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
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B.Tech - COMPUTER SCIENCE AND ENGINEERING (NETWORKS)

URR-18

(Applicable from the Academic Year 2018-19)

SYLLABI (III to IV SEMESTERS)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (NETWORKS)
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

[7Th+2P+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	U18CN303	Object Oriented Programming through JAVA	3	1	-	4	10	30	40	60	100
4	PCC	U18CN304	Database Management Systems	3	1	-	4	10	30	40	60	100
5	PCC	U18CN305	Computer Architecture and Organization	3	-	-	3	10	30	40	60	100
6	PCC	U18CN306	Advanced Data Structures	3	-	-	3	10	30	40	60	100
7	ESC	U18EI309	Digital Electronics	3	-	-	3	10	30	40	60	100
8	PCC	U18CN310	Object Oriented Programming through Java Laboratory	-	-	2	1	40	-	40	60	100
9	PCC	U18CN311	Database Management Systems Laboratory	_	_	2	1	40	-	40	60	100
10	MC	U18MH315	Essence of Indian Traditional Knowledge	2	-	-	-	10	30	40	60	100
			Total:	20	3	6	24	250	210	460	540	1000

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

Total Contact Periods/Week : 29 **Total Credits: 24**

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 : **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*: *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 region of convergence (ROC), Laplace Transform of some commonly used signals- 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 semi circle

Text Book:

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

Reference Books:

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

Course Code: **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 PROFESSIONAL ENGLISH

Class: B.Tech III Semester
Teaching Scheme :

Branch: Common to all branches
Examination Scheme :

L	T	P	C
-	-	2	1

Continuous Internal Evaluation :	100 marks
End Semester 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 Reading Skimming **II. Verbal Ability-** Synonyms **III. Grammar-** Articles
II	**I. Reading Comprehension-** Scanning **II. Verbal Ability-** Antonyms **III. Grammar-** Articles
III	**I. Reading Comprehension-** Critical Reading **II. Verbal Ability-** Sentence completion with correct alternative word/group **III. Grammar-** Prepositions
IV	**I. Reading Comprehension-** Intensive Reading **II. Verbal Ability-** Sentence completion with correct alternative word/group **III. Grammar-** Reported Speech
V	**I. Reading Comprehension-** Intensive Reading **II. Verbal Ability-** Jumbled Sentences **III. Grammar-** Error Detection
VI	**I. Reading Comprehension-** Inferential Reading **II. Verbal Ability-** Jumbled Sentences **III. Grammar-** Error Detection
VII	**I. Reading Comprehension-** Lexical Reading **II. Verbal Ability-** Phrasal Verbs **III. Grammar-** Tenses, Structures
VIII	**I. Reading Comprehension-** Read to Interpret **II. Verbal Ability-** Single Word Substitutes **III. Grammar-** Tenses, Uses
IX	**I. Reading Comprehension-** Read to Analyze **II. Verbal Ability-** Collocations **III. Grammar-** Tenses, Uses
X	**I. Reading Comprehension-** Read to Summarize **II. Verbal Ability-** Spellings **III. Grammar,** Agreement between Subject & verb (concord)

Text Books:

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",8th Edition *McGraw Hill Education (India) Private Ltd*, Chennai, 2018

Reference Books:

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

Course Outcomes (COs):

Course Code: U18MH302/402 Course Name: Professional English		
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):

Course Code: U18MH302					**Course Name: Professional English**										
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**

U18CN303 OBJECT ORIENTED PROGRAMMING THROUGH JAVA

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

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 and 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, StringBuffer, StringBuilder, and StringTokenizer classes

UNIT-III (9+3)

Inheritance: Inheritance basics, Types of inheritances, *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 ed.,New Delhi: McGraw-Hill Education India Pvt. Ltd, 2014.

Reference Books:

[1] Kathy Sierra, Bert Bates, *Head First Java*, 2nd ed.,Boston: O'Reilly Publications, 2013.
[2] Uttam K. Roy, *Advanced JAVA Programming*, 1st ed.,England: Oxford Publication, 2013.
[3] Balaguruswamy ,*Programming with Java : A Primer* ,6th ed., New Delhi: McGraw-Hill Education India Pvt. Ltd, 2019.
[4]Tanweer Alam ,*Internet and Java Programming*,1st ed.,New Delhi: Khanna Publishing House,2010.

Course Learning Outcomes(COs):

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

CO1: *apply the basic OOP concepts using java.*
CO2: *develop programs using classes, constructors and strings.*
CO3: *develop programs using inheritance, dynamic method dispatch and interfaces.*
CO4: *construct packages, develop programs using streams (I/O), exception handling and multithreading.*

Course Articulation Matrix (CAM): U18CN303 OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Course Outcomes		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
U18CN303.1	CO1	1	1	1	1	-	-	-	-	-	1	-	-	1	1	2
U18CN303.2	CO2	2	2	2	1	-	-	-	-	-	1	-	2	2	1	3
U18CN303.3	CO3	2	2	2	1	-	-	-	-	-	1	-	2	2	1	3
U18CN303.4	CO4	2	2	2	1	-	-	-	-	-	1	-	2	2	1	3
U18CN303		1.75	1.75	1.75	1	-	-	-	-	-	1	-	2	1.75	1	2.75

U18CN304DATABASE MANAGEMENT SYSTEMS

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

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 and different database models
LO3: distinct normalization techniques on database systems and query optimization techniques
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-PhaseLocking 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 Controlfor Multilevel Security

Text Book:

[1] Ramez Elmasri, Shamkanth B. Navathe, *Fundamentals of Database Systems*, 7th ed.
New Delhi: Pearson Education, 2017.

Reference Books:

[1] Raghu Ramakrishnan,Johannes Gehrke, *Database Management Systems*, 4th ed.New Delhi:
Mc-Graw Hill, 2014.
[2] Abraham Siberschatz, Henry F.Korth, and S.Sudarshan, *Database System Concepts*, 6th ed.New Delhi: McGraw-Hill, 2011.
[3] R. P. Mahapatra, Govind Verma, *Database Management Systems*,1sted. New Delhi: Khanna publications, 2016.
[4] Thomas Connolly,Carolyn Begg, *Database Systems*,3rded.Chennai:Pearson Education, 2003.

