference frame; window-to-viewport coordinate transformation, Two dimensional viewing functions; clipping operations – point, line, and polygon clipping algorithms.

THREE-DIMENSIONAL GRAPHICS **9 Hours**

Three dimensional concepts; Three dimensional object representations – Polygon surfaces- Polygon tables- Plane equations - Polygon meshes; Curved Lines and surfaces, Quadratic surfaces; Blobby objects; Spline representations – Bezier curves and surfaces -B-Spline curves and surfaces.

TRANSFORMATION AND VIEWING: Three dimensional geometric and modeling transformations – Translation, Rotation, Scaling, composite transformations; Three dimensional viewing – viewing pipeline, viewing coordinates, Projections, Clipping; Visible surface detection methods. CASE STUDY: OPENGL Programming

MULTIMEDIA SYSTEM DESIGN & MULTIMEDIA FILE HANDLING **9 Hours**

Multimedia basics − Multimedia applications − Multimedia system architecture − Evolving technologies for multimedia − Defining objects for multimedia systems − Multimedia data interface standards − Multimedia databases. Compression and decompression − Data and file format standards − Multimedia I/O technologies − Digital voice and audio − Video image and animation − Full motion video − Storage and retrieval technologies.

HYPERMEDIA **9 Hours**

Multimedia authoring and user interface – Hypermedia messaging – Mobile messaging – Hypermedia message component – Creating hypermedia message – Integrated multimedia message standards – Integrated document management – Distributed multimedia systems. CASE STUDY: BLENDER GRAPHICS - Blender Fundamentals–Drawing Basic Shapes–Modelling–Shading & Textures-Wrapping

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

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REFERENCES

1. Donald Hearn, M. Pauline Baker, “Computer Graphics”, Second edition, Prentice Hall, 2014.
2. Prabhat K.Andleigh, Kiran Thakrar, “Multimedia Systems Design”, Prentice Hall India, 2013.
3. Foley, Vandam, Feiner and Hughes, “Computer Graphics: Principles and Practice”, 3rdEdition, Addison Wesley Professional, 2013.
4. Jeffrey McConnell, “Computer Graphics: Theory into Practice”, Jones and BartlettPublishers,2006.
5. Hill F S Jr., "Computer Graphics using OpenGL", 2nd edition, Maxwell Macmillan, 2001.
6. Ze-Nian Li and Mark S. Drew, “Fundamentals of Multimedia”, First Edition, Pearson Education, 2004.
7. https://blender.org/support/tutorials/

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U18ITE0014 BUSINESS INTELLIGENCE

L	T	P	J	C
3	0	0	0	3

COURSE OBJECTIVES:

- To provide insight to businesses and professionals, helping them make better decisions, gain competitive advantage and enhance return on investment.

COURSE OUTCOMES:

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

CO1: Explain the Business Intelligent Environment
CO2: Describe the Business Intelligence Architecture
CO3: Outline the usage of ETL in Business Intelligence
CO4: Explore the Emerging trends in Business Intelligence

Pre-requisite : NIL

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	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	M												M		
CO2	M												M		
CO3	M													M	
CO4	M	M	M		M			M		S	M				M

COURSE ASSESSMENT METHODS

Direct
1. Continuous Assessment Test I, II (Theory component) 2. Assignment, Group Presentation (Theory component) 3. End Semester Examination (Theory and Lab components)
Indirect
1. Course-end survey

THEORY COMPONENT CONTENTS

INRODUCTION 9 Hours

BI and Information Exploitation - BI Definitions & Concepts - Business Applications of BI- Organizational preparedness for BI and Analytics - Types of BI Users – Planning

BUSINESS INTELLIGENCE ENVIRONMENT 9 Hours

BI Framework - Services and system Evolution - Business Processes and Information flow - Data Requirements Analysis

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BUSINESS INTELLIGENCE ARCHITECTURE 9 Hours

Data Modelling and Analytics - Analytical Platforms - Types of Metadata - Semantic Metadata Processes for Business Analytics - Data profiling - Business Rules

DATA QUALITY 9 Hours

Types of Data Flaws - Dimensions of Data Quality – Assessment – Rules - Data Cleansing - Data Integration – ETL - Data latency and Synchrony

BUSINESS INTELLIGENCE TRENDS9 Hours

Knowledge Discovery and Data Mining for Predictive Analytics - Repurposing publicly available Data - Knowledge Delivery - Emerging BI Trends - Case study.

