KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE
(An Autonomous Institute under Kakatiya University, Warangal)
(Approved by AICTE, New Delhi; Recognised by UGC under 2(f) & 12(B); Sponsored by EKASILA EDUCATION SOCIETY)
Opp : Yerragattu Gutta, Hasanparthy (Mandal), WARANGAL - 506 015, Telangana, INDIA.
काकतीय प्रैद्योगिकी एवं विज्ञान संस्थान, वरंगल - ५०६ ०१५
కాకతీయ సాంకేతిక విజ్ఞాన శాస్త్ర విద్యాలయం, వరంగల్ - ౫౦౬ ౦౧౫
website: www.kitsw.ac.in E-mail: principal@kitsw.ac.in ✆ : +91 9392055211, +91 7382564888

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

B.Tech - COMPUTER SCIENCE AND ENGINEERING

URR-18

(Applicable from the Academic Year 2018-19)

SYLLABI (III to VI SEMESTERS)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
KAKATIYA INSTITUTE OF TECHNOLOGY &SCIENCE:: WARANGAL – 15
(An Autonomous Institute under Kakatiya University, Warangal)

SCHEME OF INSTRUCTION & EVALUATION
III-SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAM

[6Th+3P+1MC]

S.No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	BSC	U18MH301	Engineering Mathematics - III	3	1	-	4	10	30	40	60	100
2	HSMC	U18MH302	Professional English	_	_	2	1	100	-	100	-	100
3	PCC	U18CS303	Object Oriented Programming through JAVA	3	1	-	4	10	30	40	60	100
4	BSC	U18MH304	Discrete Mathematics	3	-	-	3	10	30	40	60	100
5	PCC	U18CS305	Computer Architecture and Organization	3	-	-	3	10	30	40	60	100
6	PCC	U18CS306	Advanced Data Structures	3	-	-	3	10	30	40	60	100
7	ESC	U18EI309	Digital Electronics	3	-	-	3	10	30	40	60	100
8	PCC	U18CS310	Object Oriented Programming through Java Lab	-	-	2	1	40	-	40	60	100
9	PCC	U18CS311	Advanced Data Structures Lab	_	_	2	1	40	-	40	60	100
10	MC	U18MH315	Essence of Indian Traditional Knowledge	2	-	-	-	10	30	40	60	100
			Total:	20	2	6	23	250	210	460	540	1000

[L= Lecture, T = Tutorials, P = Practical & C=Credits]

Total Contact Periods/Week: 28 **Total Credits: 23**

Stream-I: ME, CSE, IT, CSN, CSE (IOT) **Stream-II: CE, EIE, EEE, ECE, ECI, CSE (AI&ML)**

U18MH301 ENGINEERING MATHEMATICS-III

Class: B.Tech. III-Semester

Branch: Common to all branches

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: Laplace transform and its use to find the solutions of certain initial and boundary value problems occur in engineering

LO2: Fourier series and its importance.

LO3: functions of complex variables and the property of analyticity of a function of complex variable and their applications.

LO4: integration of a function of complex variable, and evaluation of certain real integrals using complex analysis.

UNIT-I (9+3)

Laplace Transforms: Integral transforms, Kernel of a transform, Laplace transform of a function, Inverse Transform-Existence and uniqueness of Laplace Transforms, S- plane and regionofconvergence(ROC),LaplaceTransformofsomecommonlyusedsignals-Dirac-delta (impulse) function $[\delta(t)]$,step $[u(t)]$,ramp $[tu(t)]$,parabolic $[t^2u(t)]$,real exponential $[e^{at}u(t)]$, complex exponential $[e^{j\Omega t}u(t)]$,sine and cosine functions, damped sine and cosine functions, hyperbolic sine and cosine functions, damped hyperbolic sine and cosine functions, rectangular pulse and triangle. Properties of Laplace Transforms- Linearity, First shifting theorem (Frequency shift property), Laplace transforms of derivatives and integrals, time scaling property, time reversal property, Laplace Transform of Heaviside unit step function, Second shifting theorem (time shift property), Initial value and final value theorems, Laplace transform of periodic functions- Convolution theorem

Operational Calculus: Transfer functions, Solution of ordinary differential equations with constant coefficients and system of ordinary differential equations with constant coefficients using Laplace Transforms. Application of Laplace transforms to the first order and second order system subjected to impulse, step, periodic, rectangular, square, ramp, triangular and sinusoidal functions

UNIT-II (9+3)

Fourier Series: Periodic functions, orthogonal and orthonormal functions and systems of orthogonal functions, representation of a function as Trigonometric Fourier series (FS) in a range of length 2π, Euler formulae, Conditions for the existence of Fourier series (Dirichlet's conditions), FS for typical wave forms-square wave, pulse train, impulse train(comb function), periodic rectangular wave, triangle, saw tooth, half wave rectified signal, full wave rectified signal, plotting FS coefficients - line spectrum (magnitude and Phase spectra), Fourier series on an arbitrary period, effects of symmetry of function on FS coefficients, half range series – half range cosine and sine series expansions, exponential FS

UNIT-III (9+3)

Complex Variables: Functions of complex variables, Limit, Continuity, Differentiability, Analytic Functions, Cauchy-Riemann Equations in Cartesian and Polar coordinates. Elementary functions, Harmonic Functions, Construction of Analytic functions. Applications to find velocity potential

and stream function of a flow. Conformal mapping and bilinear transformation

UNIT-IV (9+3)

Complex Integration: Line integration in complex plane, integral of a non analytic function, dependence on path of integration, *ML*-Inequality, Cauchy's integral theorem, Cauchy's integral formula, series expansion of complex functions: Taylor's series and Laurent's series, zeros and singularities, residues, Residue Theorem- Applications of Residue theorem to the properly chosen integrals around a unit circle and semicircle.

Text Book:

1. Grewal, B.S., "Higher Engineering Mathematics", *Khanna Publishers,* Delhi, 43/e, 2014

Reference Books:

1. Kreyszig E., "Advanced Engineering Mathematics", *John Wiley & Sons, Inc.,* U.K 9/e,2013
2.Churchill R.V., "Complex Variable and its Applications", McGraw Hill, New York, 9/e,2013

CourseCode: **U18MH301** Course Name: **ENGINEERING MATHEMATICS-III**		
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	**U18MH301.1**	*find the Laplace transform of a given function and apply Laplace transforms to solve and certain differential equations whose solutions cannot be computed using classical methods.*
CO2	**U18MH301.2**	*describe a given function as Fourier series in an interval and understand its importance in engineering.*
CO3	**U18MH301.3**	*understand the concept of a function of complex variable and verify whether a function is analytic or not, construct analytic function when real/imaginary part of the function is known; find velocity potential and stream function of a fluid flow using complex analytical methods.*
CO4	**U18MH301.4**	*represent a given function in Taylor's and Laurent's series and evaluate certain real integrals using integral theorems.*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

	Course code:**U18 MH301** Course Name: **Engineering Mathematics-III**														
CO Code	**PO1**	**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**
U18MH301.1	2	2	--	--	--	--	--	--	--	--	--	1	1	--	1
U18MH301.2	2	2	--	--	--	--	--	--	--	--	--	1	1	--	1
U18MH301.3	2	2	--	--	--	--	--	--	--	--	--	1	1	--	1
U18MH301.4	2	1	--	--	--	--	--	--	--	--	--	1	1	--	1
U18MH301	**2**	**1.75**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**--**	**1**

U18MH302 PROFESSIONALENGLISH

Class: B.TechIIISemester
Branch: Common to allbranches

Teaching Scheme

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation :	100 marks
EndSemester Exam :	-

Course Learning Objectives (LOs):

This course will develop the student's knowledge in/on

LO1: reading skill and sub skills to comprehend the text
LO2: vocabulary and using it appropriately to describe situations
LO3: using phrasal verbs in speech and writing
LO4: grammar and improve language ability to write effectively

Week	Topic Name
I	**I. Reading Comprehension-** Significance of ReadingSkimming **II. Verbal Ability-**Synonyms **III. Grammar-**Articles
II	**I. Reading Comprehension-**Scanning **II. Verbal Ability-**Antonyms **III. Grammar-**Articles
III	**I. Reading Comprehension-** CriticalReading **II. Verbal Ability-** Sentence completion with correct alternativeword/group **III. Grammar-**Prepositions
IV	**I. Reading Comprehension-** IntensiveReading **II. Verbal Ability-** Sentence completion with correct alternativeword/group **III. Grammar-** ReportedSpeech
V	**I. Reading Comprehension-** IntensiveReading **II. Verbal Ability-** JumbledSentences **III. Grammar-** ErrorDetection
VI	**I. Reading Comprehension-** InferentialReading **II. Verbal Ability-** JumbledSentences **III. Grammar-** ErrorDetection
VII	**I. Reading Comprehension-** LexicalReading **II. Verbal Ability-** PhrasalVerbs **III. Grammar-** Tenses,Structures
VIII	**I. Reading Comprehension-** Read toInterpret **II. Verbal Ability-** Single WordSubstitutes **III. Grammar-** Tenses,Uses
IX	**I. Reading Comprehension-** Read toAnalyze **II. Verbal Ability-**Collocations **III. Grammar-** Tenses,Uses
X	**I. Reading Comprehension-** Read toSummarize **II. Verbal Ability-**Spellings **III. Grammar,** Agreement between Subject & verb(concord)

Text Book:

1. Professional English *Manual prepared by the faculty of English, KITSW*
2. Arun Sharma & Meenakshi Upadhyay, " Verbal Ability and Reading Comprehension for CAT & Other Management Examinations",8thEdition *McGraw Hill Education (India) Private Ltd*, Chennai,2018

Reference Books:

1. Nishit K. Sinha, " Verbal Ability and Reading Comprehension for the CAT", 3rdEdition Pearson India Education Services Pvt. Ltd.,Chennai
2. Harper Collins, "Collins COBUILD English Grammar" Third Edition, *Harper Collins PublishersLtd*
3. Rosemary & Courtney, "Longman-English-Chinese Dictionary of PhrasalVerbs"

Course Outcomes (COs):

CourseCode:U18MH302/402		**Course Name: ProfessionalEnglish**
CO	**CO Code**	*Up on completion of this course, the students will be able to…*
CO1	**U18MH302.1**	analyze the passage using skill and sub skill to solve different types of questions related to reading comprehension
CO2	**U18MH302.2**	identify grammatical errors in the given sentences and correct them
CO3	**U18MH302.3**	select correct synonyms/antonyms/phrasal verbs and complete sentences with suitable words or phrases
CO4	**U18MH302.4**	keep the given jumbled sentences in proper sequence to make a coherent paragraph

Course Articulation Matrix (Mapping of COs with POs and PSOs):

CourseCode:U18MH302					**Course Name: ProfessionalEnglish**										
Course Outcomes	**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**	**PS 3**
U18MH302.1	-	-	-	-	-	-	-	-	1	2	-	1	1	1	1
U18MH302.2	-	-	-	-	-	-	-	-	1	2	-	1	1	1	1
U18MH302.3	-	-	-	-	-	-	-	-	1	2	-	1	1	1	1
U18MH302.4	-	-	-	-	-	-	-	-	1	2	-	1	1	1	1
U18MH302	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**-**	**1**	**1**	**1**	**1**

U18CS303 OBJECT ORIENTED PROGRAMMING THROUGHJAVA

Class: B. Tech III-Semester **Branch:** Computer Science and Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on…

LO1: the basic concepts of programming paradigms and java programming.

LO2: concepts of classes, methods and strings.

LO3: types of inheritance, interfaces.

LO4: concepts of packages, streams (I/O), exceptional handling and multithreading.

UNIT-I (9+3)

Programming paradigms: Procedural programming, Modular programming, Object oriented programming, Generic programming.

Java basics: History and evolution of Java, An overview of java, Data types, Variables and arrays, Operators, Control statements.

Introducing classes: Structures in C, Class fundamentals, Objects, Methods, Object reference variables

UNIT-II (9+3)

Classes and methods: Overloading methods, *this* keyword, Passing and returning objects, Recursion, Variable length arguments, Constructors, Overloading constructors, Garbage collection, *static* variables, *static* blocks and *static* methods, Nested and inner classes, Command line arguments, Wrapper classes

Strings: Exploring String, String Buffer, StringBuilder, and String Tokenizer classes

UNIT-III (9+3)

Inheritance: Inheritance basics, Types of inheritance, *super* keyword, Method overriding, Order of constructors calling, Dynamic method dispatch, Abstract classes, *final* with inheritance, Object class

Interfaces: Defining an interface, Implementing interfaces, Nested interfaces, Interfaces can be extended

UNIT-IV (9+3)

Packages: Packages, Access protection, Importing packages.

Using I/O: I/O basics, Reading, Writing and copying files using byte and character streams.

Exception handling: Fundamentals, Exception types, Uncaught exceptions, Using *try* and *catch*, Multiple catch clauses, Nested *try* statements, *throw*, *throws*, *finally*

Multithreading: Creating a thread, Creating multiple threads, Thread priorities, Synchronization, and interthread communication

Text Book:

1. Herbert Schildt, "Java The Complete Reference", *9th Edition*, *McGraw-Hill Education India Pvt. Ltd,* ISBN: 9781259002465,2014

Reference Books:

1. Kathy Sierra, Bert Bates, "Head First Java", *2nd Edition, O'Reilly Publications,* ISBN-13: 978-0596009205, 2013
2. Uttam K. Roy, "Advanced JAVA Programming", *1st edition*, *Oxford Publications;* ISBN- 13: 978-0199455508, 2013

CourseCode: **U18CS303** Course Name: **Object Oriented Programming Through Java**		
CO	**CO code**	*Upon completion of this course, the student will be able to…*
CO1	U18CS303.1	*distinguish various programming paradigms and implement java fundamental programs.*
CO2	U18CS303.2	*implement classes, constructors, and strings.*
CO3	U18CS303.3	*apply reusability concepts like inheritance, dynamic method dispatch, and interfaces.*
CO4	U18CS303.4	*implement packages, apply streams (I/O), exception handling, and multithreading.*

Mapping of the Course Learning Outcomes with Program Outcomes:

Course Code: U18CS303 **Course Name:** Object Oriented Programming through Java

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
U18CS303.1	1	1	1	1	-	-	-	-	-	1	-	-	1	1	2
U18CS303.2	2	2	2	1	-	-	-	-	-	1	-	2	2	1	3
U18CS303.3	2	2	2	1	-	-	-	-	-	1	-	2	2	1	3
U18CS303.4	2	2	2	1	-	-	-	-	-	1	-	2	2	1	3
U18CS303	1.75	1.75	1.75	1	-	-	-	-	-	1	-	2	1.75	1	2.75

U18MH304 DISCRETEMATHEMATICS

Class: B.Tech. III-Semester **Branch:** Common to CSE &IT branches

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: *necessary mathematical concepts that are prerequisite for computer related subjects namely database management systems, knowledge based systems and artificial intelligence.*

LO2 :*different types of logics namely first-order logic ,quantifier logic and predicator logic so as to gain knowledge of artificial intelligence.*

LO3: *elementary Combinations and permutations with repetitions, different methods of solving recurrence relations.*

LO4: *concepts and algorithms related various types of graphs, trees and applications to real life Problems.*

UNIT-I (9)

Foundation: Sets and operations on sets ,relations and functions, binary relations ,equivalence relations, partial order relations, Hasee diagram and lattices, transitive closure of a relation. paths and closures, digraphs, adjacency matrices of binary relations, Warshall algorithm

UNIT-II (9)

Fundamentals of Logic: Propositions and connectives, truth tables ,propositional functions, logical inferences, first order logic, predicate calculus and quantified logic, pigeonhole principle, mathematical induction

UNIT-III (9)

Elementary combinations and recurrence Relations: Basic concepts of permutations and combinations, enumeration with unlimited repetition and applications, enumeration with constrained repetitions and applications, principle of inclusion and exclusion

Generating function of sequences: Coefficients of generating function, recurrence relations and its applications, solutions of recurrence relations by method of substitution, characteristic roots and generating functions, solving non-linear recurrence relations

UNIT-IV (9)

Graphs: Basic concepts, isomorphism, sub graphs, trees and their properties, spanning trees, binary trees, planner graphs, Euler's formula, multi graphs and Eulerian circuits, Hamiltonian graphs, chromatic number, four color problem

Text Books:

1. J.L.Mott, A.Kandel and T.P.Baker – "Discrete Mathematics for Computer Scientists",*Prentice- Hall of India,* New Delhi, 2nd Edition, 1999.*(Chapter 1, 4, 2, 3,5).*

Reference Books:

1. J.P.Tremblay, R.Manohar,"Discrete Mathematical Structures with Applications to Computer Science", *MGH*, New York,1977
2. Zohar Manna, "Mathematical Theory of Computation", *MGH*, NewDelhi
3. C.L. Liu,"Elements of Discrete mathematics", *Tata Mc. Graw Hill*, 3rd edition,2008

Course Outcomes (COs):

Course Code: **U18MH304**		Course Name: **DISCRETEMATHEMATICS**
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	**U18MH304.1**	*explain the basic concepts of sets and relations and their applications to lattice problems, to determine all the possible paths available in directed paths*
CO2	**U18MH304.2**	*analyze the different types of logic in order to establish knowledge based systems, to*
CO3	**U18MH304.3**	*solve different type of enumeration problems and apply to real life problems .*
CO4	**U18MH304.4**	*solve different problems like Koenig's Berge seven bridges, using Euler graphs and find the chromatic number of the different graphs.*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

CO Code	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
U18MH304.1	2	2	--	--	--	--	--	--	--	--	--	1	1	1	1
U18MH304.2	2	2	--	--	--	--	--	--	--	--	--	1	1	1	1
U18MH304.3	2	2	--	--	--	--	--	--	--	--	--	1	1	1	1
U18MH304.4	2	2	--	--	--	--	--	--	--	--	--	1	1	1	1
U18MH304	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**1**	**1**

U18CS305 COMPUTER ARCHITECTURE AND ORGANIZATION

Class: B.Tech. III-Semester **Branch:** Computer Science & Engineering

Teaching Scheme: **Examination Scheme:**

L	T	P	C			
3	-	-	3		Continuous Internal Examination	40 marks
					End Semester Examination	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1: basic structure of a computer, principle components and instruction set architecture.
LO2: working of processing unit and computation of arithmetic operations.
LO3: various types of memories and data transfer among memory, processor & I/O.
LO4: architecture and operation of high performance computing systems.

UNIT-I (9)

Basic structure of computers: Functional units, Basic operational concepts, Performance.
Instruction set architecture: Memory locations and addresses, Memory operations, Instructions and instruction sequencing, Instruction formats, Addressing modes, Assembly language-Assembler directives

UNIT-II (9)

Basic processing unit: Fundamental concepts, Instruction execution, Hardware components, Instruction fetch and execution steps, Control signals, Hard-wired control, CISC-style processors.
Arithmetic: Addition and subtraction of signed numbers, Multiplication of unsigned numbers, Multiplication of signed numbers, Fast multiplication, Integer division, Floating-point numbers and operations

UNIT-III (9)

The memory system: Basic concepts, Semiconductor RAM memories-Internal organization of memory chips, Static memories, Dynamic RAMs, Read-only memories, Memory hierarchy, Cache memories, Performance considerations, Secondary storage
Input-output organization: Input-output interface- I/O bus and interface modules, I/O versus memory bus, Isolated versus memory-mapped I/O, Asynchronous data transfer- Strobe control, Handshaking, Asynchronous serialtransfer

UNIT-IV (9)

Modes of transfer: Modes of transfer, Priority interrupt, Direct memory access, Interconnection standards.
Pipeline and vector processing: Parallel processing, Pipelining, Arithmetic pipeline, Instruction pipeline, Vector processing.
Multi processors: Characteristics of multiprocessors, Interconnection structures.

Text Books:

a. Carl Hamacher, ZvonkoVranesic, SafwatZaky, NaraigManjikian, "Computer Organization and Embedded Systems", *McGraw-Hill Education*, 6thEdition, ISBN: 978-0- 07-338065-0, 2012.*(ChapterNos.1,2,5,7-9)*

b. M. Morris Mano, "Computer System Architecture", Revised Third Edition, Pearson Education, ISBN: 978- 93-325-8560-7, 2019. *(ChapterNos.9,10,11,12,14)*

Reference Books:

1. B Ram, Sanjay Kumar, "Computer Fundamentals: Architecture and Organization", *New Age International Publishers*, 5thEdition, ISBN: 978-81-224-3610-5,2018
2. W. Stallings, "Computer Organization and Architecture - Designing for Performance", 7th Edition, Pearson Education, ISBN 978-81-7758-993-1,2009

Course Code: **U18CS305** Course Name: **Computer Architecture And Organization**		
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	U18CS305.1	*identify functional units of a computer, explain addressing modes and instruction formats.*
CO2	U18CS305.2	*write control sequence for execution of an instruction, explain hardwired and microprogrammed control and perform arithmetic operations with signed and unsigned integers.*
CO3	U18CS305.3	*design memory organization and explain data transfer among memory, processor & I/O .*
CO4	U18CS305.4	*analyze different modes of data transfer and explain the concepts of parallel processing, pipelining for high performance computing systems.*

Course Articulation Matrix (Mapping of Cos with POs & PSOs):

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
U18CS305.1	2	2	2	1	-	1	-	-	-	-	-	1	1	2	2
U18CS305.2	2	2	2	1	-	1	-	-	-	-	-	1	1	2	2
U18CS305.3	2	2	2	1	-	1	-	-	-	-	-	1	1	2	2
U18CS305.4	2	2	1	1	-	1	-	-	-	-	-	1	1	2	2
U18CS305	**2**	**2**	**1.75**	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**2**	**2**

U18CS306 ADVANCED DATA STRUCTURES

Class: B. Tech III-Semester **Branch:** Computer Science & Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Learning Objectives(LOs):

This course will develop student's knowledge in/on

LO1: representing the data with circular single linked list and double linked list.
LO2: organizing and retrieving the data using binary search trees and AVL trees.
LO3: maintaining balanced search tress with B-trees, B+-trees and Splay trees.
LO4: concepts of spanning trees, searching, sorting and hashing.

UNIT – I (9)

Stacks and Queues Extended: Multiple stacks, Deques, Priority queues.

Linked Lists: Circular linked lists, doubly linked lists, circular doubly linked list and its operations (Insertion, Deletion, Searching, and Traversal)

UNIT – II (9)

Binary Tree : Construction of binary tree using tree traversal results, Applications of trees.

Binary Search Tree: Binary search tree operations- Insertion, Deletion, Search, Recursive and Non-recursive traversals, Threaded binary trees

AVL Trees: AVL trees operations –Insertion, Deletion and Traversal

UNIT - III (9)

Multiway Search Trees: Introduction to m-way search trees, Operations on B-Trees (Insertion, Deletion, Search), Introduction to B+-trees

Red-Black Trees: Properties, Operations, Applications, Splay trees

UNIT – IV (9)

Minimum Spanning Trees: Prim's algorithm, Kruskal's algorithm

Searching and Internal Sorting: Fibonacci search, Insertion sort, Radix sort. **External sorting:** Merge sort, Heap sort

Hashing: Introduction, Hash tables, Different hash functions, Collisions.

Text Book:

1. DebasisSamanta, "Classic Data Structures", *Prentice Hall India*, 2nd Edn., ISBN-13: 978-81- 203-3731-2,2009.
2. Reema Thareja, "Data Structures Using C", *Oxford University Press*, 2nd Edn., ISBN-13: 978-0- 19-809930-7,2014

Reference Books:

1.E. Balagurusamy, "Data Structure Using C", *McGraw Hill Education*, 1st Edn., ISBN-13: 978-125-902-9547, 2017

2.Richard F. Gilberg and Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", *Cengage Learning*, 2nd Edn., ISBN-13: 9788131503140, 2007

Course Code: **U18CS306** Course Name: **Advanced Data Structures**		
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	U18CS306.1	*implement programs using circular single linked list and double linked list.*
CO2	U18CS306.2	*represent the data with non linear data structure using binary trees, binary search trees and AVL trees.*
CO3	U18CS306.3	*analyze balanced search trees such as B-trees, B+-trees and Splay trees.*
CO4	U18CS306.4	*organize and retrieve the data using minimum spanning trees, searching, sorting and hashing techniques*

Mapping of the Course Learning Outcomes with Program Outcomes:

CO/PO	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
U18CS306.1	2	2	2	2	-	-	-	-	-	1	-	1	2	2	2
U18CS306.2	2	2	2	2	-	-	-	-	-	1	-	1	2	2	2
U18CS306.3	2	3	3	2	-	-	-	-	-	1	-	2	2	2	2
U18CS306.4	2	2	3	2	-	-	-	-	-	1	-	1	2	2	2
U18CS306	2	2.25	2.5	2	-	-	-	-	-	1	-	1.25	2	2	2

U18EI309 DIGITAL ELECTRONICS

Class: B.Tech. III-Semester **Branch:** Computer Science &Engineering

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on…

LO1: *switching algebra and various minimization techniques of switching functions*
LO2: *various combinational circuits and their applications*
LO3: *types of flip flops and their use in the design of sequential circuits*
LO4: *finite state machines and their minimization*

UNIT – I (9)

Number Systems and Codes: Representation of number systems, conversion of numbers from one radix to other, Binary arithmetic, r's and (r-1)'s complements, 1's and 2's complement subtraction, Binary weighted and non-weighted codes – BCD, Self complementing, Excess-3 and GrayCodes

Boolean Algebra and Minimization: Postulates and theorems; logic gates –symbols and truth tables, realization of switching functions - AOI, NAND-NAND and NOR-NOR realizations; minimization of switching functions - using theorems, standard SOP & POS forms, Karnaugh map and Quine - McClusky techniques

UNIT – II (9)

Combinational circuits: Design of combinational circuits using logic gates – Half adder, Full adder, Half subtractor, Full subtractor, Parallel adder, Serial adder, Carry look ahead adder, BCD adder and 1's & 2's complement adder/subtractors; Decoders - BCD to 7 segment, BCD to Decimal; Encoders, Priority encoders; Multiplexers, Demultiplexers, Realization of switching functions using Multiplexers and Decoders

UNIT – III (9)

Sequential circuits: NAND RS latch, NOR RS latch; Flip flops- SR, JK, D and T, preset and clear inputs, truth tables, excitation tables , race around condition, Master slave flip flop, conversion of one flip flop to other; Binary counters – ripple and synchronous counters; Shift registers – modes of operation, Ring and Johnson counters

Synchronous sequential circuits: State table, state diagram, state assignment, design of synchronous binary counters

UNIT – IV (9)

Finite State Machines: Capabilities and limitations of Finite State Machines , state equivalence, state minimization of completely specified machines using Partition technique, state minimization of incompletely specified machines using Merger graphs and Merger tables

Text Books:

1 Zvi. Kohavi, "Switching and Finite Automata Theory", *Tata McGraw-Hill,* 2nd edn., 2008, New Delhi. (Chapter 3,4,5 and 9)

2 Moris Mano," Digital Design", *PHI* , 3rd edn., 2003, New Delhi. (Chapters 2 to 6)

Reference Books:

1 R.P. Jain, "Modern Digital Electronics", *Tata McGraw-Hill,* 3rd edn., 2003, New Delhi.

2 A.Anand Kumar, "Switching Theory and Logic Design", *PHI* ,1st edn., 2013, New Delhi. (Reprint)

3 Herbert Taub and Donald Schilling, "Digital Integrated Circuits", *Tata McGraw-Hill* 2008, New Delhi.

Course Code: **U18EI309**		Course Name: **Digital Electronics**
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	U18CS309.1	*apply various minimization techniques to obtain minimal SOP/POS forms of switching functions*
CO2	U18CS309.2	*design different combinational circuits to implement logic functions*
CO3	U18CS309.3	*explain the operation of flip flops and design sequential circuits like counters, shift registers*
CO4	U18CS309.4	*minimize completely and incompletely specified state machines using partition and merger graph/table methods*

Mapping of the Course Learning Outcomes with Program Outcomes:

CO/PO	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
U18EI309.1	2	2	-	1	1	-	-	-	-	-	-	1	1	1	1
U18EI309.2	2	2	2	1	1	-	-	-	-	-	-	1	1	1	1
U18EI309.3	2	2	2	1	1	-	-	-	-	-	-	1	1	1	1
U18EI309.4	2	2	2	1	1	-	-	-	-	-	-	1	1	1	1
U18EI309	2	2	2	1	1	-	-	-	-	-	-	1	1	1	1

U18CS310 OBJECT ORIENTED PROGRAMMING THROUGH JAVALABORATORY

Class: B. Tech III-Semester **Branch:** Computer Science & Engineering

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on…

LO1: The basic concepts of java programming and difference from procedural programming approach to object oriented programming approach.

LO2: building fundamental java programs related to classes, methods and strings.

LO3: designing java programs effectively with the help of inheritance and interfaces concepts.

LO4: packages, I/O, exceptional handling and multithread programming using java.

List of Experiments

UNIT-I

Experiment-I:

1. Write a program to demonstrate different operators in java.
2. Write a program to demonstrate control structures.
3. Write a program to demonstrate *switch* statement.

Experiment-II:

1. Write a program to read an array and display them using *for-each* control. Finally display the sum of array elements.
2. Writeaprogramtoreadamatrixanddisplaywhetheritisanidentitymatrixornot.Use *civilized form* of *break* statement.
3. Write a program to define a two dimensional (2D) array where each row contains different number of columns. Display the 2D-array using *for-each*.

UNIT-II

Experiment-III:

1. Write a program to demonstrate class concept.
2. Write a program to demonstrate object reference variable.
3. Write a program to demonstrate overloading of methods.
4. Write a program to demonstrate passing and returning objects.

Experiment-IV:

1. Write a program to demonstrate variable length argument (using array and ellipsis notation).
2. Write a program to demonstrate constructors and garbage collection.
3. Write a program to demonstrate nested and inner classes.
4. Write a program to demonstrate *static* variables, *static* methods, and *static* blocks.

Experiment-V:

1. Read at least five strings from command line argument and display them in sorted order.
2. Write a program to demonstrate wrapper class by reading N number of integers from command line and display their sum.
3. Write a program to demonstrate wrapper class by reading N floating point numbers from command line and display their average.

Experiment-VI:

1. Write a program to accept a string, count number of vowels and remove all vowels.
2. Write a program to accept a string, count number of vowels and remove all vowels using *String Buffer* class.
3. Write a program to accept a line of text, tokenize the line using *String Tokenizer* class and print the tokens in reverse order.

UNIT-III

Experiment-VII:

1. Write a program to demonstrate single level-inheritance.
2. Write a program to demonstrate multilevel-inheritance using super.
3. Write a program to demonstrate method overriding.

Experiment-VIII:

1. Write program to demonstrate dynamic method dispatch.
2. Write a program to demonstrate use of abstract class.
3. Write a program to demonstrate the use of overriding *equals()* method of an Object class.

Experiment-IX:

1. Write a program to implement interfaces.
2. Write a program to demonstrate implementation of nested interfaces.

UNIT-IV

Experiment-X:

1. Write a program to create a *package*, and demonstrate to import the *package* into any java program (Consider the behavior of all access specifiers).

Experiment-XI:

1. Write a program to demonstrate *try-catch* block.
2. Write a program to demonstrate *throws* clause.
3. Write a program to demonstrate *re-throw* an exception, and *finally* block.

Experiment-XII:

1. Write a program to demonstrate read/write/copy a file using *by testream*.
2. Write a program to demonstrate read/write/copy a file using *characterstream*.
3. Write a program to create a thread (using *Thread* class or *Runnable* interface).
4. Write a program to demonstrate *synchronization* of threads.
5. Write a program to demonstrate *Interthread communication*.

Text Book:

1. Herbert Schildt, "JAVA The Complete Reference", *9th Edition*, *McGraw-Hill Education India Pvt. Ltd,* ISBN: 9781259002465,2011.

Reference Books:

1. Kathy Sierra, Bert Bates, "Head First Java", *2nd Edition, O'Reilly Publications,* ISBN- 13: 978-0596009205, 2013.
2. Uttam K. Roy, "Advanced JAVA Programming", *1st edition*, *Oxford Publications;* ISBN- 13: 978-0199455508, 2013.

Course Code: U18CS310 Course Name: Object Oriented Programming through Java Laboratory		
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	U18CS310.1	*implement java fundamental programs.*
CO2	U18CS310.2	*implement classes, constructors, and strings.*
CO3	U18CS310.3	*apply reusability concepts like inheritance, dynamic method dispatch, and interfaces.*
CO4	U18CS310.4	*implement packages, apply streams (I/O), exception handling, and multithreading.*

Mapping of the Course Learning Outcomes with Program Outcomes:

CO/PO	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
U18CS310.1	2	2	2	1	-	-	-	-	-	1	-	-	2	2	2
U18CS310.2	2	2	2	1	-	-	-	-	-	1	-	2	2	2	3
U18CS310.3	2	2	2	1	-	-	-	-	-	1	-	2	2	2	3
U18CS310.4	2	2	2	1	-	-	-	-	-	1	-	2	2	2	3
U18CS310	2	2	2	1	-	-	-	-	-	1	-	2	2	2	2.75

U18CS311 ADVANCED DATA STRUCTURES LABORATORY

Class: B. Tech III-Semester **Branch:** Computer Science & Engineering

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on

LO1*: represent the data using multi stack, circular single linked list, double linked list, list and circular double linked list.*

LO2*: non linear data structures binary search trees and AVL trees.*

LO3*: balanced search trees like B-trees and graph traversal methods.*

LO4*: concepts of searching and sorting.*

List of Experiments

Experiment-I

1. Program to implement multi stack.

Experiment-II

1. Program to create circular single linked list and implement its operations
   i) insert ii) delete iii)traversal

Experiment-III

1. Program to create double linked list and implement its operations
   i) insert ii) delete iii)traversal

2. Program to create circular double linked list and implement its operations
   i) insert ii) delete iii)traversal

Experiment-IV

1. Program to perform following binary search tree operations.
   i) creation ii) insertion of a node iii) traversal using recursion.

Experiment-V

1. Program to perform following binary search tree operations.
   i) creation ii) deletion of a node iii) traversal using recursion.

Experiment-VI

2. Program to create a binary search tree operations
   i) creation ii) insertion of a node iii) traversal using non-recursion.

Experiment-VII

1. Program to implement AVL tree construction.

Experiment-VIII

1. Program to implement B-tree construction (degree 3).

Experiment-IX

1. Program to implement the following graph traversal techniques.
   a) Depth first search b) Breadth firstsearch.

Experiment-X

1. Program to implement Fibonacci search.
2. Program to implement insertionsort.

Experiment-XI

1. Program to implement Mergesort.
2. Program to implement radixsort

Experiment-XII

1. Program to implement heap sort.

Laboratory Manual:

1. 'Advanced Data Structures' laboratory manual, *prepared by faculty of Dept. of Computer Science&Engineering.*

Reference Books:

1. Reema Thareja, "Data Structures Using C", *Oxford University Press*, 2nd Edn., ISBN-13: 978-0- 19-809930-7,2014.
2. E Balagurusamy, "Data Structure Using C", *McGraw Hill Education*, 1st Edn., ISBN-13: 978- 125-902-9547, 2017.

Course Code: U18CS311		Course Name: **Advanced Data Structures Laboratory**
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	U18CS311.1	*implement Multistack and different linked lists.*
CO2	U18CS311.2	*perform operations on binary search trees and AVL trees.*
CO3	U18CS311.3	*implement various operations on B-trees and graph traversal techniques.*
CO4	U18CS311.4	*apply the different methods on graph traversal, searching and sorting.*

Mapping of the Course Learning Outcomes with Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
U18CS311.1	1	1	3	1	1	1	1	1	1	1	0	2	2	2	2
U18CS311.2	1	1	2	2	1	1	1	1	-	1	-	2	2	2	2
U18CS311.3	1	1	3	3	2	1	1	1	-	1	-	3	2	2	2
U18CS311.4	1	1	3	2	3	2	2	2	-	2	-	3	2	2	2
U18CS311	**1**	**1**	**2.75**	**2**	**1.75**	**1.25**	**1.25**	**1.25**	**1**	**1.25**	**0**	**2.5**	**2**	**2**	**2**

U18MH315 ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

Class : **B.Tech. IIISemester** Branch : **Common to all branches**

Teaching Scheme:

L	T	P	C
2	-	-	-

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Examination	60 Marks

Course Learning Objectives (Los):
This course will develop the student's knowledge in/on
LO1: *basic structure of Indian knowledge system*
LO2: *Indian perspective of modern science*
LO3: *basic principles of yoga and holistic health care*
LO4: *benefits of yoga practice*

Unit – I(6)

Basic Structure of Indian Knowledge System: Introduction, Vedas – Origin, Classification, Structure, Rig Veda, Sama Veda, Yajur Veda, Atharva Veda; Upavedas – Dhanurveda, Sthapatveda, Gandharvaveda, Ayurveda; Vedang – Shiksha, Chanda, Vyakarna, Nirukta, Kalpa, Jyothisha; Upanga – Dharmashastra, Mimamsa, Tarkashastra,Purana

Unit – II (6)

Modern Science and Indian Knowledge System: Introduction – Vedas as Basis for Modern Science – Architectural Developments – Medicine and its relevance – Mathematical Sciences in Vedas – Space and Military related developments – Chemical Sciences

Unit – III (6)

Yoga and Holistic Health Care: Healthy mind in healthy body – Yoga: Definition, types; Yoga to keep fit: Diet, Yoga Asanas – Fundamentals; Breathing techniques in Patanjali Yogatradition – Pranayama; chakras; meditation; Benefits of Yoga – Physical Health, Emotional Health, Prevention of Disease, Reducing or Alleviating Symptoms of Problems

Unit – IV (6)

Case studies – Yoga Practice: Yoga as an effective tool for management of human crisis – Depression, Self – Concept & Mental health, Yoga for stress management; Yoga: A way to cure for Insomnia

Requisite: Yoga practice sessions are to be conducted for all the students taking this course by the time they complete Unit 1 and Unit 2

Text Books :

1. Sathish Chandra Chaterjee, Dhirendramohan Datta, "An Introduction to Indian Philosophy", Rupa Publications Pvt. Ltd. New Delhi. (Chapter 2,3)
2. Priyadaranjan Ray, S.N. Sen, "The Cultural Heritage of India", Vol. 6, Science and Technology, The Ramakrishna Mission Institute of Culture,Calcutta
3. Yoga Sutra of Patanjali, Ramakrishna Mission,Kolkatta

4. RN Jha, Science of Consciousness Psychotherapy and Yoga Practices, VidyanidhiPrakasham Delhi, 2016 (Chapter 4, 5, 6, 7,8)

Reference Book:

1. Swami Jitatmananda, "Holistic Science and Vedanta", Bharatiya Vidya Bhavan Bombay. (Chapter 2, 3)

Course Outcomes (COs):

Course Code: **U18MH315/U18MH415** Course Name: **Essence OfIndian Traditional Knowledge**		
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	U18MH315.1	*summarize the basic structure of Vedas, Upavedas, Vedanga, Upanga*
CO2	U18MH315.2	*explain Vedas as principal source of knowledge for scientific inventions*
CO3	U18MH315.3	*describe different yogasanas, breathing techniques, chakras, meditation and their benefits*
CO4	U18MH315.4	*discuss the benefits of yoga as an effective tool for management of human crisis*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Coursecode: **U18MH315** Course Name: **Essence OfIndianTraditional Knowledge**															
CO Code	**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**
U18MH315.1	-	-	-	-	-	1	-	2	1	1	-	-	-	-	-
U18MH315.2	-	-	-	-	-	1	1	2	1	1	-	-	-	-	-
U18MH315.3	-	-	-	-	-	1	-	2	2	1	-	2	-	-	-
U18MH315.4	-	-	-	-	-	1	1	2	2	1	-	2	-	-	-
U18MH315	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**2**	**1.5**	**1**	**-**	**2**	**-**	**-**	**-**

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
KAKATIYA INSTITUTE OF TECHNOLOGY &SCIENCE:: WARANGAL – 15
(An Autonomous Institute under Kakatiya University, Warangal)

SCHEME OF INSTRUCTION & EVALUATION

IV SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAM

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	OE	U18OE401	Open Elective-II	3	1	-	4	10	30	40	60	100
2	HSMC	U18TP402	Soft and Inter Personal Skills	-	-	2	1	100	-	100	-	100
3	OE	U18OE403	Open Elective-I	3	-	-	3	10	30	40	60	100
4	PCC	U18CS404	Theory of Computation	3	-	-	3	10	30	40	60	100
5	PCC	U18CS405	Database Management Systems	3	1	-	4	10	30	40	60	100
6	PCC	U18CS406	Operating Systems	3	-	-	3	10	30	40	60	100
7	PCC	U18CS407	Database Management Systems Lab	-	-	2	1	40	-	40	60	100
8	PCC	U18CS408	Operating Systems Lab	-	-	2	1	40	-	40	60	100
9	OE	U18OE411	Open Elective-I based lab	_	_	2	1	40	-	40	60	100
			Total:	17	2	8	21	280	180	460	540	1000
10	MC	U18CH416	Environmental Studies*	2	_	_	_	10	30	40	60	100

L= Lecture, T = Tutorials, P = Practicals& C=Credits]

Open Elective-I: U18OE403A: Object Oriented Programming (CSE) U18OE403B: Fluid Mechanics & Hydraulic Machines (CE) U18OE403C: Mechatronics (ME) U18OE403D: Web Programming (IT) U18OE403E: Microprocessors (ECE) U18OE403F: Strength of Materials (ME)	**Open Elective-II:** U18OE401A: Applicable Mathematics (MH) U18OE401B: Basic Electronics Engineering (ECE) U18OE401C: Elements of Mechanical Engineering (ME) U18OE401D: Measurements & Instrumentation (EIE) U18OE401E: Fundamentals of Computer Networks (IT) U18OE401F: Renewable Energy Sources (EEE)	**Open Elective-I based Lab:** U18OE411A: Object Oriented Programming Lab (CSE) U18OE411B: Fluid Mechanics & Hydraulic Machines Lab (CE) U18OE411C: Mechatronics Lab (ME) U18OE411D: Web Programming Lab (IT) U18OE411E: Microprocessors Lab (ECE) U18OE411F: Strength of Materials Lab (CE)

U18OE401A APPLICABLEMATHEMATICS

Class: B.Tech. IV-Semester **Branch:** Common to all branches

Teaching Scheme : **Examination Scheme:**

L	T	P	C
3	1	-	4

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in /on
LO1*: application of Fourier series to solve wave equation, heat conduction equation and Laplace equation*
LO2**:** *the methods of fitting curves by the method of least squares, statistical methods and probability distributions with applications to engineering disciplines.*
LO3**:** *finite difference operators; the concept of interpolation and numerical integration.*
LO4**:** *numerical methods and application to find numerical solutions of differential equations.*

UNIT-I (9+3)

Applications of Partial Differential Equations: Basic concepts of partial differential equations, classification of second order partial differential equations, solution of a partial differential equation, solution through the method of separation of variables.
Vibrating String: Wave equation and its solution by the method of separation of variables, D'Alembert's solution of wave equation, solutions of various boundary value problems based on vibrating string.
One Dimensional Heat Flow: Transient heat flow equation, heat flow through a bar of finite length with homogeneous and non homogeneous boundary conditions, heat flow through a bar with insulated ends.
Two Dimensional Heat Flow: Equation of two dimensional heat flow (Laplace's equation) under steady state / the electrostatic potential of electrical charges in any region that is free of these charges (problems based on Trigonometric FS only),solution of Laplace's equation in Cartesian and polar form, heat flow through infinite rectangular plates, finite square plate and semi circular and circular plates.

UNIT-II (9+3)

Statistics: Statistical data: Review of measures of central tendency and measures of dispersion, correlation coefficient, rank correlation, regression – Linear regression equations.
Curve Fitting: Method of least squares –fitting of (i) Straight line (ii) Second degree parabola
(iii) Exponential curves, most plausible solution of a system of linear algebraicequations.
Probability: Review of the concepts of probability, random variables, Discrete and continuous probability distributions, mean and variance of a distribution, Binomial distribution, Poisson distribution, and Normal distribution, fitting of these probability distributions to the given data.

UNIT-III (9+3)

Numerical Analysis: Finite differences and difference operators.
Interpolation: Newton's forward and backward interpolation formulae. Lagrange interpolation
Numerical Differentiation: First and second derivatives using forward and backward interpolation polynomials at the tabulated points.
Numerical Integration: Gaussian quadrature formula, Trapezoidal rule, Simpson's $1/3^{rd}$rule and Simpson's $3/8^{th}$rule.

UNIT-IV (9+3)

Solution to System of Linear Equations: Gaussian elimination method, Jacobi Method and Guass-Siedel Iteration Method.

Numerical Solution of Algebraic and Transcendental Equations: Bisection method, Regula-Falsi method and Newton Raphson's method.
Numerical Solution of Ordinary Differential Equations: Taylor's method, Picard's method, Euler's method and Runge - Kutta methods of second and fourth order**.**

Text Book:

1. Grewal, B.S., "Higher Engineering Mathematics", *Khanna Publishers,* Delhi, 43/e,2014.

Reference Books:

1. Gupta and Kapoor, "Fundamentals of Mathematical Statistics", *Sulthan Chand and & sons,* New Delhi, 11thedition, 2010.
2. KreyszigE.,"AdvancedEngineeringMathematics",*JohnWiley&sons,Inc.,U.K.,*9th edition,2013.
3. Sastry S.S, "Introduction to numerical Analysis", *Prentice Hall of India Private Limited*, New Delhi.4thedition,2005.