Course Learning Outcomes(COs):

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

CO1: analyze the schemata, illustrate the relational data model and consistency constraintseffectively, and develop effectivequeries

CO2: design the database with an ER and EER models

CO3: apply the normalization on database to eliminate redundancy and query optimization techniques to determine the most efficient way to execute a query plans

CO4: illustrate the multi-level security, correctness of data and control over access on database

Course Articulation Matrix(CAM):U18CN304 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	U18CN304.1	2	2	2	2	1	-	-	-	-	1	-	2	2	1	2
CO2	U18CN304.2	2	2	2	2	1	-	-	-	-	1	-	2	3	1	3
CO3	U18CN304.3	2	2	2	2	1	-	-	-	-	1	-	2	2	1	2
CO4	U18CN304.4	2	2	2	2	1	-	-	-	-	1	-	2	3	1	2
U18CN304		**2**	**2**	**2**	**2**	**1**	-	**-**	-	-	1	-	**2**	**2.5**	**1**	**2.25**

U18CN305 COMPUTER ARCHITECTURE AND ORGANIZATION

Class: B. Tech. III – Semester

Branch: Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Examination	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on…
LO1: functional units of a computer, principle components and instruction set architecture
LO2: processing unit and computation of arithmetic operations
LO3: memory unit and data transfer between processor, memory & 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 serial transfer

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:

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Naraig Manjikian, *Computer Organization and Embedded Systems*, 6th ed. New Delhi: McGraw-Hill Education, 2012. *(Chapters 1, 2, 5, 7-9)*
2. M. Morris Mano, *Computer System Architecture*, Revised 3rd ed. New Delhi: Pearson Education, 2019. *(Chapters 9, 10, 11, 12, 14)*

Reference Books:

1. B Ram, Sanjay Kumar, *Computer Fundamentals: Architecture and Organization*, 5th ed. New Delhi: New Age International Publishers, 2018.
2. W. Stallings, *Computer Organization and Architecture - Designing for Performance*, 7th ed. New Delhi: Pearson Education, 2009.
3. John P. Hayes, *Computer Architecture and Organization,* 3rd ed. New Delhi: McGraw-Hill Education, 1998.
4. Vincent P. Heuring, Harry F. Jordan, *Computer Systems Design and Architecture*, 2nd ed. United States: Pearson Education, 2004.

Course Learning Outcomes (COs):

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

CO1: apply instruction formats for assembly language instructions and explain addressing modes

CO2: *classify hardwired & CISC style processors and solve arithmetic operations with signed and unsigned integers*

CO3: *design memory organization and explain data transfer between processor, memory & I/O*

CO4: *analyze different modes of data transfer and explain the concepts of parallel processing, pipelining for high performance computing systems*

Course Articulation Matrix (CAM): U18CN305 COMPUTER ARCHITECTURE AND ORGANIZATION

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	U18CN305.1	2	2	2	1	-	1	-	-	-	1	-	1	1	2	2
CO2	U18CN305.2	2	2	2	2	-	1	-	-	-	1	-	1	1	2	2
CO3	U18CN305.3	2	2	2	2	-	1	-	-	-	1	-	1	2	2	2
CO4	U18CN305.4	2	2	2	3	-	1	-	-	-	1	-	3	2	2	2
U18CN305		2	2	2	2	-	1	-	-	-	1	-	1.5	1.5	2	2

U18CN306 ADVANCED DATA STRUCTURES

Class: B.Tech. III Semester **Branch:** Computer Science and Engineering (Networks)

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 real world data with deques, priority queues, circular linked list and doubly linked list data structures
LO2: organizing the data using binary trees, binary search trees and AVL trees
LO3: organizing the data using m-way search tree, B tree, B+ tree, red-black tree and splay tree operations
LO4: organizing the data using spanning trees, searching, sorting, and hashing techniques

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; Introduction to threaded binary trees
AVL Tree: AVL tree operations – Insertion, deletion and traversal

UNIT - III (9)

Multiway Search Trees: Introduction to m-way search trees, Operations on B-tree-Insertion, deletion, search; Introduction to B+-tree
Red-Black Tree: Properties, Operations, Applications, Splay tree

UNIT – IV (9)

Minimum Spanning Trees: Prim's algorithm and Kruskal's algorithm
Searching and Internal Sorting: Fibonacci search, Insertion sort and Radix sort
External sorting: Merge sort and Heap sort
Hashing: Introduction, Hash tables, Different hash functions and Collisions

Text Book:

[1] Debasis Samanta, *Classic Data Structures*, 2nd ed. New Delhi: Prentice Hall India, 2009. *(Chapters 3 to 8, 10, 11)*

Reference Books:

[1] Reema Thareja, *Data Structures Using C,* 2nd ed. Noida: Oxford University Press, 2014.
[2] E Balagurusamy, *Data Structure Using C*, 1st ed. New Delhi: McGraw Hill Education, 2017.
[3] Richard F. Gilberg, Behrouz A. Forouzan, *Data Structures: A Pseudo code Approach with C*, 2nd ed. Noida: Cengage Learning, 2007.
[4] Yashavant P. Kanetkar, *Data Structure Through C*, 2nd ed. New Delhi: BPB Publications, 2003.

Course Learning Outcomes(COs):

After completion of this course, students' will be able to…

CO1: apply the operations of deques, priority queues, circular linked list and doubly linked list data structures in organizing the data related to real world problems
CO2: organize the data using binary trees, binary search trees, and AVL trees in solving real world problems
CO3: examine the real world data in organizing it using m-way search tree, B tree, B+ tree, red-black tree and splay tree operations
CO4: organize the data using spanning trees, searching, sorting and hashing techniques

Course Articulation Matrix (CAM): U18CN306 ADVANCED DATA STRUCTURES																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18CN306.1	2	2	2	2	-	-	-	-	-	1	-	1	2	1	2
CO2	U18CN306.2	2	2	2	2	-	-	-	-	-	1	-	1	2	1	2
CO3	U18CN306.3	2	3	3	2	-	-	-	-	-	1	-	2	2	1	2
CO4	U18CN306.4	2	2	3	2	-	-	-	-	-	1	-	1	2	1	2
U18CN306		2	2.25	2.5	2	-	-	-	-	-	1	-	1.25	2	1	2

U18EI309 DIGITAL ELECTRONICS

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

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, their minimization; different logic family circuits and their operation*

UNIT – I (9+3)

Number Systems and Codes: Representation of number systems, conversion of numbers from one radix to other, Binary arithmetic, Signed binary numbers, 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, Gray codes

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+3)

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+3)

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 – design of asynchronous (ripple) and synchronous counters; Shift registers – modes of operation, bidirectional & universal types, Ring and Johnson counters

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

UNIT – IV (9+3)

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 and 10)

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 Learning Outcomes (COs):

Upon completion of the course, students will be able to…

CO1: *apply various minimization techniques to obtain minimal SOP/POS forms of switching functions*

CO2: *design different combinational circuits to implement logic functions*

CO3: *explain the operation of flip flops and design sequential circuits like counters, shift registers, sequence detectors etc*

CO4: *minimize completely and incompletely specified state machines; explain the operation of various logic family circuits and their performance characteristics*

Mapping of the Course Learning Outcomes with Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
U18EI307.1	3	2	-	2	2	-	-	-	-	-	-	1	1	-	1
U18EI307.2	3	2	1	2	2	-	-	-	-	-	-	1	1	-	1
U18EI307.3	3	2	1	2	2	-	-	-	-	-	-	1	1	-	1
U18EI307.4	3	2	1	2	2	-	-	-	-	-	-	1	1	-	1
U18EI307	3	2	1	2	2	-	-	-	-	-	-	1	1	-	1

U18CN310 OBJECT ORIENTED PROGRAMMING THROUGH JAVA 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 students' knowledge in/on…

LO1: the basic concepts of java programming and change 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 interface concepts.

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

List of Experiments

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:

4. Write a program to read an array and display them using *for-each* control. Finally display the sum of array elements.
5. Write a program to read a matrix and display whether it is an identity matrix or not. Use *civilized form* of *break* statement.
6. 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*.

Experiment-III:

7. Write a program to demonstrate class concept.
8. Write a program to demonstrate object reference variable.
9. Write a program to demonstrate overloading of methods.
10. Write a program to demonstrate passing and returning objects.