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

REFERENCE BOOKS:

1. David Loshin, "Business Intelligence", Second Edition, Morgan Kaufmann Series, 2013
2. Mike Bierre, "Business Intelligence for the Enterprise", IBM Press, 2003
3. Larissa T. Moss, ShakuAtre, "Business Intelligence Roadmap: The Complete Project Lifecycle for Decision-Support Applications", Addison-Wesley, 2003
4. CindiHowson, "Successful Business Intelligence: Secrets to Making BI a Killer App", McGraw-Hill, 2008
5. Brain, Larson, "Delivering business intelligence with Microsoft SQL server 2008", McGraw-Hill, 2009

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U18ITE0015 NATURAL LANGUAGE PROCESSING

L	T	P	J	C
3	0	0	0	3

COURSE OBJECTIVES:

- To learn the fundamentals of natural language processing
- To learn the language models in NLP
- To understand the role of semantics of sentences and pragmatics
- To identify the NLP techniques in IR applications

COURSE OUTCOMES:

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

CO1: Explain the language models
CO2: Analyze the natural language text
CO3: Generate the natural language
CO4: Do machine translation
CO5: Apply information retrieval techniques

Pre-requisite : NIL

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	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	M												M		
CO2	M		M	M	M					M			M		
CO3	M		M		M					M			M		
CO4	M		M		M					M			M		
CO5	M		M		M					M			M		

COURSE ASSESSMENT METHODS

Direct
1. Continuous Assessment Test I, II (Theory component) 2. Assignment, Group Presentation (Theory component) 3. End Semester Examination (Theory and Lab components)
Indirect
1. Course-end survey

THEORY COMPONENT CONTENTS

OVERVIEW AND LANGUAGE MODELING 9 Hours

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Overview: Origins and challenges of NLP-Language and Grammar-Processing Indian Languages - NLP Applications-Information Retrieval. Language Modeling: Various Grammar- based Language Models-Statistical Language Model

WORD LEVEL AND SYNTACTIC ANALYSIS 9 Hours

Word Level Analysis: Regular Expressions-Finite-State Automata-Morphological Parsing-Spelling Error Detection and correction-Words and Word classes-Part-of Speech Tagging. Syntactic Analysis: Context-free Grammar-Constituency- Parsing-Probabilistic Parsing.

SEMANTIC ANALYSIS AND DISCOURSE PROCESSING 9 Hours

Semantic Analysis: Meaning Representation-Lexical Semantics- Ambiguity-Word Sense Disambiguation. Discourse Processing: cohesion-Reference Resolution- Discourse Coherence and Structure

NATURAL LANGUAGE GENERATION AND MACHINE TRANSLATION 9 Hours

Natural Language Generation: Architecture of NLG Systems- Generation Tasks and Representations- Application of NLG. Machine Translation: Problems in Machine Translation-Characteristics of Indian Languages- Machine Translation Approaches-Translation involving Indian Languages

INFORMATION RETRIEVAL AND LEXICAL RESOURCES 9 Hours

Information Retrieval: Design features of Information Retrieval Systems-Classical, Non-classical, Alternative Models of Information Retrieval – valuation Lexical Resources: World Net-Frame Net- Stemmers-POS Tagger- Research Corpora.

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

REFERENCE BOOKS:

1. Tanveer Siddiqui, U.S. Tiwary, "Natural Language Processing and Information Retrieval", Oxford University Press, 2008.
2. Daniel Jurafsky and James H Martin, "Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", 2 nd Edition, Prentice Hall, 2008.
3. James Allen, "Natural Language Understanding", 2nd edition, Benjamin /Cummings publishing company, 1995.
4. Steven Bird, Ewan Klein and Edward Loper, "Natural Language Processing with Python", First Edition, OReilly Media, 2009.
5. Charniack, Eugene, "Statistical Language Learning", MIT Press, 1993.
6. Manning, Christopher and Heinrich, Schutze, "Foundations of Statistical Natural Language Processing", MIT Press, 1999.
7. Radford, Andrew et. al., "Linguistics, An Introduction", Cambridge University Press,

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1999.