Course Outcomes (COs):

CourseCode: **U18OE401A** Course Name: **APPLICABLEMATHEMATICS**		
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	**U18OE401A.1**	*solve wave equation, heat conduction equation and Laplace equation using Fourier series*
CO2	**U18OE401A.2**	*find correlation regression coefficients, fit curves using method of least squares for given data and apply theoretical probability distributions in decision making*
CO3	**U18OE401A.3**	*estimate value of a function by applying interpolation formulae*
CO4	**U18OE401A.4**	*apply numerical methods to solve simultaneous algebraic equations, differential equations, find roots of algebraic and transcendental equations*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course code: **U18OE401A**															
CO Code	**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**
U18OE401A.1	2	2	--	--	--	--	--	--	--	--	--	1	2	2	2
U18OE401A.2	2	2	--	--	--	--	--	--	--	--	--	1	2	2	2
U18OE401A.3	2	2	--	--	--	--	--	--	--	--	--	1	2	2	2
U18OE401A.4	2	2	--	--	--	--	--	--	--	--	--	1	2	2	2
U18OE401A	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**2**	**2**

U18OE401B BASIC ELECTRONICSENGINEERING

Class: B.Tech.IV Semester

Branch: Common to all branches

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives:

This course will develop student's knowledge on/in…

LO1: t*o introduce the basic concepts of semiconductors and conductivity in semiconductors*

LO2: t*o impart the knowledge on working of semiconductor diode as Rectifier*

LO3: t*o make the students to understand the basic concepts of BJT &DC biasing concepts*

LO4: t*o introduce the fundamental concepts and basic principles of special semiconductor devices.*

UNIT-I(9+3)

Introduction to Electronics:

Analog Signals (DC & AC), Sources (DC & AC), Digital Signals

Semiconductors:

Energy bands in solids, Concept of forbidden gap, Insulator, Metals and Semiconductors, Transport phenomenon in semiconductors: Mobility and conductivity, Intrinsic semiconductor, Donor and Acceptor impurities, Fermi level, Drift currents and Diffusion currents, Temperature dependence of conductivity, Hall Effect

UNIT-II(9+3)

Semiconductor Diode:

Junction, Band diagram, Depletion layer, V-I characteristics of P-N Diode, Diode resistance and capacitance, Avalanche and Zener breakdown mechanisms

Diode Circuits:

Rectifier circuits – Half wave, Full wave & Bridge rectifiers, Ripple factor with and without filters, Voltage regulation using Zener diode, Block diagram of DC adapter.

UNIT-III(9+3)

Bipolar Junction Transistor:

Physical structure, Transistor current components, CE, CB & CC configurations and their Input & Output characteristics

DC Analysis of BJT Circuits:

DC load line, Need for biasing, Transistor biasing techniques for CE configuration, Basic transistor applications: Switch and Amplifier.

UNIT-IV(9+3)

Field Effect Transistor:

Physical **s**tructure, Operation and Characteristics of a Junction Field Effect Transistor (JFET), MOSFET, DMOSFET,EMOSFET.

Special Semiconductor Devices:

Operation and Characteristics- Tunnel Diode, Schottky diode, Photo Diode, Photo Transistor, PIN Diode, LED, LASER, UJT.

Text Books:

1. Bhargava and Kulashresta, "Basic Electronics and Linear Circuits", *TTTI, TMH,India*.
2. S.Salivahanan and N.Suresh Kumar, "Electronic Devices and Circuits", *Tata McGraw Hill Education (India) Private* Ltd, 2nd Edition,2009.

Reference Books:

1. Jacob Millman, Christos C Halkias, "Electronic Devices and Circuits", 3/e, *TMH,*India.
2. David.A.Bell, "Electronic Devices and Circuits", *Oxford University Press,* New Delhi, India.
3. Neil storey, "Electronics: A systems Approach", *4/e-Pearson Education Publishing company Pvt. Ltd*,India

Course Outcomes (COs)

CourseCode:**U18EC401B**		Course Name: **BASIC ELECTRONICSENGINEERING**
CO	**CO Code**	Upon completion of this course, the student will be able to..
CO1	**U18EC401B.1**	*Analyze the behavior of semiconductor devices*
CO2	**U18EC401B.2**	*Design half wave and full wave rectifier circuits with filters*
CO3	**U18EC401B.3**	*Characterize BJT configurations with input output characteristics and biasing techniques*
CO4	**U18EC401B.4**	*Acquire knowledge of new emerging areas of science and technology in differentiating semiconductor devices..*

Course Articulation Matrix (Mapping of COs with POs and PSOs)

CourseCode:**U18EC401B**	Course Name: **BASIC ELECTRONICSENGINEERING**														
CO Code	**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**
U18EC401B.1	2	2	1	2	-	-	-	-	-	-	-	-	2	-	1
U18EC401B.2	2	2	2	2	-	-	-	-	-	-	-	-	-	-	-
U18EC401B.3	2	2	2	2	-	-	-	-	-	-	-	-	-	-	-
U18EC401B.4	2	2	1	2	-	-	-	-	-	-	-	2	2	-	1
U18EC401B	**2**	**2**	**1.5**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**-**	**1**

U18OE401C ELEMENTS OF MECHANICALENGINEERING

Class: B.Tech., IV-Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on
LO1*: types of materials, design methodology and elements of power transmission*
LO2: *different manufacturing processes and their applications.*
LO3: *laws of thermodynamics and types of systems*
LO4: *principle and applications of SI & CI engines.*

UNIT- I (12)

Engineering Materials: Classification, properties and applications
Design Criterion: Discrete steps in engineering design process
Power Transmission: Classification; flat belt drives - length of open and cross belts, belt tensions and power transmitted; Gears-types and applications; spur gear-nomenclature
Bearings: Types – sliding& rolling contact bearings and applications;

UNIT- II (12)

Manufacturing Processes: Classification; Foundry- steps in sand casting process; pattern-types, materials and allowances, mould cross section, moulding sand-composition and properties; Machining: lathe machine-line diagram and operations; Welding-classification; principle of arc welding- AC and DC welding, principle of gas welding, principle of brazing and soldering;
Metal forming process: forging, rolling, extrusion.

UNIT- III (12)

Thermodynamics: System-types, state, property, process and cycle; Energy-property; Zeroth law, thermodynamic equilibrium, laws of perfect gases.
Law of Thermodynamics: First law- applied to a cycle, change of state, Internal energy, Enthalpy; Work and Heat in closed systems- Isobaric, Isochoric, Isothermal, Adiabatic and Polytropic; PMM-I, limitations of first law of thermodynamics.

UNIT- IV (12)

Second Law of Thermodynamics: Kelvin-Planck and Clausius Statements and their equivalence; Carnot cycle, Carnot theorem, heat engine, heat pump and refrigerator; working principle of domestic air conditioner-line diagram.
IC Engines: Classification; working principle of four and two stroke SI and CI engines.

Text Book:

1. Mathur, Mehta and Tiwari, "Elements of Mechanical Engineering", *Jain Brothers*, New Delhi,2017.

Reference Books:

1. Hazra Chowdary. S. K and Bose, "Basic Mechanical Engineering", *Media Promoters and Publishers Pvt. Ltd,* India,2010.
2. P. K. Nag, "Engineering Thermodynamics", *Tata McGraw Hill*, New Delhi.
3. Hazra Chowdary. S. K and Bose, "Workshop Technology, Vol. I & II", *Media Promoters and publishers Pvt Ltd,* India.

Course Outcomes (COs):

Course Code:**U18OE401C**		Course Name: **Elements of Mechanical Engineering**
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	**U18OE401C.1**	*explain mechanical properties of an engineering materials and learn the steps in design methodology.*
CO2	**U18OE401C.2**	*describe the principles of manufacturing processes*
CO3	**U18OE401C.3**	*apply first law of thermodynamics to various processes to calculate work and heat for a closed system.*
CO4	**U18OE401C.4**	define *second law of thermodynamics and demonstrate the working principle of IC engines.*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course code:**U18OE401C**Course Name: **Elements of Mechanical Engineering**

CO Code	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
U18OE401C.1	2	2	-	-	-	-	-	-	-	-	-	-	1	1	1
U18OE401C.2	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
U18OE401C.3	2	2	-	-	-	-	-	-	-	-	-	-	1	1	-
U18OE401C.4	2	2	-	-	-	-	-	-	-	-	-	-	1	1	-
U18OE401C	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**1**

U18OE401D FUNDAMENTALS OF MEASUREMENTS & INSTRUMENTATION

Class: B.Tech. IV–Semester **Branch**: Common to all Branches

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge on /in
LO1: working principle of DC measuring instruments; DC, AC bridge circuits and their applications LO2: principle of operation of Q meter, DVM, DMM, CRO, DSO and display devices
LO3: working principle of various transducers and their applications
LO4: working principle of seismic transducers, piezoelectric accelerometer, sound level meter, level transducer, flow meter and data acquisition system

UNIT–I (9+3)

DC measuring instruments (principle of operation): Measurement system – block diagram and example; performance characteristics – accuracy, precision, resolution, threshold, span, % error and fidelity; DC meters (working principle) – PMMC mechanism, shunt type ammeter, series type voltmeter, shunt type ohmmeter; DC potentiometers - Crompton's DC potentiometer, calibration of meters (ammeter, voltmeter & wattmeter) using DC potentiometer
DC & AC bridges: General bridge balance equation, bridge calibration, applications of bridges, Wheatstone bridge, Maxwell bridge, Schering bridge, Wien's bridge

UNIT – II (9+3)

Electronic instruments (principle of operation): Q-meter – basic Q-meter circuit; digital meter – characteristics (resolution & count), DC & AC attenuators, block diagram of dual slope type digital voltmeter, block diagram of digital multimeter (DMM); oscilloscopes – working principle of cathode ray tube (CRT), block diagram of cathode ray oscilloscope (CRO) , block diagram of digital storage oscilloscope (DSO); display devices – working principle of LED & LCD types

UNIT – III (9+3)

Transducers (principle of operation): Transducer - classification, examples and ideal requirements; sensors – cantilever beam & proving ring types of load cells, bourdon tube & diaphragm type pressure sensors; resistive transducers – piezo-resistive effect of strain gauge (SG), gauge factor, SG type force transducer, SG type pressure transducer and RTD; thermocouple type temperature transducer, LVDT type inductive transducer, differential type capacitive transducer, piezoelectric type transducer; photoelectric type transducer

UNIT – IV (9+3)

Transducers (principle of operation): Seismic transducers – displacement transducer, velocity pickup and accelerometer, piezoelectric accelerometer, sound level meter (block diagram), capacitive microphone, capacitive type level transducer (double electrode type), ultrasonic flow meter and electromagnetic flow meter; introduction to data acquisition (DAQ)system

Text Books:

1 P. Pruthviraj, B. Bhudaditya, S. Das and K. Chiranjib, "Electrical and Electronic Measurement and Instrumentation", McGraw-Hill Education, 2nd edition, 2013, New Delhi. (*Chapters 1 to 3, 8 to 10 and 13 to 15*)

2 Arun K. Ghosh, "Introduction to Transducers*", PHI*, 4th edition, 2015, New Delhi. (*Chapters 1 to7*)

Reference Books:

1 A.K. Sawhney, "Electrical and Electronics Measurements and Instrumentation"*, Dhanpatrai*& Co., 2015, New Delhi.

2 Helfrick. A.D and Cooper W.D., "Modern Electronic Instrumentation and Measurement Techniques", *Pearson India Edn.,* 2nd edition*,* 2016*,* New Delhi*.*

3 B.C. Nakra, K.K Choudhry, "Instrumentation Measurement and Analysis", *TMH,* 4th edition, 2008, New Delhi.

4 D.V.S. Murthy, "Transducers and Instrumentation", *Prentice Hall of India,* 2nd edition, 2012, New Delhi.

Course Outcomes (COs):

Course Code: **U18EI401D** Course Name: **FUNDAMENTALS OF MEASUREMENTS & INSTRUMENTATION**		
CO	**CO Code**	*Upon completion of this course, students will be able to…*
CO1	**U18EI401D.1**	explain about working principle of measurement system, PMMC based meters and applications of DC & AC bridge circuits
CO2	**U18EI401D.2**	describe the principle of operation of Q-meter, DVM, DMM, CRO, DSO and display devices
CO3	**U18EI401D.3**	elaborate on the working principle of resistive, inductive, capacitive and piezoelectric transducers and their applications
CO4	**U18EI401D.4**	explain about seismic transducers, sound level meter, level transducer, flow meters and block diagram of data acquisition system

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course Code: **U18EI401D** Course Name: **FUNDAMENTALS OF MEASUREMENTS &INSTRUMENTATION**															
CO Code	**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**
U18EI401D.1	2	1	1	1	-	-	1	-	-	-	-	1	1	1	1
U18EI401D.2	2	1	1	1	-	-	1	-	-	-	-	1	1	1	-
U18EI401D.3	2	1	1	1	-	-	1	-	-	-	-	1	1	1	-
U18EI401D.4	2	1	1	1	-	-	1	-	-	-	-	1	1	1	-
U18EI401D	**2**	**1**	**1**	**1**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**1**

U18OE401E FUNDAMENTALS OF COMPUTERNETWORKS

Class: B.Tech. IV- Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LO) :

This course will develop students' knowledge in/on

LO1: network topologies, network reference models, network architecture and data transmission

LO2: design issues and protocols of data link layer, error detection and correction, MAC protocols and ethernet standards

LO3: principles and design issues of network layer and internet protocols

LO4: transport layer design issues, protocols and application layer services

UNIT - I (9)

Introduction: History of Computer Networks and The Internet, Principles of Computer Network Design, Network Architecture, Network Types.

Physical Layer: Factors Affecting Data Transmission, Data Transmission, Data Transmission Codes: Non-return to Zero, Manchester Encoding, Digital modulation & Modems, Transmission Media.

UNIT- II (9)

Data Link Layer: Functions of Data Link Layer, Framing Techniques, Error Detection and Correction, Elementary Data Link Layer Protocols for Flow Control.

Local Area Networks: Medium Access Protocols, LAN Protocol Stack, Ethernet Protocols, IEEE 802.11 LAN Standard: IEEE 802.11 Protocol Stack, Wireless LAN Topologies, Frames in IEEE 802.11.

UNIT - III (9)

The Network Layer: Network Layer Services, Packet Switching Networks, The Internet Protocol(IP): IP Header in IPv4, IP Addressing in IPv4, Subnet addressing and Classless Inter-Domain Routing (CIDR), Address Resolution Protocol, Dynamic Host Configuration Protocol, Internet Layer Protocols, Fragmentation and Reassembly, IP Version 6: Motivation for IPv6 Development, Features of IPv6, IPv6 Address Representation.

Routing Protocols: Elements of Routing Protocol Performance, Flooding, Distance-Vector and Link State Routing Protocols, Hierarchical Routing.

UNIT - IV (9)

The Transport Layer: User Datagram Protocol, Transmission Control Protocol, TCP State Transition Diagram, Other TCP Timers, TCP Congestion Control.

The Application Layer: World Wide Web, Domain Name System, Electronic Mail.

Network Security: Threats and Vulnerabilities in Computer Networks, Cryptographic Algorithms, Data Encryption Standard.

Text Book:

1. Mayank Dave, "Computer Networks", Second Edition, Cengage Learning, ISBN-13:978-81-315-0986-9, 2014.

Reference Books:

1. Forouzan, "Data Communication and Networking", Fifth Edition, *TMH*, *ISBN*978-0-07-296775- 3, 2012.
2. William Stallings, "Data and Computer Communications", Ninth Edition, *Prentice-Hall India*, ISBN-81-203-1240-6,2011.

3. Andrew S.Tanenbaum , David J. Wetherall, "Computer Networks", Fifth Edition, *Pearson Education*, ISBN-13: 978-0-13-212695-3,2011.

Course Outcomes (COs):

Course Code: **U18OE401E** Course Name: **Fundamentals of Computer Networks**		
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	**U18OE401E.1**	*describe various network topologies, architecture and techniques for data transmission modes*
CO2	**U18OE401E.2**	*outline various design issues in data link layer and develop protocols to handle data link layer operation*
CO3	**U18OE401E.3**	*describe various design issues and develop protocols for network Layer.*
CO4	**U18OE401E.4**	*explain various design issues , protocols of transport layer & application layer services*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course code:**U18OE401E** Course Name: **Fundamentals of Computer Networks**														
CO Code	**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**
U18OE401E.1	2	1	-	1	-	1	-	-	-	-	-	1	2	3	1
U18OE401E.2	3	3	2	1	1	1	-	-	-	-	-	1	3	3	1
U18OE401E.3	3	3	2	2	1	1	-	-	-	-	-	1	3	3	1
U18OE401E.4	3	3	2	2	1	1	-	-	-	-	-	1	3	3	1
U18OE401E	**2.75**	**2.5**	**2**	**1.5**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**2.75**	**3**	**1**

U18OE401F RENEWABLE ENERGY SOURCES

Class: B.Tech. IV Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs) :

This course will develop student's knowledge in/on

LO1 *different renewable energy sources and principle of solar energy systems*

LO2 *wind energy, geothermal energy and MHD power generation systems*

LO3 *harnessing energy from oceans and biomass*

LO4 *working of fuel cells and different energy storage systems*

UNIT-I (9)

Introduction: Conventional and non-conventional sources of energy – Brief Description of different Renewable energy sources

Solar Energy: Introduction to prospects of solar photovoltaic (SPV) systems, principle of a PV cell, large scale SPV systems, economic considerations of SPV systems, PV cell technology, merits and limits of SPV systems, applications of SPV systems-street lighting, domestic lighting, Battery charging, SPV pumping systems

UNIT-II (9)

Wind Energy: Principles of wind power- Operation of a wind turbine- Site Characteristics.

Geothermal Energy: Origin and types of geothermal energy- Operational Difficulties- Vapor dominated systems- Liquid dominated systems- Petro- thermal systems.

Magneto-Hydro Dynamic (Mhd) Power Generation: MHD system- Open and Closed systems- Advantages of MHD systems.

UNIT-III (9)

Energy from Oceans: Ocean temperature differences, ocean waves-Wave motions and tides-Energy from the waves; Introduction of tidal power, basic principle of tidal power, components of tidal power plants, advantages and disadvantages

Bio-Energy: Introduction-bio-mass conversion, technologies-wet process, dry process, photo synthesis; Biogas generation- biogas from power plant wastes, methods of maintaining biogas production, utilization of biogas, biogas gasification, applications of gasifiers

UNIT-IV (9)

Chemical Energy Sources: Introduction of fuel cells, Principle of Operation of fuel cell, Classification of Fuel cells, Advantages and disadvantages of fuel cells.

Types of Energy Storage Systems: Introduction, Different types of Batteries, Ultra Capacitors, Flywheels, Super Conducting Magnetic storage

TEXT BOOKS:

1. Rai G.D "*Non-Conventional Energy Sources*", Khanna Publishers, New Delhi
2. Felix A. Farret, M. Godoy Simoes, —Integration of Alternative Sources of Energy, John Wiley & Sons, 2006
3. Bansal N.K, Kaleeman and M.Miller, "Renewable *Energy Sources and Conversion Technology*", TATA Mc Graw-Hill, NewDelhi

REFERENCE BOOKS:

1. EL-Wakil M.M, "Power Plant Technology", Mc Graw-Hill, NewYork
2. Duffie and Beckman, "Solar Energy Thermal Process", John Wiley & Sons, NewYork

Coursecode:**U18OE401F**		Course Name: **Renewable EnergySources**
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	**U18OE401F.1**	*compare conventional and non-conventional energy resources; explain the working principle of solar energy harnessing and its applications*
CO2	**U18OE401F.2**	*explain the working principles of wind energy, geothermal energy and MHD power generation systems*
CO3	**U18OE401F.3**	*describe the harnessing of electric power from oceans and biomass*
CO4	**U18OE401F.4**	*explain the principle of operation of fuel cells and different types of energy storage systems*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course code:**U18OE401F**				Course Name: **Renewable Energy Sources**										
CO Code	**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**
U18OE401F.1	3	-	-	-	-	-	1	-	-	-	-	-	3	-	-
U18OE401F.2	3	-	-	-	-	-	1	-	-	-	-	-	3	-	-
U18OE401F.3	3	-	-	-	-	-	1	-	-	-	-	-	3	-	-
U18OE401F.4	3	-	-	-	-	-	1	-	-	-	-	-	3	-	-
U18OE401F	**3**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**

U18TP402 SOFT AND INTERPERSONALSKILLS

Class: B. Tech IV semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	100 marks
End Semester Examination	-

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on….

LO1: logical construction of speech appropriate for the occasion and exhibiting team work

LO2: acquiring spontaneity, presence of mind for effective communication

LO3: identifying, analyzing the theme of the topic and understanding presentation skills

LO4: communicating professionally and developing strategies in selecting career objectives in line with industry expectations

LIST OF ACTIVITIES

Introduction

Activity 1	Team interaction
Activity 2	SWOT analysis
Activity 3	Debate
Activity 4	Group Discussion

Activity 5	Presentations through PPTs
Activity 6	Video Synthesis
Activity 7	Resume Writing
Activity 8	Email Etiquette

Activity9 : My interview Plan: Self Introduction &FAQs
Activity10 : "My Career Plan" Oral presentation
} Comprehensive Presentation

Text Books:

- Developing Communications Skills – Krishna Mohan & Meera Benerji
- Soft Skills -Alex. K
- Soft skills Cornerstone of Professional success – Raman &Meenakshi

References:

- https://onlinecourses.nptel.ac.in/noc19_hs20/preview
- https://onlinecourses.nptel.ac.in/noc18_hs30/preview

Course Outcomes (COs):

Course code: **U18TP302/U18TP402**		Course Name: **Soft and Interpersonal Skills**
CO	**CO code**	*Upon completion of this course, the student will be able to…*
CO1	**U18TP402.1**	*introspect to convert strengths into opportunities, identify weaknesses, bypass threats*
CO2	**U18TP402.2**	*present views on various issues confidently in a group*
CO3	**U18TP402.3**	*make effective PPT presentations, synthesize videos*
CO4	**U18TP402.4**	*prepare a professional resume, communicate effectively to attain better opportunities*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Coursecode:**U18TP402**								Course Name: **Soft and Interpersonal Skills**						
CO Code	**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 2**
U18TP402.1	-	-	-	-	-	-	-	-	2	3	-	-	1	1	1
U18TP402.2	-	-	-	-	-	-	-	2	3	3	-	-	1	1	1
U18TP402.3	-	-	-	-	-	-	-	-	2	3	-	-	1	1	1
U18TP402.4	-	-	-	-	-	-	-	1	2	3	-	-	1	1	1
U18TP402	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.5**	**2.25**	**3**	**-**	**-**	**1**	**1**	**1**

U18OE403A Object Oriented Programming

Class: B. Tech IV-Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on…

LO1: fundamentals of object oriented and java programming.

LO2: classes, objects and inheritance for implementing object oriented concepts.

LO3: polymorphism, interfaces and packages for realizing object oriented programming.

LO4: manage Exceptional and I/O operations in application developments.

UNIT- I (9)

Fundamentals of Object Oriented Programming: Programming paradigms, Basic concepts of Object Oriented paradigm (OOP), benefits and applications of OOP.

Basics of Java Language: Java language Features, Java Programming Structure, Java Tokens, JVM, Constants, Variables, Data types, Scope of variable, Type Casting, Operators and Expressions, Branching and looping statements, Arrays.

UNIT – II (9)

Classes and Objects: Defining a class, Field declaration, Method declaration, Creating object, Accessing Class Members, Constructors, garbage collection, Static members, Nested and inner classes, Command line arguments, Wrapper classes.

Inheritance: Extending a class, Defining subclasses, Subclass constructor, Multilevel inheritance, Hierarchical inheritance, Access controls, *this*and *super* keywords

UNIT-III (9)

Polymorphism: Overloading methods, Overloading constructors, Overriding Methods, Dynamic method dispatch, Abstract classes, Final Keyword.

Interfaces: Defining an interface, Implementing interfaces, Nested Interfaces, Variables in interfaces, Extending interfaces

Packages: Packages, java API packages, Using System Packages, Naming Conventions, Creating Packages, Accessing Packages, Adding a class to package, Hiding classes, Static Import.

UNIT – IV (9)

Exception handling: Fundamentals, Exception types, Uncaught exceptions, Using try and catch, Multiple catch clauses, Explicit exceptions with *throw, throws* and *finally* keywords.

String Handling: String constructors, String length, String operations, Character extraction, String comparison, Searching string, Modifying string, Changing string cases, Joining strings**.**

Using I/O: I/O Basics, Reading console Input, Writing console output, Reading and writing files.

Text Books:

1. Herbert Schildt,"JAVA The Complete Reference", 9th Edition, McGraw-Hill Education India Pvt.Ltd , ISBN: 9781259002465,2014.
2. E.Balgurusamy, "Programming with JAVA a primer", 5e Edition, McGraw-Hill Publication Ltd, ISBN: 9351343200,2014.

References Books:

1. P Radha Krishna, "Object Oriented Programming through JAVA", Universities Press, ISBN: 9788173715723,2011.
2. Herbert Schildt,"JAVA The Complete Reference", McGraw-Hill Education India Pvt.Ltd , 9th Edition, ISBN: 9781259002465,2011.
3. Kathy Sierra, Bert Bates, "Head First Java", O'Reilly Publictions, 2nd Edition, ISBN-13: 978- 0596009205.
4. UttamK.Roy, "Advanced JAVA Programming", Oxford Publications; First edition, ISBN- 13: 978-0199455508.

Course Code: **U18OE403A** Course Name: **Object Oriented Programming**		
CO	**CO code**	*Upon completion of this course, the student will be able to…*
CO1	**U18OE403A.1**	*demonstrate object oriented concepts and java programming features.*
CO2	**U18OE403A.2**	*solve computing problems using object orientation and inheritance concepts.*
CO3	**U18OE403A.3**	*use polymorphism, interfaces and Packages for effective object oriented programming*
CO4	**U18OE403A.4**	*handle Exceptions and I/O operations in application development.*

Mapping of the Course Learning Outcomes with Program Outcomes:

Course Code: **U18OE403A** Course Name: **Object Oriented Programming**															
CO/PO	**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**
U18OE403A.1	2	2	2	1	2	1	-	1	2	1	2	1	2	2	2
U18OE403A.2	2	2	2	1	2	1	-	-	2	1	2	1	2	2	2
U18OE403A.3	2	2	2	1	2	1	-	-	2	1	2	1	2	2	2
U18OE403A.4	2	2	2	1	2	1	1	1	2	1	2	1	2	2	2
U18OE403	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**1**	**2**	**1**	**2**	**1**	**2**	**2**	**2**

U18OE403B FLUID MECHANICS AND HYDRAULIC MACHINES

Class: B.Tech. IV-Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in /on
LO1*: various Properties of fluids and fluid statics*
LO2*: application of Bernoulli's equation and dimensional analysis*
LO3*: flow through pipes and working principles of hydraulic turbines*
LO4*: performance of reciprocating and centrifugal pumps*

UNIT-I(9)

Fluid fundamentals: Classification of fluids, fluid properties - density, specific weight, specific gravity, specific volume, viscosity, capillarity, vapor pressure, compressibility, surface tension, cohesion and adhesion.

Fluid statics: Pascal's Law, hydrostatic Law, measurement of pressure, manometers, Piezometer, U-tube differential manometer, inverted differential manometer, hydrostatic forces on submerged plane and curved surfaces, buoyancy, metacenter, stability of floating and submerged bodies

UNIT-II (9)

Fluid dynamics: Classification of fluid flow, continuity equation in one, two and three dimensional flow, velocity potential and stream function, forces causing motion, Euler's equation of motion, Bernoulli's Equation, applications of Bernoulli's equation, venturi meter, orifice meter, pitot tube, linear momentum equation ,application of linear momentum equation to forces on pipe bend.

Dimensional analysis: Dimensional analysis by Rayleigh's method and Buckingham π's theorem, dimensionless numbers and model laws, Reynolds law and Froude's law.

UNIT-III(9)

Flow through pipes: Loss of head in pipes, expression for head loss due to major and minor losses in pipes, HGL and TEL lines, pipes in series and parallel, equivalent pipe.

Hydraulic turbines: Concept of impact jets, classification, head, losses and various efficiencies, Pelton turbines, components, velocity triangles, power and efficiencies, reaction turbines, Francis and Kaplan turbines, efficiencies and characteristics, unit quantities, specific speed, draft tube theory.

UNIT-IV (9)

Reciprocating pumps: Working of single and double acting pumps, work done and efficiencies, slip, negative slip, performance characteristics of pumps, air vessel.

Centrifugal pumps: Principle, components, work done and efficiency, pumps in series and in parallel, multi stage pumps, characteristics, cavitation and priming.

Text Books:

1. P.N.Modi and S.M. Seth, "*Hydraulics and Fluid Mechanics Including Hydraulic Machines*", Standard Book House, Rajsons Publications Private Limited, 21thedn.,2017

Reference Books:

1. R.K.Bansal, "*Fluid Mechanics and Hydraulic Machines*", Periodicals PrivateLtd.,2018
2. Victor Streeter and E. Benjamin Wylie, "*Fluid Mechanics*", McGraw Hill, Singapore, 9thedn.,2017.
3. Frank M. White, "*Fluid Mechanics*", Special Indian Edition, Tata McGraw Hill, New Delhi,2011.
4. A.K. Jain, "*Fluid Mechanics Including Hydraulic Machines*", Khanna Publications,*12*thedn,2018.

Course Outcomes (COs):

CourseCode:**U18OE303B** Course Name: **Fluid mechanics and hydraulic machines**		
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	**U18CE403B.1**	*summarize fluid properties using fundamental laws of fluid statics.*
CO2	**U18CE403B.2**	*analyse fluid flows using Bernoulli's equation and model laws.*
CO3	**U18CE403B.3**	*estimate losses in pipes and characterize hydraulic turbines.*
CO4	**U18CE403B.4**	*discuss the working principle and characteristics of pumps.*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

CourseCode:**U18OE303B** Course Name: **Fluid mechanics and hydraulic machines**

CO Code	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
U18CE403B.1	2	1	-	-	-	-	-	-	1	1	-	1	1	-	-
U18CE403B.2	2	1	-	1	-	-	-	-	1	1	-	1	1	-	-
U18CE403B.3	2	1	-	1	-	-	-	-	1	1	-	1	1	-	-
U18CE403B.4	2	1	-	1	-	1	-	-	1	1	-	1	1	-	-
U18CE403B	**2**	**1**	**-**	**1**	**-**	**1**	**-**	**-**	**1**	**1**	**-**	**1**	**1**	**-**	**-**

U18OE403C MECHATRONICS

Class: B.Tech. IV-Semester **Branch:** Common to all branches

Teaching Scheme : **Examination Scheme:**

L	T	P	C
3	-	-	3

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Outcomes (LOs):
This course will develop students' knowledge in /on
LO1: *role of mechatronics based technology, sensors and transducers used in industry*
LO2: *various types of actuation systems, working principles and their applications*
LO3: *mathematical models for various types of systems*
LO4: *various transfer functions and control modes*

UNIT-I (9)

Introduction to Mechatronics: Measuring system, Control systems, Microprocessor based controllers. Mechatronics approach.

Sensors and Transducers: Performance, terminology. displacement, position, proximity, velocity and motion.

UNIT-II (9)

Actuation Systems: working principles of pneumatic and hydraulic systems, directional control valves, pressure control valves, process control valves and rotary actuators.

Electrical Actuation Systems: working principles of electrical system, mechanical switches, solid-state switches solenoids, DC motors, AC motors and stepper motors.

UNIT-III (9)

Basic Models: Mathematical models, mechanical system building blocks, electrical system building blocks, fluid system building blocks and thermal system building blocks.

System Models: Engineering system, rotational-translational system and electro- mechanical systems and hydraulic-mechanical system.

UNIT-IV (9)

System Transfer functions: Transfer function, first order system, second order system, system in series and systems with feedback loops.

Closed Loop Controllers: Continuous and discrete processes. Control modes. Two step mode and proportional mode. Derivative control, integral control, PID controller, digital controllers, velocity controllers and adaptive control.

TEXT BOOK:

1. Bolton W., Mechatronics, *Pearson Publications,* 6/e, ISBN: 9788131732533, 2015.

REFERENCE BOOKS:

1. Nitaigour Premchand Mahalik, Mechatronics: Principles Concepts and Applications, *Tata McGraw Hill, 2/e,* ISBN-13: 978-0070483743,2017.
2. HMT, Mechatronics, *Tata McGraw-Hill, ISBN*9788415700272 New Delhi,2000.
3. Devdas Shetty, Richard and Kilk, Mechatronics System and Design, *Cenage Learning*, Inc. 2/e, ISBN-13: 978-1439061985,2010.

Course Outcomes (COs):

Course Code: **U18OE403C** Course Name: **MECHATRONICS**		
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	**U18OE403C.1**	*apply the mechatronics approach ad select suitable sensors and transducers for a given application.*
CO2	**U18OE403C.2**	*explain working principles of mechanical, hydraulic, pneumatic and electrical actuators and their applications.*
CO3	**U18OE403C.3**	*develop basic building blocks for mechanical, electrical, fluid and thermal systems and build mathematical models and analyze.*
CO4	**U18OE403C.4**	*explain various system transfer functions and select an appropriate closed loop controller for a given application*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

CourseCode: **U18OE403C** Course Name: **MECHATRONICS**															
CO Code	**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**
U18OE403C.1	2	2	1	-	2	2	-	-	-	1	-	1	1	-	1
U18OE403C.2	2	2	1	-	2	-	-	-	-	1	-	1	1	-	1
U18OE403C.3	2	2	1	3	2	-	-	-	-	1	-	1	1	-	-
U18OE403C.4	2	2	1	1	2	-	-	-	-	1	-	1	1	-	1
U18OE403C	2	2	1	2	2	2	-	-	-	1	-	1	1	-	1

U18OE403D WEB PROGRAMMING

Class: B.Tech. IV-Semester **Branch:** Common to all branches

Teaching Scheme : **Examination Scheme :**

L	T	P	C
3		-	3

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: designing static webpage using HTML Tags, CSS properties, interactivity with JavaScript
LO2: creating dynamic webpage using JSP.
LO3: developing server-side scripts for web applications using PHP.
LO4: building databases applications using PHP, MYSQL and XML.

UNIT-I (9)

HTML: Document Structure, Basic Tags, Creating Headings, Working with Links, Creating Paragraph, Working with Images, Tables, Frames. Introduction to Forms and Controls: Creating HTML Form, Specifying Action URL and Method to Send the Form, Using HTMLControls.

CSS: *CSS* (Cascading style sheet) rules and properties, Types: Inline, External and Internal Style Sheets, Style Classes, MultipleStyles.

JAVASCRIPT: JavaScript syntax, Embedding JavaScript in HTML Page. Usage of variables, Working with Operators, Control-Flow Statements, Functions and Array, Creating Objects, Handling Events.

UNIT-II (9)

JSP: Syntax and Semantics, JSP Development Model, Components of JSP page: Directives, Comments, Expressions, Scriptlets, Declarations, Implicit Objects, Standard Actions, Tag Extensions, A Complete JSP Example. Session and Thread Management: Session Tracking, Session API, Thread Management. Application Event Listeners.

JDBC: Database access with JDBC, Overview, JDBC drivers, connecting to database with Driver Manager, Statement Interfaces: Statement, Prepared statement, Callable statement, Result Sets.

UNIT-III (9)

Introduction to PHP: Overview of PHP, Advantages of PHP over scripting languages, Creating and running a PHP script, handling errors. Working with Variables and Constants: Variables, Data Types and Operators. Controlling Program Flow: Conditional Statements, Looping Statements, Break, Continue and Exit Statements. Working with Functions, Arrays, Files and Directories.

Working with Forms: Web Forms and Form Elements, Processing a Web Form, Validating a Web Form.

UNIT-IV (9)

Database using PHP: Exploring Relational Database Model, Records and Primary Keys. Working with SQL Statements. Using PHP and MySql: Checking Configuration, Connecting to Database, Selecting a Database, Adding and Altering a Table in a Database, Inserting and modifying Data in a Table, Retrieving Data from a Table.

XML : Introduction to XML, XML Basics: Syntax, Declaration, Elements, Attributes, Valid XML Documents, Viewing XML, XML Parser, XML Technologies, Document Object Model(DOM).

Text Books:

1. Kogent, "Web Technologies HTML, CSS, JavaScript, ASP.NET, Servlets, JSP, PHP, ADO.NET, JDBC and XML", *1st Edition, Dreamtech Press (Black Book),* ISBN-13:9789351192510,2013.
2. Phil Hanna, "JSP: The Complete Reference", *2nd Edition, McGraw-Hill,* ISBN: 007-212768-6,2001.

Reference Books:

1. Ivan Bayross, "Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP", *4th Edition,BPB Publications,*ISBN-13: 978-8183330084,2009,
2. Uttam K.Roy, "Web Technologies", *7th Edition*, *Oxford Higher Education,* ISBN-10: 0-19-806622-8, ISBN-13: 978-0-19-806622-4,2010
3. Luke Welling, Laura Thomson,"PHP and MySQL Web Development", *3rd Edition, Sams Publications,* ISBN: 0-672-32672-8,2005
4. Jayson Falkner, Kevin Jones, "Servlets and Java Server Pages", *1st Edition, Pearson,* ISBN: 0-321- 13649-7, 2003

Course Outcomes (COs):

Course Code: **U18OE403D**		Course Name: **Web Programming**
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	**U18OE403D.1**	*create static web pages using HTML Tags, CSS properties and Java scripts*
CO2	**U18OE403D.2**	*create dynamic web pages using java server page concepts.*
CO3	**U18OE403D.3**	*develop web server side applications using PHP concepts*
CO4	**U18OE403D.4**	*develop enterprise databases for web-based applications using PHP and MySQL.*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course Code: **U18OE403D**							Course Name: **Web Programming**							
CO Code	**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**
U18OE403D.1	2	2	2	1	2	1	-	1	2	1	2	1	2	2	2
U18OE403D.2	2	2	2	1	2	1	-	1	2	1	2	1	2	2	2
U18OE403D.3	2	2	2	1	2	1	-	1	2	1	2	1	2	2	2
U18OE403D.4	2	2	2	1	2	1	1	1	2	1	2	1	2	2	2
U18OE403D	2	2	2	1	2	1	1	1	2	1	2	1	2	2	2

U18OE403EMICROPROCESSORS

Class: B.Tech., IV-Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam:	60 marks

Course Learning Objectives:

This course will develop students' knowledge in/on
LO1*: architectural issues of 8086 Microprocessor*
LO2*: programming concepts of 8086 Microprocessor*
LO3*: interfacing of 8086 microprocessor to various I/O subsystems.*
LO4: *serial data communication types and standards like RS232, IEEE 488 Bus.*

UNIT – I(9)

Review of 8085 MPU Architecture
8086 Family Architecture: Organization of 8086 CPU, Concept of Memory Segmentation, Segment Registers, Physical and Logical Addressing, Addressing Modes and Instruction Formats, Instruction Set**.**

UNIT – II(9)

Assembly Language Programming: Assembler Directives, Simple Programming of 8086, Arithmetic, Logical and Data Processing Programs; Implementation of Control Loops, Structures, Strings, Procedures, Macros.
Pin Configuration, Minimum / Maximum Modes, Timing Diagrams, Delay Subroutines.

UNIT – III(9)

Interfacing with 8086: 8086 Interrupts, Interrupt Service Routines, Programmable Interrupt Controller 8259, Programmable Peripheral Interface 8255, Interfacing of Switches, Keyboards, LEDs, Stepper Motor, ADCs and DACs.

UNIT – IV(9)

DMA Controller 8257, Programmable Timer/Counter 8254.
Serial Data Communication through 8086: Types of Serial Communication, Synchronous and Asynchronous Communication, Serial Data Communication through USART 8251, Serial Data Communication Standards, RS-232, IEEE 488 Bus (GPIB).

Text Books:

1. D.V.Hall, "Microprocessors and Interfacing: Programming & Hardware*"*, 2nd Edition, *Tata McGraw Hill*, New Delhi, 1992. (Chapter 3 to 10)
2. Yuchang Liu, Glen A. Gibson," Microcomputer Systems. The 8086/8088 Family, Architecture, Programming and Design*", 2nd Edition, PHI*, New Delhi, 1995. (Chapter 2 to 11)

Reference Books:

1. Kenneth J. Ayala,Ayala Kenneth," The 8086 Microprocessor: Programming and Interfacing The PC", *West Pub*., 1994.
2. Barry B. Brey," The Intel Microprocessors: Architecture, Programming and Interfacing", 2nd Edition, *PHI, New Delhi,* 1998.

Course Outcomes (COs):

Course Code: **U18OE403E**		Course Name: **MICROPROCESSORS**
CO	**CO Code**	Upon completion of this course, the student will be able to…
CO1	**U18OE 403E.1**	*describe the architecture of 8086 microprocessor and explain instructions with suitable examples*
CO2	**U18OE 403E.2**	*write Assembly Language Programs (ALPs) to perform a given task*
CO3	**U18OE 403E.3**	*design 8086 microprocessor based system for given specifications with memory mapping*
CO4	**U18OE 403E.4**	*explain serial communication modes and discuss it standards*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course code: **U18OE403E**															
CO Code	**PO 1**	**PO2**	**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**
U18OE 403E.1	3	3	2	1	--	--	--	--	--	--	--	--	2	2	1
U18OE 403E.2	3	2	2	1	--	--	--	--	--	--	--	--	2	2	1
U18OE 403E.3	3	3	2	1	--	--	--	--	--	--	--	--	2	2	1
U18OE 403E.4	3	3	2	1	--	--	--	--	--	--	--	1	2	2	1
U18OE 403E	3	2.75	2	1	--	--	--	--	--	--	--	1	2	2	1

U18OE403F STRENGTH OFMATERIALS

Class: B.Tech.IV-Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1*: behaviour of bodies subjected to various types of stresses and strains*
LO2*: shear force and bending moment for determinate beams*
LO3*: bending and shearing stresses for beams in flexure*
LO4*: behaviour of circular shafts, springs and thin cylinders*

UNIT-I(9)

Simple stresses and strains: Types of stresses, strains, stress–strain diagram, elastic limit, Hooke's law, bars of varying sections, uniformly tapering circular and rectangular sections, elongation of bars due to self weight, temperature stresses in uniform bars.

Elastic modulii: Elastic constants, longitudinal strain, lateral strain, Poisson's ratio, complimentary shear stress, state of simple shear, modulus of elasticity (E), modulus of rigidity (N), bulk modulus (K), relation between E, N & K, strain energy, resilience, impact loading.

UNIT-II (9)

Principal stresses: Definition, normal and shear stress, principal stresses, principal planes and their graphical representation by Mohr's circle.

Shear force and bending moment: Types of supports, classification of beams, concept of shear force and bending moment, shear force diagram and bending moment diagram for simply supported, cantilever and overhanging beams, loading from shear force and bending moment diagram, principle of superposition.

UNIT-III(9)

Bending stresses in beams: Assumptions, theory of simple bending, application of bending equation and calculation of bending stresses in beams of homogeneous and flitched beam material, beams of uniform strength.

Shearing stresses in beams: Shearing stress due to bending, variation of flexural shear stress distribution across rectangular, triangular, circular, flanged section, shear resilience.

UNIT-IV (9)

Circular shafts and springs: Theory of pure torsion in solid and hollow circular shafts, shear stresses, angle of twist, power transmitted by shaft, close-coiled and open-coiled helical spring subjected to axial load and axial twist, springs in series and parallel.

Thin cylinders: Analysis of thin walled pressure vessels, hoop stress, longitudinal stress.

Text Books:

1. Rajput R.K., "*Strength of Materials"*, *7th Edition,* S Chand and Company.
2. Gunneswara Rao T. D., Mudimby Andal, *"Strength of Materials", 1st edn.2018*, Cambridge University Press.

Reference Books:

1. Timoshenko and Gere, "*Mechanics of Materials", 1st Edition* Mc Graw Hill International.
2. Punmia B.C., Arun K. Jain, Ashok K. Jain, "*Mechanics of Materials", 2nd Edition,* Laxmi Publications, New Delhi.
3. Subramanian R., "*Strength of Materials*", *3rd Edition,* Oxford University Press.
4. Ramamrutham S., *"Strength of Materials", 2nd Edition,* Dhanpat Rai & Sons, New Delhi.