Experiment-IV:

11. Write a program to demonstrate variable length argument (using array and ellipsis notation).
12. Write a program to demonstrate constructors and garbage collection.
13. Write a program to demonstrate nested and inner classes.
14. Write a program to demonstrate *static* variables, *static* methods, and *static* blocks.

Experiment-V:

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

Experiment-VI:
18. Write a program to accept a string, count number of vowels and remove all vowels.
19. Write a program to accept a string, count number of vowels and remove all vowels using *StringBuffer* class**.**
20. Write a program to accept a line of text, tokenize the line using *StringTokenizer* class and print the tokens in reverse order.

Experiment-VII:
21. Write a program to demonstrate single level-inheritance.
22. Write a program to demonstrate multilevel-inheritance using super.
23. Write a program to demonstrate method overriding.

Experiment-VIII:
24. Write program to demonstrate dynamic method dispatch.
25. Write a program to demonstrate use of abstract class.
26. Write a program to demonstrate the use of overriding *equals()* method of an Object class.

Experiment-IX:
27. Write a program to implement interfaces.
28. Write a program to demonstrate implementation of nested interfaces.

Experiment-X:
29. 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:
30. Write a program to demonstrate *try-catch* block.
31. Write a program to demonstrate *throws* clause.
32. Write a program to demonstrate *re-throw* an exception, and *finally* block.

Experiment-XII:
33. Write a program to demonstrate read/write/copy a file using *byte stream*.
34. Write a program to demonstrate read/write/copy a file using *character stream*.
35. Write a program to create a thread (using *Thread* class or *Runnable* interface).
36. Write a program to demonstrate *synchronization* of threads.
37. Write a program to demonstrate *Interthread communication*.

Laboratory manual:

[1] Object Oriented Programming through Java Laboratory Manual, Prepared by the faculty of Department of Computer Science and Engineering.

Reference Book:

[1] Herbert Schildt, *Java The Complete Reference*, 9th ed.,New Delhi: McGraw-Hill Education India Pvt. Ltd, 2014.

Course Learning Outcomes(COs):

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

CO1: write fundamental programs using java constructs.

CO2: develop programs using OOP concepts like classes, constructors and strings.

CO3: develop programs using inheritance, dynamic method dispatch and interfaces.

CO4: construct packages, develop programs using streams (I/O), exception handling and multithreading.

Course Articulation Matrix (CAM): U18CN310 OBJECT ORIENTED PROGRAMMING THROUGH JAVA LABORATORY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
U18CN310.1	CO1	2	2	2	1	-	-	-	-	-	1	-	-	2	1	2
U18CN310.2	CO2	2	2	2	1	-	-	-	-	-	1	-	2	2	1	3
U18CN310.3	CO3	2	2	2	1	-	-	-	-	-	1	-	2	2	1	3
U18CN310.4	CO4	2	2	2	1	-	-	-	-	-	1	-	2	2	1	3
U18CN310		2	2	2	1	-	-	-	-	-	1	-	2	2	1	2.75

U18CN311 DATABASE MANAGEMENT SYSTEMS LABORATORY

Class: B.Tech. III-Semester
Branch: Computer Science and Engineering (Networks)

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: implementing the basic SQL queries related to DDL, DML, TCL and DCL constructs using Oracle

LO2: implementing the SQL queries related to functions, joins, indexes, sequences and user defined data types

LO3:implementing PL/SQL programs using PL/SQL block, cursors, parameterized cursors, and exceptions

LO4:implementing PL/SQL programs using stored procedures

LIST OF EXPERIMENTS

Structured Query Language (SQL):

Experiment-I

1. Design and implement DDL,DML, TCL and DCL commands
2. Design and implement Queries on types of constraints

Experiment -II

3. Design and implement Queries using built-in functions of NUMBER, CHARACTER and DATE Data types
4. Design and implement Queries on Data type conversion functions

Experiment -III

5. Design and implement Queries on single row functions and operators

Experiment -IV

6. Design and implement Queries on aggregate functions

Experiment -V

7. Design and implement Queries on joins and nested queries

Experiment -VI

8. Construct SQL statements to create simple, composite indexes, user-defined data types, views, sequences

PL/SQL Programs:

Experiment –VII

9. Implementation of sample PL/SQL programs using conditional and iterative statements

Experiment -VIII

10. Implementation of PL/SQL programs using cursors

Experiment -IX

11. Implementation ofPL/SQL programs using parameterized cursors

Experiment-X

12. Create PL/SQL programs to handle exceptions

Experiment –XI

13. Create PL/SQL programs using stored procedures and functions

Experiment -XII

14. Create PL/SQL programs using packages

Experiment -XIII

15. Create PL/SQL programs using Triggers

Laboratory Manual:

[1] *Database Management Systems Laboratory Manual,* Dept. of CSN, KITS Warangal.

Reference Books:

[1] Ivan Bayross, *SQL,PL/SQL: The Programming Language of Oracle,* 4th*ed.*NewDelhi:BPB publications, 2010.
[2] P.S. Deshpande, *SQL & PL/SQL for Oracle 11g Black Book,*NewDelhi: Wiley Publisher, 2011.

Course Learning Outcomes(COs):

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

CO1: develop sql queries using the concepts related to DDL, DML, TCL and DCL constructs of Oracle

CO2:illustrate the SQL queries related to functions, joins, indexes, sequences and views

CO3: develop SQL queries using the PL/SQL programs and cursors

CO4:create PL/SQL including stored procedures, stored functions, cursors and packages

Course Articulation Matrix (CAM): U18CN311 DATABASE MANAGEMENT SYSTEMS LABORATORY																
CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN311.1	2	2	2	2	2	-	-	-	1	1	-	2	2	1	2
CO2	U18CN311.2	2	2	2	2	2	-	-	-	1	1	-	2	2	1	2
CO3	U18CN311.3	2	2	2	2	2	-	-	-	1	1	-	2	2	1	3
CO4	U18CN311.4	2	2	2	2	2	-	-	-	1	1	-	2	3	1	3
U18CN311		2	2	2	2	2	-	-	-	1	1	-	2	2.25	1	2.5

U18MH315 ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

Class :**B.Tech. III Semester** Branch : **Common to all**

branches Teaching Scheme: **Examination Scheme:**

L	T	P	C
2	-	-	-

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, Vidyanidhi Prakasha 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** Course Name: **Essence Of Indian 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):

Course code: **U18MH415**Course Name: **Essence Of Indian Traditional 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 (NETWORKS)
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

								[6Th+3P+1MC]				
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	U18CN404	Theory of Computation	3	-	-	3	10	30	40	60	100
5	PCC	U18CN405	Software Engineering	3	-	-	3	10	30	40	60	100
6	PCC	U18CN406	Operating Systems	3	-	-	3	10	30	40	60	100
7	PCC	U18CN407	Unix Programming Laboratory	-	-	2	1	40	-	40	60	100
8	PCC	U18CN408	Advanced Java Laboratory	-	-	2	1	40	-	40	60	100
9	OE	U18OE411	Open Elective-I based lab	_	_	2	1	40	-	40	60	100
Total:				17	1	8	20	280	180	460	540	1000
10	MC	U18CH416	Environmental Studies*	2	_	_	_	10	30	40	60	100
[L= Lecture, T = Tutorials, P = Practical's & C = Credits] Stream-I: ME, CSE, IT, CSN Stream-II: CE, EIE, EEE, ECE, ECI												
Total Contact Periods/Week = 26								Total Credits: 20				

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

U18OE401A APPLICABLE MATHEMATICS

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 algebraic equations.
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 Books:

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, 11th edition, 2010.
2. Kreyszig E.," Advanced Engineering Mathematics", *John Wiley & sons, Inc.,U.K.,*9th edition,2013.
3. Sastry S.S, "Introduction to numerical Analysis", *Prentice Hall of India Private Limited*, New Delhi.4th edition,2005.