U18ITE0016 INFORMATION RETRIEVAL TECHNIQUES

L	T	P	J	C
3	0	0	0	3

COURSE OBJECTIVES:

- To understand the basics of information retrieval with pertinence to modeling, query operations and indexing
- To get an understanding of machine learning techniques for text classification and clustering.
- To understand the various applications of information retrieval giving emphasis to multimedia IR, web search
- To understand the concepts of digital libraries

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

CO1: Build an Information Retrieval system using the available tools
CO2: Identify and design the various components of an Information Retrieval system
CO3: Apply machine-learning techniques to text classification which is used for efficient Information Retrieval
CO4: Apply machine-learning techniques to text clustering
CO5: Design an efficient search engine and analyze the Web content structure

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Pre-requisite : NIL

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	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	M												M		
CO2	M	M	M										M		
CO3	M		M		M								M		
CO4	M		M		M								M		
CO5	M		M	M	M					M		M	M		

Course Assessment methods

Direct
1. Continuous Assessment Test I, II (Theory component) 2. Assignment, Group Presentation (Theory component) 3. End Semester Examination (Theory and Lab components)
Indirect
1. Course-end survey

INTRODUCTION: MOTIVATION 9 Hours

Basic Concepts – Practical Issues - Retrieval Process – Architecture - Boolean Retrieval – Retrieval Evaluation – Open Source IR Systems–History of Web Search – Web Characteristics– The impact of the web on IR —IR Versus Web Search–Components of a Search engine

MODELING 9 Hours

Taxonomy and Characterization of IR Models – Boolean Model – Vector Model - Term Weighting – Scoring and Ranking –Language Models – Set Theoretic Models - Probabilistic Models – Algebraic Models – Structured Text Retrieval Models – Models for Browsing

INDEXING 9 Hours

Static and Dynamic Inverted Indices – Index Construction and Index Compression. Searching - Sequential Searching and Pattern Matching. Query Operations -Query Languages – Query Processing - Relevance Feedback and Query Expansion - Automatic Local and Global Analysis – Measuring Effectiveness and Efficiency

CLASSIFICATION AND CLUSTERING 9 Hours

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Text Classification and Naïve Bayes – Vector Space Classification – Support vector machines and Machine learning on documents. Flat Clustering – Hierarchical Clustering –Matrix decompositions and latent semantic indexing – Fusion and Meta learning

UNIT V – SEARCHING THE WEB **9 Hours**

Searching the Web –Structure of the Web –IR and web search – Static and Dynamic Ranking – Web Crawling and Indexing – Link Analysis - XML Retrieval Multimedia IR: Models and Languages – Indexing and Searching Parallel and Distributed IR – Digital Libraries

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

REFERENCE BOOKS:

1. Christopher D. Manning, Prabhakar Raghavan, Hinrich Schutze, ―Introduction to Information Retrieval‖, Cambridge University Press, First South Asian Edition, 2008.
2. Implementing and Evaluating Search Engines‖, The MIT Press, Cambridge, Massachusetts London, England, 2010
3. Ricardo Baeza – Yates, Berthier Ribeiro – Neto, ―Modern Information Retrieval: The concepts and Technology behind Search‖ (ACM Press Books), Second Edition, 2011.
4. Stefan Buttcher, Charles L. A. Clarke, Gordon V. Cormack, ―Information Retrieval

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U18ITE0017 **SECURITY OF INTERNET OF THINGS**

L	T	P	PJ	C
3	0	0	0	3

COURSE OBJECTIVES:

- Understand the security and privacy challenges of IoT
- Understand system, application, and network security and privacy threats and vulnerabilities on IoT systems.

COURSE OUTCOMES:

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

CO1: Explain the security and privacy requirements of IoT

CO2: Explain IoT security attacks.

CO3: Explain security issues in the front-end of IoT system

CO4: Explain security issues in the networking of IoT devices.