Course Outcomes (COs):

Course Code:**U18OE303F** Course Name: **Strength of Materials**		
CO	**CO code**	*Upon completion of this course, the student will be able to…*
CO1	**U18CE403F.1**	*estimate various types of stresses and strains*
CO2	**U18CE403F.2**	*construct Mohr's circle, shear force and bending moment diagrams for determinate beams*
CO3	**U18CE403F.3**	*determine the bending and shearing stresses for beams subjected to pure bending*
CO4	**U18CE403F.4**	*analyze stresses in thin cylinders, circular shafts and springs by theory of pure torsion*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course code: **U18OE303F** Course Name: **Strength of Materials**															
CO Code	**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**
U18CE403F.1	2	2	1	1	-	-	-	-	-	1	-	2	1	-	-
U18CE403F.2	2	2	1	-	-	-	-	-	-	1	-	1	1	-	-
U18CE403F.3	2	2	1	1	-	-	-	-	-	-	-	1	-	-	-
U18CE403F.4	2	2	1	2	-	-	-	-	-	1	-	1	1	-	-
U18CE403F	**2**	**2**	**1**	**1.33**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**1.25**	**1**	**-**	**-**

U18CS404 THEORY OFCOMPUTATION

Class: B.Tech.IV-Semester

Branch: Computer Science &Engineering

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LO):

This Course will develop student's knowledge in/on

LO1: formal notation for strings, languages and finite automata.

LO2: properties of regular languages, types of grammars and applications of Context Free Grammar(CFG).

LO3: equivalence of languages accepted by Pushdown Automata(PDA) and languages generated by Context Free Grammars(CFG)

LO4: computability & non-computability and decidability & un-decidability problems in turing machines.

UNIT – I (9)

Automata theory: Introduction to finite automata, Structural representations and the central concepts of automata theory.

Finite automata: Deterministic finite automata, Non-deterministic finite automata, Finite automata with epsilon-transitions, Finite automata with output.

Regular expressions and languages: Regular expressions, Finite automata and regular expressions, Applications of regular expressions, Regular sets and regular grammars.

UNIT – II (9)

Properties of regular languages: Proving languages not to be regular, Closure properties of regular languages, Equivalence and minimization of automata.

Context-free grammars and languages: Chomsky classification of languages, Context-free grammars, Parse trees, Applications of context-free grammars, Ambiguity in grammars and languages, Simplification of context-free grammars.

UNIT – III (9)

Properties of context-free languages: Normal forms for context-free grammars, The pumping lemma for context-free languages, Closure properties of context-free languages, Decision properties of context free languages.

Pushdown automata: Definition of the pushdown automaton, Deterministic pushdown automata, The languages of pushdown automata, Equivalence of pushdown automata and context free grammar.

UNIT – IV (9)

Introduction to turing machines: Problems that computers cannot solve, The turing machine, Programming techniques for turing machines, Extensions to the basic turing machine.

Undecidability :A language that is not recursively enumerable, An undecidable problem that is recursively enumerable, Undecidable problems about turing machines, Post's correspondence problem, The classes P & NP, An NP-complete Problem.

Text Books:

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, Pearson Education Asia, 3rdEdition, ISBN: 0-321-45536-3, 2007
2. Mishra K.L.P., Chandrasekaran N,"Theory Of Computer Science: Automata, Languages and Computation", PHI Learning Pvt. Ltd., 3rdEdition, ISBN: 978-81-203-2968-3, 2012.

Reference Books:

1. Harry R. Lewis and Christos H. Papadimitriou, Elements of the Theory of Computation, Pearson Education Asia, 2nd edition,ISBN: 978-0132624787,1998
2. Michael Sipser, Introduction to the Theory of Computation, PWS Publishing, *Books/Cole Thomson Learning*, 2ndEdition, ISBN: 8131517500,2001.
3. John Martin, Introduction to Languages and The Theory of Computation, Tata McGraw- Hill Education Pvt. Ltd., 3rdEdition,ISBN: 9780070660489,2007.
4. Dexter C. Kozen, Automata and Computability, Undergraduate Texts in Computer Science, Springer, 1stEdition, ISBN: 978-0-387-94907-9,1997

Course Code: **U18CS404**		Course Name: **THEORY OFCOMPUTATION**
CO	**CO code**	*Upon completion of this course, the student will be able to…*
CO1	**U18CS404.1**	*write a formal notation for strings, languages and finite automata.*
CO2	**U18CS404.2**	*design context free grammars to generate strings of context free language.*
CO3	**U18CS404.3**	*determine equivalence of languages accepted by push down automata and languages generated by context free grammars.*
CO4	**U18CS404.4**	*distinguish between computability and noncomputability, decidability and undecidability in turingmachines*

Mapping of the Course Learning Outcomes with Program Outcomes:

Course Code: **U18CS404**					Course Name: **THEORY OFCOMPUTATION**										
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
U18CS404.1	2	2	2	2	-	-	-	-	-	-	-	-	2	2	2
U18CS404.2	2	2	2	-	-	-	-	-	-	-	-	-	2	2	2
U18CS404.3	2	2	2	2	-	-	-	-	-	-	-	-	2	2	2
U18CS404.4	2	2	2	2	-	-	-	-	-	-	-	2	2	2	2
U18CS404	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**2**	**2**

U18CS405 DATABASE MANAGEMENTSYSTEMS

Class: **B.Tech.** IV-Semester

Branch: Computer Science and Engineering

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LO) :

This course will develop students' knowledge in/on

LO1: diverse issues involved in the design and implementation of a database management system
LO2: study the physical and logical database designs, database modeling and different database models
LO3: distinct normalization techniques on database systems and query optimization technique
LO4: database structure and build up essential DBMS concepts like database security, data integrity and concurrency control

UNIT - I (9+3)

Databases and Database Users: Introduction, Characteristics of the database approach, Actors on the scene, Workers behind the scene, Advantages of using a DBMS, When not to use a DBMS.

Database System Concepts and Architecture: Data models, Schemas and instances, Three-schema architecture and data independence, Database languages and interfaces, The database system environment, Classification of database management systems.

The Relational Data Model, Relational Database Constraints: Relational model concepts, Relational constraints and the Relational database schemas, Update operations and dealing with constraint violations.

Basic SQL: SQL Data Definition and Data Types, Specifying Constraints in SQL, Basic Retrieval Queries in SQL, INSERT, DELETE, and UPDATE Statements in SQL.

UNIT - II (9+3)

Data modeling using the Entity-Relationship Model: Using high-level conceptual data models for database design, Entity types, Entity sets, Attributes and keys, Relationships types, Relationship sets, Roles and structural constraints, Weak entity types, ER diagrams.

Enhanced Entity-Relationship: Sub classes, Super classes and Inheritance, Specialization and generalization, Constraints and characteristics of specialization and generalization hierarchies, Modeling of union types using categories.

Relational Database Design by ER-and EER-to-Relational Mapping: Relational database design using ER-to-Relational mapping, Mapping EER model constructs to relations.

UNIT - III (9+3)

Database Design Theory and Normalization: Informal design guidelines for relation schemas, Functional dependencies, Normal forms based on primary keys, General definitions of second and third normal forms, Boyce-Codd normal form, Algorithms for relational database schema design, Multivalued dependency and fourth normal form , Join dependencies and fifth normal form.

The Relational Algebra and Relational Calculus: Basic relational algebra operations, Examples of queries in relational algebra, The tuple relational calculus, The domain relational calculus.

Query Processing and Optimization: Translating SQL queries into relational algebra, Using heuristics in query optimization.

UNIT - IV (9+3)

Introduction to Transaction Processing Concepts and Theory: Introduction to transaction processing, Transaction and system concepts, Desirable properties of transactions, Characterizing Schedules Based, Characterizing Schedules Based on Serializability.

Concurrency Control Techniques: Two-Phase Locking techniques for concurrency control, Concurrency control based on Timestamp Ordering.

Database Recovery Techniques: Recovery concepts, NO-UNDO/REDO Recovery Based on Deferred Update, Recovery techniques based on immediate update, Shadow paging.

Database Security and Authorization: Introduction to database security issues, Discretionary access control based on granting and revoking privileges, Mandatory Access Control and Role-Based Access Control for Multilevel Security.

Text Book:

1. Ramez Elmasri and Shamkanth B. Navathe, "Fundamentals of Database Systems", *Pearson Education*, 6thEdition, ISBN-13: 978-0-136-08620-8,2010.

Reference Books:

1. Raghu Ramakrishnan and Johannes Gehrke, "Database Management Systems", *McGraw-Hill Education*, 3rdEdition, ISBN-13: 978-0072465631,2002.
2. Abraham Silberschatz, Henry F.Korth and S.Sudarshan, "Database System Concepts", *McGraw-Hill Education,* 3rdEdition, ISBN: 0-07-114810-8, 1997.
3. Thomas Connolly and Carolyn Begg, "Database Systems", *Pearson Education*, 3rdEdition, ISBN: 81-7808-861-4,2003.

Course Outcomes (COs):

Course Code: **U18CS405**		Course Name: **DATABASE MANAGEMENTSYSTEMS**
CO	**CO code**	*Upon completion of this course, the student will be able to…*
CO1	**U18CS405.1**	*design the database management system effectively*
CO2	**U18CS405.2**	*design the databases, which includes Enhanced Entity Relationship model*
CO3	**U18CS405.3**	*outline the database by using normalization and query optimization techniques to avoid redundancy and maintain the performance of database.*
CO4	**U18CS405.4**	*manage multi-level security, correctness of data and control over access on database*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course code: **U18CS405**	Course Name: **DATABASE MANAGEMENTSYSTEMS**														
CO Code	**PO 1**	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PO6**	**PO7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**	**PSO3**
U18CS405.1	2	2	2	2	1	-	-	-	-	1	-	2	2	1	2
U18CS405.2	2	2	2	2	1	-	-	-	-	1	-	2	3	1	3
U18CS405.3	2	2	2	2	1	-	-	-	-	1	-	2	2	1	2
U18CS405.4	2	2	2	2	1	-	-	-	-	1	-	2	3	1	2
U18CS405	**2**	**2**	**2**	**2**	**1**	-	**-**	-	-	1	-	**2**	**2.5**	**1**	**2.25**

U18CS406 OPERATING SYSTEMS

Class: B.Tech. IV-Semester

Branch: Computer Science and Engineering.

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on

LO1: basics of operating systems and its structure
LO2: understanding scheduling and process synchronization techniques
LO3: exploring deadlocks, memory management and virtual memory techniques
LO4: discuss the file system organization , disk management and protection techniques.

UNIT – I (9)

Introduction: What operating systems do, Computer-system architecture, Operating-system operations, Process management, Memory management, Storage management, Protection and security, Computing environments.

System Structures: Operating-system services, System calls, Types of system calls, System programs, Operating-system structure, System boot.

UNIT - II (9)

Process Concept: Process concept, Process scheduling, Interprocess communication.

Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms – First- come first serve, Shortest-job-first, Priority, Round-robin, Multilevel queue, Multilevel feedback queue.

Synchronization: Background**,** The critical-section problem, Peterson's solution, Synchronization hardware, Mutex locks, Semaphores, Classic problems of synchronization, Monitors.

UNIT - III (9)

Deadlocks: System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

Memory Management: Background, Swapping, Contiguous memory allocation, Segmentation, Paging, Structure of page table-Hierarchical paging, Hashed page tables, Inverted pagetables.

Virtual-Memory Management: Background, Demand paging, Page replacement, Allocation of frames, Thrashing.

UNIT - IV (9)

File System: File concept, Access methods, Directory structure, Implementing File-Systems - Allocation Methods, Free-space management.

Mass-Storage Structure: Overview of mass-storage structure, Disk structure, Disk scheduling, Disk management, Swap-space management.

System Protection: Goals of protection, Principles of protection, Domain of protection, Access matrix

Text Book:

1. Abraham Silberschatz , Peter B Galvin, Gerg Gagne, "Operating SystemConcepts", *Wiley* , 9th Edition, ISBN-978-81-265-5427-0, 2016.

Reference Books:

1. Ekta Walia, "Operating Systems", *Khanna Publishing House*, Delhi, 2nd Edition, ISBN-10: 9789380016658, ISBN-13: 978-9380016658,2015.
2. Dhananjay M. Dhamdhere, "Operating Systems A Concept-Based Approach", *McGraw Hill Education*, ISBN-10: 0072957697 ISBN-13: 978-0072957693,2008
3. William Stalling, "Operating Systems", *Maxwell, McMillan International Editions*, ISBN 81-203-1187- 6, 1992.

Course Code: **U18CS406**		Course Name **Operating Systems**
CO	**CO code**	*Upon completion of this course, the student will be able to…*
CO1	**U18CS406.1**	*demonstrate the architecture of an operating system, process concepts and system calls*
CO2	**U18CS406.2**	*implement the CPU scheduling and process synchronization algorithms*
CO3	**U18CS406.3**	*solve the deadlock related problems and memory management issues*
CO4	**U18CS406.4**	*explain the file, disk and system protection techniques*

Mapping of the Course Learning Outcomes with Program Outcomes:

Course Code: **U18CS406**															Course Name **Operating Systems**
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
U18CS406.1	2	1	2	1	-	-	-	-	1	-	-	2	2	2	2
U18CS406.2	3	2	2	2	-	-	-	-	-	-	-	2	2	2	2
U18CS406.3	3	2	2	2	2	-	-	-	-	-	1	2	2	2	2
U18CS406.4	2	2	2	1	2	1	-	-	1	-	1	1	2	2	2
U18CS406	2.5	1.75	2	1.5	2	1	-	-	1	-	1	1.75	2	2	2

U18CS407 DATABASE MANAGEMENT SYSTEMSLABORATORY

Class: B.Tech. IV-Semester **Branch:** Computer Science and Engineering

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LO):
This course will develop students' knowledge in/on

LO1: Data Definition Language (DDL) commands, Data Manipulation Language (DML) commands, Transaction Control Languages (TCL) and Data Control Languages (DCL)
LO2: Structured Query Language (SQL) functions, sub queries, indexes, user defined data types, views and sequences
LO3: basic Procedural Structured Query Language (PL/SQL) programs and Cursors
LO4: stored procedures/functions, exception handling, packages and triggers

List of Experiments

Structured Query Language (SQL):

Experiment-I
1. Queries on DDL and DML statements.
2. Queries on TCL and DCL commands.
3. Queries on column level and table level constraints.

Experiment -II
4. Queries using built-in functions of NUMBER, CHARACTER, DATE Datatypes.
5. Queries on Data type conversion functions.

Experiment -III
6. Queries on single row functions and operators.

Experiment -IV
7. Queries on aggregate functions.

Experiment -V
8. Queries on joins and nested queries.

Experiment -VI
9. Write SQL statements to create simple, composite indexes, user-defined data types, views, sequences.

PL/SQL Programs:
Experiment –VII
10. Write sample PL/SQL programs using conditional and iterative statements.

Experiment -VIII
11. Write PL/SQL programs using cursors.

Experiment -IX

12. Write PL/SQL programs using parameterized cursors.

Experiment-X

13. Write PL/SQL programs to handle exceptions.
14. Write PL/SQL programs using stored procedures and functions.

Experiment –XI

15. Write PL/SQL programs for creating packages.

Experiment -XII

16. Write PL/SQL programs for creating triggers.

Laboratory Manual:

1. Database Management Systems Laboratory Manual, *Prepared by the faculty of Department of CSE.*

Reference Books:

1. Ivan Bayross, "SQL, PL/SQL: The Programming Language of Oracle", *BPB publications*, 4thEdition, ISBN: 978-8176569644,2010.
2. SQL and PL/SQL for Oracle 11g Black Book 1stEdition by P S Deshpande

Course Outcomes (COs):

Course Code: **U18CS407**		Course Name: **Database Management Systems Laboratory**
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	**U18CS407.1**	*evaluate SQL queries using DDL/DML/TCL/DCL commands to create and manipulate data in database by enforcing constraints*
CO2	**U18CS407.2**	*demonstrate various database objects using SQL queries*
CO3	**U18CS407.3**	*implement block structured programming with cursors to enable traversal over the records of the database*
CO4	**U18CS407.4**	*implement pre-compiled stored programs, run-time errors checking, database objects collection in PL/SQL packages and high-level security using triggers*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course code:**U18CS407**	Course Name: **DATABASE MANAGEMENTSYSTEMS LABORATORY**													
CO Code	**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**	**PS O3**
U18CS407.1	2	2	2	2	2	-	-	-	1	1	-	2	2	1	2
U18CS407.2	2	2	2	2	2	-	-	-	1	1	-	2	2	1	2
U18CS407.3	2	2	2	2	2	-	-	-	1	1	-	2	2	1	3
U18CS407.4	2	2	2	2	2	-	-	-	1	1	-	2	3	1	3
U18CS407	2	2	2	2	2	-	-	-	1	1	-	2	2.25	1	2.5

U18CS408 OPERATING SYSTEMSLABORATORY

Class: B.Tech. IV Semester **Branch:** Computer Science and Engg.

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives (LOs):
This Lab course will develop students' knowledge in/on
LO1: understanding and familiarizing the UNIX environment.
LO2: fundamental concepts of shell programming.
LO3: different CPU scheduling algorithms and Dead Lock Avoidance algorithm.
LO4: understanding different page replacement algorithms and file organization techniques.

List of Experiments

Experiment-I

1. Practicing basic UNIX commands:
   a) General Utility Commands: login, cal, date, who, uname, echo, passwd, pwd,exit.
   b) File and Directory Related Commands : ls, cd, mkdir, rmdir, cat, cp, rm, mv, wc, comm, diff, split, ln, touch, chmod, chown,chgrp.
2. Practice the following examples.
   a) Display the contents of file (filenames starting with 'a' and ending with X)
   b) Copy the contents of directory1 todirectory2.
   c) Remove the all .C files from current directory.
   d) Merge the three different files into singleone.
   e) Display the list of files in given directory.
   f) Set given file as read only.

Experiment-II

3. **Filters**: (Data Processing Commands): more, head, tail, cut, paste, sort, uniq, nl,tr.
4. **Communication Commands**: write, mail, talk, finger,news.

Experiment-III

5. a) Process Related Commands :ps, kill, nice, at &batch
   b) Pattern Searching Commands: grep, egrep,fgrep.
6. Write the programs for the following:
   a) Display the details of all users those who are working on the system.
   b) Display the details of all users in an order they logged on to system (based on time) who are working on the system.

Experiment-IV

7. Practicing the Vi editor commands.
8. Shell Script Related Commands**:** sh, read, command line arguments ($1), $ @ & $*, set, exit, status ($?), logical operators: **||,** &&, exit, if, sleep & wait, case, while & until, for, export, expr commands.

Experiment-V

9. Write programs for the following**:**
   a) Reading a character and displaying on the screen.
   b) Display the name and class of student in separate line.
   c) To check the given two characters are equal or not.

10. Write programs for the following:
    a) Display the given character in its binary form.
    b) To check given number is even orodd.
    c) Write a shell script to accept login name as command line argument and find out at how many terminals the user has loggedin.

Experiment-VI

11. Write a shell script which gets executed at login time and displays a blinking message "Good morning/Good Afternoon / Good Evening" depending upon the time at which the user logsin.
12. Write a shell script to check the given character is vowel ornot.
13. Write a shell script to perform all basic arithmetic operations using switch statement.
14. Write a menu driven program which has the following options:
    a) contents of a given file
    b) list of users who have currently logged in
    c) present working directory
    d) exit

Experiment-VII

15. Write the shell programs for the following:
    a) To print the Fibonacciseries
    b) To check the given number is prime or not
    c) To print the following format: 1

```
1    2
1    2    3
1    2    3    4
.....
```

Experiment-VIII

16. Write a shell script to display the given string in reverse order.
17. Write a shell script to find min and max elements in the given Array of integers.
18. Write a shell script function for factorial of a number.

Experiment-IX

19. Implement the following CPU Scheduling Algorithms.
    a) FCFS b)RR c) SJF d) Priority Scheduling

Experiment-X

20. Implement the Banker's Algorithm for Deadlock Avoidance.

Experiment-XI

22. Implement the following Page Replacement Algorithms.
    a) FIFO b)LRU

Experiment-XII

23. Implement the following Directory structures.
    a) Single Level Directory b) Two Level Directory

Text Books:

1. Sumitabha Das, "Your Unix: The Ultimate Guide", *McGraw Hill,* Third Edition, ISBN 0-07-053475-6,2005.
2. Yashavant P. Kanetkar, "Unix Shell Programming", *BPB Publications,* ISBN 81-7029-753-2,1996.
3. Operating Systems Laboratory Manual, prepared by the faculty of Department ofCSE.

Course Code: **U18CS408** Course Name: **Operating Systems Laboratory**		
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	**U18CS408.1**	*recognize the importance of various categories of UNIX commands.*
CO2	**U18CS408.2**	*apply shell programming concepts for developing applications*
CO3	**U18CS408.3**	*implement different scheduling algorithms and compare their performance and apply the Banker's algorithm for solving the dead lock avoidance problem.*
CO4	**U18CS408.4**	*implement different scheduling algorithms and compare their performance and apply the Banker's algorithm for solving the dead lock avoidance problem.*

Mapping of the Course Learning Outcomes with Program Outcomes:

Course Code: **U18CS408** Course Name: **Operating Systems Laboratory**															
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
U18CS408.1	2	2	-	3	1	-	-	-	-	-	1	2	2	2	2
U18CS408.2	3	3	2	2	-	-	-	-	-	-	-	2	2	2	2
U18CS408.3	2	2	2	2	-	-	-	-	-	-	-	2	2	2	2
U18CS408.4	2	2	1	-	-	-	-	-	-	-	-	1	2	2	2
U18CS408	**2.25**	**2.25**	**1.66**	**2.33**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**1.75**	**2**	**2**	**2**

U18OE411A OBJECT ORIENTED PROGRAMMINGLABORATORY

Class: B. Tech IV-Semester **Branch:** Open Elective Based Lab

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LO):

This course will develop students' knowledge in/on…

LO1: implementing concepts of object oriented programming
LO2: debug and test java applications effectively
LO3: effective use of exception handling, interfaces and packages during applications development
LO4: I/O and applet programming in java

List Of Experiments

Experiment-I

1. Write a program to demonstrate operators of java.
2. Write a program to demonstrate type casting and operator precedence.
3. Write a program to demonstrate different types of if-statements.
4. Write a program to demonstrate switch-case.

Experiment-II

1. Write a program to demonstrating loop control statements.
2. Write a program to demonstrate for-each control loop.
3. Implement programs using single dimensional arrays.
4. Write a program to define a two dimensional array where each row contains different number of columns.

Experiment -III

1. Write a program to demonstrate creating object to a class for accessing variables and methods.
2. Write a program to demonstrate creating multiple object.
3. Write a program to demonstrate passing objects to methods.
4. Write a program to demonstrate constructors and garbage collector by invoking it explicitly.

Experiment -IV

1. Write a program to demonstrate static members.
2. Write a program to demonstrate command line argument.
3. Write a program to demonstrate variable length argument.
4. Write a program to demonstrate wrapper classes.

Experiment -V

1. Write a program to demonstrate inheritance using extends keyword.
2. Write a program to demonstrate multilevelinheritance.
3. Write a program to demonstrate hierarchicalinheritance.
4. Write a program to demonstrate access controls.

Experiment -VI

1. Write program to demonstrate *this* and *supper* keywords.
2. Write program to demonstrate dynamic method dispatch.
3. Write a program to demonstrate final variable and methods.
4. Write a program to demonstrate use of abstract class.

Experiment -VII

1. Write a program to define an Interface and implement it into a class.
2. Write a program to implement multiple interfaces into single class.
3. Write a program to extend interfaces.
4. Write a program to implement nested interfaces.

Experiment -VIII

1. Write a program to create a package, and demonstrate to import a package to a class.
2. Write a program to demonstrate access protection of packages.
3. Write a program to demonstrate static import of package.

Experiment-IX

1. Write a program to demonstrate *try* and *catch* statement for exception handling
2. Handle *Array Index Of Bounds Exception*, *Number Format Exception* and *Divide By Zero Exception* using multiple catch blocks.
3. Write a program to demonstrate user defined exception with *throwkeyword*
4. Write a program to demonstrate *finally*block.

Experiment-X

1. Write a program to demonstrate string handling functions.
2. Write a program to demonstrate string searching functions.
3. Write a program to demonstrate string comparison functions.
4. Write a program to demonstrate string modification functions.

Experiment-XI

1. Write a program to demonstrate reading and writing input using byte stream classes
2. Write a program to demonstrate reading and writing input using character stream classes
3. Write a program to demonstrate data input and outputstreams
4. Write a program to demonstrate array input and outputstreams

Experiment-XII

1. Write a program to create a file using byte stream classes
2. Write a program to create a file using character stream classes
3. Write a program to open the specific file
4. Write a program to copy the content of one file to another.

Laboratory Manual:

1. Java Programming laboratory manual, *prepared by faculty of Dept. of CSE.*

Reference Book:

1. Herbert Schildt,"JAVA The Complete Reference", 9th Edition, McGraw-Hill Education India Pvt.Ltd , ISBN: 9781259002465, 2014.

Course Outcomes:

Course Code: U18OE411A		Course Name: Object Oriented Programming Laboratory
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	**U18OE411A.1**	*implement OOP concepts using Java*
CO2	**U18OE411A.2**	*use the concepts like inheritance, polymorphism, packages and interfaces in application development*
CO3	**U18OE411A.3**	*handle runtime exceptions in object oriented programming*
CO4	**U18OE411A.4**	*build effective I/O interfaces for software applications*

Mapping of the Course Learning Outcomes with Program Outcomes:

Course Code: U18OE411A															
CO/PO	**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**
U18OE411A.1	2	2	2	1	-	-	-	-	-	1	-	-	2	1	2
U18OE411A.2	2	2	2	1	-	-	-	-	-	1	-	2	2	1	3
U18OE411A.3	2	2	2	1	-	-	-	-	-	1	-	2	2	1	3
U18OE411A.4	2	2	2	1	-	-	-	-	-	1	-	2	2	1	3
U18OE411	2	2	2	1	-	-	-	-	-	1	-	2	2	1	2.75

U18OE411B FLUID MECHANICS AND HYDRAULIC MACHINES LABORATORY

Class: B.Tech. IV-Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: *determining the hydraulic coefficient for various flow measuring devices*

LO2: *implementing Bernoulli's equation and application of Bernoulli's theorem in estimating various losses in pipe*

LO3: *studying the various parameters which effects the impact of jet*

LO4: *studying the characteristics of hydraulic machines*

LIST OF EXPERIMENTS

1. Determination of Coefficient of Discharge for given Orifice meter and Venturi meter.
1. Determination of Coefficient of Discharge for given notches (triangular/rectangular)
2. Determination of Coefficient of Discharge for given orifice and mouth piece.
3. Verification of Bernoulli's theorem.
4. Estimation of coefficients of various head losses in pipes due to major and minor losses (sudden enlargement, sudden contraction and bend).
5. Determine of Reynolds's number using Reynolds's apparatus.
6. Determination of coefficient of impact for a jet on given vane.
7. Determination of performance characteristics of Francis Turbine
8. Determination of performance characteristics of Pelton Wheel.
9. Determination of performance characteristics of Centrifugal Pump.
10. Determination of performance characteristics of Submersible Pump.
11. Determination of performance characteristics of Reciprocating Pump.

Laboratory Manual:

1. "Fluid Mechanics Laboratory Manual", prepared by the faculty of Department of Civil Engineering.

Reference Books:

1. N. Kumara Swamy, *"Fluid Mechanics and Machinery Laboratory Manual",* Charotar Publishing House Pvt., Ltd., 1st edn.,2008.
2. Sarbjit Singh, "*Experiments in Fluid Mechanics*", PHI Learning Private Limited, New Delhi,2009.

Course Outcomes (COs):

Course Code:**U18OE411B**		Course Name: **Fluid Mechanics and Hydraulic Machines Laboratory**
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	**U18OE411B.1**	*determine the hydraulic coefficient for various flow measuring devices*
CO2	**U18OE411B.2**	*apply Bernoulli's equation in estimating head loss in pipes*
CO3	**U18OE411B.3**	*apply the principles of impact of jet on different vanes*
CO4	**U18OE411B.4**	*demonstrate the characteristics of hydraulic machines.*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course Code:**U18OE311B** Course Name: **Fluid Mechanics And Hydraulic Machines Laboratory**

CO Code	PO 1	PO2	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
U18OE411B.1	2	1	-	1	-	-	-	-	1	-	-	1	2	-	-
U18OE411B.2	2	1	-	1	-	-	-	-	1	-	-	1	2	-	-
U18OE411B.3	2	1	-	1	-	-	-	-	1	-	-	1	2	-	-
U18OE411B.4	2	1	-	1	-	-	-	-	1	1	-	1	2	-	-
U18OE311B	**2**	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**1**	**2**	**-**	**-**

U18OE411C MECHATRONICS LAB

Class: B.Tech. IV-Semester **Branch:** Mechanical Engineering

Teaching Scheme : **Examination Scheme:**

L	T	P	C
-	-	2	1

Continuous Internal Evaluation	:	40 marks
End Semester Examination	:	60 marks

Course Learning Outcomes (LOs):

This course will develop students' knowledge in /on

LO1: *basic elements underlying mechatronic systems: analog electronics, digital electronics, sensors, transducers, actuators, microcontrollers and embedded software.*

LO2*: interface of various systems to a PLC.*

LO3*: integration of various systems through programming.*

LO4*: design and simulation of hydraulic and pneumatic circuits.*

LIST OF EXPERIMENTS

1. Controlling A.C. Non servomotor clockwise and anti clockwise with time delay.
2. Controlling A.C. Non servo motor using digital inputs proximity sensors.
3. Controlling of Single acting Pneumatic Cylinder with time delay
4. Controlling of double acting Pneumatic Cylinder with time delay and sequencing
5. Control of D.C servomotor (rotating table clockwise and counterclockwise)
6. Integration of AC Non servo motors, single acting pneumatic cylinder and double acting pneumatic cylinder.
7. Integration of AC Non- servomotor and pneumatic cylinders with digital inputs.
8. Controlling of X table and Y table.
9. Controlling of various systems using manual inputs.
10. Controlling of traffic lights with time delay.
11. Controlling of lift operations with time delay.
12. Hydraulic and Pneumatic simulation.

Laboratory Manual:

1. Mechatronics Lab Manual, prepared by faculty of Mechanical Engineering, KITSW

REFERENCE BOOKS:

1. *ATS Manual of L.S. Mechatronics2000*.
2. Bolton W., Mechatronics, *Pearson Publications,* 5/e, ISBN-13: 978-0273742869,2011.

Course Outcomes (COs):

Course Code: **U18OE411C** Course Name: **MECHATRONICSLAB**		
CO	**CO code**	*Upon completion of this course, the student will be able to…*
CO1	**U18OE411C.1**	*Develop PLC program to control AC non servomotors, single acting and double acting pneumatic cylinders with different operation conditions*
CO2	**U18OE411C.2**	*Develop PLC program to control various systems.*
CO3	**U18OE411C.3**	*Integrate various mechanical and electrical systems and operate them.*
CO4	**U18OE411C.4**	*Design and simulate the hydraulic and pneumatic circuits.*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course Code: **U18OE411C** Course Name: **MECHATRONICSLAB**															
CO Code	**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**
U18OE411C.1	1	2	1	2						1		1			
U18OE411C.2	1	2	1	2	2	-	-	-	-	1	-	1	1	1	1
U18OE411C.3	1	2	1	2	2	-	-	-	-	1	-	1	1	1	1
U18OE411C.4	1	2	1	2	2	-	-	-	-	1	-	1	1	1	1
U18OE411C	**1**	**2**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**-**	**1**	**1**	**1**	**1**

U18OE411D WEB PROGRAMMINGLABORATORY

Class: IV Semester **Branch:** Computer Science and Engineering

Teaching Scheme:

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives:
This course will develop students' knowledge in /on

CO1: implementing HTML Tags, CSS and Java Scripts for creating static web pages.
CO2: usage of JSP in designing dynamic web pages.
CO3: usage of PHP in designing a web base application.
CO4: accessing different web data servers using JSP and PHP

Experiment-1

1. Design the following static web pages with the following attributes:
   a. Basic Tags.
   b. Heading Tags.
   c. List (Ordered and Un-Ordered).
   d. Textbox, Buttons.

Experiment-2

2. HTML

AIM: Design the following static web pages required for an online book store web site.

a. HOMEPAGE:
b. LOGINPAGE
c. CATALOGEPAGE

DESCRIPTION:

a. HOMEPAGE

The static home page must contain three **frames**.

- ***Top frame*:** Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).
- ***Left frame*:** At least four links for navigation, which will display the catalogue of respective links. For e.g.: When you click the link **"CSE"** the catalogue for **CSE** Books should be displayed in the Right frame.
- ***Right frame*:** The *pages to the links in the left frame must be loaded here*. Initially this page contains description of the website.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	Description of the Web Site			

b. LOGIN PAGE: This page looks like below:

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	Login : Password: Submi Reset			

Experiment-3

c. CATOLOGUEPAGE:

The catalogue page should contain the details of all the books available in the web site in a table. The details should contain the following:

- Snap shot of Cover Page.
- Author Name andPublisher.
- Price and Add to cartbutton.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE		Book : XML Bible Author : Winston Publication :Wiely	$ 40.5	Add to cart
ECE		Book : AI Author :S.Russel Publication : Princeton hall	$ 63	Add to cart
EEE		Book : Java 2 Author : Watson Publication : BPB publications	$ 35.5	Add to cart
CIVIL		Book : HTML in 24 hours Author : Sam Peter Publication : Sam publication	$ 50	Add to cart

Experiment-4

3. **VALIDATION**

AIM: To do validation for registration page using JavaScript.

DESCRIPTION: Write *JavaScript* to validate the following fields of the above registration page.

a. Name (Name should contains alphabets and the length should not be less than 6 characters).
b. Password (Password should not be less than 6 characters length).
c. E-mailid(shouldnotcontainanyinvalidandmustfollowthestandardpattern ***(name@domain.com)***
d. Phone number (Phone number should contain 10 digits

only). Note: You can also validate the login page with these parameters.

4. **CSS**

AIM: Write a program illustrating various methods in cascading style sheets.

a. Use different font, styles and set a background image
b. Control the repetition of the image
c. Define styles for links
d. Work with layers and add a customized cursor

DESCRIPTION: Design a web page using **CSS (C**ascading **S**tyle **S**heets**)** which includes the following:

a. Use different font, styles: In the style definition you define how each selector should work (font, color etc.).Then, in the body of your pages, you refer to these selectors to activate the styles.
b. Set a background image for both the page and single elements on the page. You can define the background image for the page like this:
c. Control the repetition of the image with the background-repeat property. As background-repeat:repeat
d. Define styles for links
e. Work with layers:
f. Add a customized cursor:

Selector {cursor:value}
.xlink {cursor:crosshair}
.hlink{cursor:help}

5. Embedding JavaScript in HTML pages.
6. Design a registration form and validate its field by using JavaScript.

Experiment-5

7. To design the scientific calculator and make event for each button using JavaScript.
8. WAP to create popup boxes in Java Script.
9. Program to create a class calculator that contains an overloaded method called "add" to calculate the sum of two integers, two float numbers and, one integer and one float.

Experiment-6

10. Print current date &time
11. JSP Program to auto refresh a page
12. JSP Program to count no. of visitors on website
13. JSP program for error handling
14. Demonstrate expression tag
15. Detect locale, language settings & local specific time
16. Demonstrate JSP implicit object
17. JSP Program to display given number in words

Experiment-7

18. Display the contents of Employee table in a neat format.
19. Insert ***N***, no. of records into Employee table using ***Prepared Statement.***
20. EnhancethesalariesofEmployeeby10%whoareearningsalarygreaterthan5000using ***Callable Statement.***
21. Delete all students whose marks are below 50% and also display the count.

Experiment-8

22. Write a HTML file to create a simple form with 5 input fields ***(Name, Password, Email, Pin code, Phone No. and a Submit button)*** and demonstrate required field validations to validate that all input fields are required and display error messages if the above validations do not hold.
23. Create a JSP Page with and run in JSP Engines.
24. Demonstrate Session Tracking in JSP.
25. JSP Program to validate username and password

Experiment-9

26. Create Database Connectivity with JSP page with different JDBC Drivers.
27. JSP Program to Select record from database
28. JSP Program to Insert a record into the database
29. Create a CRUD operation for JSP Page using MySQL
30. JSP Program to upload file into server

Experiment-10

31. Create a form for your college library entering student details for each student in the college. Validate the form using PHP valuators and display error messages.
32. Write a PHP which does the following job:
Insert the details of the 3 or 4 users who register with the web site by using registration form. Authenticate the user when he submits the login form using the User Name and Password from the database (instead of cookies).

Experiment-11

33. Create tables in the database which contain the details of items (books in our case like Book name, Price, Quantity, Amount) of each category. Modify your catalogue page in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using PHP.
34. Create and delete MYSQL database using PHP.

Experiment-12

35. Create a PHP program to demonstrate opening and closing a file.
36. Create a PHP program to demonstrate reading a file and writing in a file.

Course Code: **U18OE411D** Course Name: **Web Programming Laboratory**		
CO	**CO code**	*Upon completion of this course, the student will be able to…*
CO1	**U18OE411D.1**	create the static web pages using HTML Tags and CSS and Java Scripts
CO2	**U18OE411D.2**	design dynamic web page for web applications using JSP
CO3	**U18OE411D.3**	develop server side scripts for web base applications using PHP
CO4	**U18OE411D.4**	design web applications for effective storage and retrieval of data in MySQL using PHP.

Mapping of the course outcome with program outcomes

Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12	PSO1	PSO2	PSO3
U18OE411D.1	2	2	2	1	2	1	-	1	2	1	2	1	2	2	2
U18OE411D.2	2	2	2	1	2	1	-	1	2	1	2	1	2	2	2
U18OE411D.3	2	2	2	1	2	1	-	1	2	1	2	1	2	2	2
U18OE411D.4	2	2	2	1	2	1	1	1	2	1	2	1	2	2	2
U18OE411D	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**1**	**2**	**1**	**2**	**1**	**2**	**2**	**2**

U18OE411E MICROPROCESSORS LABORATORY

Class: B.Tech. IV-Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LO):

This Course will develop student's knowledge on/in

LO1*: programming using 8086 Microprocessor kit*

LO2*: basic arithmetic programs and sorting using 8086 Microprocessor kit*

LO3*: string manipulation and code conversions using MASM*

LO4*: interfacing of subsystems to 8086 microprocessor kit*

List of Experiments

(Based on theory course U18OE303E)

1. Study of 8086 Trainer Board
2. Simple Arithmetic Operations (Addition, Subtraction, Multiplication and Division)
3. Finding Sum, Average.
4. Largest/Smallest Number in a given array
5. Arranging in Ascending/ Descending order
6. Finding Factorial using recursive procedure
7. Transfer of bytes from DS to ES
8. ALPs for String Manipulation
9. ALPs for Code conversions
10. Wave form Generation using DAC modules
    i. Square wave ii. Sawtooth wave iii. Triangular wave
11. ADC interfacing
12. Stepper motor –interfacing

Laboratory Manual:

1. Microprocessors Laboratory Manual, *prepared by the faculty of department of ECE,KITSW.*

Course Learning Outcomes (COs):

Course Code: **U18OE411E**		Course Name: **MICROPROCESSORSLAB**
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	**U18OE411E.1**	*write and execute assembly language programs for given tasks on 8086 microprocessor kit*
CO2	**U18OE411E.2**	*implement code conversions and bit manipulations programs in 8086 using MASM*
CO3	**U18OE411E.3**	*write waveform generation code using DAC modules*
CO4	**U18OE411E.4**	*interface stepper motor, keyboard, memory etc. with 8086 microprocessor*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course code:**U18OE311E**					Course Name: **MICROPROCESSORSLAB**										
CO Code	**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**	**PSO 2**	**PSO 3**
U18OE411E.1	3	3	2	1	--	--	--	--	--	--	--	--	2	2	1
U18OE411E.2	3	2	2	1	--	--	--	--	--	--	--	--	2	2	1
U18OE411E.3	3	2	1	1	--	--	--	--	--	--	--	--	2	2	1
U18OE411E.4	3	3	2	1	--	--	--	--	--	--	--	--	2	2	1
U18OE 411E	**3**	**2.5**	**1.75**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2**	**2**	**1**

U18OE411F STRENGTH OF MATERIALSLABORATORY

Class: B.Tech.IV-Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: *testing of civil engineering materials*
LO2: *mechanical properties of civil engineering materials*
LO3:*behavior of civil engineering materials when tested*
LO4:*codal specifications of various engineering materials*

LIST OF EXPERIMENTS

1. Determination of Stress–Strain characteristics of (a) Mild steel and (b) TOR steel.
2. Determination of the compressive strength of wood and punching shear strength.
3. Determination of the brinell's hardness numbers for steel, brass and aluminum.
4. Determination of the modulus of rigidity by conducting torsion test on solid shaft or hollow shaft.
5. Determination of the modulus of rigidity by conducting compression test on spring.
6. Determination of the Young's modulus of the given material by conducting flexural test on simply supported beam.
7. Determination of the Young's modulus of the given material by conducting flexural test on continuous beam.
8. Determination of the Young's modulus of the given material by measuring conducting flexural test on propped cantilever beam.
9. Bend and rebend test on steel specimen.
10. Shear test for Mild steel specimen.
11. Impact test on Metal Specimens using Izod test.
12. Impact test on Metal Specimens using Charpy test.
13. Demonstration of measuring strains using strain gauges, LVDTs

Laboratory Manual:

1. *Strength of Materials Laboratory Manual*, prepared by faculty ofCivil Engineering, KITSW

Reference Books:

1. Harmer E. DavisandGeorge Earl Troxell, "*Testing and Inspection of Engineering Materials",*Mc Graw-Hill book company, inc,2nd edn.,1955.
2. A.V.K. Suryanarayana, "*Testing of Metallic Materials",* Prentice-Hall of India, 2nd edn.,2007.
3. IS 1786:2008 *"High strength deformed steel bars and wires for concrete reinforcement-specification.* Bureau of Indian standards, New Delhi,2008.
4. IS 432(Part-I):1982 *"Specification for mild steel and medium tensile steel bars and Hard drawn steel wires for concrete reinforcement".* Bureau of Indian standards, New Delhi,1992.
5. IS 432(Part-II):1982 *"Specification for mild steel and medium tensile steel bars and Hard drawn steel wires for concrete reinforcement".* Bureau of Indian standards, New Delhi,2004.

Course Outcomes (COs):

Course Code: **U18OE411F**		Course Name: **Strength of Materials Laboratory**
CO	**U18OE411F.1**	Upon completion of this course, the student will be able to…
CO1	**U18OE411F.2**	correlate theory with the testing of engineering materials for quality assessment.
CO2	**U18OE411F.3**	evaluate the mechanical properties of civil engineering materials.
CO3	**U18OE411F.4**	appraise the behavior of civil engineering materials when tested under loads.
CO4	**U18OE411F.1**	realize the specifications recommended by codes to civil engineering materials.

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course Code: **U18OE411F** Course Name: **Strength of Materials Laboratory**

CO Code	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
U18OE411F.1	1	-	-	1	-	1	-	-	2	1	1	1	1	1	1
U18OE411F.2	1	-	-	1	-	1	-	-	2	-	-	1	1	1	1
U18OE411F.3	1	-	-	1	-	1	-	-	2	-	-	1	1	1	1
U18OE411F.4	1	-	-	1	-	1	-	2	1	1	1	1	1	1	1
U18OE411F	**1**	**-**	**-**	**1**	**-**	**1**	**-**	**2**	**1.75**	**1**	**1**	**1**	**1**	**1**	**1**

U18CH416 ENVIRONMENTALSTUDIES

Class: B. Tech. IV-Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
2	-	-	2

Examination Scheme:

Continuous Internal Evaluation:	40 marks
End Semester Exam :	60 marks

Course Learning objectives (LOs):
This course will develop students' knowledge in/on
LO1: *necessity to use natural resources more equitably*
LO2 :*concepts of ecosystem and the importance of biodiversity conservation*
LO3 : *causes, effects and control measures of various environmental issues*
LO4 : *issues involved in enforcement of environmental legislation*

UNIT-I (6)

Introduction - The multidisciplinary nature of environmental studies - definition, scope and importance.

Natural Resources: Forest Resources - Use and over–exploitation of forests, deforestation, timber extraction, mining, dams - their effects on forests and tribal people; **Water Resources -** Use and over-utilization of surface and ground water, floods, drought, conflicts over water; **Mineral Resources -** Environmental effects of extracting and using mineral resources; **Agricultural Land -** Land as a resource, land degradation, soil erosion and desertification; **Food Resources** - World food problems, effects of modern agriculture, fertilizer-pesticide problems, water logging and salinity; **Energy Resources -** Renewable and non-renewable energy sources, use of alternate energy sources.

UNIT-II (6)

Ecosystem and Biodiversity: Ecosystem - Concepts of an ecosystem, food chain, food webs, ecological pyramids, energy flow in the ecosystem and ecological succession;

Biodiversity and its Conservation – Introduction, definition, genetic, species and ecosystem diversity, value of biodiversity, biodiversity in India, hot spots of biodiversity, man-wildlife conflicts, endangered and endemic species of India, in-situ and ex-situ conservation.

UNIT-III (6)

Environmental Pollution: Global climatic change, green house gases, effects of global warming, ozone layer depletion; International conventions/protocols - Earth summit, Kyoto protocol and Montreal protocol; causes and effects of air, water, soil, marine and noise pollution with case studies; solid and hazardous waste management, effects of urban industrial and nuclear waste; natural disaster management - flood, earthquake, cyclone and landslides.