Course Outcomes (COs):

Course Code: **U18OE401A** Course Name: **APPLICABLE MATHEMATICS**		
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 ELECTRONICS ENGINEERING

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: to *introduce the basic concepts of semiconductors and conductivity in semiconductors*
LO2: to *impart the knowledge on working of semiconductor diode as Rectifier*
LO3: to *make the students to understand the basic concepts of BJT &DC biasing concepts*
LO4: to *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)

Course Code: **U18EC401B**		Course Name: **BASIC ELECTRONICS ENGINEERING**
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)

Course Code: **U18EC401B**					Course Name: **BASIC ELECTRONICS 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**
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 MECHANICAL ENGINEERING

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 to 7*)

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 COMPUTER NETWORKS

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, New Delhi

REFERENCE BOOKS:

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

Course code: **U18OE401F**		Course Name: **Renewable Energy Sources**
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 INTERPERSONAL SKILLS

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

Activity 9 : My interview Plan: Self Introduction &
Activity 10 : "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):

Course code: **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. Uttam K.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 Book:

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 Private Ltd.,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):

Course Code:**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):

Course Code:**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:

L	T	P
3	-	-

Examination Scheme:

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):

Course Code: **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 HTML Controls.
CSS: *CSS* (Cascading style sheet) rules and properties, Types: Inline, External and Internal Style Sheets, Style Classes, Multiple Styles.
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 DriverManager, 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. UttamK.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

U18OE403E MICROPROCESSORS

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: **U18OE 403E**		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: **U18OE 403E**												Course Name: **MICROPROCESSORS**			
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 OF MATERIALS

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**	**-**	**-**

U18CN404 THEORY OF COMPUTATION

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

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: formal notation for languages, finite automata and regular expressions

LO2: closure properties of regular languages, types of grammars and simplification of context-free grammar

LO3: normal forms for context-free grammars and equivalence of pushdown automata

LO4: turing machine, undecidable problems about turing machines and post's correspondence problem

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, 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, Languages of pushdown automata, Equivalence of pushdown automata and context- free grammar

UNIT – IV (9)

Introduction to Turing Machines: Problems that computers cannot solve, 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, Classes P & NP, NP-complete problem

Text Book:

hn E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, *Introduction to Automata Theory, Languages and Computation*, 3rd ed. Hong Kong: Pearson Education Asia, 2007.

Reference Books:

[1] Mishra K. L. P, Chandrasekaran N, *Theory of Computer Science: Automata, Languages and Computation*, 3rd ed. New Delhi: PHI, 2012.

[2] Harry R. Lewis, Christos H. Papadimitriou, *Elements of the Theory of Computation*, 2nd ed. Hong Kong: Pearson Education Asia, 1998.

[3] chael Sipser, *Introduction to the Theory of Computation*, 3rd ed. Boston: Cengage Learning, 2012.

[4] John Martin, *Introduction to Languages and the Theory of Computation*, 3rd ed. New York: McGraw-Hill, 2007.

Course Learning Outcomes (COs):

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

CO1: build formal notation for languages, finite automata and regular expressions

CO2: simplify the given context-free grammar and prove the given language is not regular

CO3: construct the given context-free grammar into chomsky normal form or greibach normal form and design pushdown automata for the given language

CO4: design turing machine and examine whether the given post's correspondence problem has a solution or not

Course Articulation Matrix (CAM): U18CN404 THEORY OF COMPUTATION

Course Outcomes		PO 1	PO2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18CN404.1	2	2	2	2	-	-	-	-	-	1	-	2	2	1	2
CO2	U18CN404.2	2	2	2	2	-	-	-	-	-	1	-	2	2	1	2
CO3	U18CN404.3	2	2	3	3	-	-	-	-	-	1	-	3	3	1	3
CO4	U18CN404.4	2	2	3	3	-	-	-	-	-	1	-	3	3	1	3
U18CN404		2	2	2.5	2.5	-	-	-	-	-	1	-	2.5	2.5	1	2.5

U18CN405 SOFTWARE ENGINEERING

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

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,* 8th 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:Tata Mcgraw 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) U18CN405 SOFTWARE ENGINEERING

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN405.1	1	1	1	1	-	-	-	-	1	1	2	1	2	1	2
CO2	U18CN405.2	1	1	1	1	-	-	-	-	1	1	2	1	1	1	2
CO3	U18CN405.3	2	2	1	1	-	1	1	-	1	1	2	1	2	1	2
CO4	U18CN405.4	2	2	2	2	-	1	1	-	1	1	2	1	2	1	2
U18CN405		1.5	1.5	1.25	1	-	1	1	-	1	1	2	1	1.75	1	2

U18CN406 OPERATING SYSTEMS

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

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 system structures

LO2: process concept, scheduling and process synchronization techniques

LO3: handling deadlocks, memory management and virtual memory techniques

LO4: 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, Swaping, Contiguous memory allocation, Segmentation, paging, Structure of page table-Hierarchical paging, Hashed page tables, Inverted page tables

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, Principle of protection, Domain of protection, Access matrix

Text Book:

[1] Abraham Silberschatz , Peter B Galvin, Gerg Gagne, *Operating System Concepts*, 9th ed. United States of America: Wiley, 2016.

Reference Books:

[1] Ekta Walia, *Operating Systems*, 2nd ed. New Delhi: Khanna Publishing House, 2019.
[2] Dhananjay M. Dhamdhere, *Operating Systems A Concept-Based Approach*, 3rd ed. New Delhi: McGraw Hill Education, 2017.
[3] William Stalling, *Operating Systems*, 9th ed., United States of America: Person, 2018.
[4] Andrew S. Tanenbaum, Herbert Bos, *Modern Operating Systems*, 4th ed. United States of America: Person, 2016.

Course Learning Outcomes(COs):

on completion of this course, students' will be able to…

CO1: identify the components of operating system and the role of operating system in management policies
CO2: analyze the CPU scheduling algorithms and process synchronization problems
CO3: solve the deadlock related problems and memory management issues
CO4: evaluate the storage management policies, file management and protection methods

Course Articulation Matrix (CAM): U18CN406 OPERATING SYSTEMS

CO		PO1	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
CO1	U18CN406.1	1	1	2	1	-	-	-	-	-	1	-	1	2	1	2
CO2	U18CN406.2	2	2	2	2	-	-	-	-	-	1	-	1	2	1	2
CO3	U18CN406.3	2	2	2	2	-	-	-	-	-	1	-	1	2	1	2
CO4	U18CN406.4	2	2	2	1	-	1	-	-	-	1	-	1	2	1	2
U18CN406		1.75	1.75	2	1.5	-	1	-	-	-	1	-	1	2	1	2

U18CN407 UNIX PROGRAMMING LABORATORY

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

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 laboratory course will develop students' knowledge in/on…
LO1: implementation of commands used in UNIX environment
LO2: the commands related to VI editor environment
LO3: the concepts related to control structure, loop, string and arrays in shell script
LO4: the concept related to functions, recursion, pipe and process control

List of Experiments

Experiment-I

1. Practicing UNIX commands:
   a) General utility Commands.
   b) File and directory handling utilities.

Experiment-II

2. Practicing UNIX commands:
   c) Disk utilities.
   d) Network communication utilities.
   e) Text processing and backup utilities.