CO5: Explain security issues in the back-end of IoT system

Pre-requisite: U18ITT6002- Internet of Things – Architecture and Protocols

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak													**PSO**		
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	1	2	3
CO 1	M	M											M		
CO 2	M	M											M		
CO 3	M	M											M		
CO 4	M	M			M								M		
CO 5	M	M			M								M		

COURSE ASSESSMENT METHODS:

DIRECT
4. Continuous Assessment Test I, II **5.** Assignment, Group presentation **6.** End Semester Exam
INDIRECT
2. Course-end survey

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THEORY COMPONENT CONTENTS

IoT Security Requirements **9 Hours**

Fundamentals, Architecture of IoTs, IoT Security Requirements, IoT Privacy Preservation Issues.

Attack Models **9 Hours**

Attack Models – Attacks to Sensors in IoTs, Attacks to RFIDs in IoTs, Attacks to Network Functions in IoTs, Attacks to Back-end Systems,

Security in Front-end **9 Hours**

Security in Front-end Sensors and Equipment, Prevent Unauthorized Access to Sensor Data, M2M Security, RFID Security, Cyber-Physical Object Security, Hardware Security, Front-end System, Privacy Protection,

Networking Function Security **9 Hours**

Networking Function Security- IoT Networking Protocols, Secure IoT Lower Layers, Secure IoT Higher Layers, Secure Communication Links in IoTs,

Security in Back-end **9 Hours**

Back-end Security -Secure Resource Management, Secure IoT Databases, Security Products-Existing Testbed on Security and Privacy of IoTs, Commercialized Products

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

REFERENCES:

1. Fei HU, "Security and Privacy in Internet of Things (IoTs): Models, Algorithms, and Implementations", CRC Press,2016
2. Russell, Brian and Drew Van Duren, "Practical Internet of Things Security", Packt Publishing, 2016.
3. Ollie Whitehouse, "Security of Things: An Implementers' Guide to Cyber-Security for Internet of Things Devices and Beyond", NCC Group, 2014

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U18ITE0018 **PROFESSIONAL READINESS FOR INNOVATION, EMPLOYABILITY AND ENTREPRENEURSHIP**

L	T	P	J	C
0	0	6	0	3

COURSE OUTCOMES

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

CO1:	Upskill in emerging technologies and apply to real industry-level use cases.
CO2:	Understand agile development process.
CO3:	Develop career readiness competencies, Team Skills / Leadership qualities
CO4:	Develop Time management, Project management skills and Communication Skills.
CO5:	Use Critical Thinking for Innovative Problem Solving
CO6:	Develop entrepreneurship skills to independently work on products.

Pre-requisites :Nil

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	M	S	S	S				M			M	S		
CO2	S		M										M		
CO3									S			M			
CO4									M	S	S	S			
CO5	M	M	S	S									S		
CO6			M			S	M	M	S				M		

COURSE **ASSESSMENT METHODS**

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DIRECT
Continuous Project Based Assessment
INDIRECT
Course-end survey

TABLE 1: ACTIVITIES

Activity Name	Activity Description	Time (weeks)
Choosing a Project	Selecting a project from the list of projects categorized various technologies & business domains	2
Team Formation	Students shall form a team of 4 Members before enrolling to a project. Team members shall distribute the project activities among themselves.	1
Hands on Training	Students will be provided with hands-on training on selected technology in which they are going to develop the project.	2
Project Development	Project shall be developed in agile mode. The status of the project shall be updated to the mentors via appropriate platform	6
Code submission,Project Doc and Demo	Project deliverables must include the working code, project document and demonstration video. All the project deliverables are to be uploaded to cloud-based repository such as GitHub.	3
Mentor Review and Approval	Mentor will be reviewing the project deliverables as per the milestone schedule and the feedback will be provided to the team.	1
Evaluation and scoring	Evaluators will be assigned to the team to evaluate the project deliverables, and the scoring will be provided based on the evaluation metrics	1
TOTAL		**16 WEEKS**

Theory: 0 **Tutorial: 0** **Practical: 100** **Project: 0** **Total: 100 Hours**

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