UNIT-IV (6)

Social Issues and the Environment: **Role of Individual and Society** - Role of individual in prevention of pollution, water conservation, Rain water harvesting and watershed management; **Environmental Protection / Control Acts** - Air (Prevention and control of Pollution) Act- 1981, water (Prevention and Control of Pollution) Act-1974, water Pollution Cess Act-1977, Forest conservation Act (1980 and 1992), wildlife Protection Act 1972 and environment protection Act 1986, issues involved in enforcement of environmental legislations; **Human Population and Environment** - Population growth, family welfare programmes, women and child welfare programmes, role of information technology in environment and humanhealth.

TEXT BOOK:

1. ErachBharucha, "Text Book of Environmental Studies for Under Graduate Courses(2nd edn.)", *Universities Press (India) Private Limited,* 2013.

REFERENCE BOOKS:

1. Y. Anjaneyulu, "Introduction to Environmental Science", *B.S. Publications*,2004.
2. Gilbert M. Masters, "Introduction to Environmental Engineering &Science", *Prentice Hall of India,*Third Edition,1991.
3. Anubha Kaushik, C.P. Kaushik, "Environmental Studies", 4/e, *New Age International Publishers,*2014.
4. R.Rajagopalan, "Environmental Studies from crisis to cure", *Oxford UniversityPress*, Second Edition,2011.

Course Outcomes (COs):

Course Code: **U18CH416**		Course Name: **Environmental Studies**
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	**U18CH416.1**	*investigate any environmental issue using an interdisciplinary framework*
CO2	**U18CH416.2**	*formulate an action plan for sustainable alternatives and conserving biodiversity that integrates science, humanist, social and economic perspective*
CO3	**U18CH416.3**	*identify and explain the complexity of issues and processes which contribute to an environmental problem*
CO4	**U18CH416.4**	*participate effectively in analysis and problem-solving through knowledge in environmental legislations*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course Code: **U18CH416**					Course Name: **Environmental Studies**							
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
U18CH416.1	2	1	2	1	-	2	1	-	1	-	-	-
U18CH416.2	-	-	2	-	-	1	2	-	1	-	-	-
U18CH416.3	1	2	1	-	-	1	2	1	1	-	-	-
U18CH416.4	-	-	1	-	-	1	2	-	1	-	-	-
U18CH416	**1.5**	**1.5**	**1.5**	**1**	**-**	**1.25**	**1.75**	**1**	**1**	**-**	**-**	**-**

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
KAKATIYA INSTITUTE OF TECHNOLOGY &SCIENCE:: WARANGAL – 15
(An Autonomous Institute under Kakatiya University, Warangal)

SCHEME OF INSTRUCTION & EVALUATION

V- SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAM

[6Th+3P+Seminar]

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	HSMC	U18TP501	Quantitative Aptitude & Logical Reasoning	2	_	_	1	10	30	40	60	100
2	PE	U18CS502	Professional Elective - I / MOOC-I	3	-	-	3	10	30	40	60	100
3	PCC	U18CS503	Computer Networks	3	1	-	4	10	30	40	60	100
4	PCC	U18CS504	Software Engineering	3	-	-	3	10	30	40	60	100
5	PCC	U18CS505	Compiler Design	3	-	-	3	10	30	40	60	100
6	PCC	U18CS506	Python Programming	3	-	-	3	10	30	40	60	100
7	PCC	U18CS507	Advanced Java Programming Lab	-	-	2	1	40	-	40	60	100
8	PCC	U18CS508	Compiler Design Lab	-	-	2	1	40	-	40	60	100
9	PCC	U18CS509	Python Programming Lab	-	-	2	1	40	-	40	60	100
10	PROJ	U18CS510	Seminar	-	-	2	1	100	-	100	-	100
Total:				17	1	8	21	280	180	460	540	1000
***Additional Learning*:** *Maximum credits allowed for Honours/Minor*				-	-	-	*7*	-	-	-	-	-
Total credits for Honours/Minor students:				-	-	-	***21+7***	-	-	-	-	-

** List of courses for additional learning through **MOOCs** towards Honours/Minor in Engineering shall be prescribed by the department under Honours/ Minor Curricula*

[L= Lecture, T = Tutorials, P = Practicals& C = Credits] Total Contact Periods/Week : 26 Total Credits **: 21**

Professional Elective-I / MOOC-I:	**U18CS502A: Artificial Intelligence** **U18CS502B: Computer Graphics and Multimedia** **U18CS502C: Advanced Database Management System** **U18CS502M: MOOCs course**

U18TP501QUANTITATIVE APTITUDE AND LOGICAL REASONING

Class: B.Tech V-Semester **Branch(s):** Computer Science and Engineering

Teaching Scheme:

L	T	P	C
2	-	-	1

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: quantitative aptitude & problem solving skills

LO2: computing abstract quantitative information

LO3: application of basic mathematics skills & critical thinking to draw conclusions

LO4: evaluating the validity & possible biases in arguments presented in authentic contexts

UNIT - I (6)

Quantitative Aptitude-I: Number system, Averages, Percentages, Ratios & proportions, Time, Speed & distance, Time and work, Data interpretation

UNIT - II (6)

Quantitative Aptitude-II: Simple Interest, Compound Interest, Profit & loss, Ages, Permutations &Combinations, Probability

UNIT - III (6)

Logical Reasoning-I: Series completion, Analogy, Coding and decoding, Blood relations, Number, Ranking & Time sequence test, Linear & Circular arrangements

UNIT - IV (6)

Logical Reasoning-II: Data sufficiency, Logical Venn diagram, Syllogisms, Statement & Arguments, Statement & Assumptions, Direction sense test

Text Books:

[1] R S Agarwal, *Quantitative Aptitude for Competitive Examinations*, 3rd ed.New Delhi: S. Chand Publications, 2019. *(Chapters 1,6,7,8,10,11,12,15,17,21,22,30,31)*

[2] R S Agarwal, *A Modern Approach to Verbal and Non-Verbal Reasoning*, 3rd ed. New Delhi: S. Chand Publications, 2019. *(Chapters Section I: 1,3,4,5,6,8,16, Section II: 2,3)*

Reference Books:

[1] Dinesh Khattar, *Quantitative Aptitude for Competitive Examinations*, New Delhi: Pearson India, 2019.

[2] Nishit K Sinha, *Reasoning for Competitive Examinations*, New Delhi: Pearson India, 2019.

[3] R.N.Thakur , *General Intelligence and Reasoning*, New Delhi: McGraw Hill Education, 2017.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1:solvearithmetic relationships and interpret data using mathematical models

CO2:compute abstract quantitative information

CO3:apply basic mathematics & critical thinking skillsto draw conclusions and solve problems

CO4: evaluate the validity & possible biases in arguments presented in authentic contexts logically &sensibly

Course Articulation Matrix (CAM):U18TP501 QUANTITATIVE APTITUDE AND LOGICAL REASONING

CO		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	U18TP501.1	-	2	-	1	-	-	-	-	-	-	-	1	-	-	1
CO2	U18TP501.2	-	2	-	1	-	-	-	-	-	-	-	1	-	-	1
CO3	U18TP501.3	-	1	-	2	-	2	-	-	-	-	-	1	-	-	1
CO4	U18TP501.4	-	1	-	2	-	2	-	-	-	-	-	1	-	-	1
U18TP501		**-**	**1.5**	**-**	**1.5**	**-**	**2**	-	-	-	-	-	1	**-**	**-**	**1**

U18CS502A ARTIFICIAL INTELLIGENCE

Class: B.Tech. V-Semester **Branch:** Computer Science & Engineering

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on…

LO1: *fundamentals of Artificial Intelligence, agents, problem solving approaches & searching techniques*

LO2: *local search algorithms, Game playing, solution searching using min-max and CSP problems*

LO3: *prepositional logic syntax & semantics, inference procedure, first order logic, augmented grammar rules and machine translation systems*

LO4: *decision theory, making simple & complex decisions and robot hardware, software motion, and applications*

UNIT – I (9)

Introduction: Introduction to AI, The foundations &history of AI

Intelligent Agents: Agents and environments, Nature of environments, Structure of agents

Problem Solving: Problem-solving agents, Example problems searching for solutions, Uninformed and informed search strategies, Heuristic functions

UNIT – II (9)

Classical Search: Local search algorithms &optimization problems, Local search in continuous space, searching in nondeterministic actions, Partial observations

Adversarial Search: Game playing, The Mini-max search procedure, Alpha-Beta pruning, cutoffs and Additional refinements

Constraint Satisfaction Problems(CSP): Constraint propagation, Backtracking search for CSPs

UNIT – III (9)

Logical Agents: Knowledge based agents, Wumpus world, Propositional logic

First Order Logic (FOL): Syntax & Semantics, Using FOL, Knowledge engineering

Inference in FOL, Forward chaining, Backward chaining, Resolution

Natural Language for Communication: Phrase structure grammars, Syntactic analysis, Augmented grammars, Machine translation

UNIT – IV (9)

Quantifying Uncertainty: Acting under uncertainty, Bayes' rule

Probabilistic Reasoning Over Time: Time and uncertainty, Inference in temporal models, Hidden markov models

Making Simple and Complex Decisions: Combining beliefs and desires under uncertainty, The basis of utility theory, Utility functions, Sequential decision problems, Value iteration and Policy iteration

Robotics: Robotic hardware, Perception, Planning and control, Application domains

Text Book:

Stuart Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach*, 3rd ed.New Delhi: Prentice Hall Series in AI, 2010

Reference Books:

[1] Elaine rich and Kevin knight, *Artificial Intelligence*, 2nded.New Delhi:Tata McGraw-Hill, 2002.

[2] k Stefik, *Introduction to Knowledge Systems*,San Francisco: Morgan Kaufman, 1995.

[3] Winston,Patrick Henry, *Artificial Intelligence*, 3rded. California: Addison Wesley, 1995.

[4] Dan W. Patterson, *Introduction to Artificial Intelligence and Expert Systems*, 2nded.New Delhi, Prentice Hall of India, 1997.

On completion of this course, students will be able to…

CO1: *apply fundamentals of AI in various problem-solving approaches for engineering problems*

CO2: *analyze search algorithms, game playing and constraint satisfying problem &solutions*

CO3: *develop prepositional logic, Fist Order Logic and apply the augmented grammar solutions for machine translation*

CO4: *apply decision theory for simple & Complex problems and illustrate the software & hardware used in robotics*

Course Articulation Matrix (CAM):U18CS502A ARTIFICIAL INTELLIGENCE

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS0 1	PS0 2	PS0 3
CO1	U18CS502A. 1	2	2	2	2	-	1	-	1	-	1	-	2	2	2	1
CO2	U18CS502A. 2	2	2	2	2	-	1	-	1	-	1	-	2	2	2	1
CO3	U18CS502A. 3	2	2	2	2	-	1	-	1	-	1	-	2	2	2	1
CO4	U18CS502A. 4	2	2	2	2	-	1	-	1	-	1	-	2	2	2	1
U18CS502A		2	2	2	2	-	1	-	1	-	1	-	2	2	2	1

U18CS502B COMPUTER GRAPHICS AND MULTIMEDIA

Class: B.Tech. V–Semester Branch: Computer Science & Engineering (CSE)

Teaching Scheme:

L	T	P	C
3	–	–	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):
This course will develop students' knowledge on /in…
LO1: computer graphics primitives algorithms by drawing line drawing algorithms and 2D transformations
LO2: algorithms of segments, clipping &3D viewing transformations
LO3:deriving projections mathematically and identification of hidden surfaces for creating standard animations
LO4: fundamental concepts of multimedia systems

UNIT-I (9)

Geometry and line generation: Introduction, Application of computer graphics, Pixels and frame buffer, Graphics standards, Image representation, *DDA* and Bresenham line generation algorithms, Graphics primitive operations, Character generation methods, Aliasing and anti aliasing
Polygons: Polygon representation, Inside test methods, Seed filling, Scanline filling algorithms
Two dimensional transformations: Scaling, Translation and rotation transformations, Rotation about arbitrary point, Homogenous coordinates, Inverse transformations, Transformation routines, Reflection and shearing transformations, Instance transformations

UNIT-II (9)

Segments: Segment creation algorithm, Segment closing algorithm, Segment deletion and segment renaming algorithms, Image transformation
Windowing and clipping: Window and view port, Viewing transformation matrix, Implementation of viewing transformation, Multiple windowing, Cohen Sutherland outcode algorithm , Sutherland hodgman algorithm, Midpoint subdivision algorithm, Generalized clipping
Three dimensions: *3D* primitives, *3D* transformations, Rotation about arbitrary axis, *3D* viewing, Viewing parameters

UNIT-III (9)

Projections: Parallel projection, Perspective projection, Derivation of parallel projection matrix, Derivation of perspective projection matrix
Hidden surface and line removal algorithms: *Z buffer* algorithm, Painters algorithm, Warnock algorithm, Franklin algorithm, Back face removal algorithm
Computer based animation: Basic concepts, Animation languages, Methods of controlling animation, Display of animation, Transmission of animation

UNIT-IV (9)

Multimedia: Media and data streams, Main properties of multimedia system, Traditional data stream characteristics - Asynchronous transfer mode, Synchronous transfer mode
Sound / Audio: Basic sound concepts - Computer representation of sound, Audio formats, Music - *MIDI* concepts, *MIDI* devices, *MIDI* messages, *MIDI* software, Speech - Speech generation, Speech analysis, Speech transmission
Multimedia applications: Media preparation, Media composition, Media integration, Media communication, Media consumption, Media entertainment

Text Books:

[1] Steven Harrington, *Computer Graphics, A Programming Approach*, 2nd ed. New York: McGraw-Hill, 1987

[2] Ralf Steinmetz, Klara Nahrstedt, Multimedia: *Computing, Communications & Applications*, New Delhi: Pearson First Impression, 2006,(Chapters 2, 3, 17)

Reference Books:

[1] James D.FoleyAndries Van Dam Steven K. Fernier, John Hugs, *Computer Graphics Principles & Practice*, 2nd ed. New Delhi: Pearson Education, 2002.

[2] Donad Hearn, Pauline Baker, *Computer Graphics*, 2nded. New Delhi: Pearson Education, 1997.

[3] Fabio Ganovelli, Massimiliano Corsini, SumantaPattanaik, Marco Di Benedetto, *Introduction to computer graphics a practical learning approach*, Newyork: Chapman and Hall, 2014.

[4] Dr Rajiv chopra*Computer graphics : a practical approach, concepts, principles, case studies, experiments,* 4th ed.New Delhi: S Chand, 2011.

Course Learning Outcomes(COs):

On completion of this course, students will be able to…

CO1: design and transform a line or polygon using two dimensional transformations

CO2: apply segmentation and clipping algorithms to transform 2D to basic 3D transformations

CO3: analyze and apply projections, hidden surface algorithms to include final clipped images into animations

CO4: demonstrate knowledge on different concepts of multimedia

Course Articulation Matrix (CAM): U18CS502B COMPUTER GRAPHICS AND MULTIMEDIA

CO		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	PSO3
CO1	U18CS502B.1	2	2	2	1	-	-	-	-	-	1	-	2	2	2	-
CO2	U18CS502B.2	2	2	2	1	-	-	-	-	-	1	-	2	2	2	-
CO3	U18CS502B.3	2	2	1	1	-	-	-	-	-	1	-	1	2	1	-
CO4	U18CS502B.4	1	1	-	-	1	-	-	-	-	1	-	2	1	1	1
U18CS502B		**1.75**	**1.75**	**1.7**	**1.5**	**1**	1	-	-	-	1	-	**1.75**	**1.75**	**1.5**	**1**

U18CS502C ADVANCED DATABASE MANAGEMENT SYSTEMS

Class: B.Tech. V-Semester **Branch:** Computer Science and Engineering (CSE)

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on…

LO1 : data storage, disk organization, tree structured indexing & hash-based indexing techniques
LO2 :parallel & distributed database architectures, organization &management
LO3 :object database systems, operators and query evaluation
LO4 :deductive databases, web databases, XQuery and spatial data management

UNIT-I(9)

Overview of Storage and Indexing: Data on external storage, File organizations and indexing, Index data structures, Indexes and performance tuning
Storing Data Disks and Files: The memory hierarchy, Redundant arrays of independent disks, Disk space management, Buffer manager, Files of records, Page formats, Record formats
Tree-Structured Indexing: Intuition for tree indexes, ISAM, B+ trees - Search, insert, delete, duplicates, B+ trees in practice;
Hash-Based Indexing: Static hashing, Extendible hashing, Linear hashing, Extendible versus linear hashing

UNIT-II(9)

Parallel Databases: **Introduction, Architectures for parallel databases, Parallel query evaluation, Parallelizing individual operations and parallel query optimization**

Distributed Databases: Introduction, Distributed DBMS architectures, Storing data in distributed DBMS, Distributed catalog management, Distributed query processing, Updating distributed data, Distributed transactions, Distributed concurrency control, Distributed recovery

UNIT-III(9)

Object-Database Systems: *Motivating example, Structured data types, Operations on structured data, Encapsulation and ADTS, Inheritance, Objects, OIDS and reference types, Database design for an ORDBMS, ORDBMS implementation challenges, OODBMS, Comparing RDBMS,OODBMS, and ORDBMS*
Overview of Query Evaluation: The system catalog, Introduction to operator evaluation, Introduction to query optimization, What a typical optimizer does
Evaluating Relational Operators: The selection operation, General selection conditions, The projection operation, The join operation, The set operations, Aggregate operations

UNIT-IV (9)

Deductive Databases: Introduction to recursive queries, Recursive queries with negation, Data log to SQL, Evaluating recursive queries
Web Databases: Introduction to information retrieval, Indexing for text search, Web search engines, Managing text in DBMS, A data model for XML
XQuery: Querying XML data, Efficient evaluation of XML queries
Spatial Data Management: Types of spatial data and queries, Applications involving spatial data, Introduction to spatial indexes, Indexing based on space-filling curves

Text Book:

[1] Raghu Ramakrishnan, Johannes Gehrke, *Database Management Systems*,4th ed. Hyderabad:Mc-Graw Hill, 2014.*(Chapters 7 to 10, 12, 13, 21, 22, 25, 26, 27)*

Reference Books

[1] Hector Garcia Molina,Jeffery D Ullman, and Jennifer Widom,*Database Systems: The Complete Book*,2nded.New Jersey:Pearson, 2008.

[2] RamezElmasri,Shamkanth B. Navathe, *Fundamentals of Database Systems*, 7thed. New Delhi: Pearson Education, 2017.

[3] Abraham Siberschatz, Henry F.Korth, and S.Sudarshan, *Database System Concepts*, 6thed. New Delhi: McGraw-Hill 2011.

[4] R. P. Mahapatra,Govind Verma, *Database Management Systems*, 1st ed.New Delhi:Khanna publications, 2016.

Course Learning Outcomes(COs):

On completion of this course, students will be able to…

CO1: illustrate the way data stored &organized in external storage devices and apply various indexing techniques to efficiently access the data

CO2: illustrate the architectures, data organization and management of parallel & distributed databases

CO3: evaluate queries using various operators and features of object database systems

CO4: illustrate the data mangement in deductive databases, web databases, XQueries& spatial databases

Course Articulation Matrix (CAM): U18CS502C ADVANCED DATABASE MANAGEMENT SYSTEMS

CO		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	PSO3
CO1	U18CS502C.1	2	2	2	2	1	-	-	-	-	1	-	2	2	1	2
CO2	U18CS502C.2	2	2	2	2	1	-	-	-	-	1	-	2	2	1	2
CO3	U18CS502C.3	2	2	2	2	1	-	-	-	-	1	-	1	2	1	2
CO4	U18CS502C.4	2	2	2	2	1	-	-	-	-	1	-	2	2	1	2
U18CS502C		**2**	**2**	**2**	**2**	**1**	-	-	-	-	1	-	**1.75**	**2**	**1**	**2**

U18CS503 COMPUTER NETWORKS

Class: B. Tech. V-Semester **Branch: Computer Science and Engineering**

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop students' knowledge on /in…

LO1: computer networks reference models, physical layer components & network switching
LO2: data link and medium access control protocols
LO3:routing algorithms, congestion control algorithms & internetworking
LO4: transport and application layer protocols used in the networks

UNIT-I (9+3)

Introduction: Uses of computer networks, Network hardware, Network software
Reference Models: OSI reference model, TCP /IP reference model, Comparison of *OSI* and TCP/IP reference model
Physical Layer: Transmission media - Guided transmission media, Wireless transmission, Communication satellites; Digital modulation and multiplexing
Switching: Circuit and Packet switching

UNIT-II (9+3)

Data Link Layer: Data link layer design issues, Error detection and correction, Elementary data link protocols, Sliding window protocols
Medium Access Control Sub Layer: Channel allocation problem, ALOHA, Carriers sense multiple access, Collision free protocols, Limited contention protocol, IEEE standard 802.3, Token bus, Token ring, Switched Ethernet, Fast Ethernet, Gigabit Ethernet, Bluetooth, Data link layer switching

UNIT-III (9+3)

Network Layer: Network layer design issues, Routing algorithms - Optimality principle, Shortest path algorithm, Flooding, Distance vector routing, Link state routing, Hierarchical routing, broadcast routing, Multicast routing
Congestion Control Algorithms: Approaches to congestion control, Traffic aware routing, Admission control, Traffic throttling, Load shedding
Internetworking: How networks differ, How networks can be connected, Tunneling, Internetwork routing, Packet fragmentation

UNIT-IV (9+3)

Network Layer In The Internet: *IP* version 4 protocol, *IP* addresses, *IP* version 6 protocol, Internet control protocols, *OSPF* – Interior gateway routing protocol, *BGP* – Exterior gateway routing protocol, Internet multicasting
Transport Layer: Transport services, Elements of transport protocols – Connection establishment and release, Error control and flow control, Crash recovery, Multiplexing congestion control; Internet transport protocols - UDP, TCP
Application Layer: Domain name system (DNS), Electronic mail, World Wide Web

Text Book:

[1] AndrewS.Tannenbaum, David J.Wetherall, *Computer Networks*, 5thed.London:Pearson Education, 2011.

Reference Books:

[1] William Stallings, *Data and Computer Communications*, 10thed.London:Pearson Education, 2014.
[2] Behrouz Forouzan, *Data Communication and Networking*, 5thed.New York: Tata McGraw Hill, 2012.
[3] Larry Peterson, Bruce S Davie, *Computer Networks*, 5thed.New York: Elsevier Inc., 2011.
[4] James F. Kurose and Keith W. Ross, *Computer Networking A Top-Down Approach*, 6th ed.London:Pearson Education, 2013.

Course Learning Outcomes(COs):

On completion of this course, students will be able to…

CO1: compare OSI & TCP/IP reference models
CO2: analyze different types of data link & medium access control protocols
CO3: apply routing algorithms, congestion control algorithms & internetworking
CO4: analyze the different services of transport and application layer protocols

Course Articulation Matrix (CAM)U18CS503 COMPUTER NETWORKS

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**U18CS503.1**	2	-	-	-	-	-	1	-	-	1	-	1	1	1	1
CO2	**U18CS503.2**	2	2	1	2	2	-	-	-	-	1	-	1	1	1	2
CO3	**U18CS503.3**	2	2	2	2	1	-	-	-	-	1	-	1	2	1	1
CO4	**U18CS503.4**	1	2	-	1	-	-	-	-	-	1	-	1	1	1	-
U18CS503		**1.75**	**2**	**1.5**	**1.66**	**1.5**	**-**	**1**	**-**	**-**	**1**	**-**	**1**	**1.25**	**1**	**1.33**

U18CS504 SOFTWARE ENGINEERING

Class: B. Tech. V-Semester **Branch: Computer Science and Engineering**

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):
This course will develop students' knowledge in/on…

LO1: fundamental concepts of software and different types of software models
LO2: different types of design concepts and patterns
LO3: software design principles and test strategies
LO4: metrics for quality analysis of software and risk management

UNIT-I (9)

Software Engineering Concepts: The changing nature of software, Software application domains, Legacy software, Software myths, Software engineering layered technology, A process framework, The capability maturity model integration (*CMMI*), Agile software

Process Models -Prescriptive process models, RAD model, Specialized process models, Unified process model, Personal and team process models

Agile Development: Agility and the cost of change, Agile process, Extreme programming, Other agile process models

Software **Engineering Practices**: Communication principles, Planning principles, Modeling principles, Construction principles, Deployment principles

UNIT-II (9)

Requirements Engineering Tasks: Requirements analysis and modeling strategies, User requirement, System requirement, Software requirements document

Design Engineering: Design within the context of software engineering, Design process, Design concepts, The design model

Architectural Design: Creating an architectural design - Software architecture, Architectural genres, Architectural styles, Architectural design, Assessing alternative architectural designs, Designing class based components, Conducting component level design, Design for WebApps, Designing traditional components

UNIT-III (9)

User Interface Design: The golden rules, User interface analysis and design, Interface analysis, Interface design steps, WebApp and mobile interface design

Testing Strategies: Software testing fundamentals, Test strategies for conventional software, Test strategies for object-oriented software, Validation testing, System testing, The art of Debugging, White box testing, Basis path testing, Control structure testing, Black box testing

Testing Web Applications: Testing concepts for webapps, The testing process, Content testing, User interface testing, Component-level testing, Navigation testing, Configuration testing, Security testing, Performance testing

UNIT-IV (9)

Product Metrics: Measures, Metrics and indicators, Metrics for the requirements model, Metrics for the design model, Metrics for source code, Metrics for testing, Metrics for maintenance

Process and Project Metrics: Metrics in the process and project domains, Software measurement, Metrics for software quality, Integrating metrics within the software process, The *W5HH* principle

Project Scheduling: Project scheduling, Scheduling for WebApps projects, Earned value analysis

Risk Management: Reactive versus Proactive risk strategies, Software risks, Risk identification, Risk projection, Risk refinement, RMMM plan

Text Book:

[1] Roger S.Pressman and Bruce R.Maxim, *Software Engineering: A Practitioner's Approach,*7th ed., NewDelhi:McGraw Hill, 2019

Reference Books:

[1] Ian Sommerville, *Software Engineering*, 10th ed., Delhi:Pearson Education, 2016

[2] Deepak Jain, *Software Engineering: Principles and Practices*, 3rd ed., Delhi:Oxford University Press, 2008

[3] Pankaj Jalote, *Software Engineering: A Precise Approach,*NewDelhi:Wiley India, 2010

[4]Waman S. Jawadekar, *Software Engineering: A Primer*, NewDelhi:TataMcgraw Hill, 2008

Course Learning Outcomes(COs):

On completion of this course, students will be able to…

CO1: implement the appropriate software model for a given real time application

CO2: develop different types of software designs &patterns

CO3: apply an appropriate testing method for a given software

CO4: apply metrics to assess the quality of software and analyze the risk management in project scheduling

Course Articulation Matrix (CAM): U18CS504 SOFTWARE ENGINEERING

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CS504.1	1	1	1	1	-	-	-	-	1	1	2	1	2	1	2
CO2	U18CS504.2	1	1	1	1	-	-	-	-	1	1	2	1	1	1	2
CO3	U18CS504.3	2	2	1	1	-	1	1	-	1	1	2	1	2	1	2
CO4	U18CS504.4	2	2	2	2	-	1	1	-	1	1	2	1	2	1	2
U18CS504		1.5	1.5	1.25	1	-	1	1	-	1	1	2	1	1.75	1	2

U18CS505 COMPILER DESIGN

Class: B.Tech. V-Semester

Branch: Computer Science and Engineering(CSE)

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop students' knowledge on /in…

LO1: phases of a compiler and design of a lexical analyzer

LO2: parsing techniques using context-free grammar and construction of syntax tree

LO3: specification of a type checker, storage allocation strategies and generating intermediate form for programming statements

LO4: generating target code from the intermediate form and applying code optimization techniques

UNIT-I (9)

Introduction to Compiling: Compilers, Analysis of the source program, Phases of a compiler, Cousins of the compiler, Grouping of phases, Compiler construction tools

Lexical Analysis: Role of lexical analyzer, Input buffering, Specification of tokens, Recognition of tokens, A language for specifying lexical analyzers, Finite automata, Design of a lexical analyzer, Optimization of deterministic finite automata based pattern matchers

UNIT-II (9)

Syntax Analysis: Role of the parser, Writing grammars, Context free grammars, Top down parsing, Bottom up parsing, Operator precedence parsing, LR parsers, Using ambiguity grammars, Parser generators

Syntax Directed Translation: Syntax directed definitions, Construction of syntax trees, Bottom up evaluation of S-attributed definitions, L-attributed definitions, Top down translation, Bottom up evaluation of inherited attribute, Space for attribute values at compile time, Analysis of syntax directed definition

UNIT-III (9)

Type Checking: Type systems, Specification of a simple type checker, Equivalence of type expressions, Type conversions

Runtime Environments: Source language issues, Storage organization, Storage allocation strategies, Symbol tables, Language facilities for dynamic storage allocation, Dynamic storage allocation techniques

Intermediate Code Generation: Intermediate languages, Declarations, Assignment statements, Boolean expressions, Back patching

UNIT-IV (9)

Code Generation: Issues in the design of code generator, The target machine, Runtime storage management, Basic blocks and flow graphs, Next-use information, A simple code generator, Register allocation and assignment, Directed acyclic graph representation of basic blocks, Peephole optimization, Generating code from directed acyclic graphs, Code generation algorithm

Code Optimization: Introduction, The principal sources of optimization, Optimization of basic blocks, Loops in flow graphs, Introduction to global data flow analysis, Code improving transformations

Text Book:

fred V.Aho, Ravi Sethi, Jeffrey D.Ullman, *Compilers: Principles, Techniques and Tools*, 2nd ed. Hong Kong: Pearson Education Asia, 2013.

Reference Books:

[1] Allen I. Holub, *Compiler Design in C*, 2nd ed.New Jersey: Prentice Hall of India, 2003.

[2] N. Fischer, R. J. LeBlanc, *Crafting a compiler with C*, California: Pearson Education, 2003.

[3] J.P. Bennet, *Introduction to Compiling Techniques*, 2nd ed. New York: McGraw-Hill, 2003.

[4] Henk Alblas, Albert Nymeyer, *Practice and Principles of Compiler Building with C*, London: PHI, 2001.

Course Learning Outcomes(COs):

On completion of this course, students will be able to…

CO1: design lexical analyzer using regular expressions to generate tokens from the given programming statements

CO2: construct syntax tree and parsing table for the given context-free grammar

CO3: generate intermediate code for the given programming statements

CO4: generate target code from the intermediate form and apply code optimization techniques to improve the performance of the code

Course Articulation Matrix (CAM): U18CS505 COMPILER DESIGN

Course Outcomes		PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18CS505.1	2	2	2	2	1	1	-	-	1	1	1	1	2	2	2
CO2	U18CS505.2	2	2	2	2	1	1	-	-	1	1	1	1	2	2	2
CO3	U18CS505.3	2	2	2	2	1	1	-	-	1	1	1	1	2	2	2
CO4	U18CS505.4	2	2	2	2	1	1	-	-	1	1	1	1	2	2	2
U18CS505		2	2	2	2	1	1	-	-	1	1	1	1	2	2	2

U18CS506 PYTHON PROGRAMMING

Class: B.Tech. V-Semester **Branch:** Computer Science and Engineering(CSE)

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on…
LO1: basics of python programming, operators, control statements & functions in Python
LO2:namespaces, modules, string handling methods & collections
LO3: object oriented programming, inheritance, polymorphism, files& database connectivity using SQLite
LO4: Numpy, Pandas and Matplotlib libraries of Python

UNIT-I (9)

Introduction: Features of Python, The future of Python, Writing and executing Python programs
Python Preliminaries: Literal constants, Variables and identifiers, Data types, Input operation, Comments, Reserved words, Indentation, Operators, Expressions in Python, Type conversion
Decision Control Statements: Selection/Conditional branching statements, Loop structures/ iterative statements, Nested loop, The continue statement, The pass statement, The else statement used with loops
Functions: Function definition, Function call, Variable scope and lifetime, The return statement, Advances in defining in functions, Lambda functions, Recursive functions

UNIT-II (9)

Modules and Name Spaces: The from…import statement, Naming module, The dir() function, Packages in Python, Standard library modules, globals(), locals(), and reload(), Function redefinition
Python Strings: String operations, String formatting operator, Built-in string methods and functions, slice operation, ord() and chr() Functions, in and not in operators, Comparing strings, Regular expressions
Data Structures: Sequences, Lists, Tuple, Sets, Dictionaries

UNIT-III (9)

Python Object Oriented Programming: Classes and objects, Class method and self-argument, The_init_() method, Class variables and object variables, The_del_() method, Public and private data members, Private methods, Calling a class method from another class method, Built-in class attributes, Class methods, Static methods, Inheritance and polymorphism, Error and exception handling
Files: Opening and closing files, Reading and writing files, File positions, Renaming and deleting files, Directory methods
Database Connectivity: Databasebrowser for SQLite, Creating a database table, Insert and retrieve data from database
Case-Study: Spidering Twitter using a database

UNIT-IV (9)

NumPy: The basics of NumPy arrays, Array indexing, Array slicing, Reshaping of array, Concatenation and splitting arrays, Introducing UFuncs

Data Manipulation with Pandas: Installing and using Pandas, Introducing Pandas objects, data indexing and selection, Handling missing data, Combining datasets, Merge and join, Aggregation and grouping
Visualization with Matplotlib:Importing Matplotlib, Saving figures to files, Simple line plots, Simple scatter plots, Histograms, Binnings, and density, Example-Handwritten digits, Text and annotations Example-Effects of holidays on US births, Geographic data with basemap, Plotting data on maps, Example-California cities

Text Books:

[1] Reema Thareja, *Python Programming using problem solving approach*, New Delhi: Oxford University Press, 2017.

[2] Jake VanderPlas, *Python Data Science Handbook- Essential Tools for Working with Data*,California: O'Reilly Media Inc., 2016. (*Chapter 2 to 4*)

Reference Books:

[1] Dr. Charles R. Severance, *Python for Everybody-Exploring Data Using Python*, open book, 2016.

[2] David Beazley, *Python Cookbook*, 3rd ed. California: O'Reilly Media, Inc., 2013.

[3] Caleb Hattingh, *20 Python Libraries You Aren't Using (But Should)*, 2nd ed. California: O'Reilly Media, Inc., 2016.

[4] Magnus Lie Hetland, *Beginning: From Novice to Professional*,New York City: Apress, 2005.

Course Learning Outcomes(COs):

On completion of this course, students will be able to…

CO1:make use of syntax, control statements, operators and functions for writing basic python programs
CO2:develop programs using collections, namespaces, packages &strings
CO3:explain object oriented programming principles, files & database handling mechanism for writing advanced python programs
CO4:build visualization graphs with Matplotlib and adapt packages like Numpy or Pandas for statistical analysis& data handling

Course Articulation Matrix (CAM): U18CS506PYTHON PROGRAMMING

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18CS506.1	2	2	1	1	2	1	-	-	-	1	-	-	2	1	2
CO2	U18CS506.2	2	2	2	1	2	1	-	-	-	1	-	-	2	1	3
CO3	U18CS506.3	2	2	2	2	2	1	-	-	-	1	-	2	3	2	2
CO4	U18CS506.4	2	2	2	2	3	1	-	-	1	1	-	2	2	2	3
U18CS506		2	2	1.75	1.5	2.25	1	-	-	1	1	-	2	2.25	1.5	2.5

U18CS507 ADVANCED JAVA PROGRAMMING LAB

Class: B.Tech. V-Semester **Branch:** Computer Science & Engineering

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LO):
This course will develop students' knowledge in/on…
LO1: developing GUI based programs using the concept of swings
LO2: the concepts of generics and collections
LO3: sorting user-defined data using Comparable interfaces and performing the unit testing with JUnit
LO4: lambda expressions and Stream API

List Of Experiments

Experiment-I
1. Create a JFrame program to display "Good Morning" if current time is between "6 AM to 12 PM" and "Good Afternoon" if the current time is between "12 PM to 6PM", and "Good Evening" if the current time is between "6PM to 12AM"
2. Create a JFrame program to perform basic arithmetic calculations on given two numbers with the help of button events

Experiment-II
1. Create a JFrame program from which you can open another frames with the help of button events
2. Design different JFrame's to demonstrate different layouts like Flow layout, Border layout, Grid layout & null layout
3. Create a JFrame program to work with window events

Experiment -III
1. Create a JFrame to add a menu bar with which you can select different options from different menus and perform some action on selection of every menu item
2. Create a JFrame program to open the text file using JFileChooser and display the selected text file content on the JTextArea
3. Design a registration form with the help of a JFrame and save the details in to the text file

Experiment -IV
1. Create a JFrame program to insert, delete & update the records of a database table
2. Create a JFrame program to select a database table using JComboBox component and display the content of the selected database table in JTablecomponent

Experiment -V
1. Write a java program to demonstrate generic class
2. Write a java program to demonstrate methods and constructors in generics
3. Write a java program to demonstrate multiple type parameters in generic classes
4. Write a java program to demonstrate inheritances in generics

Experiment -VI
1. Write a java program to perform following operations on ArrayList, LinkedList, HashSet and LinkedHashSet
   i. Insertion
   ii. Deletion

iii. Traversing using traditional-for, for-each, Iterator and ListIterator
iv. Display the elements in reverse order

2. Write a program that will have a Vector which is capable of storing Employee objects. Use an Iterator and enumeration to list all the elements of the Vector

Experiment -VII

1. Write a java program to perform different operations on inbuilt Stack class
2. Write a java program to perform different operations on inbuilt Queue class
3. Write a java program to perform insertion, deletion, traversing and searching operations on HashMap and TreeMap

Experiment -VIII

1. Write a java program to store and retrieve user defined class objects from TreeSet
2. Write a java program to read a set of values and display the count of occurrences of each number using collection concept

Experiment-IX

1. Write a java program to display ArrayList values in sorted order
2. Write a java program to demonstrate Comparable interface for sorting user defined data type
3. Write a java program to demonstrate Comparator interface for sorting user defined data type

Experiment-X

1. Write a java program to test simple arithmetic operations of Calculator class using JUnit concept
2. Write a java program to demonstrate different Assert methods and annotations

Experiment-XI

1. Write a java program to demonstrate lambda expression with no parameter
2. Write a java program to demonstrate lambda expression with single and multiple parameters
3. Write a java program to iterate the List and Map using lambda expressions
4. Create two threads using lambda expressions, where one thread displays even numbers for every half second and the other thread displays odd numbers for every second

Experiment-XII

1. Write a java program to demonstrate following methods using streams on a List
   a) filter **b)** sorted **c)** distinct **d)** limit **e)** count

2. Write a java program to read a string and collect upper case characters, lower case characters & digits into each individual ArrayList using streams and display them

Laboratory Manual:

[1] Advanced Java Programming laboratory Manual, Dept. of CSE, KITSW.

Reference Books:

[1] Herbert Schildt,JAVA The Complete Reference, 10th ed.New York: McGraw-Hill Education India Pvt.Ltd, 2017.

[2] Sachin Malhotra, Saurabh Choudhary, Programming in JAVA, 2nd ed. New Delhi: Oxford University Press, 2013.

[3] UttamK.Roy, Advanced JAVA Programming, New Delhi: Oxford University Press, 2015.

[4] PualDeitel, Harvey Deitel, Java How to program, 10th ed. Chennai:Pearson Education, 2016.

[5] Sujoy Acharya, Mastering Unit Testing Using Mockito and JUnit, Birmingham: Packt Publishing Limited, 2014.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: design GUI programs by using the concept of swings

CO2: apply the concept of generics &collections to work on dynamic data

CO3: demonstrate correct usage of Comparable &Comparator interfaces and examine the test cases to perform unit testing using the concept of JUnit

CO4: apply the lambda expressions instead of anonymous class and effectively process collection of objects using Stream API

Course Articulation Matrix (CAM):U18CS507 ADVANCED JAVA PROGRAMMINGLABORATORY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18CS507.1	2	2	2	1	2	-	-	-	2	1	-	2	3	1	3
CO2	U18CS507.2	2	2	2	1	-	-	-	-	2	1	-	2	3	1	2
CO3	U18CS507.3	2	2	2	1	2	-	-	-	2	1	-	2	3	3	3
CO4	U18CS507.4	2	2	2	1	-	-	-	-	2	1	-	2	3	1	2
U18CS507		2	2	2	1	2	-	-	-	2	1	-	2	3	1.5	2.5

U18CS508 COMPILER DESIGN LABORATORY

Class: B.Tech. V-Semester

Branch: Computer Science and Engineering(CSE)

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop students' knowledge on /in…

LO1: designing lexical analyzer and constructing predictive parser from the FIRST and FOLLOW of context-free grammar

LO2: constructing look ahead LR parser and generating assemble code from the intermediate representation of source code

LO3: implementing lexical analyzer based on regular expressions for the given problem

LO4: writing yet another compiler compiler program based on context-free grammar for the given problem

Experiment-I

1. Design a lexical analyzer for given language and the lexical analyzer should ignore redundantspaces, tabs and new lines
2. Implement the lexical analyzer using LEX tool to generate tokens from the given C program

Experiment-II

1. Write a program to compute FIRST and FOLLOW for the given context-free grammar
2. Design a predictive parser for the given context-free grammar

Experiment-III

1. Design a look ahead LR bottom up parser for the given context-free grammar
2. Convert the Backus–Naur form or Backus normal form rules into yet another compiler compiler form and write code to generate abstract syntax tree

Experiment-IV

1. Write a program to generate assembly code from the intermediate representation of source code
2. Write a program to implement operator precedence parsing for the given context-free grammar

Experiment-V

Write a lexical analyzer program for the following:

1. To count the number of keywords and identifiers in the given program
2. To convert an octal number to decimal number
3. To recognize numbers in the given program

Experiment-VI

Write a lexical analyzer program for the following:

1. To count the number of vowels and consonants in the given string
2. To count the number of characters, words and lines in the given text
3. To count the number of '+'ve and '-'ve integers from the given program

Experiment-VII

Write lexical analyzer program for the following:

1. To count the number of comment lines in the given C program

2. To count the number of scanf and printf statements in the given C program
3. To illustrate no pattern and no action concept

Experiment-VIII
Write lexical analyzer program for the following:
1. To add line numbers to the given file and displays the same onto the standard output
2. To extract only comments from C program and display the same onto the standard output

Experiment-IX
Write yet another compiler compiler program for the following:
1. To identify a simple and a compound statement in the given C program
2. To construct a context-free grammar which accepts the language $L=\{a^n b^n \mid n>=1\}$

Experiment-X
Write yet another compiler compiler program for the following:
1. To check the validity of given arithmetic expression
2. To construct a context-free grammar which accepts the language $L=\{a^n b \mid n>=10\}$

Experiment-XI
Write yet another compiler compiler program for the following:
1. To recognize nested if control statements and display the level of nesting
2. To check the validity of given simple sentence

Experiment-XII
Write yet another compiler compiler program for the following:
1. To check the validity of given date
2. To test for balanced parenthesesin the given input

Laboratory Manual:
[1] *Compiler Design Laboratory Manual*, Dept. of CSE, KITSW.
Reference Book:
[1] Alfred V.Aho, Ravi Sethi, Jeffrey D.Ullman, *Compilers: Principles, Techniques and Tools*, 2nd ed.Hong Kong: Pearson Education Asia, 2013.