Experiment-III

3. Practice the following examples.
   a) Display the contents of file (filenames starting with 'a' and ending with X).
   b) Copy the contents of directory1 to directory2.
   c) Remove the all .C files from current directory.
   d) Merge the three different files into one file.
   e) Display the list of files in given directory.
   f) Set given file as read only.
   g) Display the details of all users those who are working on the system.
   h) Display the details of all users in an order they logged on to system (based on time who are working on the system
4. Process related commands like ps, kill, nice, at & batch.

Experiment-IV

5. Practicing the VI editor commands.
6. Introduction to Shell script and related commands likesh, read, command line arguments

($1), $ @ & $*, set, exit, status ($?), exit, sleep & wait, export, expr commands.

Experiment-V

7. Write a shell script for the following:
   a) Reading a character and displaying on the screen.
   b) Display the name and class of student in separate line.

8. Write a shell script for the following:
   a) Display the given character in its binary form.
   b) Write a shell script to accept login name as command line argument and find outat how many terminals the user has logged in.
   c) Write a shell script for defining, accessing and unsetting a variable.

Experiment-VI

9. Write a shell script to demonstrate basic operators and file test operators.
10. Write a shell script to design and implement a calculator which includes operations such as addition, subtraction, multiplication, division and modulus operations.
11. Write a shell script on substitutions.

Experiment-VII

12. Write a shell script to demonstrate decision making.

Experiment-VIII

13. Write a shell script to demonstrate loops.
14. Write a shell script to demonstrate loop controls.

Experiment-IX

15. Write a shell script to demonstrate arrays
16. Write a shell script to demonstrate strings.

Experiment-X

17. Write a shell script to demonstrate functions.
18. Write a shell script to demonstrate recursion.

Experiment-XI

19. Write a shell script that copies multiple files to a directory.
20. Write a shell script to delete all lines counting a specific word.
21. Write a shell to count the number of lines and words present in a given file.

Experiment-XII

22. Write a program to create a child process using fork and vfork system call and print the current process id and parent process id for parent and child processes.
23. Write a program to implement client server program using pipes. Parent process acts as client and child process acts as server. Client reads the filename and sends the filename to server, then server reads the filename and file contents, the file contents are then written by server to a pipe and the child reads the contents of the file from pipe.

Course Learning Outcomes (COs):

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

CO1: make use of the commands of UNIX environment
CO2: make use of VI editor commands
CO3: develop the shell programs using the concepts of control structures, loops, strings and arrays
CO4: develop the shell and C programs using the concepts of function, recursion, pipe and process

Laboratory Manual:

1. *Unix Programming Laboratory Manual,* Dept. of CSE(Networks), KITS Warangal.

Reference Books:

1. Sumitabha Das, *Your Unix: The Ultimate Guide*, 3rd ed. New Delhi: McGraw Hill,2005.
2. Yashavant P. Kanetkar, *Unix Shell Programming*, 1st ed. New Delhi: BPB Publications, 1996.

Course Articulation Matrix (CAM): U18CN407 UNIX PROGRAMMING LABORATORY																
CO/PO/PSO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN407.1	1	1	2	1	1	-	-	-	3	1	-	1	2	1	2
CO2	U18CN407.2	1	1	2	1	1	-	-	-	3	1	-	1	2	1	2
CO3	U18CN407.3	2	3	3	3	1	-	-	-	3	1	-	2	2	1	3
CO4	U18CN407.4	2	3	3	3	1	-	-	-	3	1	-	3	3	1	3
U18CN407		1.5	2	2.5	2	1	-	-	-	3	1	-	1.75	2.25	1	2.5

U18CN408 ADVANCED JAVA PROGRAMMING LABORATORY

Class: B. Tech. IV-Semester **Branch:** Computer Science & Engineering(NETWORKS)

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 & JApplet
LO2: writing programs using JFrames
LO3: the concepts of generics and collections
LO4: sorting user-defined data using Comparable & Comparator interfaces and performing the unit testing with JUnit

List Of Experiments

Experiment-I
1. Write a java program to demonstrate the life cycle of JApplet
2. Write a JApplet program to display "Good Morning" if current time is between "6 AM and 12 PM" and "Good Afternoon" if the current time is between "12 PM and 6PM", and "Good Evening" if the current time is between "6PM and 12AM"

Experiment-II
3. Write a JApplet program which draws different geometric shapes and fill them with different colours
4. Write a JApplet program with 10 lines, with different sizes at different places
5. Write a JApplet program to display moving banner

Experiment -III
6. Write a JApplet program to demonstrate Mouse Events and KeyEvents
7. Write a JApplet program to demonstrate **MiniCalculator** with button events

Experiment -IV
8. Write a JFrame to demonstrate **MiniCalculator** with button events
9. Write a JFrame program from which you can open another frames with the help of button events
10. Design a registration form with the help of a JFrame

Experiment -V
11. Create a JFrame to add a menu bar with which we can change the background colour and draw different shapes like circle, oval, rectangle and square
12. Design different JFrames to demonstrate different layouts like Flow layout, Border layout, Grid layout and null layout

Experiment -VI
13. Write a JFrame program to open and read text files and display them on the JTextArea
14. Write a JFrame program to work with window events
15. Write a JFrame program to insert, delete and update the records of a database table

Experiment -VII

16. Write a java program to demonstrate generic class
17. Write a java program to demonstrate methods and constructors in generics
18. Write a java program to demonstrate multiple type parameters in generic classes
19. Write a java program to demonstrate inheritances in generics

Experiment -VIII

20. 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
21. 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-IX

22. Write a java program to perform different operations on inbuilt Stack class
23. Write a java program to perform different operations on inbuilt Queue class
24. Write a java program to perform insertion, deletion, traversing and searching operations on HashMap and TreeMap

Experiment-X

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

Experiment-XI

27. Write a java program to display ArrayList values in sorted order
28. Write a java program to demonstrate Comparable interface for sorting user defined data type
29. Write a java program to demonstrate Comparator interface for sorting user defined data type

Experiment-XII

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

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
[2] India Pvt.Ltd, 2017.
[3] Sachin Malhotra, Saurabh Choudhary, Programming in JAVA, 2nd ed. New Delhi: Oxford University Press, 2013.
[4] Uttam K.Roy, Advanced JAVA Programming, New Delhi: Oxford University Press, 2015.
[5] Pual Deitel, Harvey Deitel, Java How to program, 10th ed. Chennai: Pearson Education, 2016.
[6] 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 & JApplet

CO2: create programs with the help of JFrames

CO3: apply the concept of generics & collections to work on dynamic data

CO4: demonstrate correct usage of Comparable & Comparator interfaces and examine the test cases to perform unit testing using the concept of JUnit