Course Learning Outcomes(COs):
On completion of this course, students will be able to…
CO1: design lexical analyzer and construct predictive parser from the FIRST and FOLLOW of context-free grammar
CO2: construct look ahead LR parser and generate assemble code from the intermediate representation of source code
CO3: implement lexical analyzer based on regular expressions for the given problem
CO4: develop yet another compiler program based on context-free grammar for the given problem

Course Articulation Matrix (CAM): U18CS508COMPILER DESIGN LABORATORY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O 2	PS O 3
CO1	U18CS508.1	2	2	2	2	1	1	-	-	2	1	2	1	2	2	2
CO2	U18CS508.2	2	2	2	2	1	1	-	-	2	1	2	1	2	2	2
CO3	U18CS508.3	2	2	2	2	1	1	-	-	2	1	2	1	2	2	2
CO4	U18CS508.4	2	2	2	2	1	1	-	-	2	1	2	1	2	2	2
U18CS508		2	2	2	2	1	1	-	-	2	1	2	1	2	2	2

U18CS509 PYTHON PROGRAMMING LABORATORY

Class: B.Tech. V-Semester

Branch: Computer Science & Engineering

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LO):

This Course will develop student's knowledge in/on

LO1: fundamentals of python programming such as variables, operators, control statements & functions
LO2: namespaces, packages, string handling methods, lists&dictionaries of Python
LO3:object oriented programming, file handling & accessing database of Python
LO4: NumPy, Pandas &Matplotlib libraries in python

Experiment-I

1. Installation of Python and verifying PATH environment variable
2. Running instructions in Interactive interpreter and a python script
   (a) Executing instructions in Python Interactive Interpreter
   (b) Running python scripts in Command Prompt
   (c) Running python scripts in IDLE
3. Write a program to demonstrate importance of indentations. Purposefully raise Indentation Error and correct it.
4. Write a program to take input text as command line argument and display it on screen

Experiment-II

1. Write a program that takes 2 numbers as command line arguments and print its sum
2. Write a program to check whether the given number is even or odd
3. Write a program to calculate GCD of 2 numbers
4. Write a program to find Exponentiation (Power) of a number
5. Write a program to find given year is leap year or not
6. Write a program to develop a simple calculator

Experiment-III (Use functions concept for implementing below programs)

1. Write a program to find the Factorial of a given number
2. Write a program to evaluate the Fibonacci series for a given number 'n'
3. Write a program to find the Armstrong for a given number
4. Write a program to find sum of N numbers
5. Write a program to take a number as input, and print countdown from that number to zero (use while loop)
6. Write a program to find circulating 'n' values

Experiment-IV

1. Write a program to implement a module using import statement (Use python source file as a
2. module and implement import statement another python source file)
3. Write a program to implement from…import statement
4. Write a program to implement dir() function
5. Write a program to demonstrate packages in python

Experiment-V

Write python program on strings for the following

1. To display substring in a string
2. To update an existing string
3. To implement string concatenation
4. To implement string repetition
5. To demonstrate string formatting operator
6. To demonstrate built-in string methods

Experiment-VI

1. Write a program to demonstrate use of slicing in strings
2. Write a program to compare two strings
3. Write a program which prints the reverse of a given input string. (use a function with name reverse string and call this function for performing the operation)
4. Write a program to demonstrate list and related functions
5. Write a program to demonstrate tuple, set and related functions
6. Write a program to demonstrate dictionaries

Experiment-VII

Write python program for the following

1. To demonstrate classes and objects
2. To demonstrate class method and static method
3. To demonstrate inheritance

Experiment-VIII

Write python program on file operations for the following

1. To open and read data from a file
2. To write data into a file
3. To compute number of characters, words, lines in a file

Experiment-IX

Write python programs to implement database connectivity

1. Install and verify SQLite Connector for Python
2. To connect check SQLite Database connectivity
3. To retrieve and display data from a table
4. To insert data into a table
5. To delete rows in a table

Experiment-X

1. Install and setup NumPy environment
2. Write a program to demonstrate NumPy array
3. Write a program to demonstrate Slice operation
4. Write a program to demonstrate Reshaping of an array

Experiment-XI

1. Install and setup pandas environment
2. Write a python pandas program to create a series from an ndarray
3. Write a python pandas program to demonstrate indexing and selecting data
4. Twitter data analysis using Pandas

Experiment-XII

1. Install and setup matplotlib
2. Write a program to draw a simple line plot

3. Write a program to draw a histogram plot
4. Customize plots and experiment with different maps plots

Laboratory Manual:

1. Python Programming Laboratory Manual, Dept. of CSE, KITSW

Reference Books:

1. ReRemaThareja, *Python Programming using problem solving approach*, New Delhi: Oxford university press, 2017.

Course Learning Outcomes(COs):

On completion of this course, students will be able to

CO1: develop python programs using operators, control statements &functions

CO2: apply name spaces, packages, string handling methods, lists &dictionaries of Python for writing programs

CO3: build new classes, create objects, perform operations on files and implement database operations in Python

CO4: design visualization graphs with Matplotlib and experiment with Numpy& Pandas libraries for data analysis programs in Python

Course Articulation Matrix (CAM): U18CS509PYTHON PROGRAMMING LABORATORY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O 2	PS O 3
CO1	U18CS509.1	2	2	2	2	2	-	-	-	1	1	-	-	2	2	2
CO2	U18CS509.2	2	2	2	2	2	-	-	-	1	1	-	-	2	2	3
CO3	U18CS509.3	2	2	2	2	2	-	-	-	2	1	-	1	3	3	3
CO4	U18CS509.4	3	2	2	2	3	-	-	-	2	1	-	2	2	3	3
U18CS509		2.25	2	2	2	2.25	-	-	-	1.5	1	-	1.5	2.25	2.5	2.75

U18CS510 SEMINAR

Class: B.Tech.V - Semester **Branch:** Computer Science and Engineering

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	100 marks
End Semester Examination	-

Course Learning Objectives(LOs):

This course will develop students' knowledge on /in…

LO1: selecting topic, referring to peer reviewed journals / technical magazines / conference proceedings
LO2: literature review and well-documented report writing
LO3: creating PPTs and effective technical presentation
LO4: preparing a technical paper in scientific journal style &format

Student has to give independent seminar on the state-of-the-art technical topics relevant to their program of study, which would supplement and complement the program assigned to each student.

Guidelines:

1. The HoD shall constitute a Department Seminar Evaluation Committee (DSEC)
2. DSEC shall allot a faculty supervisor to each student for guiding on (i) selection of topic (ii) literature survey and work to be carried out (iii) preparing a report in proper format and (iv) effective seminar presentation
3. There shall be only Continuous Internal Evaluation (CIE) for seminar
4. The CIE for seminar is as follows:

Assessment	Weightage
Seminar Supervisor Assessment	20%
Seminar Report	30%
Seminar Paper	20%
DSEC Assessment: *Oral presentation with PPT andviva-voce*	30%
Total Weightage:	100%

Note: It is mandatory for the student to appear for oral presentation and viva-voce to qualify for course evaluation

(a) **Seminar Topic**: The topic should be interesting and conducive to discussion. Topics may be found by looking through recent issues of peer reviewed Journals / Technical Magazines on the topics of potential interest

(b) **Report:** Each student is required to submit a well-documented report on the chosen seminar topic as per the format specified by*DSEC.*

(c) **Anti-Plagiarism Check:** The seminar report should clear plagiarism check as per the Anti-Plagiarism policy of the institute.

(d) **Presentation:** Each student should prepare PPT with informative slides and make an effective oral presentation before the *DSEC* as per the schedule notified by thedepartment

(e) The student has to register for the Seminar as supplementary examination in the following cases:

i) he/she is absent for oral presentation and viva-voce

ii) he/she fails to submit the report in prescribed format

iii) he/she fails to fulfill the requirements of seminar evaluation as per specified guidelines

(f) i) The CoE shall send a list of students registered for supplementary to the HoD concerned

ii) The DSEC, duly constituted by the HoD, shall conduct seminar evaluation and send the award list to the CoE within the stipulated time

Course Learning Outcomes(COs):

On completion of this course, students will be able to…

CO1: select current topics in their engineering discipline & allied areas from peer reviewed journals / technical magazines/ conference proceedings

CO2: demonstrate the skills for performing literature survey, identify gaps, analyze the technical content and prepare a well-documented seminar report

CO3: create informative PPT and demonstrate communication skills through effective oral presentation showing knowledge on the subject & sensitivity towards social impact of the seminar topic

CO4: write a "seminar paper" in scientific journal style & format from the prepared seminar report

Course Articulation Matrix (CAM):U18CS510SEMINAR															
CO		**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**	**PSO 2**	**PSO 3**
CO1	U18CS510.1	1	1	-	1	1	-	1	2	2	2	1	2	1	1	1
CO2	U18CS510.2	1	1	-	-	-	-	-	2	2	2	-	2	1	1	1
CO3	U18CS510.3	-	-	-	-	-	-	1	2	2	2	-	2	1	1	1
CO4	U18CS510.4	-	-	-	-	-	-	-	2	2	2	-	2	1	1	1
U18CS510		**1**	**1**	**-**	**1**	**1**	**-**	1	2	2	2	1	**2**	**1**	**1**	**1**

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
KAKATIYA INSTITUTE OF TECHNOLOGY &SCIENCE:: WARANGAL – 15
(An Autonomous Institute under Kakatiya University, Warangal)

SCHEME OF INSTRUCTION & EVALUATION

VI- SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAM

[6Th+3P+1MC+Miniproject]

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	MC	U18MH601	Universal Human Values –II	2	1	-	-	10	30	40	60	100
2	OE	U18OE602	Open Elective – III	3	-	-	3	10	30	40	60	100
3	PE	U18CS603	Professional Elective - II / MOOC-II	3	-	-	3	10	30	40	60	100
4	PCC	U18CS604	Design and Analysis of Algorithms	3	-	-	3	10	30	40	60	100
5	PCC	U18CS605	Data Warehousing and Data Mining	3	-	-	3	10	30	40	60	100
6	PCC	U18CS606	Internet of Things	3	-	-	3	10	30	40	60	100
7	PCC	U18CS607	Design and Analysis of Algorithms Laboratory	-	-	2	1	40	-	40	60	100
8	PCC	U18CS608	Data Analytics Laboratory	-	-	2	1	40	-	40	60	100
9	PCC	U18CS609	Internet of Things Laboratory	-	-	2	1	40	-	40	60	100
10	PROJ	U18CS610	Mini Project	-	-	2	1	100	-	100	-	100
Total:				17	-	8	19	280	180	460	540	1000
***Additional Learning*:** *Maximum credits allowed for Honours/Minor*				-	-	-	*7*	-	-	-	-	-
Total credits for Honours/Minor students:				-	-	-	***19+7***	-	-	-	-	-

** List of courses for additional learning through **MOOCs** towards Honours/Minor in Engineering shall be prescribed by the department under Honours/ Minor Curricula*

[L= Lecture, T = Tutorials, P = Practicals& C = Credits] **Total Contact Periods/Week: 25** **Total Credits: 19**

Open Elective-III:	Professional Elective-II / MOOC-II:
U18OE602A: Disaster Management	U18CS603A: Cryptography and Network Security
U18OE602B: Project Management	U18CS603B: Digital Image processing
U18xOE602C: Professional Ethics in Engineering	U18CS603C: Software Testing Methodologies
U18OE602D: Rural Technology and Community Development	U18CS603M: MOOCs Course

U18MH601 UNIVERSAL HUMAN VALUES - II

Class: B.Tech. VI–Semester **Branch:** Computer Science and Engineering

Teaching Scheme:

L	T	P	C
2	1	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

* Pre-requisite:U18MH111 Universal Human Values - I (*Induction Programme)*

Course Learning Objectives (LOs):
This course will develop students' knowledge on /in…
LO1: self-exploration, happiness and prosperity as the process of value education
2: harmony in the human being- self & family
LO3: co-existence of human being with society & nature
LO4: professional ethics, commitment and courage to act

UNIT – I (6 + 3)

Introduction - Need, Basic Guidelines, Content and Process for Value Education:
Purpose and motivation for the course, Recapitulation from Universal Human Values - I(*Induction programme*)
Self-Exploration: Its content and process, Natural acceptance and experiential validation – As the process for self-exploration

Continuous Happiness and Prosperity: A look at basic human aspirations, Right understanding, Relationship and physical facility - The basic requirement for fulfillment of aspirations of every human being with their correct priority

Understanding Happiness and Prosperity correctly: A critical appraisal of the current scenario, Method to fulfill the above human aspirations - Understanding and living in harmony at various levels

UNIT – II (6 + 3)

Understanding Harmony in the Human Being- Harmony in Myself & Family:
Harmony in Myself: Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - Happiness and physical facility; Understanding the 'Body' as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of 'I' with the 'Body' - Sanyam and Health; Correct appraisal of physical needs, Meaning of prosperity in detail, Programs to ensure Sanyam and Health

Harmony in Family: Understanding values in human - Human relationship; Meaning of justice (Nine universal values in relationships), Program for its fulfillment to ensure mutual happiness, Trust and respect as the foundational values of relationship, Understanding the meaning of trust, Difference between intention and competence; Understanding the meaning of respect, Difference between respect and differentiation, The other salient values in relationship

UNIT – III (6 + 3)

Understanding Harmony with Society, Nature & Existence:
Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, Fearlessness (trust) and Co-existence as comprehensive human goals, Visualizing a universal harmonious order in society – Undivided society; Universal order - From family to world family

Understanding the harmony in the nature: Interconnectedness and mutual fulfillment among the four orders of nature - Recyclability and self-regulation in nature

Whole Existence as Co-existence: Understanding existence as co-existence of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence

UNIT – IV (6 + 3)

Implications of Holistic Understanding of Harmony on Professional Ethics:
Natural acceptance of human values, Definitiveness of ethical human conduct, Basis for Humanistic education, Humanistic constitution and Humanistic universal order
Competence in professional ethics: a) Ability to utilize the professional competence for augmenting universal human order b) Ability to identify the scope and characteristics of people friendly and eco-friendly production systems and c) Ability to identify and develop appropriate technologies and management patterns for above production systems

Case studies: Case studies of typical holistic technologies, Management models and production systems, Strategy for transition from the present state to Universal human order – a) At the level of individual: As socially and ecologically responsible engineers, technologists and managers b) At the level of society: As mutually enriching institutions and organizations

Text Book:

[1] R .R. Gaur, R. Sangal and G. P. Bagaria, *Human Values and Professional Ethics*, New Delhi: Excel Books,2010.

Reference Books:

[1] A. Nagaraj, *JeevanVidya: EkParichaya*, Raipur: Jeevan Vidya Prakashan, Amarkantak, 2018.
[2] A.N. Tripathi, *Human Values*, 3rd ed. New Delhi: New Age International Publisher, 2019.
[3] M. Govindrajran, S. Natrajan& V.S. Senthil Kumar, *Engineering Ethics (includes Human Values)*, 12th ed. Haryana: PHI Learning Pvt. Ltd., 2011.
[4] Jayshree Suresh, B. S. Raghavan, *Human Values & Professional Ethics*, 4th ed.New Delhi: S. Chand & Co. Ltd., 2012.

Aditional Resources:

[1] R.R Gaur, R Sangal, G P Bagaria, *A foundation course in Human Values and professional Ethics (Teacher's Manual)*, New Delhi: Excel books, 2010.
[2] A set of DVDs containing - Video of Teachers' Orientation Program - PPTs of Lectures and Practice Sessions (*Audio-visual material for use in the practice sessions*)

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: interpret the importance of continuous happiness & prosperity through self exploration and imbibe skills to examine harmony

CO2: appraise the concept of sentience, distinguish between intention & competence and prioritize human values in relationships

CO3: build fearlessness & co-existence as comprehensive human goal and agree upon interconnectedness & mutual fulfillment

CO4: assess the understanding of harmony, adapt professional ethics and take part in augmenting universal human order

Course Articulation Matrix (CAM):U18MH601UNIVERSAL HUMAN VALUES – II

CO		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	U18MH601.1	-	-	-	-	-	1	-	2	1	1	-	2	-	-	1
CO2	U18MH601.2	-	-	-	-	-	1	-	2	1	1	-	2	-	-	1
CO3	U18MH601.3	-	-	-	-	-	1	-	2	1	1	-	2	-	-	1
CO4	U18MH601.4	-	-	-	-	-	1	-	2	1	1	-	2	_	-	1
U18MH601		-	**-**	-	**-**	-	**1**	-	**2**	**1**	**1**	**-**	**2**	_	**-**	**1**

U18OE602A DISASTER MANAGEMENT

Class: B.Tech. VI – Semester **Branch(s)**: ME, CSE, IT & CSN

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40
End Semester Examination	60

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on

LO1: disaster types, its impacts & national policy on disaster management
LO2: prevention, preparedness and mitigation measures for different disasters, emergency support functions and relief camps
LO3: different types of vulnerability, macroeconomic, financial management of disaster and its related losses
LO4: disaster management for infrastructure, treatment of plants, geo spatial information in agriculture, multimedia technology in disaster risk management and training

UNIT – I (9)

Introduction & Principles of Disaster Management: Nature - Development, Hazards and disasters; Natural disasters - Earth quakes, Floods, Fire, Landslides, Cyclones, Tsunamis, Nuclear; Chemical dimensions and Typology of disasters - Public health disasters, National policy on disaster management

UNIT –II (9)

Prevention Preparedness and Mitigation Measures: Prevention, Preparedness & mitigation measures for various disasters, Post disaster reliefs and logistics management, Emergency support functions and their coordination mechanism, Resources and material management, Management of relief camp

UNIT– III (9)

Risk and Vulnerability: Building codes and land use planning, Social vulnerability, Environmental vulnerability, Macroeconomic management and sustainable development, Climate change, Risk rendition, Financial management of disaster and related losses

UNIT - IV (9)

Role of Technology in Disaster Management: Disaster Management for infrastructures, Taxonomy of infrastructure, Treatment plants and process facilities, Electrical sub stations, Roads and Bridges, Geo spatial information in agriculture, Drought assessment, Multimedia technology in disaster risk management and training

Text Books:

[1] Rajib shah and R.R Krishnamurthy, *Disaster management – Global Challenges and local solutions,* Hyderabad: Universities Press (India) Pvt. Ltd., 2009.

Reference Books:

[1] Satish Modh*, Introduction to Disaster management,* Bengaluru: Macmillan India Ltd., 2010.

Course Learning Outcomes (COs):
On completion of this course, students will be able to ...

CO1: classify the disasters and discuss natural & non-natural disasters, their implications, the institutional& legal framework for national policy on disaster management in India

CO2: identify mitigation strategies, preparedness & prevention measures and prioritizes the rescue &
relief operations to reduce the impact of a disaster

CO3: list the vulnerable groups in disaster; examine the concepts of macroeconomic & sustainability & impact of disaster on development

CO4: discuss disaster management for infrastructure, utilize geospatial information in agriculture and apply multimedia technology for disaster risk management &training

Course Articulation Matrix (CAM): U18OE602A DISASTER MANAGEMENT														
CO		**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	U18OE602A/	-	-	-	-	-	2	2	1	-	-	1	1		
CO2	U18OE602A/	-	-	-	-	-	2	2	1	-	-	1	1		
CO3	U18OE602A/	-	-	-	-	-	2	2	1	-	-	1	1		
CO4	U18OE602A/	-	-	-	-	-	2	2	1	-	-	1	1		
U18OE602A/		**-**	**-**	-	-	-	**2**	**2**	**1**	**-**	**-**	**1**	**1**		

U18OE602B PROJECT MANAGEMENT

Class: B.Tech. VI – Semester **Branch(s)**: ME, CSE, IT & CSN

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40
End Semester Examination	60

Course Learning Objectives (LOs):

This course will develop student's knowledge in/on…

LO1: role of project manager, organization and management functions
LO2: effective time &conflict management, ethics &professional responsibilities
LO3: project planning, scheduling and budgeting
LO4:*cost control, risk management and quality control techniques*

UNIT – I (9)

Project Management: Understanding project management, Role of project manager, Classification of projects, Project management growth, Definitions and Concepts, Organizational structures - Organizing and staffing the project management office and team; Management functions

UNIT – II (9)

Time and Conflict Management: Understanding time management, Time management forms, Effective time management, Stress and burnout, Conflict environment, Conflict resolution, Management of conflicts, Performance measurement, Financial compensation and rewards, Morality, ethics, Corporate culture, Professional responsibilities, Success variables, Working with executives

UNIT – III (9)

Project planning: General planning, Life-cycle phases, Proposal preparation, Project planning, The statement of work, Project specifications, Milestone schedules, Work breakdown structure, Executive role in planning, The planning cycle, Handling project phase outs and transfers, Stopping projects, Scheduling techniques - CPM and PERT, Pricing and estimating

UNIT – IV (9)

Cost and quality control: Understanding cost control, Earned Value Measurement System, Cost control problems, Methodology for trade-off analysis, Risk management process, Risk analysis, Risk responses, Monitoring and control of risks, Contract management, Quality management concepts, Cost of quality, Quality control techniques

Text Books:

[1] Harold Kerzner, P*roject Management: A Systems Approach to Planning, Scheduling and Controlling*, 10th ed. Hoboken, NJ: John Wiley & Sons Inc., 2009.

Reference Books:

[1] Jack R Meredith & Samuel J mantel Jr., *Project Management: A Managerial Approach*, 8th ed. Hoboken,NJ: John Wiley & Sons Inc., 2012.

[2]John M Nicholas & Herman Steyn, *Project Management for Business, Engineering and Technology*,4thed. Abingdon, UK: Taylor & Francis, 2012.

[3] Adedeji B. Badiru, *Project Management: Systems, Principles and Applications*, Florida, USA: CRC Press, 2012.

Course Learning Outcomes (COs):

On completion of the course, the student will be able to…

CO1: evaluate the desirable characteristics of effective project managers

CO2: plan to resolve issues in conflicting environments

CO3: apply appropriate approaches to plan a new project in-line with project schedule & suitable budget

CO4: *estimate the risks to be encountered in a new project and apply appropriate techniques to assess & improve ongoing project performance*

Course Articulation Matrix (CAM):U18OE602B/ U18OE701B PROJECT MANAGEMENT															
CO		**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**	**PSO 2**
CO1	U18OE602B/	-	-	-	-	-	1	-	-	-	1	1	-	-	-
CO2	U18OE602B/	-	-	-	-	-	1	-	2	-	1	1	-	-	-
CO3	U18OE602B/	1	1	-	-	-	1	-	-	-	1	1	-	-	-
CO4	U18OE602B/	1	1	-	-	-	1	-	-	-	1	1	-	-	-
U18OE602B		**1**	**1**	**-**	**-**	**-**	**1**	**-**	**2**	**-**	**1**	**1**	**-**	**-**	**-**

U18OE602C PROFESSIONAL ETHICS IN ENGINEERING

Class: B.Tech. VI – Semester **Branch(s)**: ME, CSE, IT & CSN

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40
End Semester Examination	60

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on …

LO1: human values and engineering ethics

LO2: professionalism, theory of virtues and code of ethics

LO3: safety & risk benefit analysis, professional and intellectual property rights

LO4: environmental & computer ethics and various roles of engineers in a company

UNIT – I(9)

Human Values: Morals, Values & ethics, Integrity, Work ethic, Service learning, Civic virtue, Respect for others, Living peacefully, Caring, Sharing, Honesty, Courage, Valuing time, Co-operation, Commitment, Empathy, Self-confidence, Character, Spirituality

Engineering Ethics: Senses of "Engineering Ethics", Variety of moral issues, Types of inquiry, Moral dilemmas, Moral autonomy, Kohlberg's theory, Gilligan's theory - Consensus and controversy

UNIT – II(9)

Profession and professionalism: Profession and its attributes, Models of professional roles

Theory of Virtues: Definition of virtue and theories of virtues, Self-respect, Responsibility and senses, Modern theories of virtues, Uses of ethical theories

Engineering as social experimentation: Engineering as experimentation, Engineers as responsible experimenters, Codes of ethics, A balanced outlook on law, The challenger case study

UNIT –III (9)

Safety, Responsibilities and Rights: Safety and risk, Assessment of safety and risk, Risk benefit analysis and reducing risk - Three Mile Island and Chernobyl case studies; Collegiality and loyalty, Respect for authority, Collective bargaining, Confidentiality, Conflicts of interest, Professional rights, Employee rights, Intellectual Property Rights (IPR), Discrimination

UNIT – IV (9)

Global Issues: Multinational corporations - Environmental ethics, Computer ethics, Engineers as managers, Consulting engineers, Engineers as expert witnesses and advisors, Moral leadership, Sample code of ethics (*Specific to a particular engineering discipline*)

Text Books:

[1]D.R. Kiran, *Professional Ethics and Human Values*, New York: McGraw Hill, 2013.

Reference Books:

[1] Govindarajan. M, Natarajan. S, Senthil Kumar. V.S, *Professional Ethics andHuman Values,* NewDelhi: Prentice Hall of India, 2013.

[2] Mike Martin and Roland Schinzinger, *Ethics in Engineering*, 4th ed. New York: McGraw Hill,2014.

[3] Charles D. Fleddermann, *Engineering Ethics*, 4th ed. New Delhi: Prentice Hall, 2004.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: identify the need for human values, morals & ethics and apply Gilligan's & Kohlberg's theories for morale development

CO2: identify the desired characteristics of a professional & the need for code of ethics & balanced outlook on law

CO3: estimate the safety margin & threshold level and describe the procedure for obtaining a patent

CO4: analyze the role of engineer in multinational companies as an advisor, consultant &manager

Course Articulation Matrix (CAM): U18OE602C/ U18OE701CPROFESSIONAL ETHICS IN ENGINEERING

CO		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	U18OE602C/ U18OE701C.1	-	-	-	-	-	1	-	2	1	-	-	1		
CO2	U18OE602C/ U18OE701C.2	-	-	-	-	-	1	-	2	1	-	-	1		
CO3	U18OE602C/ U18OE701C.3	-	-	-	-	-	1	-	2	1	-	-	1		
CO4	U18OE602C/ U18OE701C.4	-	-	-	-	-	1	-	2	1	-	-	1		
U18OE602C/ U18OE701C		**-**	**-**	**-**	**-**	**-**	**1**	**-**	**2**	**1**	**-**	**-**	**1**		

U18OE602D RURAL TECHNOLOGY AND COMMUNITY DEVELOPMENT

Class: B.Tech. VI – Semester **Branch(s)**: ME, CSE, IT & CSN

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40
End Semester Examination	60

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on...

LO1: building technologies, modern agricultural implements and food processing methods

LO2: medicinal & aromatic plants to fulfill the needs of pharmaceutical industries and rural energy for eradication of drudgery

LO3: purification of drinking water, rain water harvesting and employment generating technologies in rural areas

LO4: objectives & characteristics of community development, need for community mobilization and approaches for community organization

UNIT – I (9)

Technologies and Process: Building materials and components - Micro concrete roofing tiles, Water &fire proof mud walls and thatch, Red mud/rice husk cement, Types of bricks, Ferro-cement water tanks and other products, Cement blocks, Preservation of mud walls, Agricultural implements-Naveen sickle, Animal drawn digger, Grubber weeder, Self propelled reaper, Seed drill, Improved bakhar

Food Processing: Fruit and vegetable preservation - Process flow sheet, Scale of operation, Economic feasibility, Source of technology; Soya milk - Process, Economics; Dehydration of fruits and vegetables, Cultivation of oyster mushroom - Preparation of beds, Spawning, Removal of bags for production of mushrooms, Harvesting and marketing, Economics, Process flow sheet, Source of technology

UNIT – II (9)

Medicinal and Aromatic plants: Plants and its use, Aromatic plants, Cymbopogons, Geranium, Manufacturing of juice, Gel and powder, Rural energy - Cultivation ofjatrophacurcusandproductionofbiodiesel,Lowcostbriquettedfuel,Solarcookersandoven, Solar drier, Bio-mass gasifier

Bio-fertilizers: Introduction, Vermicompost, Improvement over traditional technology/process, Techno economics, Cost of production, Utilization of fly ash for wasteland development and agriculture

UNIT – III (9)

Purification of Drinking water: Slow sand filtration unit, Iron removal plant connected to hand pump, Chlorine tablets, Pot chlorination of wells, Solar still, Fluoride removal, Rain water harvesting through roof top, Rain water harvesting through percolation tank, Check dams, Recharging of dug wells

Employment Generating Technologies: Detergent powder and cake - Process, Process for liquid detergent, Carcass utilization - Improvement over traditional technology, Flow chart, Process, Capital investment; Indigo blue - Dye, Organic plant production, Dye extraction techniques, Aspects of indigo market, Economics; Modernization of bamboo based industries - Process for bamboo mat making, Machinery, Products, Agarbatti manufacturing; Vegetable tanning of leathers - Raw material, Soaking, Liming, Reliming, Deliming, Pretanning, Malani, Setting, Yield

UNIT – IV (9)

Community Development: Community organization- Definition, Need, Functions, Principles, Stages; Community development - Definition, Need, Objectives, Characteristics, Elements, Indicators; Differences between community organization and community development

Community Mobilization: Need, Benefits, Preparing, Initial contact with community, Coordinating, Functions of the community, Challenges, Techniques for mobilizing community, Community contributions, Leadership and capacity building, Community participation, Role of community worker in community mobilization, Models of community organization practice - Local development model, Social planning model, Social action model, Approaches to community organization

Text Books:

[1] M.S.Virdi, *Sustainable Rural Technology*, New Delhi: Daya Publishing House,2009.

[2] Asha Ramagonda Patil, *Community Organization and Development: An Indian Perspective*, New Delhi: Prentice Hall of India, 2013.

Reference Books:

[1] Punia Rd Roy, *Rural Technology*, New Delhi: SatyaPrakashanPublishers,2009.

[2] S.B. Verma, S.K.Jiloka, Kannaki Das, *Rural Education and Technology*, New Delhi: Deep & Deep Publications Pvt. Ltd., 2006.

[3] Edwards, Allen David and Dorothy G.Jones, *Community and Community Development*, The Hague, Netherlands: Mouton, 1976.

[4] Lean, Mary, *Bread, Bricks and Belief: Communities in Charge of Their Future*, West Hartford, US: Kumarian Press, 1995.

[5] Heskin, Allen David, *The Struggle for Community*, Colorado, US: West View Press, 1991

[6] Clinard, Marshall Barron, *Slums and Community Development: Experiments in Self- Help*, Mumbai: Free Press, 1970.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: discuss various building technologies, modern agricultural implements and food processing methods which can be implemented in rural areas

CO2: identify major medicinal plants that are required for pharmaceutical companies & alternative fuel that meets substantial oil need in the country and the need and usage of bio- fertilizers

CO3: analyze several cost effective technologies for purification of water, rain water harvesting techniques for collection & storage of rain water and examine the employment generating technologies in tribal/ rural areas

CO4: distinguish between community organization and community development and identify techniques for community mobilization & approaches to community organization for social change

Course Articulation Matrix (CAM): U18OE602D RURAL TECHNOLOGY AND COMMUNITY DEVELOPMENT															
CO		**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	U18OE602D/ U18OE701D.1	-	-	1	-	-	1	2	-	-	-	-	1		
CO2	U18OE602D/ U18OE701D.2	-	-	1	-	-	1	2	-	-	-	-	1		
CO3	U18OE602D/ U18OE701D.3	-	-	1	-	-	1	2	-	-	-	-	1		
CO4	U18OE602D/ U18OE701D.4	-	-	-	-	-	1	2	-	-	-	-	-		
U18OE602D/ U18OE701D		-	-	**1**	-	-	**1**	**2**	-	-	-	-	**1**		

U18CS603A CRYPTOGRAPHY AND NETWORK SECURITY

Class: B. Tech. VI–Semester

Branch: Computer Science and Engineering (CSE)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on…

LO1: security attacks, services, mechanisms and symmetric key cryptographic algorithms

LO2: number theory and public key cryptographic algorithms

LO3: hash techniques, message authentication techniques and key management & distribution

LO4: IP security, web security, firewalls and various malicious software

UNIT – I (9)

Overview: The OSI security architecture, Security attacks, Security services, Security mechanisms, A model for network security

Classical Encryption Techniques: Symmetric cipher model, Substitution techniques, Transposition techniques, Steganography

Block Ciphers and the Data Encryption Standard: Traditional block cipher structure, The data encryption standard, The strength of DES, Block cipher design principles, Block cipher operation

Advanced Encryption Standard: AES structure, AES transformation functions, AES key expansion

UNIT - II (9)

Number Theory: Prime numbers, Fermat's and Euler's theorems, Discrete logarithms

Public-Key Cryptography and RSA: Principles of public-key cryptosystems, The RSA algorithm

Other Public-Key Cryptosystems: Diffie-Hellman key exchange, Elliptic curve arithmetic, Elliptic curve cryptography

UNIT - III (9)

Cryptographic Hash functions: Applications of cryptographic hash functions, Two simple hash functions, Secure hash algorithm (SHA)

Message Authentication Codes: Message authentication requirements, Message authentication functions, Requirements for message authentication codes, Security of MACs, HMAC

Digital Signature and Authentication Protocols: Digital signatures, Schnorr digital signature scheme

Key Management and Distribution: Symmetric key distribution using symmetric encryption, Symmetric key distribution using asymmetric encryption, Distribution of public keys, X.509 certificates

Electronic Mail Security: Pretty good privacy, S/MIME

UNIT - IV (9)

IP Security:IP security overview, IP security policy, Encapsulating security payload, Combining security associations

Transport-Level Security: Web security considerations, Secure sockets layer, Transport layer security

Malicious Software: Types of malicious software, Propagation-infected content-viruses, Virus countermeasures

Firewalls: The need for firewalls, Firewall characteristics, Types of firewalls

Text Book:

1. William Stallings*, Cryptography and Network Security: Principles and Practice*, 6th ed. New Delhi: Pearson Education, 2014.

Reference Books:

1. Behrouz A. Forouzan, Debdeep Mukhopadhyay, *Cryptography and Network Security*,2nd ed. New Delhi: McGraw Hill Education,2010.
2. Atul Kahate, *Cryptography and Network Security,*New Delhi:McGraw Hill Education, 2003.
3. Denning. D, *Cryptography and Data Security*, United Kingdom: Addison Wesley, 1982.
4. V. K. Iain, *Cryptography and Network Security,* New Delhi: Khanna Publishing House, 2013.

Course Learning Outcomes (COs):

On completion of this course, students will be able to …

CO1: *classify different security attacks, services, mechanisms & symmetric key cryptographic algorithms*

CO2: *apply mathematical concepts in cryptographic algorithms for providing security & key exchange*

CO3: *categorize the hash and message authentication techniques and examine key management for distribution of keys*

CO4: *analyze the security issues at network layer & transport layer for protecting data from unauthorized persons, intruders and malicious software*

Course Articulation Matrix (CAM): U18CS603A CRYPTOGRAPHY AND NETWORK SECURITY

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CS603A.1	1	-	-	-	-	-	-	1	-	1	-	2	-	1	-
CO2	U18CS603A.2	2	2	2	1	-	-	-	-	-	1	-	2	2	2	1
CO3	U18CS603A.3	2	2	2	1	-	1	-	-	-	1	-	2	1	2	1
CO4	U18CS603A.4	2	2	1	1	-	1	-	-	-	1	-	2	2	2	1
U18CS603A		**1.75**	**2**	**1.67**	**1**	**-**	**1**	**-**	**1**	**-**	**1**	**-**	**2**	**1.67**	**1.75**	**1**

U18CS603B DIGITAL IMAGE PROCESSING

Class: B.Tech. VI- Semester

Branch: Computer Science and Engineering(CSE)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on…

LO1: fundamental concepts of digital image processing such as sampling, quantization, and basic relationship between pixels
LO2: intensity transformation functions, spatial domain filters, and frequency domain filters for smoothing and sharpening of input images
LO3: morphological image processing and image segmentation techniques applied on input images to filter and segment the objects present in input image
4: extracting features from an object present in an input image and identify the object using classification techniques

UNIT – I (9)

Introduction: What is digital image processing, Origins of digital image processing, Examples of fields that use digital image processing, Fundamental steps in digital image processing, Components of an image processing system

Digital Image Fundamentals: Elements of visual perception, Light and the electromagnetic spectrum, Image sensing and acquisition, Image sampling and quantization, some basic relationships between pixels, Introduction to the mathematical tools used in digital image processing

UNIT - II (9)

Intensity Transformations & Spatial Filtering: The basics of intensity transformations and spatial filtering, Basic intensity transformation functions, Histogram processing, Fundamentals of spatial filtering, Smoothing spatial filters, Sharpening spatial filters, Combining spatial enhancement methods

Filtering in the Frequency Domain: A brief history of the Fourier series and transform, Preliminary concepts, Discrete Fourier transform (DFT) of one variable, Extension to functions of two variables, Some properties of the 2-D discrete Fourier transform, The basics of filtering in the frequency domain

UNIT - III (9)

Morphological Image Processing: Preliminaries, Erosion and dilation, Opening and closing, Hit-or-miss transformation, Some basic morphological algorithms

Image Segmentation-I Edge Detection, Thresholding, and Region Detection: Fundamentals, Point, Line and edge detection**,** Thresholding, Segmentation by region growing and by region splitting and merging, Region segmentation using clustering and super pixels, Segmentation using morphological water sheds

UNIT - IV (9)

Feature Extraction: Background, Boundary preprocessing, Boundary feature descriptors, Region feature descriptors, Principal components as feature descriptors, Whole-image features, Scale-invariant feature transform

Image Pattern Classification: Background, Patterns and pattern classes, Pattern classification by prototype matching, Optimum (Bayes) statistical classifiers, Neural networks and deep learning, Deep convolution neural networks

Text Book:

[1] Rafael C. Gonzalez, Richard E. Woods,*Digital Image Processing*, 4th ed. New Delhi: Pearson, 2018. *(Chapters 1 to 4, 9, 10, 12, 13)*

Reference Books:

[1] Anil K. Jain, *Fundamentals of Image Processing*, 1st ed. Chennai: Pearson, 2015.
[2] B. Chanda, D. Dutta Majunder, *Digital Image Processing and Analysis*, 2nd ed. New Delhi: Prentice Hall of India, 2011.
[3] S. Sridhar, *Digital Image Processing*, 2nd ed. Oxford: Oxford University Press, 2016.
[4] Munesh C. Trivedi, *Digital Image Processing*, 1st ed. New Delhi: Khanna Book Publishing, 2014.

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…

1: make use of the concepts of digital image processing such as sampling, quantization, and basic relationships ween pixels during pre-processing stage of image processing
2: identify the effect of intensity transformation functions, frequency and spatial domain filters on input images image smoothing and sharpening
3: identify the effect of morphological image processing techniques on objects present in input images and cover novel ways to segment the objects present in the input images
4: discover novel ways to extract the features to depict the shape of an object and apply classification techniques to ntify the object present in an input image

Course Articulation Matrix (CAM):U18CS603B DIGITAL IMAGE PROCESSING

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CS603B.1	2	2	1	1	1	-	-	-	-	1	-	1	2	1	2
CO2	U18CS603B.2	2	2	2	1	1	-	-	-	-	1	-	1	2	1	2
CO3	U18CS603B.3	2	3	2	3	1	-	-	-	-	1	-	2	2	1	2
CO4	U18CS603B.4	2	3	3	3	1	-	-	-	-	1	-	2	3	1	3
U18CS603B		2	2.5	2	2	1	-	-	-	-	1	-	1.5	2.25	1	2.25

U18CS603C SOFTWARE TESTING METHODOLOGIES

Class: B.Tech.VI – Semester

Branch: Computer Science &Engineering

Teaching Scheme:

L	T	P	C
3	–	–	3

Examination Scheme:

Continuous Internal valuation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop student's knowledge on /in…

LO1: practices that supports the production of quality software
LO2: testing techniques to perform system integration
LO3: procedures for testing a system being developed, and testing its acceptance
LO4: models of software quality

UNIT–I (9)

Introduction: Software development life cycle, Role of testing, Verification and validation, Objectives and issues of testing, Testing activities and levels, Categories of testing-white-box and black-box testing. Testing Strategies
Unit Testing: Concept of unit testing, Static unit testing, Dynamic unit testing, Mutation testing, Defect prevention, Debugging
Control Flow Testing: Outline of control flow testing, Control flow graph, Paths in a control flow graph, Path selection criteria, All-path coverage criterion

UNIT – II (9)

System Architecture: System architecture with sub-systems and components overview, Information modeling of system and DFD diagrams with examples, Data flow anomalies, Data flow testing criteria
Integration Testing: Concept of integration testing, Different types of interfaces and interface errors, System integration techniques
System Tests: Basic tests, Functionality tests, Performance tests, Stress tests, Reliability tests, Regression tests, Documentation tests

UNIT – III (9)

System Test Plan and Design: Structure of a system test plan, Test design factors, Test case design effectiveness, Test execution strategy, Beta testing, System test report , Measuring test effectiveness
Acceptance Testing: Types of acceptance testing, Acceptance criteria, Acceptance test plan, Acceptance test execution, Acceptance test report

UNIT – IV (9)

Software Quality: Five views of software quality, *McCalls* quality factors, Quality criteria, Relationship between quality factors and criteria, *ISO 9126* quality characteristics, Quality metrics, *ISO 9000:2000* software quality standard
Software Quality Assurance: Quality planning and control, Quality improvement process, Evolution of software quality assurance (SQA), Major SQA activities

Text Book:

[1] Kshirasagar Naik, Priyadarshi Tripathy, *Software Testing and Quality Assurance: Theory and Practice*, 1sted., New Delhi: WileySpektrum, 2008.

Reference Books:

[1] Roger Pressman, *Software Engineering: A Practitioner's Approach*, 7th ed., New York: McGraw Hill Higher Education, 2010.
[2] Ron Patton, *Software Testing*, 2nd ed., New Jersey:Sams Publishing, 2006.
[3] Jeff Tian, *Software Quality Engineering*, 1st ed., New Jersey: John Wiley & Sons, 2005.

Course Learning Outcomes(COs):

On completion of this course, students will be able to…

CO1: employ essential software engineering practices for development of quality software
CO2: simulate software testing techniques at component-level, subsystem-level, and at system-level
CO3: construct and articulate testing plan and design for system and its acceptance
CO4: estimate the quality of software based on software quality models

Course Articulation Matrix (CAM) U18CS603C SOFTWARE TESTING METHODOLOGIES

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CS603.1	1	1	2	2	-	-	-	1	1	1	2	1	2	1	2
CO2	U18CS603.2	2	1	2	1	-	-	-	1	1	1	2	1	1	1	2
CO3	U18CS603.3	2	2	1	1	-	-	-	1	1	1	2	1	2	1	2
CO4	U18CS603.4	2	2	2	2	-	1	-	1	1	1	2	1	2	1	2
U18CS603		1.75	1.5	1.75	1.5	-	1	-	-	1	1	2	1	1.75	1	2

U18CS604 DESIGN AND ANALYSIS OF ALGORITHMS

Class: B.Tech. VI-Semester

Branch: Computer Science and Engineering

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on…

LO1: time and space complexity, asymptotic notations, set operations, problem solving with divide and conquer strategy

LO2: greedy and backtracking methods to solve computational problems

LO3: principle of optimality and problem solving with dynamic programming method

LO4: branch and bound method, classes of P,NP,NP-Hard and NP-Complete

UNIT-I (9)

Introduction: Algorithm analysis, Performance analysis, Space complexity and time complexity, Big 'O' notation, Omega notation, Theta notation, Different mathematical approach's for solving time complexity of algorithms

Sets and Disjoint Set Union: Introduction, Union, Find operations

Divide and Conquer: General method, Binary search, Merge sort, Quick sort, Strassen's matrix multiplication

UNIT-II (9)

Greedy Method: General method, Knapsack problem, Job sequencing with deadlines, Optimal storage on tapes, Optimal merge patterns, Single source shortest paths

Back Tracking: General method, N-Queensproblem, Sum of subsets, Graph coloring problem

UNIT-III (9)

Dynamic Programming: General method, Multistage graphs, All pairs shortest paths, Single source shortest paths,Optimal binary search trees, String editing, 0/1 Knapsack problem, Reliability design problem, Travelling sales person problem

UNIT-IV (9)

Branch and Bound: General method, Least cost (LC) search, The 15-puzzle problem, Control abstractions for LC search, 0/1 Knapsack problem, Travelling salesperson problem

NP Hard and NP Complete Problems: Basic concepts - Nondeterministic algorithms, The classes NP hard and NP complete; COOK's theorem, NP hard graph problems - Clique decision problem, Node cover decision problem, Traveling sales person decision problem

Text Book:

[1] E.Horowitz, S.Sahni, S.Rajasekaran, *Fundamentals of Computer Algorithms,* 2nd ed. Hyderabad: Universities Press, 2018

Reference Books:

[1] Thomas H.Cormen, Charles E.Leiserson, Ronald L.Rivest, Cliford Stein, *Introduction to Algorithms*, 3rd ed, New Delhi: Prentice-Hall of India, 2010

[2] Gajendra Sharma,*Design and Analysis of Algorithms*,4thed, Khanna, Rajput: Publishing,2019

[3] S.Sridhar, *Design and Analysis of Algorithms*,3rd ed, Oxford University Press, UK*:* 2015

[4]Mark Allen Weiss, *Data Structures and Algorithm Analysis in Java,* 3rd ed, New Delhi: Pearson, 2012

[5] Rajiv Chopra ,Shipra Raheja, *Design and Analysis of Algorithms*, New Delhi: New Age International Publishers,2019

Course Learning Outcomes(COs):

On completion of this course, students will be able to…

CO1: apply divide and conquer strategy for searching and sorting techniques with performance

CO2: analyze algorithms using greedy and backtracking methods

CO3: *design of algorithms using dynamic programming approach*

CO4: evaluate the classes P, NP ,NP-Hard and NP-Complete

Course Articulation Matrix (CAM):U18CS604DESIGN AND ANALYSIS OF ALGORITHMS

CO		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	PSO 2	PSO 3
CO1	U18CS604.1	1	2	2	1	-	1	-	-	1	1	-	1	2	1	2
CO2	U18CS604.2	1	2	2	1	-	1	-	-	1	1	-	1	2	1	2
CO3	U18CS604.3	1	2	2	1	-	1	-	-	1	1	-	1	2	1	2
CO4	U18CS604.4	1	2	2	1	-	1	-	-	1	1	-	1	2	1	2
U18CS604		**1**	2	2	1	-	1	-	-	1	1	-	1	2	1	2

U18CS605 DATA WAREHOUSING AND DATA MINING

Class: B.Tech. VI-Semester **Branch:** Computer Science and Engineering

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on…

LO1:data warehouse architecture, multidimensional modeling & preprocessing
LO2:algorithms for mining frequent patterns &associations rules
LO3:classification models and relevant evaluation techniques
LO4: clustering techniques and data mining applications on web, finance & retail business

UNIT-I (9)

Data Warehouse: Basic concepts, Multitier architecture, Data warehouse models, ETL tools, Metadata repository

Multidimensional Data Modeling: Data cube, Star, Snowflake and Fact constellation schemas, Dimensions, Measures, *OLAP* operations, Star net query model

Data Warehouse Implementation: Efficient data cube computation, Indexing *OLAP*, Efficient processing of *OLAP* queries, *OLAP* servers

Data Preprocessing: Data cleaning, Integration, Reduction and Transformation

UNIT-II (9)

Data Mining: Introduction, Types of data and patterns can be mined, Technologies Used, Applications Targeted, Major issues in data mining

Association Rule Mining: Basic concepts, Apriori algorithm, Generating association rules from frequent item sets, Improvements of Apriori algorithm, *Patten-Growth*approach, Mining frequent Item sets using vertical data format, Mining closed frequent item sets, Correlation analysis, Patten mining in multilevel and multidimensional space, Constraint based frequent pattern mining

UNIT-III (9)

Classification: Basic Concepts, Classification by decision tree induction, Bayesian classification, Rule based classification, Model evaluation and Selection

Advanced Classification: Classification by back propagation, Associative classification, *K Nearest* Neighbor classifiers, Rough set and Fuzzy set approaches

UNIT-IV (9)

Cluster Analysis: Introduction, Types of data in cluster analysis, Partitioning methods by *K- Means and K-Medoids*, Agglomerative versus Divisive hierarchical clustering, *BIRCH* Multiphase hierarchical clustering, Density based method with *DBSCAN* algorithm, Grid based method with *STING*, Evaluation of clusters, Outlier Analysis and detection methods

Data Mining Trends: Mining sequence data, Web data mining, Data mining applications with Finance data analysis, Retail industry and Recommender systems

Text Book:

[1] Jiawei Han, Micheline Kambler, *Data Mining Concepts and Techniques*, 3rd ed., Singapore:Morgan Kaufmann Publishers,2016.

Reference Books:

[1] Sam Anahory, Dennis Murray, *Data warehousing in the real world*, New Delhi: Pearson Education, 2003.
[2] C.S.R.Prabhu, *Data Warehousing Concepts, Techniques, Products and Applications*, 2nded. New Delhi: Prentice-Hall of India, 2002.
[3] Arun K.Pujari, *Data Mining Techniques*, 2nd ed. Hyderabad: Universities press, 2010.

Course Learning Outcomes(COs):

On completion of this course, students will be able to…

CO1: design multi dimensional models & preprocessing strategies for data warehouses applications
CO2: apply frequent pattern mining techniques on data sets for association rules extraction
CO3: analyze efficiency of classification algorithms
CO4:evaluateclustering techniquesand design data mining applications on web & financial domains.

Course Articulation Matrix (CAM): U18CS605 DATA WAREHOUSING AND DATA MINING

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O 2	PS O 3
CO1	U18CS605.1	1	2	2	2	1	-	-	-	-	1	1	1	2	1	2
CO2	U18CS605.2	1	2	2	2	-	-	-	-	-	1	-	1	2	1	2
CO3	U18CS605.3	1	2	2	2	1	-	-	-	1	1	-	1	2	1	2
CO4	U18CS605.4	1	2	2	2	-	-	-	-	1	1	-	1	2	1	2
U18CS605		1	2	2	2	1	-	-	-	1	1	1	1	2	1	2

U18CS606 INTERNET OF THINGS

Class: B.Tech. VI-Semester **Branch:** Computer Science & Engineering

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on…
LO1: fundamentals, Physical & logical designs of Internet of Things
LO2: standard architectures & protocols of Internet of Things
LO3: components and IP addressing optimizations of Internet of Things
LO4: Internet of Things platforms, security issues and application areas

Unit-I (9)

Introduction: What is the Internet of Things (IoT), IoT Definitions, IoT Architecture, General Observations, ITU-T Views, Working Definition, IoT Frameworks, Basic Nodal Capabilities,
Physical and Logical Design of IoT: Things of IoT, IoT Protocols, Functional block, communication Model, Communication API's
IoT Enabling Technologies: WSN, cloud computing, Big data Analytics, communication Protocols, Embedded systems, IoT levels and Deployment templates

Unit-II (9)

IoT NETWORK ARCHITECTURE: The M2M IoT Standardized Architecture, The IoT World Forum (IoTWF) Standardized Architecture, A Simplified IoT Architecture,
IoT Protocol Stack: The Core IoT Functional Stack, Sensors and Actuators Layer, Communications Network Layer, Applications and Analytics Layer, IoT Data Management and Compute Stack, Fog Computing, Edge Computing, the Hierarchy of Edge, Fog, and Cloud
IoT and M2M: Introduction to M2M, Difference between IoT and M2M, software defined networking and Network function virtualization

Unit-III (9)

Smart Objects: Sensors, Actuators, Smart Objects and Sensor Networks
Connecting Smart Objects: Communications Criteria, IoT Access Technologies: IEEE 802.15.4, IEEE 802.15.4g and 802.15.4e, IEEE 1901.2a, IEEE 802.11ah, LoRaWAN
Optimizing IP for IoT: The Need for Optimization, From 6LoWPAN to 6Lo, Header Compression, Fragmentation, Mesh Addressing, Mesh-Under Versus Mesh-Over Routing, 6Lo Working Group, 6TiSCH, RPL, Authentication and Encryption on Constrained Nodes, Profiles and Compliances

Unit-IV (9)

IoT PLATFORMS: Raspberry Pi, Raspberry Pi Interfaces, Other IoT Devices: pcDuino, Beagle Bone Black, CubieBoard, ARDUINO
Securing IoT: How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures, The Phased Application of Security in an Operational Environment
IoT PHYSICAL SERVERS AND CLOUD OFFEREINGS: Introduction to cloud storage models and communication API's, WAMP- for IoT, Python web application framework, Designing a RESTful web API.AutoBahn
IoT case studies: Home Automation, Smart and connected Cities, Transportation, Public safety, Environment and Agriculture.

Text Books:

[1]. ArshdeepBahga and Vijay Madisetti, *Internet of Things: A Hands-On Approach,* Hyderabad: University Press, 2015.

[2]. David Hanes, Gonzalo Salgueiro and Patrick Grossetete, *IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things,* Cisco Press, 2017. (Chapters: 2, 3, 4, 5, 8,13,15)

Reference Books:

[1]. Bassi Alessandro, *Enabling things to talk*, Berlin: Springer-Verlag, 2016.

[2]. Hersent, Olivier, David Boswarthick, and Omar Elloumi, *The internet of things: Key applications and protocols*. London: John Wiley & Sons, 2011.

[3]. Buyya, Rajkumar, and Amir Vahid Dastjerdi, *Internet of Things: Principles and paradigms*. New York: Elsevier, 2016.

Course Learning Outcomes(COs):

On completion of this course, students will be able to…

CO1:demonstrate fundamentals, Physical & logical designs of Internet of Things
CO2:analyze standard architectures & protocols of Internet of Things
CO3:select effective components and IP addressing structure to develop IoT applications
CO4:design IoT applicatons for domestic safety, transportation and agricultural applications

Course Articulation Matrix (CAM): U18CS606 INTERNET OF THINGS

Course Outcomes		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	PSO 2	PSO 3
CO1	U18CS606.1	1	2	2	2	1	-	-	-	1	1	1	1	2	2	2
CO2	U18CS606.2	1	2	2	2	-	-	-	-	1	1	-	1	2	2	2
CO3	U18CS606.3	1	2	2	2	1	-	-	-	1	1	-	1	2	2	2
CO4	U18CS606.4	1	2	2	2	-	-	-	-	1	1	1	1	2	2	2
U18CS606		1	2	2	2	1	-	-	-	1	1	1	1	2	2	2

U18CS607DESIGN AND ANALYSIS OF ALGORITHMS LAB

Class: B.Tech. VI-Semester **Branch:** Computer Science and Engineering

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on…

LO1: searching and sorting techniques using divide and conquer strategy
LO2: computational problems using greedyand backtracking methods
LO3: computationalproblems using dynamic programming technique
LO4:computationalproblems using dynamic programming and branch and bound methods

List of Experiments

Experiment-I

1. Program to implement binary search algorithm
2. Programto implement min-max algorithm

Experiment-II

1 Program to implement merge sortalgorithm
2 Program to implement quick sort algorithm

Experiment-III

1. Program to implement stassen's matrix multiplication

Experiment-IV

1. Program to implement 0/1 knapsackproblem
2. Program to implement job sequencing with deadlines

Experiment-V

1. Program to implement single source shortest path applying greedy method
2. Program to implement N-Queens problem

Experiment-VI

1. Program to implement sum of subsets problem

Experiment-VII

1 Program to implement single source shortest paths problem using dynamic programming

Experiment-VIII

1 Program to implement multistage graphs problem

Experiment-IX

1. Program to implement all pairs shortest paths

Experiment-X

1. Program to implement optimal binary search trees

Experiment-XI

1. Program to implement travelling sales person problem using dynamic programming

Experiment-XII

1. Program to implement travelling salesperson problem using branch and bound

Laboratory Manual:

[1] *Design and analysisofalgorithmslaboratory manual*, Dept. of CSE,KITSW.

Reference Books:

[1]E.Horowitz, S.Sahni, S.Rajasekaran, *Fundamentals of Computer Algorithms,* 2nd ed, Hyderabad: Universities Press, 2018.

[2] Mark Allen Weiss, *Data Structures and Algorithm Analysis in Java,* 3rd ed, New Delhi: Pearson,2012.

[3] Kathy Sierra, Bert Bates, *Head First Java8*, 2nd ed, California: O'Reilly Publications, 2020

[4] NarasimhaKarumanchi, *Data Structures and Algorithms Made Easy in Java*, Hyderabad: CareerMonk, 2011.

[5]Uttam K. Roy, *Advanced JAVA Programming*, Noida: Oxford Publications, 2015.

Course Learning Outcomes(COs):

On completion of this course, students will be able to…

CO1: implement programs on binary search,min-max,merge sort, quick sort &strassen's matrix multiplication problems

CO2 :developknapsack, jobsequencing with deadline & shortest path using greedy method,N-Queens & sum of subsetsusing backtracking method

CO3 :implement programs on single source shortest path, multistage graph &all pairs shortest path using dynamic programmingtechnique

CO4:construct optimal binary search tree & travelling sales person using dynamic programming technique, travelling sales person problem using branch and bound method

Course Articulation Matrix (CAM):U18CS607DESIGN AND ANALYSIS OF ALGORITHMS LAB

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18CS607.1	1	2	2	1	-	1	-	-	1	1	-	1	2	1	2
CO2	U18CS607.2	1	2	2	1	-	1	-	-	1	1	-	1	2	1	2
CO3	U18CS607.3	1	2	2	1	-	1	-	-	1	1	-	1	2	1	2
CO4	U18CS607.4	1	2	2	1	-	1	-	-	1	1	-	1	2	1	2
U18CS607		1	2	2	1	-	1	-	-	1	1	-	1	2	1	2

U18CS608DATA ANALYTICS LABORATORY

Class: B. Tech VI-Semester **Branch:** Computer Science & Engineering

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):
This course will develop students' knowledge in/on…
LO1: designing data warehouse & OLAP operations
LO2: ETL &OLAP tools
LO3: evaluating data processing techniques using WEKA tool
LO4: programming data mining techniques

List of Experiments

Experiment-I
1. SQL queries to implement multidimensional data models (Star, snowflake and Fact constellation schemes)using SQL queries.

Experiment-II
2. SQL queries to implement Cube operations on multidimensional data models.

Experiment-III
3. SQL queries to implement Set operations on multidimensional data models.

Experiment-IV
4. Develop a data warehouse application for sales management using ETL tool

Experiment-V
5. Demonstrate OLAP operations using for sales data analytics using OLAP server

Experiment-VI
6. Demonstrate different options of handling missing values
7. Demonstrate elimination of data noise using various kinds of binning functions

Experiment-VII
8. Perform data preprocessing/analysis tasks using WEKA Tool.
9. Write a program in any programming language to create a file in ARFF format consisting of at least 10,000 transactions with at least three items.

Experiment-VIII
10. Write a program to implement Apriori algorithm for association rule mining.
11. Generate association rules using Apriori and FP-Growth methods in WEKA Tool on German credit card dataset.
12. Compare efficiency of Apriori and FP-Growth methods in WEKA Tool on German credit card dataset.

Experiment-IX
Write a program to implement ID3 classification algorithm.
13. Generate and compare different classification functions of WEKA Tool on German credit card dataset.
14. Generate the significance of attributes Foreign worker and social status of German credit card dataset in classification process using WEKA Tool.

Experiment-X

15. Generate and compare significance of Ten cross fold and Fifty cross fold options of testing data generation for classification using WEKA Tool.
16. Generate and compare significance of Cross validation and boot strapping techniques of evaluation using WEKA Tool.
17. Evaluate the significance of attributes Foreign worker and social status of German credit card dataset using cross validation techniques of WEKA Tool.

Experiment-XI

18. Write a program to implement simple K-means Clustering algorithm using WEKA Tool.
19. Generate and compare different clustering functions of WEKA Tool on German credit card dataset.
20. Generate the significance of attributes Foreign worker and social status of German credit card datasetin clustering process using WEKA Tool.

Experiment-XII

21. Perform data visualization of German credit card dataset using R-Open Tool.
22. Generate synthetic data set and evaluate different classification algorithms using R-Open Tool.
23. Evaluate on different clustering algorithms on synthetic dataset using R-Open Tool.

Laboratory Manual:

1. *Data Analytics Laboratory Manual*, Department of Computer Science and Engineering, KITSW

Text Book:

1. Jiawei Han, Micheline Kambler, *Data Mining Concepts and Techniques*, 3rd ed. Singapore: Morgan Kaufmann Publishers,2016

Course Learning Outcomes(COs):

On completion of this course, students will be able to…

CO1: design data warehouse and implement OLAP operations
CO2: apply ETL &OLAP tools for data analysis
CO3: evaluate different data processing techniques using WEKA tool
CO4: implement data mining techniques on various data sets

Course Articulation Matrix (CAM): U18CS608 DATA ANALYTICS LABORATORY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO 2	PSO 3
CO1	U18CS608.1	1	2	2	2	1	-	-	-	1	1	1	1	2	2	2
CO2	U18CS608.2	1	2	2	2	-	-	-	-	1	1	-	1	2	2	2
CO3	U18CS608.3	1	2	2	2	1	-	-	-	1	1	-	1	2	2	2
CO4	U18CS608.4	1	2	2	2	-	-	-	-	1	1	1	1	2	2	2
U18CS608		1	2	2	2	1	-	-	-	1	1	1	1	2	2	2

U18CS609 INTERNET OF THINGS LABORATORY

Class: **B.Tech. V**I-Semester

Branch: Computer Science and Engineering

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Outcomes(LO) :
This course will develop students' knowledge in/on

LO1: configuring Rasberry Pi for IoT applications
LO2: running python program on Rasberry Pi for developing IoT applications
LO3: implementing cloud based IoT applications
LO4: usage of Pi camera and 7-segment display

List of Experiments

Experiment I:

1. Installation of OS onto Raspberry Pi
2. Start Raspberry Pi and try various Linux commands in command terminal window:
   i. ls, cd, touch, mv, rm, man, mkdir, rmdir, tar, gzip
   ii. cat, more, less, ps

Experiment II:

3. Start Raspberry Pi and try various Linux commands in command terminal window:
   a. sudo, cron, chown, chgrp, ping etc.
   b. process-related commands
4. Run a python program on Pi to Read your name and print Hello message with name
5. Run a python program on Pi to Read two numbers and print their sum, difference, product and division
6. Run a python program on Pi to read a word and count characters in that word

Experiment III:

7. Run a python program on Pi to Area of a given shape (rectangle, triangle and circle) reading shape and appropriate values from standard input

Experiment IV:

8. Run a python program on Pi to demonstrate *while* loop
9. Run a python program on Pi to demonstrate *for* loop
10. Run a python program on Pi to demonstrate handle *Divide By Zero* Exception

Experiment V:

11. Run a python program on Pi to print current time for 10 times with an interval of 10 seconds.

12. Run a python program on Pi to print Read a file line by line and print the word count of each line.
13. Run a python program on Pi to demonstrate Light an LED through Python program

Experiment VI:

14. Run a python program on Pi to get input from two switches and Switch ON corresponding LEDs

Experiment VII:

15. Run a python program on Pi to Flash an LED at a given on time and off time cycle, where the two times are taken from a file.
16. Run a python program on Pi to Flash an LED based on *cron* output (acts as an alarm)

Experiment VIII:

17. Switch on a relay at a given time using *cron*, where the relay's contact terminals are connected to a load.

Experiment IX:

18. Get the status of a bulb at a remote place (on the LAN) through web.

Experiment X:

19. Get input from DHT sensor and upload on cloud
20. Get input from ultrasonic sensor and upload on cloud

Experiment XI:

21. Working with LED, button, *pir* sensor

Experiment XII:

22. Working with Pi camera
23. Working with 7-segment display using Raspberry PI

Course Learning Objectives(CO) :

On completions of the course, students will be able to…

LO1: configure Rasberry Pi to develop IoT applications
LO2: implement python programs on Rasberry Pi for developing IoT applications
LO3: design cloud based IoT applications
LO4: develop real time IoT application using Pi camera and 7-segment display

Course Articulation Matrix (CAM): U18CS609 Internet of Technologies Laboratory																
Course Outcomes		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	U18CS609.1	-	2	2	-	-	-	-	-	-	-	-	-	2	1	1
CO2	U18CS609.2	1	2	2	-	2	-	-	-	-	-	-	-	2	1	1
CO3	U18CS609.3	1	2	2	-	2	-	-	-	-	-	1	1	2	1	1
CO4	U18CS609.4	1	2	2	-	2	-	-	-	-	1	1	1	2	1	1
U18CS609		1	2	2	-	2	-	-	-	-	1	1	1	2	1	1

U18CS610 MINI PROJECT

Class: B.Tech. VI - Semester **Branch:** Computer Science and Engineering

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	100 marks
End Semester Examination	-

Course Learning Objectives(LOs):
This course will develop students' knowledge on /in…

LO4: implementing a project independently by applying knowledge to practice
LO5: literature review and well-documented report writing
LO6: creating PPTs and effective technical presentation skills
LO7: writing technical paper in scientific journal style & format and creating video pitch

Student has to take up independent mini project on innovative ideas, innovative solutions to common problems using their knowledge relevant to courses offered in their program of study, which would supplement and complement the program assigned to each student.

Guidelines:

1. The HoD shall constitute a *Department Mini Project Evaluation Committee (DMPEC)*
2. DMPEC shall allot a faculty supervisor to each student for guiding on (i) selection of topic (ii) literature survey and work to be carried out (iii) preparing a report in proper format and (iv) effective mini project oral presentation
3. There shall be only Continuous Internal Evaluation (CIE) for mini project
4. The CIE for seminar is as follows:

Assessment	Weightage
Mini Project Supervisor Assessment	20%
Working model / process / software package / system developed	20%
Mini Project report	20%
Mini Project paper	10%
Video pitch	10%
DMPEC Assessment: *Oral presentation with PPT and viva-voce*	20%
Total Weightage:	100%

Note: It is mandatory for the student to appear for oral presentation and viva-voce to qualify for course evaluation

(g) **Mini Project Topic**: The topic should be interesting and conducive to discussion. Topics may be found by looking through recent issues of peer reviewed Journals / Technical Magazines on the topics of potential interest

(h) **Working Model**: Each student is requested to develop a working model / process / system

(i) on the chosen work and demonstrate before the *DMPEC* as per the dates specified by *DMPEC*

(j) **Report:** Each student is required to submit a well-documented report on the chosen seminar topic as per the format specified by*DMPEC*

(k) **Anti-Plagiarism Check:** The seminar report should clear plagiarism check as per the Anti-Plagiarism policy of the institute

(l) **Presentation:** Each student should prepare PPT with informative slides and make an effective oral presentation before the *DMPEC* as per the schedule notified by thedepartment

(m) **Video Pitch:** Each student should create a pitch video, which is a video presentation on his /

(n) her mini project. Video pitch should be no longer than 5 minutes by keeping the pitch concise and to the point,

which shall also include key points about his / her business idea / plan (*if any*) and social impact

(o) The student has to register for the Mini project as supplementary examination in the following cases:
   iv) he/she is absent for oral presentation and viva-voce
   v) he/she fails to submit the report in prescribed format
   vi) he/she fails to fulfill the requirements of Mini project evaluation as per specified guidelines

(p) i) The CoE shall send a list of students registered for supplementary to the HoD concerned
   ii) The DSEC, duly constituted by the HoD, shall conduct Mini project evaluation and send the award list to the CoE within the stipulated time

Course Learning Outcomes(COs):

On completion of this course, students will be able to…

CO1: apply knowledge to practice to design & conduct experiments and utilize modern tools for developing working models / process / system leading to innovation & entrepreneurship

CO2: demonstrate the competencies to perform literature survey, identify gaps, analyze the problem and prepare a well-documented Mini project report

CO3: make an effective oral presentation through informative PPTs, showing knowledge on the subject & sensitivity towards social impact of the Mini project

CO4: write a "Mini project paper" in scientific journal style & format from the prepared Mini project report and create a video pitch on Mini project

Course Articulation Matrix (CAM): U18CS610 MINI PROJECT

CO		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	PSO 2	PSO 3
CO1	U18CS610.1	1	1	2	2	1	1	1	2	2	2	1	2	2	2	2
CO2	U18CS610.2	1	1	-	2	-	-	-	2	2	2	-	2	2	2	2
CO3	U18CS610.3	-	-	-	-	-	-	1	2	2	2	-	2	2	2	2
CO4	U18CS610.4	-	-	-	-	-	-	-	2	2	2	-	2	2	2	2
U18CS609		**1**	**1**	**2**	**2**	**1**	**1**	1	2	2	2	1	**2**	**2**	**2**	**2**

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE:: WARANGAL – 15
(An Autonomous Institute under Kakatiya University, Warangal)

SCHEME OF INSTRUCTION & EVALUATION
VII - SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAM

[4Th+2P+ MP-I+ internship]

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	HSMC	U18MH701	Management Economics and Accountancy	3	_	_	3	10	30	40	60	100
2	PE	U18CS702	Professional Elective - III / MOOC-III	3	-	-	3	10	30	40	60	100
3	PE	U18CS703	Professional Elective - IV / MOOC-IV	3	-	-	3	10	30	40	60	100
4	PCC	U18CS704	Cloud Computing	3	-	-	3	10	30	40	60	100
5	PCC	U18CS705	Cloud Computing Lab	-	-	2	1	40	-	40	60	100
6	PCC	U18CS706	CASE Tools Lab	-	-	2	1	40	-	40	60	100
7	PROJ	U18CS707	Major Project - Phase – I	-	-	6	3	100	-	100	-	100
8	MC	U18CS708	Internship Evaluation	-	-	2	-	-	-	-	-	-
			Total:	12	_	12	17	220	120	340	360	700
***Additional Learning*:** *Maximum credits allowed for Honours/Minor*				-	-	-	*7*	-	-	-	-	-
			Total credits for Honours/Minor students:	-	-	-	***17+7***	-	-	-	-	-

** List of courses for additional learning through **MOOCs** towards Honours/Minor in Engineering shall be prescribed by the department under Honours/ Minor Curricula*

[L= Lecture, T = Tutorials, P = Practicals & C = Credits] **Total Contact Periods/Week: 24** **Total Credits: 17**

Professional Elective-III / MOOC-III:	**Professional Elective-IV / MOOC-IV:**
U18CS702A: Machine Learning	**U18CS703A: User Experience Design**
U18CS702B: High Performance Computing	**U18CS703B: Big Data Analytics**
U18CS702C: Mobile Computing	**U18CS703C: Cyber Security and Digital Forensic**
U18CS702M: MOOCs course	**U18CS703M: MOOCs course**

***Note: An Android course with at least 2-weeks duration must be done by students and should submit course completion certificate**

U18MH701 MANAGEMENT ECONOMICS AND ACCOUNTANCY

Class: B.Tech. VII-Semester

Branch: CE, EIE, EEE, ECE, ECI, ME, CSE, IT & CSN

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: basic concepts of management
LO2: concepts of economics and forms of business organizations
LO3: fundamentals of accountancy and journalising
LO4: preparation of final accounts

UNIT – I (9)

Management: Meaning and definition, Scientific Management - Definition, Characteristics, Principles of management

Functions of Management: Planning - Definition, Characteristics; Organizing - Definition, Characteristics; Staffing- Meaning, Functions of personnel management; Directing- Leadership, Nature; Motivation– Nature, Types (financial, non-financial, intrinsic and extrinsic), Communication- Process, Types, Co-ordination- Definition, Steps to achieve effective coordination, Controlling- Definition, process (*Chapters 1,3, 4, 5, 6, 7 of Part 4 of Text 1)*

UNIT – II (9)

Economics: Meaning and definition, Scope, Micro and Macro Economics, Methods of Economics, Laws of Economics

Forms of Business Organization: Sole Proprietor ship, Partnership firm- Types of Partners, Cooperative society, Joint Stock Company- Features, Types, Merits and demerits (*Chapters 1, 2, 3, 4 of Part 2 of Text 1)*

UNIT – III (9)

Double Entry System and Book Keeping: Accounting concepts and conventions, Overview of accounting cycle, Journal- meaning, Journalizing, Ledger- Meaning, Ledger posting, Balancing; Cashbook (Single column), Preparation of Trial balance *(Chapter 3, 4 of Text 2)*

UNIT – IV (9)

Final Accounts: Trading Account, profit and loss account and Balance Sheet with simple adjustments *(Chapter5 of Text 2)*

Text Book:

[1] Y.K. Bhushan, Fundamentals of Business Organization and Management, 20th ed. New Delhi: Sultan Chand & Sons, 2017. (Units 1,2)

[2] T. S. Grewal, S.C. Gupta, *Introduction to Accountancy*, 8th ed. New Delhi: Sultan Chand & Sons, 2014. (Units 3, 4)

Reference Books:

[1] L. M. Prasad, *Principles and Practice of Management*, 9th ed. New Delhi: Sulthan Chand, 2016.

[2] R.L.Gupta&V.K.Gupta, *Principles and Practice of Accountancy*, 14th ed. New Delhi: Sulthan Chand and Son, 2018.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: comprehend the basic concepts of management

CO2: distinguish between micro & macro economics and forms of business organizations

CO3: pass journal entries & post the minto ledgers

CO4: prepare profit & loss accounts and assess the financial position through the balance sheet

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Web page

Course Case Study: Case studies relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them

Course Articulation Matrix (CAM): U18MH701 MANAGEMENT ECONOMICS AND ACCOUNTANCY

Course Outcomes		PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18MH602/ U18MH701.1	-	-	-	-	-	-	-	-	1	1	1	1	1	-	-
CO2	U18MH602/ U18MH702.2	-	-	-	-	-	-	-	-	1	1	2	1	1	-	-
CO3	U18MH602/ U18MH703.3	-	-	-	-	-	-	-	-	1	1	1	1	1	-	-
CO4	U18MH602/ U18MH704.4	-	-	-	-	-	-	-	-	1	1	1	1	1	-	-
U18MH602/ U18CN704		-	-	-	-	-	-	-	-	1	1	1.25	1	1	-	-

U18CS702A MACHINE LEARNING

Class: B.Tech. VII-Semester

Branch: Computer Science and Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: machine learning fundamentals, binary classification and handling more than two classes
LO2: dimensionality reduction, linear and kernel models
LO3: fundamentals of ANN, multi-layer feed forward and back propagation networks
LO4: reinforcement learning, decision making by ensemble learning

UNIT – I (9)

The ingredients of machine learning: The problems that can be solved with machine learning, The output of machine, The workhorses of machine
Binary classification: Classification, Scoring and Ranking, Class probability estimation
Beyond Binary Classification: Handling more than two classes
Case Study: Spam filtering

UNIT – II (9)

Dimensionality Reduction: Linear discriminant analysis (LDA), Principal components analysis (PCA), Factor analysis, Independent components analysis (ICA)
Linear Models: The Least-Squares method, Multivariate linear regression
Support Vector Machines: Optimal separation, Kernels, The support vector machine algorithm, Extensions to the SVM
Case Study: Disease prediction using SVM

UNIT – III (9)

Artificial Neural Networks: Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptron, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm
The Multi-layer Perceptron: Going forwards, Going backwards, Back-propagation of error, The Multi-layer perceptron in practice, Examples of using the MLP, A Recipe for using the MLP, Deriving Back-Propagation

UNIT – IV (9)

Reinforcement Learning: Overview, Example: getting lost, Markov decision processes, Values, Back on holiday: Using reinforcement learning, The difference between SARSA and Q-Learning, Uses of Reinforcement learning
Ensemble Learning: Boosting, Bagging, Random forests, Different ways to combine classifiers
Case Study: optimization of disease prediction using ensemble learning

Text Book:

[1] Peter Flach, *Machine Learning: The Art and Science of Algorithms that Make Sense of Data*, Cambridge University Press, 1st ed., ISBN: 978-1 -107-09639-4, 2012.

[2] Stephen Marsland, Taylor & Francis, *Machine Learning: An Algorithmic Perspective*, CRC, ISBN -13: 978-1420067187, 2009.

Reference Books:

[1] Tom M. Mitchell, *Machine Learning*, MGH, Indian Edition, ISBN 1259096955, 2013.

[2] S. Russell and P. Norvig, *Artificial Intelligence – A Modern Approach*, 2nd ed., Pearson Education, 2003, ISBN: 978-0137903955.

[3] Jason Bell, *Machine Learning: Hands-On for Developers and Technical Professionals*, John Wiley & Sons, 1st ed., ISBN-13: 978-1118889060, 2014.

[4] William W Hsieh, *Machine Learning Methods in the Environmental Sciences, Neural Networks*, Cambridge University Press, ISBN-13: 978-0805822410, 2009.

Course Research Papers: Research papers (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Web page.

Course Patents: Patents relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course project titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: classify given input class based on binary and multivariate classification techniques

CO2: apply linear models and dimensionality reduction in real world problems

CO3: analyze the ANN and its usage in real world problems

CO4: analyze the concepts of reinforcement learning and decision making by ensemble learning

Course Articulation Matrix (CAM): U18CS702A MACHINE LEARNING

Course Outcomes		PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18CS702A.1	2	2	2	3	3	2	-	1	1	1	-	2	2	2	2
CO2	U18CS702A.2	3	3	3	2	2	2	-	1	1	1	-	2	3	2	3
CO3	U18CS702A.3	2	2	2	3	3	1	-	1	1	1	-	2	2	2	3
CO4	U18CS702A.4	3	2	3	3	3	2	-	1	1	1	-	2	3	2	3
U18CS702A		2	2.5	2.5	2.5	2.75	2.75	1.75	-	1	1	1	-	2	2.5	2

U18CS702B HIGH PERFORMANCE COMPUTING

Class: B.Tech. VII-Semester **Branch:** Computer Science and Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: fundamental concept of Parallel computing and algorithms
LO2: study the typical Parallel programs and Message passing paradigm
LO3: study the CUBA and Heterogeneous Computing
LO4: concept of Cluster Computing

UNIT – I (9)

Introduction: Implicit parallelism, Limitations of memory system performance, control structure, communication model, physical organization, and communication costs of parallel platforms, Routing mechanisms for interconnection networks, Mapping techniques

Parallel algorithm design: Preliminaries, decomposition techniques, tasks and interactions, mapping techniques for load balancing, methods for reducing interaction overheads, parallel algorithm models

UNIT – II (9)

Basic communication operations: Meaning of all-to-all, all-reduce, scatter and gather, circular shift and splitting routing messages in parts

Analytical modeling of parallel programs: sources of overhead, performance metrics, the effect of granularity on performance, scalability of parallel systems, minimum execution time, minimum cost-optimal execution time, asymptotic analysis of parallel programs

Programming using message passing paradigm: Principles, building blocks, MPI, Topologies and embedding, Overlapping communication and computation, collective communication operations, Groups and communicators

UNIT – III (9)

Introduction to General-purpose GPU Programming (CUDA): Brief History of GPUs, An Overview of GPU Programming, An Overview of GPU Memory Hierarchy Features, An Overview of CUDA and its architecture, Applications of CUDA, Introduction to CUDA C, Programming in CUDA C

Introduction to Heterogeneous Computing: Open CL, OpenCL Kernel, OpenCL Memory model, Open CL Execution Model, OpenCL Platform and Devices, OpenCL execution environment, Overview of OpenCL API, Heterogeneous Programming in Open CL

UNIT – IV (9)

Cluster Computing: Introduction to Cluster Computing, Scalable Parallel Computer Architectures, Cluster Computer and its Architecture, Classifications, Components for Clusters, Cluster Middleware and Single System Image, Resource Management and Scheduling, Programming Environments and Tools, Applications, Representative Cluster Systems, Heterogeneous Clusters, Security, Resource Sharing, Locality, Dependability, Cluster Architectures, Detecting and Masking Faults, Recovering from Faults, Condor, Evolution of Meta computing

Text Book:

[1] Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, *Introduction to Parallel Computing*, 2nd ed. Pearson Education, 2007 *(Unit-I and Unit-II)*.
[2] Jason Sanders, Edward Kandrot, *CUDA By Example— An Introduction to General-Purpose GPU Programming*, Addison Wesley, 2011 *(Unit-III)*.
[3] R.Buyya, *High Performance Cluster Computing: Architectures and Systems*, Volume **1,** Pearson Education, 2008 *(Unit-IV).*

Reference Books:

[1] Michael J.Quinn, *Parallel Programming in C with MPI and OpenMP*, McGraw-Hill International Editions, Computer Science Series, 2004.
[2] Benedict Gaster, Lee Howes, David R. Kaeli, Perhaad Mistry, Dana Schaa,Morgan Kaufmann, *Heterogeneous Computing with Open CL*, Newyork, McGraw-Hill Inc., 2011.
[3] Duane Storti, Mete Yurtoglu, *CUDA for Engineers : An Introduction to High-Performance Parallel Computing*, Addison Wesley, 2015.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: design the parallel algorithms for real world problems and implement them on available parallel computer systems
CO2: optimize the performance of a parallel program to suit a particular hardware and software environment
CO3: design algorithms suited for Multi core processor systems using CUDA and OpenCL, OpenMP, Threading techniques
CO4: analyze the Cluster Computing in Parallel Computer Architectures

Course Articulation Matrix (CAM): U18CS702B High Performance Computing

Course Outcomes		PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18CS702B.1	2	2	1	1	2	-	-	-	1	1	-	1	2	1	2
CO2	U18CS702B.2	2	2	2	1	2	-	-	-	1	1	-	1	2	1	2
CO3	U18CS702B.3	2	2	2	3	2	-	-	-	1	1	-	2	2	1	2
CO4	U18CS702B.4	2	2	3	3	2	-	-	-	1	1	-	2	3	1	3
U18CS702B		2	2	2	2	2	-	-	-	-	1	1	1.5	2.25	1	2.25

U18CS702C MOBILE COMPUTING

Class: B.Tech. VII-Semester **Branch:** Computer Science and Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: fundamental concept of mobile computing paradigm, its novel applications and limitations
LO2: components and working of various mobile devices and systems
LO3: functionalities of mobile networks namely network layer and transport layer
LO4: database issues in mobile environment & mobile application development platforms

UNIT – I (9)

Introduction: Mobile communications, Modulation methods and standards for voice-oriented data communication standards, Modulation methods and standards for data and voice communication,
Super3G and 4G: 3GPPLTE and WiMax802.16e standards
Features of 4G: LTE Advanced and Advanced WiMax802.16m, Wireless personal area network, Wireless local area network and Internet access, Near-field communication
Mobile computing: Novel applications, Limitations of mobile computing, Mobile computing architecture, Programming languages, Functions of operating systems, Functions of middleware for mobile systems, Mobile computing architectural layers and protocols

UNIT – II (9)

Mobile devices and systems: Cellular networks and frequency reuse cellular networks for mobile smart phones, Frequency reuse in networks, Capacity enhancement in networks
Smart Mobiles and systems: Smartphone features, Digital music players, Bluetooth and Wi-Fi, GPS, Gyroscope and accelerometer, Digital compass and magnetometer, Camera 2D and 3D Graphics and HDMI
Handheld devices: Mac OS 4 based devices, Android, Linux based mobile devices, e-book reader
Smart systems: Smartcards, Smart labels, RFID, Smart tokens, Sensors, Actuators, Sensors and actuators for robotic systems, Smart appliances and Set-top boxes

UNIT – III (9)

4G Networks: 4G Networks-Requirements and design, Modulation and multiplexing techniques for 4G, High speed OFDM packet access Super 3G, LTE advanced, WiMax advanced (802.16m)
Mobile Network Layer: IP and Mobile IP network layers, Packet delivery and handover management, Location management, Registration, Tunneling and Encapsulation, Route optimization, DHCP
Mobile Transport Layer: Conventional TCP/IP protocols, Indirect TCP, Snooping TCP and Mobile TCP
Database and Mobile Computing: Database transactional models, Query processing, Data recovery process, Database hoarding and caching, Client-Server computing for mobile computing and adaption

UNIT – IV (9)

Data Dissemination: Communication asymmetry, Classification of data-delivery mechanisms, Data dissemination broadcast models, Selective tuning and indexing techniques
Data Synchronization: Synchronization in mobile computing systems, Domain dependent specific data synchronization, Personal information manager, Strategies, Synchronization software, Synchronization protocols, Mobile application development platforms

Text Book:

[1] Jochen Schiller, *Mobile Communications*, 2nd ed., Addison-Wesley, 2008. (*Chapter 8 and 9)*

[2] Raj Kamal, *Mobile Computing*, 3rd ed., Oxford University Press, 2018. *(Chapters 2,3,4,6 and 8)*.

Reference Books:

[1] Ivan Stojmenovic, *Handbook of Wireless Networks and Mobile Computing*, 2nd ed., John Wiley and sons, INC, 2002.

[2] Reza Behravanfar, *Mobile Computing Principles: Designing and Development Mobile Applications with UML and XML*, 1st ed., Cambridge University Press,2005.

Course Research Papers: Research papers (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patents: Patents relevant to the course content will be posted by the course faculty in CourseWeb page**.**

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: make use of the concepts of mobile computing such as modulation methods and standards for data and voice communication standards using 4G networks

CO2: analyze the cellular systems features and components using different operating system-based devices

CO3: analyze the packet delivery and handover management methodology through the mobile network layer

CO4: apply data dissemination and synchronization to develop different mobile applications

Course Articulation Matrix (CAM): U18CS702C MOBILE COMPUTING

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18CS702C.1	2	2	2	2	1	-	-	1	1	1	-	2	2	1	2
CO2	U18CS702C.2	2	2	2	2	1	-	-	1	1	1	-	2	2	1	2
CO3	U18CS702C.3	3	3	2	3	1	-	-	1	1	1	-	2	2	1	2
CO4	U18CS702C.4	3	3	3	3	1	-	-	1	1	1	-	2	3	1	3
U18CN702C		2.5	2.5	2.25	2.5	1	-	-	1	1	1	1	2.5	2.5	1	2.5

U18CS703A USER EXPERIENCE DESIGN

Class: B.Tech. VII-Semester **Branch:** Computer Science and Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: the concepts, terminology, lifecycle, methods, data elicitation in UX design
LO2: user research data analysis, data modeling in UX
LO3: effective design requirements, prototyping in of UX design
LO4: evaluation methods, techniques and reports generation

UNIT – I (9)

Introduction: The Expanding Concept of Interaction: Definition of UX, UX Design, The Components of UX, What UX Is Not, Kinds of Interaction and UX

UX Processes, Lifecycles, Methods, and Techniques : Introduction , The Basic Process Components for UX, The Fundamental UX Lifecycle Activities, UX Design Techniques as Life Skills, Choosing UX Processes, methods, and Techniques

Scope, Rigor, Complexity, and Project Perspectives: Introduction, Rigor in a UX Method or Process, Scope of Delivery, The Commercial Product Perspective and the Enterprise System Perspective

Usage Research Data Elicitation: Introduction, Some Basic Concepts of Usage Research Data Elicitation, Data Elicitation Goals and Our Approach, Before the Visit: Prepare for Data Elicitation, During the Visit: Collect Usage Data

Case Study: Conversational UI for Cortana By John Price, Senior Design Lead at Microsoft.

UNIT – II (9)

Usage Research Data Analysis: Introduction, Distill the Essence from Your Usage Research by Synthesizing Work Activity Notes, Extract Work Activity Notes that Are Inputs to User Stories or Requirements, Extract Notes that Are Inputs to Usage Research Models, Construct a WAAD(Work Activity Affinity Diagram), Lead a Walkthrough of the WAAD to Get Feedback

Usage Research Data Modeling: Introduction, Some General "How to" Suggestions for Data Modeling, The User Work Role Model, User Personas, The Flow Model, Task Structure Models—The Hierarchical Task Inventory (HTI), Task Sequence Models, Artifact Model, Physical Work Environment Model, Information Architecture Model

Case Study: Box Annotations By Vandana Pai, former product designer at Box

UNIT – III (9)

UX Design Requirements: User Stories and Requirements, Introduction, User Stories, UX Design Requirements, Validating User Stories and Requirements

UX Design, The Nature of UX Design: Introduction, What is Design? The Purpose of Design: Satisfying Human Needs, Information, Information Design

Bottom-Up versus Top-Down Design: Introduction, Bottom-Up Design: Designing for Existing Work Practice, Abstract Work Activities, Top- Down Design, Designing for the Abstract Work Activity

Prototype Candidate Designs:

Prototyping, Introduction, Depth and Breadth of a Prototype, Fidelity of Prototypes, Wireframe Prototypes, Build Up Prototypes in Increasing Levels of Fidelity, Specialized Prototypes, Software Tools for Making Wireframes

Case Study: Query formulation and auto-suggest By Mr Brian Morris, Senior designer at Microsoft

UNIT – IV (9)

UX Evaluation- UX Evaluation Methods and Techniques: Introduction, UX Evaluation Methods, Rigor versus Rapidness in UX Evaluation Methods and Techniques, UX Evaluation Data Collection Techniques, Specialized UX Evaluation Methods, Adapting and Appropriating UX Evaluation Methods and Techniques
Empirical UX Evaluation: UX Goals, Metrics, and Targets, Introduction, UX Target Tables, Work Role and User Classes, UX Goals, UX Measures
UX Evaluation: Reporting Results, Introduction, Reporting Different Kinds of Data, Report Audiences, Report Content, Report Mechanics
Case Study: eBay Card Pattern - UX design pattern for eBay by Vax Liu

Text Book:

[1] Rex Hartson, PardhaPyla, " *The UX Book : Agile UX Design for a Quality User Experience*" , 2nd ed., Morgan Kaufmann – Elsevier Publisher, Hampshire Street, 5th Floor, Cambridge, United States, 2019.

Reference Books:

[1] Russ Unger and Carolyn Chandler, "*A Project Guide to UX Design",* 2nd ed., New Riders is an imprint of Peachpit, a division of Pearson Education, United States of America , 2012.

[2] Laura Klein *, "UX for Lean Startups: Faster, Smarter User Experience Research and Des",* O'Reilly Media, Sabastopol, CA, 2013.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in CourseWebpage

Course Patents: Patents relevant to the course content will be posted by the course faculty in CourseWeb page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in CourseWeb page**.** Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: understand terminology, lifecycle, methods, data elicitation process in UX design
CO2: analyze and design data models in UX
CO3: design wire flow and wireframe prototypes
CO4: design user interface according to the UX evaluation methods and technique

Course Articulation Matrix (CAM): U18CS703A USER EXPERIENCE DESIGN

Course Outcomes		PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18CS703A.1	1	2	1	1	-	1	-	-	1	1	1	1	1	1	1
CO2	U18CS703A.2	1	2	2	2	1	-	1		1	1	1	-	1	1	1
CO3	U18CS703A.3	1	2	2	2	1	-	-	-	2	1	1	1	1	1	1
CO4	U18CS703A.4	1	2	1	1	1	-	-	1	2	1	1	1	1	1	1
U18CS703A		1	2	1.5	1.5	1.5	1	1	1	1.5	1	1	1	1	1	1

U18CS703B BIG DATA ANALYTICS

Class: B.Tech. VII-Semester **Branch:** Computer Science and Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: big data platform and its technologies
LO2: apache hadoop, mapreduce and mongDB
LO3: cassandra and hive
LO4: pig and jasper reports

UNIT – I (9)

Introduction to Digital & Big Data: Types of digital data, Classification of digital data, Characteristics of data, Evolution of Big Data, Definition of Big Data, Challenges with Big Data, 3Vs of Big Data, Non definitional traits of Big Data - Business intelligence vs. Big Data - Data warehouse and hadoop environment, Coexistence

Big Data Analytics: Classification of analytics, Data science, Terminologies in Big Data, CAP Theorem, BASE concept, Few top analytics tools

The Big Data Technology Landscape: NoSQL (Not Only SQL), Hadoop

UNIT – II (9)

Introduction to Hadoop: History of hadoop, Hadoop overview, RDBMS vs. hadoop, Distributed computing challenges, Use case of hadoop, Hadoop distributors, Hadoop distributed file system(HDFS), Processing data with hadoop, Managing resources and applications with hadoop YARN (Yet Another Resource Negotiator), Interacting with hadoop ecosystem

Map Reduce: Mapper, Reducer, Combiner, Partitioner, Searching, Sorting and Compression

Mongo DB: Terms used in RDBMS and mongoDB, Data types in mongoDB, mongoDB query language

UNIT – III (9)

Introduction to Cassandra: Features of cassandra, CQL data types, CQLSH, Keyspaces, CRUD (Create, Read, Update, and Delete) operations, Collections, Using a counter, Time to live (TTL), Alter commands, Import and export, Querying system tables

Introduction to Hive: Hive architecture, Hive data types, Hive file format, Hive query language (HQL), RCFile implementation, SerDe, User defined function (UDF)

UNIT – IV (9)

Introduction to Pig: Pig on hadoop, Use case for pig-ETL processing, Data types in pig, Running pig, Execution modes of pig, HDFS commands, Relational operators, Eval function, Complex data types, Piggy bank, User defined functions (UDF), Parameter substitution, Diagnostic operator, Word count example using pig, Pig vs. hive

Introduction to Jasper Reports: Connecting to mongoDB NoSQL database, Connecting to cassandra NoSQL database

Case Study:Global innovation network and analysis (GINA)

Text Book:

[1] Seema Acharya and Subhashini Chellappan, *Big Data and Analytics*, 2nd ed., New Delhi: Wiley India Pvt. Ltd., 2019. *(chapters: 1 to 11)*.