Course Articulation Matrix (CAM): U18CN408 ADVANCED JAVA PROGRAMMING LABORATORY																
Course Outcomes		**PO 1**	**PO2**	**PO3**	**PO4**	**PO 5**	**PO6**	**PO7**	**PO 8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**	**PSO 3**
CO1	U18CN408.1	2	2	2	1	2	-	-	-	2	1	-	2	3	1	3
CO2	U18CN408.2	2	2	2	1	2	-	-	-	2	1	-	2	3	1	3
CO3	U18CN408.3	2	2	2	1	1	-	-	-	2	1	-	2	3	1	2
CO4	U18CN408.4	2	2	2	1	2	-	-	-	2	1	-	2	3	3	3
U18CN408		2	2	2	1	1.75	-	-	-	2	1	-	2	3	2.5	2.75

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 multilevel inheritance.
3. Write a program to demonstrate hierarchical inheritance.
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 *throw keyword*
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 output streams
4. Write a program to demonstrate array input and output streams

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	Course Name: Object Oriented Programming Laboratory														
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):

CourseCode:**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 MECHATRONICSLAB

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: **MECHATRONICS LAB**		
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: **MECHATRONICS LAB**															
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 JavaScripts 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:

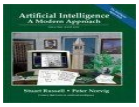
Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	Login : Password: Submi Reset			

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 MATERIALS 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: *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
Teaching Scheme :

L	T	P	C
2	-	-	2

Branch: Common to all branches
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 human health.

TEXT BOOK:

1. ErachBharucha, "Text Book of Environmental Studies for Under GraduateCourses(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 University Press*, 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 (NETWORKS)
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	U18CN502	Professional Elective - I / MOOC-I	3	-	-	3	10	30	40	60	100
3	PCC	U18CN503	Computer Networks	3	1	-	4	10	30	40	60	100
4	PCC	U18CN504	Design and Analysis of Algorithms	3	-	-	3	10	30	40	60	100
5	PCC	U18CN505	Compiler Design	3	-	-	3	10	30	40	60	100
6	PCC	U18CN506	Machine Learning	3	-	-	3	10	30	40	60	100
7	PCC	U18CN507	Computer Networks Laboratory	-	-	2	1	40	-	40	60	100
8	PCC	U18CN508	Design and Analysis of Algorithms Laboratory	-	-	2	1	40	-	40	60	100
9	PCC	U18CN509	Machine Learning with Python Programming Laboratory	-	-	2	1	40	-	40	60	100
10	PROJ	U18CN510	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 / MOOCs-I:	**U18CN502A: Artificial Intelligence** **U18CN502B: Data Mining and Data Warehousing** **U18CN502C: Digital Image processing** **U18CN502M: MOOCs course**

U18TP501 QUANTITATIVE 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…

CO5:solvearithmetic relationships and interpret data using mathematical models

CO6:compute abstract quantitative information

CO7:apply basic mathematics & critical thinking skillsto draw conclusions and solve problems

CO8: 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**

U18CN502A ARTIFICIAL INTELLIGENCE

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

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: *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 and NLP concepts*
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, Kalman filters, Dynamic Bayesian networks
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:

[1] Stuart Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach*, 3rd ed., New Delhi: Prentice Hall Series in AI, 2010. (*Chapters 1-7, 9, 11, 14, 15, 16, 17, 25*)

Reference Books:

[1] Elaine rich and Kevin knight, *Artificial Intelligence*, 2nd ed., New Delhi: Tata McGraw-Hill, 2002.
[2] Mark Stefik, *Introduction to Knowledge Systems*, San Francisco: Morgan Kaufman, 1995.
[3] Winston, Patrick Henry, *Artificial Intelligence*, 3rd ed., California: Addison Wesley, 1995.
[4] Dan W. Patterson, *Introduction to Artificial Intelligence and Expert Systems*, 2nd ed., New Delhi: Prentice Hall of India, 1997.

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 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 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: *apply fundamentals of artificial intelligence for various engineering problem-solving approaches*

CO2: *analyze search algorithms, game playing and constraint satisfying problem & solutions for designing effective artificial intelligence solutions*

CO3: *develop effective decision making artificial intelligent systems using prepositional logic, fist order logic and NLP concepts*

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

Course Articulation Matrix (CAM): U18CN502A ARTIFICIAL INTELLIGENCE

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN502A.1	2	2	2	2	1	1	-	1	1	1	-	2	3	1	1
CO2	U18CN502A.2	3	3	3	2	1	1	-	1	1	1	-	2	3	1	1
CO3	U18CN502A.3	3	3	3	2	1	1	-	1	1	1	-	2	3	1	1
CO4	U18CN502A.4	3	2	3	2	1	1	-	1	1	1	-	2	3	1	1
U18CN502A		2.75	2.5	2.75	2	1	1	-	1	1	1	-	2	3	1	1

U18CN502B DATA WAREHOUSING AND DATA MINING

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

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 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, BIRCHMultiphase 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 Kamber, *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] ArunK.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: evaluate clustering techniques and design data mining applications onweb & financial domains.

Course Articulation Matrix (CAM): U18CS605 DATA WAREHOUSING AND DATA MINING

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18CN605.1	2	2	2	2	2	-	-	1	1	1	-	2	2	-	-
CO2	U18CN605.2	2	2	2	2	2	-	-	1	1	1	-	2	2	-	-
CO3	U18CN605.3	2	2	2	2	2	-	-	1	1	1	-	2	2	-	-
CO4	U18CN605.4	2	2	2	2	2	-	-	1	1	1	-	2	2	-	-
U18CN605		2	2	2	2	2	-	-	1	1	1	-	2	2	-	-

U18CN502C DIGITAL IMAGE PROCESSING

Class: B.Tech. V- Semester (Networks)

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 student's 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

LO4: 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 watersheds

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 to 12)*

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., Noida: Oxford University Press, 2016.

[4] Munesh C. Trivedi, *Digital Image Processing*, 1st ed., New Delhi: Khanna Book Publishing, 2014.

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 project 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, student's will be able to…

CO1: make use of the concepts of digital image processing such as sampling, quantization, and basic relationships between pixels during pre-processing stage of image processing
CO2: identify the effect of intensity transformation functions, frequency and spatial domain filters on input images for image smoothing and sharpening
CO3: apply morphological image processing techniques on objects present in input images to extract image components and discover novel ways to segment the objects present in the input images
CO4: discover novel ways to extract the features to depict the shape of an object and apply classification techniques to identify the object present in an input image

Course Articulation Matrix (CAM): U18CN502C DIGITAL IMAGE PROCESSING																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18CN502C.1	2	2	2	2	1	-	-	1	1	1	-	1	1	1	1
CO2	U18CN502C.2	3	3	3	3	1	-	-	1	1	1	-	3	1	1	1
CO3	U18CN502C.3	3	3	3	3	1	-	-	1	1	1	-	3	1	1	1
CO4	U18CN502C.4	3	3	3	3	1	-	-	1	1	1	-	3	1	1	1
U18CN502C		2.75	2.75	2.75	2.75	1	-	-	1	1	1	-	2.5	1	1	1

U18CN503 COMPUTER NETWORKS

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

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 student's knowledge in/on…

LO1: introduction to computer networks and reference models
LO2: types of data link and medium access control protocols
LO3: routing algorithms, congestion control algorithms and 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, 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 Books:

[1] Andrew S.Tannenbaum, David J.Wetherall, *Computer Netwrks*, 5th ed. London: Pearson, 2013.