Reference Books:

[1] *Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data*, Indianapolis: EMC Education Services, 2015.

[2] DT Editorial Services, *BIG DATA, Black Book*, New Delhi: Dream Tech Press, 2016.

[3] Russell Bradberry, Eric Blow, *Practical Cassandra A developers Approach*, Pearson Education, 2014.

[4] Judith Hurwitz, Alan Nugent, Dr. Fern Halper, Marcia Kaufman, *Big Data for Dummies*, John Wiley & Sons, Inc., 2013.

[5] Kyle Banker, *Mongo DB in Action*, Manning Publications Company, 2012.

[6] Judith Hurwitz, Alan Nugent, Dr. Fern Halper, Marcia Kaufman, *Big Data for Dummies*, John Wiley & Sons, Inc., 2013.

Course Research Papers: Research papers (Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Web page.

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: identify big data and its business implications

CO2: examine the use cases of hadoop and mapreduce operation

CO3: inspect various query languages such as cassandra and hive

CO4: examine various concepts of pig and its applications

Course Articulation Matrix (CAM): U18CS703B BIG DATA ANALYTICS

Course Outcomes		PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18CS703B.1	2	2	1	1	1	-	-	1	1	1	-	1	2	1	2
CO2	U18CS703B.2	2	2	2	1	1	-	-	1	1	1	-	1	2	1	2
CO3	U18CS703B.3	2	2	2	2	1	-	-	1	1	1	-	2	2	1	2
CO4	U18CS703B.4	2	2	2	2	2	-	-	1	1	1	-	2	2	2	2
U18CS703B		2	2	1.75	1.5	1.25	-	-	1	1	1	-	1.5	2	1.25	2

U18CS703C CYBER SECURITY AND DIGITAL FORENSICS

Class: B.Tech. VII-Semester **Branch:** Computer Science and Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: cyber crimes and planning of cyber offenses in the society

LO2: cybercrimes in mobile and wireless devices

LO3: cyber security and cyber laws to control cyber crime

LO4: digital forensics and digital evidence

UNIT – I (9)

Introduction to Cybercrime: Introduction, Cybercrime and information security, Who are Cybercriminals, Classifications of Cybercrimes, Cybercrime - The legal perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, A global perspective on cybercrimes

Cyber offenses: How criminals plan them: Introduction, How criminals plan the attacks, Social engineering, Cyber stalking, Cyber cafe and Cyber crimes, Botnets: The fuel for cybercrime, Attack vector, Cloud computing

Case Study: A Comprehensive Digital Forensic Case Study on Mirai Botnet Servers

UNIT – II (9)

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of mobile and wireless devices, Trends in mobility, Credit card frauds in mobile and wireless computing era, Security challenges posed by mobile devices, Registry settings for mobile devices, Authentication service security

Attacks on Mobile/Cell Phones, Mobile Devices: Security implications for organizations, Organizational measures for handling mobile, Organizational security policies and measures in mobile computing era, Laptops

Case Study: A case study on the mobile malware: Cabassous/FluBot

UNIT – III (9)

Cybercrimes and Cybersecurity: the Legal Perspectives - Introduction, Cybercrime and legal landscape around the world

Need of Cyber laws: The Indian context, The Indian IT act, Challenges to Indian Law and cybercrime scenario in India, Digital signatures and the Indian IT act, Amendments to the Indian IT act, Cybercrime and punishment, Cyber law, Technology and students: Indian Scenario

Case Study: Conviction of PARK JIN HYOK held in Brambul Worm attack

UNIT – IV (9)

Introduction to Digital Forensics and Digital Evidences: Introduction to Digital Forensic, Need of Digital Forensic, Rules of Computer/Digital Forensic, Types of Digital Forensics, Ethical Issues, Digital Forensic Investigations, Introduction to Digital Evidences, Rules of Digital Evidence, Characteristics of Digital evidence, Types of Evidence, Challenges in Evidence Handling

Case Study: Post-retrieval search hit clustering to improve information retrieval effectiveness

Text Book:

[1] Nina Godbole, Sunil Belapure**,** *Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives*, New Delhi: Wiley India Pvt. Ltd., 2011 *(Unit- I, II, III)*.

[2] Dr.Nilakshi Jain and Dr. Dhananjay R. Kalbande, *Digital Forensic,* New Delhi: Wiley India Pvt. Ltd., 2018 (Unit- IV).

Reference Books:

[1] James Graham, Richard Howard and Ryan Otson, *Cyber Security Essentials*, New York: CRCPress T & FGroup, 2011.

[2] Chwan-Hwa (john) Wu, J. David Irwin, *Introduction to Cyber Security*, New York: CRC Press T& F Group, 2013.

[3] Thomas A Johnson, *Cyber Security Protecting Critical Infrastructures from Cyber Attack and CyberWarfare*, Missouri: CRC Press T & F Group, 2015.

[4] Nilakshi Jain and Ramesh Menon, *Cyber Security and Cyber Laws,* New Delhi: Wiley India Pvt.Ltd., 2020.

[5] Darren R.Hayes, *Practical Guide to Digital Forensics Investigations,* New York: Pearson It Cyber security Curriculum, 2021.

Course Research Papers: Research papers (Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patents: Patents relevant to the course content will be posted by the course faculty in CourseWeb page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: analyze the concepts of cybercrimes and identify the plans in committing cyber offenses

CO2: analyze vulnerabilities in mobile and wireless device

CO3: apply the Indian IT Act and cyber law

CO4: make use of digital forensics techniques and digital evidence techniques in forensic investigation

Course Articulation Matrix (CAM): U18CS703C CYBER SECURITY AND DIGITAL FORENSICS

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18CS703C.1	1	2	1	2	1	-	-	1	1	1	-	1	1	2	1
CO2	U18CS703C.2	2	3	2	2	2	-	-	1	1	1	-	1	2	2	1
CO3	U18CS703C.3	2	2	2	2	1	-	-	1	1	1	-	1	1	2	1
CO4	U18CS703C.4	2	2	1	3	2	-	-	1	1	1	-	1	2	2	1
U18CS703C		1.75	2.25	1.5	2.25	1.5	-	-	1	1	1	-	1	1.5	2	1

U18CS704 CLOUD COMPUTING

Class: B.Tech. VII-Semester **Branch:** Computer Science and Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: basic concepts of cloud and computing environments

LO2: cloud architecture and virtualization techniques

LO3: cloud platforms and real time applications used in industry

LO4: importance of security and federated cloud

UNIT – I (9)

Principles of Parallel and Distributive Computing: Eras of computing, Parallel Vs Distributive computing, Elements of parallel computing, Elements of distributive computing, Technologies for distributive computing

Introduction: Cloud Computing at a glance, Historical developments, Building cloud computing Environment, Computing platforms and technologies

UNIT – II (9)

Cloud Computing Architecture: Introduction, Cloud reference model, Types of cloud, Economics of the cloud, Open challenges

Virtualization: Introductions, Characteristics of virtualized environments, Taxonomy of Virtualization techniques, Virtualization and Cloud computing, Pros and Cons of virtualization, Technology examples

UNIT – III (9)

Data Intensive Computing: Introduction, Data intensive computing, Technologies for data intensive computing

Cloud Platform in Industry: Amazon web services, Google app engine, Microsoft azure

Cloud Applications: Scientific applications- ECG analysis in the cloud, Business and consumer applications- CRM and ERP

UNIT – IV (9)

Advanced Topics in Cloud Computing: Federated clouds/InterCloud Characterization and definition, Cloud federation stack, Aspects of interest, Technologies for cloud federation

Cloud Security: Security the top concern for cloud users, Cloud security risks, Privacy and privacy impact assessment, Trust, Cloud data encryption, Security of database services, Operating system security, Virtual machine security, Security of virtualization, Security risks posed by shared images, Security risks posed by a management operating system, Mobile devices and cloud security

Text Book:

[1] Rajkumar Buyya, Christian Vecchiola, ThamaraiSelvi, *Mastering Cloud Computing*, New Delhi: McGraw Hill, 2013 (reprint 2019) *(chapters: 1 to 4 & 8 to 11)*.

[2] Dan C. Marnescu, *Cloud Computing Theory and Practice*, 2nd ed. Cambridge: Elsevier, 2018 *(chapter: 11)*.

Reference Books:

[1] Dr. Kumar Saurabh, *Cloud Computing: Architecting Next-Gen Transformations Paradigms*, 4th ed. New Delhi: Wiley India Private Limited, 2018.

[2] Barrie Sosinsky, *Cloud Computing Bible*,Indiana*:* Wiley Publications, 2011.

[3] Anthony T.Velte, Toby J Velte and Robert Elsenpeter, *Cloud Computing*: *A practical Approach, New York: McGraw Hill,* 2010.

Course Research Papers: Research papers (Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patents: Patents relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: design enterprise level applications in hosted cloud environments using Storage as a Service (STaaS)

CO2: analyze virtual environments for running applications using virtual machines

CO3: design service models using SaaS, PaaS, IaaS and apply cloud platforms, technologies and applications in industry using Microsoft Azure, Google AppEngine, Amazon web services

CO4: apply automate security and resources for applications using cloud computing tools to mitigate risk and providing sufficient foundation to enable further study and research

Course Articulation Matrix (CAM): U18CS704 CLOUD COMPUTING

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18CS704.1	2	2	2	1	2	-	-	1	1	1	-	1	2	1	1
CO2	U18CS704.2	2	2	2	1	2	-	1	1	1	1	-	1	2	1	1
CO3	U18CS704.3	2	2	2	2	2	1	-	1	1	1	-	1	2	1	2
CO4	U18CS704.4	2	2	2	2	2	1	-	1	1	1	-	1	2	1	2
U18CS704		2	2	2	1.5	2	1	1	1	1	1	-	1	2	1	1.5

U18CS705 CLOUD COMPUTING LABORATORY

Class: B.Tech. VII-Semester **Branch:** Computer Science and Engineering

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: installation and configuration of cloud
LO2: virtualization techniques
LO3: creating cloud based application
LO4: securing applications in cloud

List of Experiments

Experiments-I

1. Create a storage account and a hosted service component.

2. Deploying an application using platform management portal.

Experiments-II

3. Create a word document of your class time table and store on the cloud with docx and pdf format.

4. Write a program to generate 'n' even numbers and deploy in cloud.

5. Write a program to display n^{th} largest number from the given list and deploy in cloud.

Experiments-III

6. Write a program to validate user, create a database login (username, password) and deploy in cloud.

7. Write a program to validate user, create a database to store user info and deploy in cloud.

Experiments-IV

8. Find procedure to run the virtual machine of different configuration, check how many virtual machines can be utilized at particular time.

Experiments-V

9. Find procedure to attach virtual block to the virtual machine and check whether it holds the data even after the release of the virtual machine.

Experiments-VI

10. Create your own Virtual Private Cloud (VPC).

11. Create public and private subnet.

Experiments-VII

12. Create Pubic Routing Table, associate subnet and add routing rules.

13. Create Private Routing Table, associate subnet and add routing rules.

Experiments-VIII

14. Install a 'C' compiler in the virtual machine and execute sample programs.

Experiments-IX

15. Show the virtual machine migration based on the certain condition from one node to the other.

Experiments-X

16. Using PowerShell manage an application in cloud.

Experiments-XI

17. Using Visual Studio deploy an application in cloud.

Experiments-XII

18. Securing an application in cloud.

19. Debugging an application in cloud.

Laboratory Manual:

[1] *Cloud Computing Laboratory Manual*, prepared by the faculty of Department of CSE, KITS Warangal.

Text Books:

[1] Rajkumar Buyya, Christian Vecchiola, ThamaraiSelvi, *Mastering Cloud Computing*, New Delhi: McGraw Hill, 2013 (reprint 2019).

[2] Dan C. Marnescu, *Cloud Computing Theory and Practice*, 2nd ed. Cambridge: Elsevier, 2018.

[3] Dr. Kumar Saurabh, *Cloud Computing: Architecting Next-Gen Transformations Paradigms*, 4th ed. New Delhi: Wiley India Private Limited, 2012.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: develop cloud applications and deploy using Storage as a Service(STaaS)

CO2: design applications on instantiated VMs of different configuration over different hypervisors

CO3: analyze the functioning of components in cloud platform, technologies and applications in industry

CO4: apply automate security policies for applications in cloud

Course Articulation Matrix (CAM): U18CS705 CLOUD COMPUTING LABORATORY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18CS705.1	2	2	2	2	2	-	-	1	1	1	1	1	2	1	2
CO2	U18CS705.2	2	2	2	2	2	-	-	1	1	1	1	1	2	1	2
CO3	U18CS705.3	2	2	2	2	2	-	-	1	2	1	1	1	2	1	2
CO4	U18CS705.4	2	2	2	2	2	-	-	1	1	1	1	1	2	1	2
U18CS705		2	2	2	2	2	-	-	1	1.25	1	1	1	2	1	2

U18CS706 CASE Tools LABORATORY

Class: B.Tech. VII-Semester **Branch:** Computer Science and Engineering

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: computer aided software engineering tools
LO2: object-oriented analysis and design models using UML case tools
LO3: automated testing using Selenium Testing Tool
LO4: test Director for traceability and Test link an open source testing tool to manage tests

List of Experiments

Experiment-I

1. Project scheduling using Microsoft project management tool

2. Project estimation using Microsoft project management tool

Experiment-II

Construct Use case and Class diagrams for the following
1. Online shopping
2. Banking system
3. Cab dispatching system

Experiment-III

Construct Collaboration and Sequence diagrams for the following
1. Librarian issues books to student
2. Mobile phone

Experiment-IV

Construct Activity and State chart diagrams for the following.
1. ATM transaction
2. Ticket machine
3. Credit card processing

Experiment-V

1. Case study: Develop class diagram of Unified library application and model it in different views i.e. logic view, component view, deployment view, database design and perform forward & reverse Engineering

Experiment-VI

1. Manual testing: Take any system (e.g. ATM system) and study its system specifications and report the various bugs

Experiment-VII

1. Introduction to Selenium Testing Tool
2. Exploring Features of Selenium

Experiment-VIII

1.Test a web application using Selenium in NetBeans IDE

Experiment-VIII

1. Test a web application using Selenium in Net

Experiment-IX

1. Working with Selenium Integrated Environment-Execution of IDE Commands
2. Selenium IDE locating strategies (validation of GUI components)

Experiment-X

1. Selenium IDE test case execution
2. Implement GUI tests (a web application's User Interface) using Selenium IDE

Experiment-XI

1. Study of any bug tracking tool (e.g. Bugzilla, Bug Bit)
2. Study of any test management tool (e.g. Test Director)

Experiment-XII

1. Study of any open source-testing tool (e.g. Test Link)
2. Take a mini project (e.g. University admission, Placement portal) and execute it, During the life cycle of the mini project create the various testing documents

Laboratory Manual:

[1] *CASE Tools Laboratory Manual*, prepared by the faculty of Dept. of CSE.

Text Books:

[1] Meilir Page-Jones, *Fundamentals of Object Oriented Design in UML,* 1st ed. Noida: Pearson Education, 2000.

[2] Pascal Roques, *Modeling Software Systems Using UML2*, 1st ed., New Delhi: Wiley-India, 2009.

[3] Mark Priestley, *Practical Object-Oriented Design with UML*, 2nd ed., New Delhi: TATA McGraw Hill , 2009.

[4] Gandharba Swain, *Object Oriented Analysis & Design Through Unified Modeling Language*, 1st ed., New Delhi : Lakshmi Publications Pvt. Ltd, 2010.

[5] UmeshGundecha, *Selenium Testing Tools Cookbook*, 2nd Ed., Packt Publishing, ISBN: 978-178-439251-2, 20150.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: create schedule, cost estimation of the software project using Microsoft project management tool, and construct analysis model using unified modelling approach

CO2: design a software system using unified modelling approach

CO3: test with Selenium tool to improve the quality of the project/product being developed

CO4: apply Test director and Test Link testing tools for traceability and test management

Course Articulation Matrix (CAM): U18CS706 CASE Tools Laboratory

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18CS706.1	2	2	2	2	-	-	-	1	1	1	1	1	2	1	2
CO2	U18CS706.2	2	2	2	2	2	-	-	1	1	1	1	1	2	2	2
CO3	U18CS706.3	2	1	2	2	2	-	-	1	1	1	1	1	2	1	2
CO4	U18CS706.4	1	2	2	2	2	-	-	1	1	1	1	1	2	2	2

U18CS707 : MAJOR PROJECT WORK PHASE-I

Class: B.Tech. VII - Semester

Branch: Computer Science and Engineering

Teaching Scheme:

L	T	P	C
-	-	6	3

Examination Scheme:

Continuous Internal Evaluation	100 marks
End Semester Examination	--

Course Learning Objectives (LOs):

The major project work will develop students' knowledge on /in…

LO1: real-world complex engineering problems, literature review, problem formulation; and experimental and data analysis techniques

LO2: design/development of solutions to real-world engineering problems; conduct of investigations of complex problems; modern tool usage to design, build and test a prototype; impact of solution in society, environment and sustainability contexts

LO3: ethics, team work and project management skills such as budgeting, scheduling

LO4: oral, written and multimedia communication skills; self-directed independent learning and life-long learning

1. Final Year Major Project work represents the culmination of study towards the B. Tech degree. ***Major project offers an opportunity to integrate the knowledge acquired from various courses and apply it to solve real-world complex engineering problems***. The **student learning assessment process** (SLAP) shall include good number of presentations, demonstration of work undertaken, submission of a project report, writing project paper in scientific journal style & format, preparing project poster and creating video pitch on the complete project work.
2. Activities of major project SLAP shall be planned in such a way to ensure that the students acquire the essential knowledge, skills and qualities (KSQ) of a professional engineer.
3. **Team work:** Major project work is a team work.
   (i) The students of a project team shall work together to achieve a common objective.
   (ii) Every student of a project team is expected to function effectively as an individual, and also with others as a team member in an ecosystem of team having knowledge diversity, gender diversity, social and cultural diversity among its members.
4. **Two phases:** Major project work shall be carried out in two phases. Nearly 50 - 75% of the proposed work to be completed in 7th semester as *Phase-I* and the remaining work to be continued and completed in 8th semester as *Phase-II.*
5. Every student is expected to put approximately **72 hours of work** into the major project *phase-I* course over the 12 weeks of 7th semester.
6. **Major project work *Phase-I*: 7th semester**
   (i) The HoD shall constitute the ***department project evaluation committee (DPEC)*** with following composition

Department project evaluation committee (DPEC)	
HoD	Chairman
Senior Faculty	Convener
Coordinator(s)	Section - wise coordinator(s) *One coordinator for each section*
Three Faculty members	Section-wise faculty members *three faculty members for each section representing various socializations.* *(Five specializations will be covered including the coordinator's and Convener's)*

(ii) Major project allotment to students during last working week of 6th semester:

(a) **First / Second week of 6th Semester**: The process shall be initiated during the first / second week of 6th semester by collecting project titles from the department faculty research groups, on offering innovative ideas/solutions for engineering problems.

(b) **MSE-I period of 6th Semester – Notifying project titles**: The finalized project titles shall be notified to students during the MSE-I period of 6th semester and student teams shall be allowed to exercise their options on titles that interest them.

(c) **Last working week of 6th Semester – Allotment of titles and supervisors to project teams**: The project title allotment to major project teams shall be completed before the last day of instruction of 6th semester

(d) **6th semester summer break - Literature review**: This 6th semester schedule enables students to complete literature review, preliminary simulations / investigations / experimentation during 6th semester summer break and *start the work from day-one in 7th semester*

(e) **Registration Presentation - Notifying the tentative dates:** The major project teams are expected to give registration presentation during second / third week from the commencement of 7th semester. The tentative dates for conducting the registration presentation shall be notified at the time of releasing the circular on allotted project title and project supervisors, as indicated in (c) above. This enables student teams to plan the work accordingly during summer break, to complete the literature review, preliminary simulations / investigations and get ready for informative, confident and comfortable presentations on their project work.

(iii) The convener DPEC shall notify, during MSE-I period of 6th semester, the list of implementable project titles offered by the faculty of different research groups of the department

(a) Project titles shall come with the following details to be made available to students on dept webpage and notice boards, facilitating students to select problems that interest them.

- **i.** abstract
- **ii.** deliverables / outcomes
- **iii.** knowledge and skills required to complete the project
- **iv.** resources required
- **v.** one of the deliverables shall be writing a technical paper out of the major project work done for submission to a reputed non-predatory conference/non-paid peer reviewed journal

(iv) The major project teams, finalized by the convener DPEC, shall be allowed to exercise their options on the titles that interest them from the notified list

(v) Project supervisor allotment: The convener DPEC shall allot, during the last week of 6th semester, the faculty supervisors to all project teams

(a) The project supervisors shall

- **i. define project objectives and expected deliverables**
- **ii. help the students plan their project work and timeline**
- **iii. provide enough resources for successful project completion**

(vi) The faculty supervisors are expected to provide guidance to project teams on

(a) *Knowledge, skills and qualities (KSQ) to be acquired* to propose solutions to the identified real-world problems
(b) *Problem analysis* - to identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
(c) *Applying engineering knowledge* - to apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
(d) *Design/development of solutions* - to 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
(e) *Conduct investigations of complex problems* - to 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
(f) *Modern tool usage* – to 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
(g) *Engineering and society* – to 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
(h) *Environment and sustainability* – to understand the impact of the professional engineering solutions in societal and environmental contexts, demonstrate the knowledge of, and need for sustainable development
(i) *Ethics* – to apply ethical principles and commit to professional ethics, responsibilities, and norms of the engineering practice
(j) *Individual and team work* – to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
(k) *Communication* – to 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
(l) *Project management and finance* – to 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
(m) *Life-long learning* – to 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

(vii) The project supervisors are also expected to continuously emphasize and guide students on

(a) Meeting Cadence:

i. Regular meetings with supervisor: Short and frequent meetings increase a team's work momentum. Regular meetings with supervisor to review the status of project are very essential. All students of the team shall participate in discussions and take notes.

ii. Meeting Frequency: Semi-weekly cadence, i.e., the meeting frequency shall be **twice a week.** Due weightage will be given to meeting cadence and considered for evaluation during presentations, i.e., number of planned meetings and number attended by students

(b) **Project Log Book:** The activity journaling in project log book is very important for a successful project.

i. Project log book is a written record showing the daily project activity on project goals from the very first thing like starting the project (an introduction statement what the

project is all about), to the completion of the work (including the final results, and whether project met the core objectives / outcomes, etc.).

ii. In project log book, the activities like regular meetings with project supervisor, and work carried out on daily/weekly basis are to be recorded. This ensures that the student progress is being monitored well.

iii. The project supervisor shall regularly check the log book of every student of project team and endorse each and every activity by affixing his signature with date. With this, the number of planned meetings and number attended by the students will be also monitored.

iv. Log books are to be shown during all presentations and will be graded along with the project.

v. At the conclusion of the project work *phase-I*, the supervisor shall specifically comment, in the project log book, on whether the project team met each of the project work *phase-I* goals and to give evidence which describes the quality of work. For project teams, this also serves as self-assessment.

(c) **Following project timeline**: completing the tasks as planned in project timeline

(d) The relevant knowledge, skills and qualities (**KSQ**) an engineering graduate should possess, which can be specially acquired by participating in major project work

(e) **Writing down whatever is done and making notes of whatever is read**. Writing down the procedures/models followed, designs made, experiments conducted, simulations carried out, intermediate results obtained, ***difficulties faced and how they were fixed*** are very important. This kind of documenting the whole process as we go with project implementation is a very effective way and will help preparing a well- documented report having original content. Note down and include information about all the resources that you used, magazines, Journals, patents, books, and so on.

This information will be needed for the bibliography in your project report. On the other hand, documenting a report ***on the spur of the moment*** would end up copying things from other sources resulting in a plagiarized document.

(f) **Good and sufficient literature review**: Literature review is a description and analysis of information related to the topic of project work. Reading good number of review articles, research articles published in recent issues of peer reviewed journals, technical magazines, patents, reference books on the topics of potential interest, will help one understand what has already been discovered and what questions remain to identify gaps in the literature.

(g) Completing nearly 50 - 75% of the proposed work during phase-I

(h) Right conduct of research to promote academic integrity, honesty and time management

(i) Preparing a well-documented report in proper format, covering the progress made during Phase-I

(j) Consequences of plagiarism and use of anti-plagiarism software to detect plagiarism in documents

(k) Submission of major project phase-I report within acceptable plagiarism levels, as per the ***Anti-plagiarism policy-2020 of our institute***.

(l) **Video pitch:** Capturing short videos, photos, screenshots on experiments conducted, simulations carried out, prototype / working model / process / software package / system developed during course of project execution, photos showing interaction with supervisor for creating a short video pitch on the work done during *phase-I.*

(m) **Project Paper**: Writing a technical paper at the end of *phase-II* based on the solution(s) proposed, results obtained and prototype / working model / process / software package / system developed, for submission to a reputed non-predatory conference/non-paid peer reviewed journal.

(n) **Project poster**: At the end of phase-II, the project teams shall have to present their project in the form of posters, at the time of demonstration of complete porotype / working model / software package / system developed.

(viii) Phase – I evaluation: There shall be only Continuous Internal Evaluation (CIE) for major project work *phase-I* with following components

(a) **Registration Presentation** *(during second / third week of 7th semester):* The Registration Presentation shall include a brief report and presentation focusing the identified problem, objective(s), literature review, identifying research gap in the literature, implementation of existing methods, proposed solution, and expected outcome(s).

i. The registration presentation shall invariably include the **project plan timeline** with actual start and finish dates– monthly/weekly project milestones/ timeline prepared in MS Excel or any other project management tool.

ii. **Project timeline** – *Weekly project milestones*: It's a compact and creative way to present a project plan. Identify the project intermediate goals and related tasks for completing each of those goals. Categorize tasks for each week. In the project timeline use different colors to the tasks for each week. Horizontal timeline layouts shall be preferred or any other layout of team's choice.

iii. Project teams shall create and present the following during registration presentation

1. *Complete project timeline*
2. *Phase-I project timeline*
3. *Phase-II project timeline*

iv. During every presentation, project teams shall compulsorily show the following as part of their presentation

1. *The slides on project timeline and*
2. *A table showing targeted tasks as per timeline and status – whether tasks accomplished?*

v. **Project log book**: Every student of the Project team shall compulsorily show the activity journaling in the log book (*with due signatures of project supervisor*) during presentations

(b) **Progress Presentation-I** *(during penultimate week of 7th semester):* At the end of first stage (7th semester), student teams shall be required present, before the DPEC, the progress made during phase-I and submit a well-documented report of work done for evaluation to the project coordinator

i. **Following project timeline**: The project timeline shall be meticulously followed and the tasks shall be completed as planned in project timeline.

ii. Project teams shall compulsorily show the following as part of their progress presentation-I

1. *The slides on project timeline and*
2. *A table showing targeted tasks as per timeline and whether tasks accomplished?*

iii. **Project log book**: Every student of the Project team shall compulsorily show the activity journaling in the log book (*with due signatures of project supervisor*)

(c) **CIE schedule**: The convener DPEC shall release complete schedule of CIE before start of 7th semester well in advance, so that student teams will complete the scheduled works and get ready with informative, confident and comfortable presentation for registration and progress presentations.

(ix) CIE for the Major project work phase-I shall be as given below:

Major project work Phase-I Assessment *(7th semester)*	Weightage
A. Supervisor Assessment	**20%**
B. DPEC Assessment *(i) Registration Presentation (10%)* *(ii) Progress Presentation-I (20%)* *(iii) Project progress*: Part of working model/ process/software package/system developed (30%)* *(iii) Well-documented Progress Report on Phase-I work (10%)* *(iv) Video pitch on Phase-I (10%)*	**80%**
Total Weightage	**100 %**

* *Students are advised to complete major part of the project in phase-I only*

(a) **Working Model:** Every project team shall be required to develop a working model/ process/software package/system, on the chosen work. The progress made in this shall be demonstrated during progress presentation-I at the end of *phase-I* and the completed working model/ process/software package/system before the DPEC as per the dates specified by DPEC at the end of *phase-II*.

(b) **Progress Report on *phase-I*:** Every project team shall be required to submit a well-documented progress report on dissertation phase-I as per format specified by DPEC.

(i) Tangible outcomes of *phase-I* in Conclusions - Chapter: These are the lessons learnt from doing a project work. The students have to describe in their own words what they learnt from the *phase-I* project work experience. They have to describe what specific KSQs are acquired by them, with reference to the expected COs, after successful completion of *phase-I* work. Finally, a table depicting systematic mapping of what they have learnt and the expected major project work COs, is to be presented in the conclusions chapter of *phase-I* report

(c) **Video pitch on *phase-I*:** Every project team shall be required to create a pitch video, which is a video presentation on their major project work *phase-I*. The project team shall present the produced video pitch during progress presentation-I. The produced video pitch should

(i) be 3 to 5-minute-long video (no longer than 5 minutes)
(ii) be concise and to the point, on the problem and proposed solution
(iii) show project timeline and sample page of log book
(iv) highlight the progress made at various stages during *phase-I* project implementation with the help of short videos / photos / screenshots on experiments conducted, simulations carried out, part of prototype / working model / process / software package / system being under development as part of proposed solution and also photos showing team interactions with supervisor and the team working in the lab on project
(v) discuss the impact of proposed solution in *ethical, environmental, societal and sustainable development contexts.*
(vi) emphasize key points about *business idea, potential market for the proposed solution*

(x) It is mandatory for

(a) every student of the team to *appear for oral presentation and viva-voce*, as part of progress presentation -I to qualify for course evaluation
(b) every project team *to submit a well-documented progress report on major project work phase-I*, as part of progress presentation -I to qualify for course evaluation
(c) every project team to create and present a good video pitch on major project work *phase-I*, as part of progress presentation -I to qualify for course evaluation

(xi) A student shall register for supplementary examination for the Major project work *phase-I* in the following cases:

(a) He/she is absent for oral presentation and viva-voce as part of progress presentation-I
(b) The project team fails to submit the progress report on *phase-I* in prescribed format

(c) The project team fails to submit the video pitch on the progress made during the *phase-I* period.

(e) he/she fails to fulfill the requirements of Major project work *phase-I* evaluation as per specified guidelines

(xi) Supplementary examination for Major project work *phase-I*

(a) The CoE shall send the list of students, registered for supplementary examination, to the HoDs concerned

(b) The DPEC, duly constituted by the HoD, shall conduct Major project phase-I supplementary exam and send the award list to the CoE within the stipulated time

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Course Learning Outcomes (COs):

Upon completion of major project work, students will be able to…

CO1: review research literature, identify gaps in the literature, formulate problem, apply knowledge of mathematics, sciences, engineering fundamentals, experimental and data analysis techniques; synthesize technical knowledge and innovative approaches to generate suitable solutions for real-world complex engineering problems (**Technical skills**)

CO2: *design a system or product based on product/customer specifications; develop, analyze, and critically evaluate the design alternatives in order to justify the solutions to a real-world problem guided by ethical, environmental, societal and sustainable development considerations; use modern engineering and IT tools to design, build and test a prototype within specified project timeline and budget* (**Problem solving and critical thinking skills**)

CO3: apply project management and organizational skills; demonstrate integrity, leadership, creativity, professional and ethical responsibilities as an individual and as a member or leader to produce time-sensitive deliverables in a multi-disciplinary team (**Ethics and teamwork**)

CO4: *collate the results, compare performance of prototype to design specifications and present clearly and effectively the proposed solution, conclusions and/or recommendations in written (report, poster, technical paper), oral (presentations) and multimedia formats (video pitch) and engage in self-directed independent learning and life-long learning demonstrating the KSQ of a professional engineer* (**Communication skills and life-long learning**)

Course Articulation Matrix (CAM) : U18CS707 MAJOR PROJECT WORK PHASE-I

CO	CO Code	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	U18CS707.1	2	2	2	2	-	-	-	3	-	2	-	3	3	3	3
CO2	U18CS707.2	2	2	2	-	2	2	2	3	-	-	-	3	3	3	3
CO3	U18CS707.3	-	-	-	-	-	-	-	3	2	-	2	3	3	3	3
CO4	U18CS707.4	-	-	2	2	-	-	-	3	-	2	-	3	3	3	3
U18CS707		2	2	2	2	2	2	2	3	2	2	2	3	3	3	3

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
KAKATIYA INSTITUTE OF TECHNOLOGY &SCIENCE:: WARANGAL – 15
(An Autonomous Institute under Kakatiya University, Warangal)

SCHEME OF INSTRUCTION & EVALUATION
VIII- SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAM

[3Th+1P+ MP-II]

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	PE	U18CS801	Professional Elective - V / MOOC - V	3	_	_	3	10	30	40	60	100
2	PE	U18CS802	Professional Elective - VI / MOOC - VI	3	-	-	3	10	30	40	60	100
3	OE	U18OE803	Open Elective - IV / MOOC-VII	3	-	-	3	10	30	40	60	100
4	PROJ	U18CS804	Major Project - Phase – II	-	-	14	7	60	-	60	40	100
5	PCC	U18CS805	Mobile Application Development Laboratory	-	-	-	-	-	-	-	-	-
Total:				9	_	14	16	90	90	180	220	400
***Additional Learning*:** *Maximum credits allowed for Honours/Minor*				-	-	-	*7*	-	-	-	-	-
Total credits for Honours/Minor students:				-	-	-	*16+7*	-	-	-	-	-

** List of courses for additional learning through **MOOCs** towards Honours/Minor in Engineering shall be prescribed by the department under Honours/ Minor Curricula*

[L= Lecture, T = Tutorials, P = Practical & C = Credits] **Total Contact Periods/Week: 23** **Total Credits: 16**

Professional Elective-V / MOOC-V:	**Professional Elective-VI / MOOC-VI:**	**Open Elective-IV/MOOC-VII:**
U18CS801A: Data Visualization	**U18CS802A: Deep Learning**	**U18OE803A: Operations Research**
U18CS801B: Block Chain Technologies	**U18CS802B: Social Network Analysis**	**U18OE803B: Management Information Systems**
U18CS801C: Virtual Reality Technologies	**U18CS802C: Ethical Hacking**	**U18OE803C: Entrepreneurship Development**
U18CS801M: MOOCs course	**U18CS802M: MOOCs course**	**U18OE803D: Forex & Foreign Trade**
		U18OE803M: MOOCs Course

U18CS801A DATA VISUALIZATION

Class: B.Tech. VIII-Semester

Branch: Computer Science and Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: fundamentals of data visualization and categories of data

LO2: spatial and geospatial data visualization techniques

LO3: time-oriented, trees, graphs and network-based data visualization techniques

LO4: text & document visualization and research directions

UNIT – I (9)

Data Visualization: Visualization functionalities, importance, The difference between visualization and computer graphics, The visualization process, The scatter plot

Data Foundations: Types of data, Data preprocessing, Visualization foundations, The eight visual variables, Taxonomies

UNIT – II (9)

Visualization Techniques for Spatial Data: One-dimensional data, Two-dimensional data, Three-dimensional data, Visualizing volume data, Dynamic data

Visualization Techniques for Geospatial Data: Visualizing geospatial data, Map projections, Visualization of point data, line data

UNIT – III (9)

Visualization Techniques for Time-Oriented Data: Introduction, Definitions, characterizing time-oriented data, Relating data and time, Visualizing time-oriented data, Categorization

Visualization Techniques for Trees, Graphs, and Networks: Displaying hierarchical structures, Displaying arbitrary graphs, networks, Node-link graphs, Matrix representations for graphs

UNIT – IV (9)

Text and Document Visualization: Levels of text representations, The Vector space model, Single document and Document collection visualizations

Image Visualization: Image Data Representation, Image Processing and Visualization, Basic Imaging Algorithms, Shape Representation and Analysis, Conclusion

Visualization Systems: Systems based on data type, Systems based on analysis type, Toolkits, Libraries, Research directions in visualization

Text Book:

tthew O. Ward, Georges Grinstein, Daniel Keim , *Interactive Data Visualization: Foundations, Techniques, and Applications*, 2nd ed., Boca Raton: A K Peters/CRC Press, 2015.

exandru C. Telea , *Data Visualization: Principles and Practice* , 2nd ed., Boca Raton :CRC Press, 2015.

Reference Books:

[1] Claus Wilke, *Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures*, 1st ed., Sebastopol: O'Reilly Media Inc, 2019.

[2] Kristen Sosulski, *Data Visualization Made Simple Insights into Becoming Visual*, 2nd ed., Oxon: Routledge, 2015.

[3] Ben Fry, *Visualizing Data*, 1st ed., Sebastopol, O'Reilly Media Inc, 2008.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: advanced techniques of data visualization, types of data and data processing
CO2: apply visualization techniques for representing the spatial and geospatial data
CO3: apply visualization techniques for representing the time-oriented and unstructured data
CO4: analyze text and document visualization techniques

Course Articulation Matrix (CAM): U18CS801A DATA VISUALISATION

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18CS801A.1	1	3	2	2	1	-	-	1	1	1	-	2	1	2	2
CO2	U18CS801A.2	2	3	2	2	2	-	-	1	1	1	-	2	1	2	2
CO3	U18CS801A.3	2	3	2	3	2	-	-	1	1	1	-	2	1	2	2
CO4	U18CS801A.4	2	3	2	3	2	-	-	1	1	1	-	2	1	2	2
U18CS801A		1.75	3	2	3	1.75	-	-	1	1	1	-	2	1	2	2

U18CS801B BLOCKCHAIN TECHNOLOGIES

Class: B.Tech. VIII-Semester **Branch:** Computer Science and Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: basics of Blockchain, types of Blockchains & consensus algorithms
LO2: cryptographic primitives, Bitcoin Blockchain & alternative coins
LO3: ethereum ecosystem& development tools
LO4: architecture of Hyper ledger Fabric, Corda architecture & Alternative Blockchains

UNIT – I (9)

Distributed systems
The History of Blockchain and Bitcoin: Electronic cash, Blockchain, Generic elements of a Blockchain, Benefits and limitations of Blockchain, Tiers of blockchain technology, Features of a Blockchain
Types of blockchain: Distributed ledgers, Distributed Ledger Technology, Public Blockchains
Private Blockchains, Shared ledger, fully private and proprietary Blockchains, Tokenized blockchains, Token less Blockchains
Consensus: Consensus mechanism, Types of consensus mechanisms, Consensus in Blockchain
CAP theorem and Blockchain

UNIT – II (9)

Public Key Cryptography: Asymmetric cryptography
Public and private keys: RSA, Discrete logarithm problem in ECC, Hash functions, RSA digital signature algorithm, Elliptic curve digital signature algorithm
Introducing Bitcoin: Bitcoin, Digital keys and addresses, Transactions, Blockchain, Mining
Bitcoin Network and Payments: The Bitcoin network, Wallets, Bitcoin payments, Innovation in Bitcoin
Bitcoin Clients and APIs: Bitcoin installation
Alternative Coins: Theoretical Foundations, Bitcoin limitations, Litecoin, Zcash

UNIT – III (9)

Smart Contracts: History, Definition, Ricardian contracts
Ethereum: Introduction, Ethereum - bird's eye view, The Ethereum network, Components of the Ethereum ecosystem
Further Ethereum: Programming languages
Ethereum Development Environment: Test networks, setting up a private net, starting up the private network
Development Tools and Frameworks: Languages, Solidity language
Introducing Web3: Web3

UNIT – IV (9)

Hyper ledger: Projects under Hyper ledger, Hyper ledger as a protocol, The reference architecture, Fabric
Corda: Architecture, Components, The development environment – Corda
Alternative Blockchains: Ripple, Quorum, Multi chain, Rootstock, BigchainDB, Storj, Tezos

Current Landscape and What Next: Start-ups, Strong research interest, Real-world implementations, Education of blockchain technology Employment, Cryptoeconomics, Research in cryptography,

Interoperability efforts, Blockchain as a Service
Other challenges: Regulation, Dark side
Blockchain research: Smart contracts, Centralization issues, Limitations in cryptographic functions, Consensus algorithms, Scalability, Code obfuscation

Text Book:

ran Basir, *Mastering Bockchain*, 2nd ed., Packt Publishing Ltd., Birmingham – Mumbai, 2018.

Reference Books:

[1] Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, "*Bitcoin and Crypto currency Technologies: A Comprehensive Introduction*", Princeton University Press (July 19, 2016).

[2] Josh Thompson, *Blockchain: The Blockchain for Beginners Guide To Blockchain Technology And Leveraging Blockchain Programming, Create Space Independent Publishing Platform, 2017*.

[3] dreas Antonopoulos, *Mastering Ethereum: Building Smart Contracts and Dapps,* O'REILLY 2018.

Video Lectures

https://nptel.ac.in/courses/106/104/106104220/ by Prof. Sandeep Shukla, IIT Kanpur
https://nptel.ac.in/courses/106/105/106105184/ by Prof. Sandip Chakraborty, IIT Kharagpur

Course Research Papers: Research papers (Journals/Conference papers) relevant to the course content will be posted by the course faculty in course web page.
Course Patents: Patents relevant to the course content will be posted by the course faculty in course web page.
Course Projects: Course Project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in course web page. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: distinguish the type of Blockchain and consensus algorithm
CO2: analyze cryptographic algorithms, install Bitcoin client and describe the functionality of various alternative coins
CO3: develop a smart contract using Ethereum development tools
CO4: analyze architectures of different blockchains like Hyperledger Fabric and Corda

Course Articulation Matrix (CAM): U18CS801B BLOCKCHAIN TECHNOLOGIES

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O 2	PS O 3
CO 1	U18CS801B.1	1	2	1	1	1	-	-	-	1	1	-	2	1	1	2
CO 2	U18CS801B.2	3	3	2	3	2	-	-	-	1	1	-	3	1	2	3
CO 3	U18CS801B.3	3	1	3	2	3	-	-	-	1	1	-	3	3	2	3
CO 4	U18CS801B.4	1	2	3	2	2	-	-	-	1	1	-	3	2	2	2
U18CS801B		2	2	2.25	2	2	-	-	-	1	1	-	2.75	1.75	1.75	2.5

U18CS801C VIRTUAL REALITY TECHNOLOGIES

Class: B.Tech. VIII-Semester **Branch:** Computer Science and Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: concepts and components of VR, multiple models of input & output interface in VR
LO2: geometric modeling, kinematics modeling, physical modeling and behavioral modeling
LO3: development tools like Java-3D, World Tool-Kit and Haptic General open source tool kit
LO4: augmented and mixed reality, AR methods, visualization techniques

UNIT – I (9)

Introduction of Virtual Reality: Fundamental Concept and Components of Virtual Reality. Primary Features and Present Development on Virtual Reality**. Input and Output Interface in Virtual Reality:** Input -- Tracker, Sensor, Digital Glove, Movement Capture, Video-based Input, 3D Menus & 3DScanner etc. Output -- Visual /Auditory / Haptic Devices

UNIT – II (9)

Modeling: Geometric Modeling, Virtual Object Shape, Object Visual Appearance.
Kinematics Modeling: Homogeneous Transformation Matrices, Object Position, Transformation Invariants, Object Hierarchies, Viewing the Three-Dimensional World. Physical Modeling: Collision Detection, Surface Deformation, Force Computation, Force Smoothing and Mapping, Haptic Texturing. Behavior Modeling: Model Management Level-of-Detail Management, Cell Segmentation

UNIT – III (9)

VR Programming: Toolkits and Scene Graphs. **World Tool-Kit:** Model Geometry and Appearance, The WTK Scene Graph, Sensors and Action Functions, WTK Networking. **Java 3D:** Model Geometry and Appearance, Java 3D Scene Graph, Sensors and Behaviors, Java 3D Networking, WTK and Java 3D Performance Comparison. **General Haptics Open Software Toolkit:** GHOST Integration with the Graphics Pipeline, The GHOST Haptics Scene Graph, Collision Detection and Response, Graphics and PHANToM Calibration

UNIT – IV (9)

Augmented Reality: Introduction to Augmented Reality, Taxonomy, technology and features of augmented reality, difference between AR and VR, Challenges with AR, AR systems and functionality, Augmented reality methods, **AR Hardware:** Major Hardware Components for Augmented Reality Systems **AR Software:** Major Software Components for Augmented Reality Systems, Software used to Create Content for the Augmented Reality Application **Interaction in AR:** mobile projection interfaces, marker-less tracking for augmented reality, enhancing interactivity in AR environments, evaluating AR systems

Text Book:

rdea, G. C. and P. Coffet. *Virtual Reality Technology*, Second Edition. Wiley-IEEE Press, 2003/2006.
an B. Craig, *Understanding Augmented Reality, Concepts and Applications*, Morgan Kaufmann, 2013. (*Chapter-1, 2, 3, 4 and 6*).

Reference Books:

[1] Alan Craig, William Sherman and Jeffrey Will, *Developing Virtual Reality Applications, Foundations of Effective Design*, Morgan Kaufmann, 2009.

Web and Video References: NPTEL offered a Video lectures on "*Virtual Reality".*
Link to Videos presented by IIT Madras: https://nptel.ac.in/courses/106/106/106106138/

Course Research Papers: Research papers (Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patents: Patents relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: make use of the components of VR, to interact with input & output devices
CO2: apply modeling techniques to prepare object position, object behavior and collision detection in VR
CO3: design VR apps using various tools like Java-3D, World Tool-Kit and Haptic General open source tool kit
CO4: analyze augmented reality & mixed reality, challenges and visualization techniques

Course Articulation Matrix (CAM): U18CS801C VIRTUAL REALITY TECHNOLOGIES

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18CS801C.1	2	2	2	2	2	-	-	1	1	1	-	2	2	2	2
CO2	U18CS801C.2	2	2	2	2	2	-	-	1	1	1	-	2	2	2	2
CO3	U18CS801C.3	2	2	2	2	2	-	-	1	1	1	-	3	3	3	3
CO4	U18CS801C.4	2	2	2	2	2	-	-	1	1	1	-	3	3	3	3
U18CS801C		2	2	2	2	2	-	-	1	1	1	-	2.5	2.5	2.5	2.5

U18CS802A DEEP LEARNING

Class: B.Tech. VIII-Semester **Branch:** Computer Science and Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: deep learning fundamental and regularization parameters

LO2: principles and architectures of convolutional neural networks

LO3: principles and architectures of recurrent and recursive neural networks

LO4: practical methodology and applications of deep neural networks

UNIT – I (9)

Introduction: Deep learning architecture, Historical trends in deep learning, deep feed forward networks, Gradient based learning, Hidden Units, Back propagations and differentiation algorithms, Case study: Deep learning applications and societal impact

Regularization for Deep learning: Parameters norm penalties, Norm penalties as constrained optimization, Regularization and under constrained problems, Dataset augmentation, Noise robustness, Semi supervised learning, Multitask learning, Parameter tying and sharing, Sparse representation

UNIT – II (9)

Optimization for Training Deep Models: Pure optimization, challenges in neural network optimization, Basic algorithms, Parameter initialization strategies, Algorithms with adaptive learning rates

Convolutional Neural Networks: Convolution operations, Motivation, Pooling, Convolution and pooling as an infinitely strong prior, Variants of the basic convolution functions, Structured outputs, Data types, Efficient convolution algorithms, random or unsupervised features, Convolution networks and the history of deep learning

TensorFlow case study: Using Convolutional Neural Networks for recognizing and classifying images

UNIT – III (9)

Recurrent Neural Networks: Architecture, Unfolding computational graphs, Recurrent neural networks, Bidirectional Recurrent neural networks, Encoder-decoder architectures, Deep recurrent networks

Recursive Neural networks: Architecture, Challenges of long term dependencies, Echo state networks, Leaky units, Strategies for multiple time scales, Long and short term memory for recursive neural networks, Gated recursive neural networks, optimization for long term dependencies, Explicit memory

Case study: Tensor flow modeling for recognition of hand written digits

UNIT – IV (9)

Practical Methodology: Performance Metrics, Default baseline models, selecting hyper parameters, debugging strategies, Case study: Multi digit number recognition

Applications: Large scale deep learning, Computer vision using deep learning, Speech recognition using deep learning, Natural language processing using deep learning, other deep learning applications,

TensorFlow case studies: Textual document processing, Deep learning on cloud

Text Book:

Goodfellow and YoshuaBengio and Aaron Courville, *Deep Learning*, 1st ed., MIT Press, 2017.

tonio Gulli, Amita Kapoor, Sujit Pal, *Deep Learning with TensorFlow 2.0 and Keras*, 2nd ed., Mumbai: Packt, 2019 (Chapters : 1, 3, 4, 5).

Reference Books:

[1] Deng & Yu, *Deep Learning: Methods and Applications, 1st ed.,* USA:Now Publisher, 2013.

[2] Ian Goodfellow, YoshuaBengio, Aaron Courville, *Deep Learning*, 1st ed., Massachusetts: MIT Press, 2016.

[3] astian Raschka, Vahid Mirjalili - *Python Machine Learning*, 2nd ed., Mumbai: Packt, 2019.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: design deep learning architectures and regulate parameters for effective performance
CO2: optimize deep learning and convolutional neural network algorithms
CO3: analyze recurrent and recursive neural network methods
CO4: tune deep learning network architectures for computer vision, speech and natural language processing applications

Course Articulation Matrix (CAM): U18CS802A Deep Learning

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18CS802A.1	2	2	2	1	-	1	-	1	1	1	-	1	2	1	2
CO2	U18CS802A.2	2	2	1	2	2	-	-	1	1	1	-	1	2	1	2
CO3	U18CS802A.3	2	2	1	3	2	-	-	1	1	1	-	1	2	1	2
CO4	U18CS802A.4	-	2	2	3	2	-	-	1	1	1	-	1	2	1	2
U18CS802A		1.5	2	1.5	2.25	2	1	-	1	1	1	-	1	2	1	2

U18CS802B: SOCIAL NETWORK ANALYSIS

Class: B.Tech. VIII-Semester **Branch:** Computer Science and Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: mathematical concepts and research design
LO2: multivariate techniques, visualization and testing hypotheses
LO3: directed and undirected networks
LO4: structural equivalence and regular equivalence

UNIT – I (9)

Introduction: Network essentials, Types of relations, Goals of analysis, Network variables as explanatory variables, Network variables as outcome variables

Mathematical Foundations: Introduction, Graphs, Paths and components, Adjacency matrices, Ways and modes, Matrix products

Research Design: Introduction, Experiments and field studies, Whole-network and personal-network research designs, Sources of network data, Types of nodes and types of ties, Actor attributes, Sampling and bounding, Sources of data reliability and validity issues, Ethical considerations

UNIT – II (9)

Multivariate Techniques Used in Network Analysis: Introduction, Multidimensional scaling, Correspondence analysis, Hierarchical clustering

Visualization: Introduction, Layout, Embedding node attributes, Node filtering, Ego networks, Embedding tie characteristics, Visualizing network change, Exporting visualizations, Closing comments

Testing Hypotheses: Introduction, Permutation tests, Dyadic hypotheses, Mixed dyadic–monadic hypotheses, Node-level hypotheses, Whole-network hypotheses, Exponential random graph models, Stochastic actor-oriented models (SAOMs)

UNIT – III (9)

Characterizing Whole Networks: Introduction, Cohesion, Reciprocity, Transitivity and the clustering coefficient, Triad census, Centralization and core–periphery indices

Centrality: Introduction, Basic concept, Undirected, non-valued networks, Directed, non-valued networks, Valued networks, Negative tie networks

Subgroups: Introduction, Cliques, Girvan–Newman algorithm, Factions and modularity optimization, Directed and valued data, Computational considerations, Performing a cohesive subgraph analysis, Supplementary material

UNIT – IV (9)

Equivalence: Introduction, Structural equivalence, Profile similarity, Block models, The direct method, Regular equivalence, The REGE algorithm, Core–periphery models

Analyzing Two-mode Data: Introduction, Converting to one-mode data, converting valued two-mode matrices to one-mode, Bipartite networks, Cohesive subgroups and community detection, Core–periphery models, Equivalence

Large Networks: Introduction, Reducing the size of problem, Choosing appropriate methods, Sampling, Small-world and scale-free networks

Text Book:

phen P Borgatti, Martin G Everett, Jeffrey C Johnson, *Analyzing Social Networks*, 2nd ed. Melbourne: Sage publications, 2018.

Reference Books:

[1] Stanley Wasserman, Katherine Faust, *Social Network Analysis: Methods And Applications*, New York: Cambridge University Press, 1999

[2] Derek.L.Hansen, BenShneiderman, Marc A. Smith, *Analyzing social media networks with NodeXL,* Burlington: Elsevier Publication, 2010.

[3] KsimTsvetovat, Alexander Kouznetsov, *Social Network Analysis for Startups*, California: O'Reilly Media publications, 2011

[4] BorkoFurht, *Handbook of Social Network Technologies and Applications*, New York: Springer publications, 2010.

Course Research Papers: Research papers (Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patents: Patents relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: identify networks in graph-theoretic language and identify sources and boundaries of network data

CO2: apply clustering algorithms to detect groups in proximity data and analyze testable hypothesis at the dyadic, monadic and whole-network level

CO3: analyze directed & undirected networks and evaluate measures of transitivity, reciprocity & clustering

CO4: interpret sampling methods and block models for both regular and structural equivalence

Course Articulation Matrix (CAM): U18CS802B SOCIAL NETWORK ANALYSIS

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18CS802B.1	2	2	3	2	1	-	-	1	1	1	-	1	2	2	1
CO2	U18CS802B.2	1	2	2	1	1	-	-	1	1	1	-	1	2	1	2
CO3	U18CS802B.3	2	2	2	2	1	-	-	1	1	1	-	1	2	1	2
CO4	U18CS802B.4	2	2	2	2	-	-	-	1	1	1	-	1	2	1	2
U18CS802B		1.75	2	2	1.75	1	-	-	1	1	1	-	1	2	1	1.75

U18CS802C ETHICAL HACKING

Class: B.Tech. VIII-Semester **Branch:** Computer Science and Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: methodologies and framework of ethical hacking for enhancing the security
LO2: business perspective and planning for a controlled attack
LO3: reconnaissance, preparing for a hack, enumeration and exploitation
LO4: deliverable and integration

UNIT – I (9)

Introduction: Hacking impacts, The hacker-Type of hacker, Script kiddies
Framework: Planning the test, Sound operations, Reconnaissance, Enumeration, Vulnerability analysis, Exploitation, Final analysis, Deliverable, Integration
Information Security Models: Computer security, Network security, Service security, Application security, Security architecture
Information Security Program: The process of information security, Component parts of information security programs, Risk analysis and ethical hacking

UNIT – II (9)

The Business Perspective: Business objectives, Security policy, Previous test results, Business challenges
Planning for a Controlled Attack: Inherent limitations, Imposed limitations, Timing is everything, Attack type, Source point, Required knowledge, Multi-phased attacks, Teaming and attack structure, Engagement planner, The right security consultant, The tester, logistics, Intermediates, Law enforcement

UNIT – III (9)

Reconnaissance: Social engineering, Physical security, Internet reconnaissance
Preparing for a Hack: Technical preparation, Managing the engagement
Enumeration: Enumeration techniques, Soft objective, Looking around or attack, Elements of enumeration, Preparing for the next phase
Exploitation: Intuitive testing, Evasion, Threads and groups, Operating systems, Password crackers, Rootkits, Applications, Wardialing, Network, Services and areas of concern

UNIT – IV (9)

Deliverable: The deliverable, The document, Overall structure, Aligning findings, Presentation
Integration: Integrating the results, Integration summary, Mitigation, Defense planning, Incident management, Security policy, Conclusion
Case study: various attacks scenarios and their remedies

Text Book:

[1] James S. Tiller, *The Ethical Hack: A Framework for Business Value Penetration Testing, New York: Auerbach Publications, CRC Press, 2019* 2.

Reference Books:

[1] Michael Simpson, Kent Backman, James Corley, *Hands-On Ethical Hacking and Network Defense*, 2nd ed. New York: Cengage Learning, 2005.

[2] Patrick Engebreston, *The Basics of Hacking and Penetration testing*, New York: Syngress Publishers, 2011.

[3] EC-Council, *Ethical Hacking and Counter measures: Attack Phases,* New York: Course Technology Press, 2016.

[4] Hein Smith, Hilary Morrison,*ETHICAL HACKING: A Comprehensive Beginner's Guide to Learn and Master Ethical Hacking,* New York: Kindle Edition, 2018.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course web page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in course web page. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: identify security vulnerabilities and demonstrate phases of the penetration testing framework
CO2: identify various types of attacks
CO3: make use of reconnaissance tools to gather information
CO4: analyze the dangers associated with penetration testing

Course Articulation Matrix (CAM): U18CS802C ETHICAL HACKING

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18CS802C.1	2	2	1	2	1	1	-	1	1	1	-	1	1	1	2
CO2	U18CS802C.2	2	2	2	2	1	1	-	1	1	1	-	1	1	1	2
CO3	U18CS802C.3	2	2	2	2	1	1	-	1	1	1	-	1	1	1	2
CO4	U18CS802C.4	2	2	2	2	2	1	-	1	1	1	-	1	1	1	2
U18CS802C		2	2	1.75	2	1.25	1	-	1	1	1	-	1	1	1	2

U18OE803A - OPEARTIONS RESEARCH

Class: B. Tech.VIII – Semester **Branch(s):** ME, CSE, IT, CE, EEE, ECE, EIE

Teaching Scheme:

L	T	P	C
3	–	–	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives:

This course will develop students' knowledge in/on

LO1: *concepts to solve linear programming problems which arise in real life using various methods and their advPantages*

LO2: *applications of linear programming namely transportation and assignment problems which arise in different engineering fields.*

LO3: *non-linearity in optimization problems, direct search techniques and iterative methods.*

LO4: *various queuing systems and their practical relevance.*

UNIT – I(9)

Linear Programming Problem (LPP): Mathematical models and basic concepts of linear programming problem; Solution of linear programming problem - Graphical method, Simplex method, Artificial variable techniques (Big-M and Two-phase method), Duality in linear programming, dual simplex method.

UNIT – II (9)

Special types of LPP: Mathematical model of transportation problem, Methods of finding initial basic feasible solution, optimal solution of transportation problem, Degeneracy in transportation problem; Exceptional cases in transportation problem- Unbalanced transportation problem, Maximization transportation problem; Assignment problem- Mathematical formulation of the problem, Hungarian method to solve an assignment problem, Special cases in assignment problem- Maximization assignment problem.

UNIT – III (9)

Non-linear Programming Problem (NLPP): Classical method of optimization using Hessian matrix; Iterative methods - Random search methods-Random jump method, Random walk method, Steepest decent method and Conjugate gradient method; Direct methods - Lagrange's method, Kuhn-Tucker conditions.

UNIT – IV (9)

Queueing Theory: Queueing system- Elements and operating characteristics of a queuing system; Probability distributions in queueing systems- Distribution of arrivals (Pure Birth Process); Classification of queueing models; Poisson queueing systems- Study of various characteristics of single server queuing model having infinite population $\{(M/M/1):(\infty/FIFO)\}$ and single server queuing model having finite population

$\{(M/M/1):(N/FIFO)\}$, Generalized model (Birth-Death process).

Textbook:

[1]. Kanti swarup et.al, *Operations Research*, 16th ed., New Delhi: S. Chand & Sons, 2013. (Unit-I, Unit-II, Unit-IV)

[2]. Singiresu S. Rao, *Engineering Optimization Theory and Practice*, 4th ed., Hoboken, New Jersey: John Wiley & Sons, Inc, 2009 (Unit-III)

Reference Books:

[1]. Hamdy. A. Taha, *Operations Research*, 7th ed., New Delhi: Prentice Hall of India Ltd, 2002.

[2]. J.C. Pant, *Introduction to Optimization*, 7th ed., New Delhi*: Jain* Brothers, 2012.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web

Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, the students will be able to…

CO1: model engineering real time problems and solve them using various LPP techniques

CO2: obtain the optimal solution of transportation, assignment problems and their real time applications

CO3: optimize the engineering problems using NLPP techniques

CO4: differentiate various queueing models and their practical relevance

Course Articulation Matrix: U18OE803A - OPEARTIONS RESEARCH

CO		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	U18OE803A	2	2	-	-	-	-	-	-	-	1	-	1	-	-	-
CO2	U18OE803A	2	2	-	-	-	-	-	-	-	1	-	1	-	-	-
CO3	U18OE803A	2	2	-	-	-	-	-	-	-	1	-	1	-	-	-
CO4	U18OE803A	2	2	-	-	-	-	-	-	-	1	--	1	-	-	-
U18OE803A		2	2	-	-	-	-	-	-	-	1		1	-	-	-

U18OE803B MANAGEMENT INFORMATION SYSTEMS

Class: B.Tech. - Semester
Branch: CSE & IT

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on…

LO1: basic concepts and challenges of management information systems
LO2: e-business and decision support systems techniques
LO3: development process and design of management information systems
LO4: different applications of management information systems

UNIT – I (9)

Management Information Systems: Systems: An Overview : Introduction, Need for management information systems, Management information systems: A concept, MIS: A definition, Management information system and Information technology, Nature and scope of MIS, MIS characteristics, Structure of MIS, Types of MIS, Role of MIS in global business, Challenges of managing information systems, IT Infrastructure and Emerging Technology

UNIT - II (9)

Business Applications of Information Systems:
E-Commerce, E-Business and E-Governance: Introduction, E-commerce, E-commerce sales life cycle, E-commerce infrastructure, E-commerce applications, E-commerce payment systems, Management challenges and opportunities, E-business, E-governance
Decision Support Systems: Introduction, Decision-Making: A concept, Simon's model of decision-making, Types of decisions, Methods for decision-making, Decision support techniques, Decision-making and role of MIS, Decision support systems, Business intelligence, Knowledge management systems

UNIT - III (9)

Development process of MIS : Development of long range plans of the MIS, Ascertaining the class of information, Determining the information requirement, Development and implementation of the MIS, Management of information quality in the MIS, Organisation for development of MIS, MIS: Development process mode
Strategic Design of MIS : Strategic management of the business, Why strategic design of MIS, Balance score card, Score card and Dash board, Strategic design of MIS, Development process steps for strategic design (SD) of MIS, Illustrating SD of MIS for big bazaar, Strategic management of business and SD of MIS, Business strategy determination, Business strategy implementation

UNIT - IV (9)

Management of Global Enterprise : Enterprise management system, Enterprise resource planning (ERP) System, ERP model and modules, Benefits of the ERP, ERP product evaluation, ERP implementation, Supply chain management (SCM), Information management in SCM, Customer relationship management (CRM), Management of global enterprise, EMS and MIS
Applications in Manufacturing Sector: Introduction, Personnel management (PM), Financial management (FM), Production management (PM), Raw materials management (RMM), Marketing management, Corporate overview.

Text Books:

[2] D.P.Goyal, Vikas, *Management Information Systems–Managerial Perspective*, 4th ed. Addison-Wesley, 2014. *(Unit 1)*

[3] Waman S. Jawadekar, *Management Information Systems Text and Cases: a Global Digital Enterprise Perspective,* 5th ed. McGraw Hill, 2014 *(Unit 2,3,4)*

Reference Books:

[5] Kenneth C. Laudon & Jane P. Laudon, *Management Information Systems,12th ed.* Prentice Hall, 2012.

[6] S. Sadagopan, *Management Information Systems,2nd ed.,* PHI Learning, 2014.

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…

CO1: explain the structure and importance of management information systems
CO2: analyze management information systems for decision making
CO3: explain the methodology to design and develop a management information system
CO4: describe different applications of management information systems in various manufacturing sectors

Course Articulation Matrix (CAM): U18OE803B MANAGEMENT INFORMATION SYSTEMS																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**U18OE803B**.1	2	2	1	1	1	-	-	-	-	1	-	1	2	1	2
CO2	**U18OE803B**.2	2	2	2	1	1	-	-	-	-	1	-	1	2	1	2
CO3	**U18OE803B**.3	2	2	2	3	1	-	-	-	-	1	-	2	2	1	2
CO4	**U18OE803B**.4	2	2	3	3	1	-	-	-	-	1	-	2	3	1	3
U18OE803B		2	2	2	2	1	-	-	-	-	1	-	1.5	2.25	1	2.25

U18OE 803C ENTREPRENEURSHIP DEVELOPMENT

(Open Elective-IV)

Class: B. Tech. VIII Semester

Branch: M E , C S E , I T , C E , E E E , E C E , E I E

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):
This course will develop students' knowledge in/on
LO1: various characteristics of entrepreneur and his role in development of the nation
LO2: creativity and business plan
LO3: functions of various managements/managers in industry
LO4: legal issues in entrepreneurship and intellectual property rights

UNIT –I (9)

Entrepreneurship: Definition, role of entrepreneurship in economic development, characteristics and types of an entrepreneur, Forms of business organizations; agencies dealing with entrepreneurship and small scale Industries; Case studies of successful entrepreneurs- identification of business opportunities in various branches of engineering

UNIT-II (9)

Creativity and Business Idea: Sources of new ideas, methods of generating ideas and creative problem solving, concepts of innovation and incubation.
Business Plan: definition, scope and value of business plan, market survey and demand survey.
Feasibility studies: Technical feasibility, financial viability and social acceptability; Preparation of preliminary and bankable project reports;

UNIT-III (9)

Project Planning: Product planning and development process, Sequentialsteps in executing the project.
Plant layout: Principles, types and factors influencing layouts,
Material Management: Purchase procedures, Issues of Materials -LIFO,FIFO,HIFO and Base stock;.
Fundamentals of Production Management: Production Planning and Control (PPC)-Concepts and functions, Long & short run problems.
Marketing Management: Definition, functions and market segmentation.

UNIT-IV (9)

Financial Management: Introduction, Sources of finance-internal and external.
Human Resource Management: Introduction, importance, selection, recruitment, training,placement, development;
Legal Issues in Entrepreneurship: Mechanisms for resolving conflicts; Industrial laws- IndianFactories Act, Workmen Compensation Act; Intellectual Property Rights (IPR) – patents, trademarks, and copyrights

Text Books:

1) Robert D.Hisrich, Michael P. Peters, "Entrepreneurship", *Tata McGraw-Hill*, 9th Edition 2014 (Chapters 1,2,4,5,6,7,8,11 and13).

Reference Books

1. David H. Holt, "Entrepreneurship New venture creation*" Prentice Hall of India*.2004.
2. Handbook for "New Entrepreneurs", *Entrepreneurship Development Institute of India*, Ahmadabad.
3. T.R. Banga, "Project Planning and Entrepreneurship Development", *CBS Publishers*, New Delhi,1984.
4. Personnel efficiency in Entrepreneurship Development-"A Practical Guide to Industrial Entrepreneurs", *S. Chand & Co*., New Delhi.

Course Learning Outcomes (COs):

Upon completion of this course, students will be able to…

CO1: *describe characteristics of entrepreneur and his role in economic development*

CO2: *apply creative problem solving methods to real time situations*

CO3: *explain the functions of production and marketing managements*

CO4: *identify the legal issues in entrepreneurship and explain intellectual property rights*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course Articulation Matrix (CAM): **U18OE 803C ENTREPRENEURSHIP DEVELOPMENT**															
CO	**PO 1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
U18OE803C.1	2	-	-	-	-	1	-	1	1	1	1	1	1	-	-
U18OE803C.2	2	-	-	-	-	1	-	1	1	1	1	1	1	-	-
U18OE803C.3	2	-	-	-	-	1	-	1	1	1	1	1	1	-	-
U18OE803C.4	2	-	-	-	-	1	-	1	1	1	1	1	1	-	-
U18OE803C	2	-	-	-	-	1	-	1	1	1	1	1	1	-	-

U18OE803D FOREX & FOREIGN TRADE

Class: B.Tech VIII Semester

Branch: M E , C S E , I T , C E , E E E , E C E , E I E

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LO):

This course will develop students' knowledge in/on…..

LO1: business, business system, objectives and types of companies

LO2: fundamentals of foreign trade and EXIM procedure

LO3: foreign exchange rate and methods of payments

LO4: foreign exchange control

UNIT–I (9)

Business: Nature and scope, Classification of business activities, Functions of commerce and trade.
Business System: Characteristics and components of business system, objectives of business, classification of business objectives; Types of Business.

UNIT-II(9)

Foreign Trade: Introduction of International Trade, Reasons for External Trade, Special problems of Foreign Trade; EXIM-objectives, roles of EXIM in Foreign Trade, Stages in Import procedure, Stages in export procedure-bill of lading, mate's receipt, certificate of origin.
Corporations Assisting Foreign Trade: State Trading Corporation of India, Export Credit and Guarantee Corporation, Minerals and Metals Trading Corporation of India.

UNIT–III (9)

Foreign Exchange Rate: Meaning and importance of Foreign exchange rate, Methods of foreign payments; Exchange rates- Spot, Forward and Cross Rates; Demand and supply of foreign exchange rate, Equilibrium rate of foreign exchange, Theories of determining foreign exchange rate, International Parity condition - Balance of payments.
Foreign Exchange Markets: Functions of exchange markets, Components and Players in Exchange Markets; FEMA-objectives and its role in Foreign Trade.

UNIT–IV (9)

Foreign Exchange Control: objectives, characteristics, advantages and disadvantages, Methods: intervention, exchange restriction, multiple exchange rates,exchange clearing agreements, method of operation, exchange clearing agreements in practice, payments agreements, transfer moratoria; indirect methods.

Text Books:

1. C.B. Guptha, *Business Organization & Management,* 15th ed. New:SultanChand & Sons,2015(*Units 1,5*)
2. M.L. Seth, *Macro Economics,* 22nd ed. New Delhi; Lakshmi Narayan Agarwal Publishers, 2014.
3. M.C. Vaish, Ratan Prakashan Mandir, *Monetary Theory,* 16th ed. New Delhi: Vikas Publications,2016

Reference Books:

1. Y.K.Bhushan, "Business Organization and Modern Management" *Sultan & Sons Publishers, New Delhi. 15/e,* 2014.
2. S.A. Sherlekhar "Business Organization and Management", *Himalaya Publishing House, 2000.*
3. K.P.M. Sundaram, "Money Banking, Trade & Finance ", *Sultan & Sons Publishers, New Delhi.*
4. P.N.Chopra, "Macro Economics", *Kalyani Pubnlishers, 1/e, Ludhiana*

Course Learning Outcomes (CO):

Upon completion of the course, the student will be able to…

CO1: evaluate the objectives and types of industries and companies.

CO2: assess the procedure in imports and exports

CO3: analyse the foreign exchange rate and methods of foreign payments

CO4: Adapt the methods of exchange control

Course Articulation Matrix (CAM): U18OE803D FOREX AND FOREIGN TRADE															
CO	**PO 1**	**PO2**	**PO3**	**PO4**	**PO 5**	**PO6**	**PO 7**	**PO 8**	**PO9**	**PO 10**	**PO 11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
U18OE803D 1	-	-	-	-	-	-	-	-	-	2	2	1	1	-	-
U18OE803D2	-	-	-	-	-	-	-	-	-	2	2	1	1	-	-
U18OE803D3	-	-	-	-	-	-	-	-	-	2	2	1	1	-	-
U18OE803D4	-	-	-	-	-	-	-	--	-	2	2	1	1	-	-
U18OE803D	-	-	-	-	-	-	-	-	-	2	2	1	**1**	-	-

U18CS804: MAJOR PROJECT WORK PHASE-II

Class: B.Tech. VIII - Semester

Branch: Computer Science and Engineering

Teaching Scheme:

L	T	P	C
-	-	14	7

Examination Scheme:

Continuous Internal Evaluation	60 marks
End Semester Examination	40 marks

Course Learning Objectives (LOs):

The major project work will develop students' knowledge on /in…

LO5: real-world complex engineering problems, literature review, problem formulation; and experimental and data analysis techniques

LO6: design/development of solutions to real-world engineering problems; conduct of investigations of complex problems; modern tool usage to design, build and test a prototype; impact of solution in society, environment and sustainability contexts

LO7: ethics, team work and project management skills such as budgeting, scheduling

LO8: oral, written and multimedia communication skills; self-directed independent learning and life-long learning

1. **Major project work shall be continued in 8th semester as major project *phase-II*:** All the major project teams shall take the *phase -I* work forward and complete the remaining work as *Phase-II* in the 8th semester.
2. Final Year Major Project work represents the culmination of study towards the B. Tech degree. **Major project offers an opportunity to integrate the knowledge acquired from various courses and apply it to solve real-world complex engineering problems**. The **student learning assessment process** (SLAP) shall include good number of presentations, demonstration of work undertaken, submission of a project report, writing project paper in scientific journal style & format, preparing project poster and creating video pitch on the complete project
3. Activities of major project SLAP shall be planned in such a way to ensure that the students acquire the essential knowledge, skills and qualities (KSQ) of a professional engineer.
4. **Team work:** Major project work is a team work
   (i) The students of a project team shall work together to achieve a common objective.
   (ii) Every student of a project team is expected to function effectively as an individual, and also with others as a team member in an ecosystem of team having knowledge diversity, gender diversity, social and cultural diversity among its members.
5. Every student is expected to put approximately **168 hours of work** into the major project *phase-II* course over the 12 weeks of 8th semester.
6. **Major project work *Phase-II*: 8th semester**

(xii) The convener DPEC shall release complete schedule of *phase-II* CIE during last week of 7th semester (*well in advance before start of 8th semester*), immediately after completion of progress presentation-I, so that student teams would complete the scheduled works during inter-semester break and get ready with informative, confident and comfortable presentation for progress presentation-II.

(xiii) **The project supervisors**: The project supervisors are expected to guide the students to systematically continue the *phase-I* work, useful work during inter-semester break, meeting the deadlines as proposed in project timeline.

(xiv) **The project supervisors shall ensure students focus on the project objectives and expected**

deliverables

(xv) The project supervisors shall ensure students have sufficient resources for successful project completion.

(xvi) The project supervisors shall continue guiding students on

(n) *Knowledge, skills and qualities (KSQ) of a professional engineer to be acquired* to propose solutions and design the systems to the identified real-world problems.

(o) *Problem analysis* - to identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

(p) *Applying engineering knowledge* - to apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

(q) *Design/development of solutions* - to 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

(r) *Conduct investigations of complex problems* - to 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

(s) *Modern tool usage* – to 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

(t) *Engineering and society* – to 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

(u) *Environment and sustainability* – to understand the impact of the professional engineering solutions in societal and environmental contexts, demonstrate the knowledge of, and need for sustainable development

(v) *Ethics* – to apply ethical principles and commit to professional ethics, responsibilities, and norms of the engineering practice

(w) *Individual and team work* – to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

(x) *Communication* – to 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

(y) *Project management and finance* – to 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

(z) *Life-long learning* – to 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

(xvii) The project supervisors are also expected to continuously emphasize and guide the students on

(o) **Following project timeline**: completing the tasks as planned in project timeline

(p) Meeting Cadence:

i. **Regular meetings with supervisor:** Short and frequent meetings increase a team's work momentum. Regular meetings with supervisor to review the status of project are very essential. All students of the team shall participate in discussions and take notes.

ii. **Meeting Frequency: Semi-weekly cadence,** i.e., the meeting frequency shall be **twice a week.** Due weightage will be given to meeting cadence and considered for evaluation during presentations, i.e., number of planned meetings and number attended by students

(q) **Project Log Book:** The activity journaling in project log book is very important for a successful project.

vi. Project log book is a written record showing the daily project activity on project goals from the very first thing like starting the project (an introduction statement what the project is all about), to the completion of the work (including the final results, and whether project met the core objectives / outcomes, etc.).

vii. In project log book, the activities like regular meetings with project supervisor, and work carried out on daily/weekly basis are to be recorded. This ensures that the student progress is being monitored well.

viii. The project supervisor shall regularly check the log book of every student of project team and endorse each and every activity by affixing his signature with date. With this, the number of planned meetings and number attended by the students will be also monitored.

ix. Log books are to be shown during all presentations and will be graded along with the project.

x. At the conclusion of the project work *phase-II*, the supervisor shall specifically comment, in the project log book, on whether the project team met each of the project work outcomes and to give evidence which describes the quality of work. For project teams, this also serves as self-assessment.

(r) **Writing down whatever is done and making notes of whatever is read**. Writing down the procedures / models followed, designs made, experiments conducted, simulations carried out, intermediate results obtained, ***difficulties faced and how they were fixed*** are very important. Thiskind of documenting the whole process as we go with project implementation is a very effective way and will help preparing a well- documented report having original content. Note down and include information about all the resources that you used, magazines, Journals, patents, books, and so on. This information will be needed for the bibliography in your project report. On the other hand, documenting a report ***on the spur of the moment*** would end up copying things from other sources resulting in a plagiarized document.

(s) The relevant knowledge, skills and qualities (**KSQ**) an engineering graduate should possess, which can be specially acquired by participating in major project work

(t) **Good and sufficient literature review**: Literature review is a description and analysis of information related to the topic of project work. Reading good number of review articles, research articles published in recent issues of peer reviewed journals, technical magazines, patents, reference books on the topics of potential interest, will help one understand what has already been discovered and what questions remain to identify gaps in the literature.

(u) Completing the proposed work by the end of *phase-II*

(v) Right conduct of research to promote academic integrity, honesty and time management

(w) Preparing a well-documented overall project report in proper format, covering the complete work carried out during both the phases (*phase-I and phase-II*).

(x) Consequences of plagiarism, and use of anti-plagiarism software to detect plagiarism in the report

(y) Submission of major project work report within acceptable plagiarism levels, as per the ***Anti-plagiarism policy-2020 of our institute***

(z) **Video pitch on complete project work**: Capturing short videos, photos, screenshots on experiments conducted, simulations carried out, prototype / working model / process / software package / system developed during course of project execution, photos showing interaction with supervisor for creating a short video pitch on the complete work done

during both phases (*phase-I and phase-II*).

(aa) **Project Paper**: Writing a technical paper at the end of *phase-II* based on the solution(s) proposed, results obtained and prototype / working model / process / software package / system developed, for submission to a reputed non-predatory conference/non-paid peer reviewed journal.

(bb) **Project poster**: At the end of phase-II, the project teams shall have to present their project in the form of posters, at the time of demonstration of complete porotype / working model / software package / system developed.

(xviii) **Phase – II evaluation**: There shall be only Continuous Internal Evaluation (CIE) for major project work *phase-I* with following components

(a) **Progress Presentation -II** *(during third / fourth week of 8th semester):* The progress presentation-II shall include the identified problem, objective(s), literature review, expected outcome(s), results of work done as per project plan timeline.

- **i.** **Following project timeline**: The project timeline shall be meticulously followed and the tasks shall be completed as planned in project timeline.
- **ii.** 80-85% of work is expected to be completed
- **iii.** Project teams shall compulsorily show the following as part of their progress presentation-II
    1. *The slides on project timeline and*
    2. *A table showing targeted tasks as per timeline and status – whether tasks accomplished?*
- **iv.** **Project log book**: Every student of the Project team shall compulsorily show the activity journaling in the log book (with due signatures of project supervisor) during presentations

(b) **Final Presentation** *(during penultimate week of 8th semester):* **Project supervisor shall ensure that the project team has accomplished 100% of work proposed**. The project team shall

- **i.** **Follow project timeline**: The project timeline shall be meticulously followed and the tasks shall be completed as planned in project timeline.
- **ii.** compulsorily show the following as part of their final presentation
    1. *The slides on project timeline and*
    2. *A table showing targeted tasks as per timeline and whether all the identified tasks accomplished?*
- **iii.** **show project log book**: Every student of the Project team shall compulsorily show the complete activity journaling in the log book (*with due signatures of project supervisor*)
- **iv.** present complete results & analysis
- **v.** **demonstrate the completed project**: working model / process / software package / system developed
- **vi.** demonstrate the completed project with the **project poster presentation**

(xix) Evaluation for Major project phase-II:

There shall be continuous internal evaluation (CIE) and end semester examination (ESE). The evaluation for *phase-II* shall be as given below:

Assessment	Weightage

A. CIE **(i) Supervisor Assessment (10%)** **(ii) DPEC Assessment (50%)** *(a) Progress presentation-II (10%)* *(b) Final presentation (10%)* *(c) Working model / process / software package / system developed (20%)* *(d) Project video pitch (5%)* *(e) Project paper (5%)*	**60%**
B. ESE *(i) Well-documented project report (15%)* *(DPEC shall evaluate the project reports, as per the rubrics, well before the ESE. At the time of ESE, evaluated project report marks shall be posted in the award list, along with the ESE oral presentation marks. Students shall appear for Viva-Voce with project report)* *(ii) Oral presentation with PPTs and viva-voce (15%)* *(iii) Project poster (5%)* *(DPEC shall evaluate the project poster, as per the rubrics, well before the ESE. At the time of ESE, evaluated project poster marks shall be posted in the award list. Students shall appear for Viva-Voce with project poster)*	**40%**
Total Weightage	**100%**

(d) **Working Model:** Every project team shall be required to develop a working model/ process/software package/system, on the chosen work. The completed working model/ process/software package/system shall be demonstrated during final presentation at the end of *phase-II*.

(e) **Video pitch**: Every project team shall be required to create a pitch video, which is a video presentation on their major project work *phase-I & phase-II*. The project team shall present the produced video pitch during Final presentation. The produced video pitch should

- **(i)** be 3 to 5-minute-long video (no longer than 5 minutes)
- ***(ii)*** be concise and to the point, on the problem, proposed solution and its salient features.
- **(iii)** show project timeline and sample page of log book
- **(iv)** highlight the various stages during project implementation with the help of short videos / photos / screenshots on experiments conducted, simulations carried out, prototype / working model / process / software package / system developed as part of proposed solution and also photos showing team interactions with supervisor and the team working in the lab on project.
- ***(v)*** discuss the impact of proposed solution in *ethical, environmental, societal and sustainable development contexts.*
- ***(vi)*** emphasize key points about *business idea, potential market for the proposed solution*

(f) **Project poster**: At the end, the project teams shall present their project in the form of posters (A2 size). The teams shall have to present their work during the poster presentation session scheduled at the end of the 8th semester, at the time of demonstration of complete porotype / working model / software package / system developed.

(g) **Well-documented plagiarism-cleared project report**: Every project team shall be required to submit a well-documented project report on the work carried out, as per the format specified by the DPEC. The report should clear plagiarism check as per the anti-plagiarism policy-2020 of the institute. The following shall compulsorily be included in the Results-Chapter of the project report

- (i) Photos / screen shots taken at various stages during the development of working model/ process/software package/system as part of Results-Chapter
- (ii) Snapshot of final working model/ process/software package/system developed
- (iii) Pictures of the team working in the lab, the team discussing with the project supervisor, working on creative project, or an event they are attending for work.
- *(iv) All these photos / screen shots shall be properly referred in the project report by assigning figure numbers*

(h) **Tangible outcomes of project work in Conclusions - Chapter:** These are the lessons learnt from doing a project work. The students have to describe in their own words what they learnt from the project work experience. They have to describe what specific KSQs are acquired by them, with reference to

the expected COs, after successful completion of major project work. Finally, a table depicting systematic mapping of what they have learnt and the expected major project work COs, is to be shown in the conclusions chapter.

(i) **Student feedback on major project in Conclusions - Chapter:** To gather information on whether project work was useful and gave practical experience on chosen field of interest, and other learning, a well-defined feedback questionnaire (*made available by the dept*) with closed and open questions shall be kept in the conclusions chapter of the project report.

(xx) It is mandatory for

(d) every student of the team to appear for ESE oral presentation and viva-voce, to qualify for course evaluation

(e) every project team to write a technical paper based on the solution(s) proposed, results obtained and prototype / working model / process / software package / system developed, for submission to a reputed non-predatory conference/non-paid peer reviewed journal

(f) every project team shall be required to create a pitch video, which is a video presentation on their major project work *phase-I & phase-II*

(g) every project team shall present their project in the form of a poster, during the demonstration of complete porotype / working model / software package / system developed

(xi) The student has to register for the Major project work *phase-II* as supplementary examination in the following cases:

(a) he/she is absent for oral presentation and viva-voce as part of ESE presentation

(b) he/she fails to fulfill the requirements of Major project work *phase-II* evaluation as per specified guidelines

(xii) Supplementary examination for Major project work *phase-II*

(a) The CoE shall send the list of students, registered for supplementary examination, to the HoDs concerned

(b) The DPEC, duly constituted by the HoD, shall conduct Major project *phase-II* supplementary exam and send the award list to the CoE within the stipulated time

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Course Learning Outcomes (COs):
Upon completion of the major project work, students will be able to…

CO1: review research literature, formulate problem, apply knowledge of mathematics, sciences, engineering fundamentals, experimental and data analysis techniques; synthesize technical knowledge and innovative approaches to generate suitable solutions for real-world complex engineering problems **(Technical skills)**

CO2: design a system or product based on product/customer specifications; develop, analyze, and critically evaluate the design alternatives in order to justify the solutions to a real-world problem guided by ethical, environmental, societal and sustainable development considerations; use modern engineering and IT tools to design, build and test a prototype within specified project timeline and budget **(Problem solving and critical thinking skills)**

CO3: apply project management and organizational skills; demonstrate integrity, leadership, creativity, professional and ethical responsibilities as an individual and as a member or leader to produce time-sensitive deliverables in a multi-disciplinary team (**Ethics and teamwork**)

CO4: *collate the results, compare performance of prototype to design specifications and present clearly and effectively the proposed solution, conclusions and/or recommendations in written (report, poster, technical paper), oral (presentations) and multimedia formats (video pitch) and engage in self-directed independent learning and life-long learning demonstrating the KSQ of a professional engineer* (**Communication skills and life-long learning**)

Course Articulation Matrix (CAM) : U18CS804 MAJOR PROJECT WORK PHASE-II

CO	CO Code	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	U18CS804.1	2	2	2	2	-	-	-	3	-	2	-	3	3	3	3
CO2	U18CS804.2	1	2	2	-	2	2	2	3	-	-	-	3	3	3	3
CO3	U18CS804.3	-	-	-	-	-	-	-	3	2	-	2	3	3	3	3
CO4	U18CS804.4	-	-	2	2	-	-	-	3	-	2	-	3	3	3	3
	U18CS804	1.5	2	2	2	2	2	2	3	2	2	2	3	3	3	3

U18CS805 MOBILE APPLICATION DEVELOPMENT LABORATORY

Class: B.Tech. VIII-Semester **Branch:** Computer Science and Engineering

Teaching Scheme:

L	T	P	C
-	-	2	0

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This laboratory course will develop students' knowledge on/in…

LO1: android application development tool installation and configuration
LO2: android platform user interface design
LO3: the concepts related to events, saving state information
LO4: aspects of mobile application development and resource constraints

List of Experiments

Experiment-I

1. (a) To study Android architecture and android studio installation.
   (b) Develop an application to display "Hello World".

Experiment-II

2. Write an Android application program that demonstrates the following:
   (a) Linear Layout (b) Relative Layout (c) Table Layout (d) Grid view Layout.

Experiment-III

3. (a) Develop an application that uses GUI components (Font colors).
   (b) Write an Android application program that converts the temperature in Celsius to Fahrenheit.

Experiment-IV

4. Create an application with login module (Check username and password) to understand Activity, Intent.

Experiment-V

5. Design simple calculator GUI application with activity and intents.

Experiment-VI

6. Develop an application that makes use of RSS Feed.

Experiment-VII

7. Design an application that draws basic line based drawings on the screen

Experiment-VIII

8. Develop an application that implements Multi-threading

Experiment-IX

9. Create an android app that makes use of Database (SQLLite)

Experiment-X

10. Develop a native application that uses GPS location information.

Experiment-XI

11. Design an application that writes data to the external card.

Experiment-XII

12. Develop an android application that creates alarm clock.

Text Book:

Mobile Application Development Laboratory Manual, Dept. of CSE, KITS Warangal.

Reference Books:

[1] Jeff Mcherter, Scott Gowell, *Professional Mobile Application Development*, 1st ed. Wiley India Private Limited, 2012.

[2] Reto Meier, *Professional Android 4 Application Development*, 1st ed. Wiley Publications, 2012.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course web page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in course web page. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of this Laboratory course, students will be able to…

CO5: make use of android architecture concepts to install and configure android application development tool

CO6: design user interfaces for the android platform

CO7: develop applications to save state information across important operating system events

CO1: apply programming concepts to build mobile application

Course Articulation Matrix (CAM): U18CS805 MOBILE APPLICATION DEVELOPMENT LABORATORY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18CS805.1	1	2	2	1	3	-	-	1	1	1	-	1	2	1	2
CO2	U18CS805.2	1	2	2	1	3	-	-	1	2	1	-	1	2	1	2
CO3	U18CS805.3	1	2	2	1	3	-	-	1	2	1	-	1	2	1	2
CO4	U18CS805.4	1	2	2	1	3	-	-	1	2	1	-	1	2	1	2