Reference Books:

[1] William Stallings, *Data and Computer Communications*, 10th ed. London: Pearson Education, 2014.
[2] Behrouz Forouzan, *Data Communication and Networking*, 5th ed. New York: Tata McGraw Hill, 2012.
[3] Larry Peterson, Bruce S Davie, *Computer Networks*, 5th ed. 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 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: compare OSI & TCP/IP reference models
CO2: analyze different types of data link & medium access control protocols
CO3: examine routing algorithms, congestion control algorithms and internetworking
CO4: analyze the different services of transport and application layer protocols

Course Articulation Matrix (CAM): U18CN503 COMPUTER NETWORKS

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN503.1	2	2	2	2	2	1	-	1	1	1	-	1	2	2	2
CO2	U18CN503.2	2	2	2	2	2	1	-	1	1	1	-	1	2	2	2
CO3	U18CN503.3	2	2	2	2	2	1	-	1	1	1	-	1	2	2	2
CO4	U18CN503.4	1	2	2	1	1	1	-	1	1	1	-	1	2	2	2
U18CN503		1.75	2	2	1.75	1.75	1	-	1	1	1	-	1	2	2	2

U18CN504 DESIGN AND ANALYSIS OF ALGORITHMS

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

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: 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-Queens problem, 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 sales person 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*, 4th ed. Rajput: Khanna Publishing, 2019

[3] S.Sridhar, *Design and Analysis of Algorithms*,3rd ed. UK: Oxford University Press, India, 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: analyze and categorize of problems for the classes P, NP ,NP-Hard and NP-Complete

Course Articulation Matrix (CAM): U18CN504 DESIGN 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	**U18CN504**.1	3	3	2	2	1	-	-	1	1	1	-	1	2	1	2
CO2	**U18CN504**.2	3	3	3	2	1	-	-	1	1	1	-	1	2	1	2
CO3	**U18CN504**.3	3	3	3	2	1	-	-	1	1	1	-	1	2	1	2
CO4	**U18CN504**.4	2	2	2	2	1	-	-	1	1	1	-	1	2	1	2
U18CN504		**2.75**	2.75	2.5	2	1	-	-	1	1	1	-	1	2	1	2

U18CN505 COMPILER DESIGN

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

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 student's knowledge in/on…

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 the given programming statements
LO4: generating target code from the intermediate form and applying code optimization techniques to improve the performance of the code

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:

[1] Alfred V.Aho, Ravi Sethi and 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] C. 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 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 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: write target code from the intermediate form and apply code optimization techniques to improve the performance of the code

Course Articulation Matrix (CAM): U18CN505 COMPILER DESIGN															
CO		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18CN505.1	3	3	2	2	1	-	-	1	1	1	-	2	1	1	1
CO2	U18CN505.2	3	3	2	2	1	-	-	1	1	1	-	2	1	1	1
CO3	U18CN505.3	3	3	3	3	1	-	-	1	1	1	-	3	1	1	1
CO4	U18CN505.4	3	3	3	3	1	-	-	1	1	1	-	3	1	1	1
U18CN505		3	3	2.5	2.5	1	-	-	1	1	1	-	2.5	1	1	1

U18CN506 MACHINE LEARNING

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

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: 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

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

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

Text Books:

[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 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 project 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: 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): U18CN506 MACHINE LEARNING																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**U18CN506**.1	2	2	3	2	2	-	-	1	1	2		2	2	1	2
CO2	**U18CN506**.2	3	3	3	2	2	-	-	1	1	2		2	2	1	3
CO3	**U18CN506**.3	3	3	3	3	3	-	-	1	1	2		2	2	1	3
CO4	**U18CN506**.4	2	2	3	3	3	-	-	1	1	2		2	2	1	2
U18 CN506		2.5	2.5	3	2.5	2.5	-	-	1	1	2		2	2	1	2.5

U18CN507 COMPUTER NETWORKS LABORATORY

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

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: *network diagrams, building LAN networks, communication with TCP, UDP using socket programming*
LO2: *the traffic flow and the contents of protocol frames, error detection techniques*
LO3: *routing techniques, congestion control mechanism*
LO4: *conduct computer communication network simulations, packet analysis*

List of Experiments

Experiments-I

1. Draw the network diagrams of a campus network
   a) Study of system administration, network administration and identify the responsibilities of a network engineer and network administrator
   b) Draw symbols of devices and connectors used in network diagrams
   c) Illustrate network diagram of different network topologies
   d) Illustrate network diagram of different network types (LAN, MAN, WAN)
   e) Illustrate physical and logical diagrams of a campus network

Experiments-II

2. Build a LAN network and check network connectivity
   a) Identify different Ethernet cable categories and write down the detailed specifications
   b) Identify different devices, tools, connectors used in establishing a physical LAN network
   c) Perform crimping operation for straight through cable and crossover cable
   d) Configure an IP address on a computer and verify using command
   e) Establish a LAN network with two computers and check network connectivity between two computers using Ping command

Experiments-III

3. Study of socket programming and implement a socket
4. Develop a socket program to implement date and time display from client to server using TCP
5. Develop a socket program to implement date and time display from client to server using UDP

Experiments-IV

6. Develop a socket program to implement chat application using TCP
7. Develop a socket program to implement chat application using UDP

Experiments-V

8. Develop a java program to implement stop and wait protocol
9. Develop a java program to implement sliding window protocol

Experiments-VI

10. Develop a java program for file transfer using TCP sockets
11. Develop a program for error detection code using CRC-CITTT (16-bits)

Experiments-VII

12. Develop a java program to find subnet mask and networked for given IP address

13. Develop a java program that resolves IP address from a given domain name
14. Develop a java program for SNMP application

Experiments-VIII

15. Develop a java program for simulating ARP and RARP protocols

Experiments-IX

16. Develop a program to implement distance vector routing

Experiments-X

17. Implementing simulations using NS3
    a) Study of network simulation tool NS3
    b) create nodes and connect nodes

Experiment-XI

18. Implementing simulations using NS3
    a) simulate a simple network
    b) simulate to find number of packets dropped due to congestion

Experiment-XII

19. Demonstration of Wireshark packet analyzer tool.
    a) Capture a HTTP packet
    b) View the captured packet
    c) Apply filters
    d) Analyze the packet

Laboratory Manual:

[1] *Computer Networks Laboratory manual*, prepared by the faculty of Department of CSE.

Text Books:

[1]*Computer Networks*, Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson Education/PHI
[2. W. Richard Stevens, *UNIX Network Programming – Networking APIs: Sockets and XTI*, Vol. 1, Second Edition, Prentice Hall, 1998.
[3] Eitan Altman, Tania Jimenez, *NS Simulator for Beginners*, Morgan & Claypool Publishers, 2011.
[4] Wireshark User's Guide: Version 3.5.0

Reference Book:

1. Jack L. Burbank, *An Introduction to Network Simulator 3*, First Edition, Wiley-Blackwell, 2015

Course Learning Outcomes (COs):

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

CO1: build network design and LAN networks, implement socket programming with TCP, UDP
CO2: apply data link layer framing methods, error detection and error correction codes
CO3: create network routes, congestion control in network design
CO4: develop network simulations, packet analysis using network tools

Course Articulation Matrix (CAM):U18CN507 COMPUTER NETWORKS LABORATORY																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18CN507.1	**2**	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**2**	**1**	**-**	**1**	**2**	**2**	**2**
CO2	U18CN507.2	**2**	**2**	**1**	**1**	**2**	**-**	**-**	**-**	**1**	**1**	**-**	**1**	**2**	**2**	**3**
CO3	U18CN507.3	**2**	**2**	**1**	**2**	**3**	**-**	**-**	**-**	**2**	**1**	**-**	**1**	**2**	**3**	**3**
CO4	U18CN507.4	**2**	**2**	**2**	**2**	**3**	**-**	**-**	**-**	**2**	**1**	**-**	**1**	**2**	**2**	**3**
U18CN507		**2**	**2**	**1.50**	**1.75**	**1.75**	**-**	-	-	1.75	1	-	**1**	**2**	**2.25**	**2.75**

U18CN508 DESIGN AND ANALYSIS OF ALGORITHMS LAB

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

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: searching and sorting techniques using divide and conquer strategy
LO2: computational problems using greedy and backtracking methods
LO3: computational problems using dynamic programming technique
LO4: computational problems using branch and bound methods

List of Experiments

Experiment-I(UNIT-I)

1. Program to implement binary search algorithm.
2. Program to implement min-max algorithm.

Experiment-II(UNIT-I)

1 Program to implement merge sort algorithm
2 Program to implement quick sort algorithm

Experiment-III(UNIT-I)

1. Apply strassen's matrix multiplication to multiply following matrix

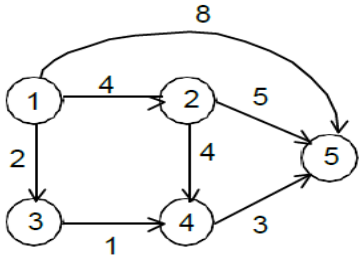
A= $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ B= $\begin{bmatrix} 2 & 1 \\ 4 & 3 \end{bmatrix}$

Experiment-IV(UNIT-II)

1. Program to implement 0/1 knapsack problem.
2. Program to implement Job sequencing with deadlines .

Experiment-V(UNIT-II)

1. Apply Dijkstras algorithm find the shortest path from 1 to each of the other five vertices in the graph



Graph

.

2. Program to implement N-Queens problem.

Experiment-VI(UNIT-II)

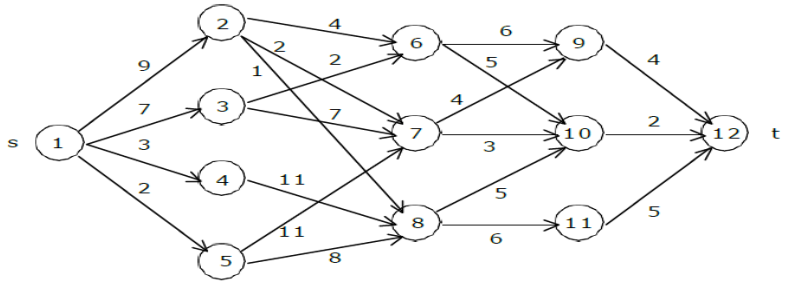
1. Program to implement sum of subsets

Experiment-VII(UNIT-III)

1 Implement bellman ford algorithm for Single source shortest paths using

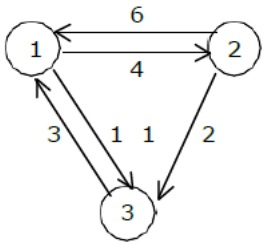
Experiment-VIII(UNIT-III)

1 Apply Multistage graph algorithm and find shortest path



Experiment-IX(UNIT-III)

1. Apply All pairs shortest paths algorithm and find shortest path



Experiment-X(UNIT-III)

2 Program to implement Optimal binary search trees.

Experiment-XI(UNIT-III)

1. Apply travelling sales person algorithm using dynamic programming and find shortest path

$$\begin{pmatrix} 0 & 10 & 15 & 20 \\ 5 & 0 & 9 & 10 \\ 6 & 13 & 0 & 12 \\ 8 & 8 & 9 & 0 \end{pmatrix}$$

Experiment-XII(UNIT-IV)

1. Apply travelling salesperson algorithm using branch and bound and find shortest path

$$\begin{pmatrix} \infty & 20 & 30 & 10 & 11 \\ 15 & \infty & 16 & 4 & 2 \\ 3 & 5 & \infty & 2 & 4 \\ 19 & 6 & 18 & \infty & 3 \\ 16 & 4 & 7 & 16 & \infty \end{pmatrix}$$

Laboratory Manual:

[1] *Design and analysis of algorithms laboratory manual*, Dept. of CSE, KITSW.

Reference Books:

[1] E.Horowitz, S.Sahni, S.Rajasekaran, *Fundamentals of Computer Algorithms,* 2nd ed, Universities Press, 2018

[2] Mark Allen Weiss, *Data Structures and Algorithm Analysis in Java,* 3rd ed, Pearson, 2012.

[3] Kathy Sierra, Bert Bates, *Head First Java8*, 2nd ed, O'Reilly Publications, 2020.

[4] Narasimha Karumanchi, *Data Structures and Algorithms Made Easy in Java*,careermonk 2011

[5] Uttam K. Roy, *Advanced JAVA Programming*, 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,mergesort,quicksort and strassen's matrix multiplication problems
CO2 : develop knapsack, job sequencing with deadline, shortest path using greedy method, N-Queens and sum of subsets using backtracking method
CO3 : implement programs on single source shortest path, multistage graph and all pairs shortest path using dynamic programming technique
CO4: implement programme for travelling sales person problem using branch and bound method

Course Articulation Matrix (CAM): U18CN604 DESIGN AND ANALYSIS OF ALGORITHMS LAB

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	U18CN508.1	3	3	2	2	1	-	-	-	1	-	-	1	2	1	2
CO2	U18CN508.2	3	3	3	2	1	-	-	-	1	-	-	1	2	1	2
CO3	U18CN508.3	3	3	3	2	1	-	-	-	1	-	-	1	2	1	2
CO4	U18CN508.4	2	2	2	2	1	-	-	-	1	-	-	1	2	1	2
U18CN508		2.75	2.75	2.5	2	1	-	-	-	1	-	-	1	2	1	2

U18CN509 MACHINE LEARNING WITH PYTHON PROGRAMMING LABORATORY

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

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: Python basics, Conditional statements, Loop statements, Functions, Module and Packages
LO2: String Handling, List, Tuples, Dictionaries and File Handling in Python
LO3: Machine Learning libraries such as numpy, pandas, matplotlib, scikit-learn to implement classification and clustering techniques
LO4: Machine Learning libraries such as keras, tensorflow and opencv to develop solutions using Neural networks and Ensemble learning techniques.

List of Experiments

Requirements: *Student should have Desktop/Laptop system with the*

1. Installed Python 3.5/3.6/3.7 software and necessary libraries for Machine Learning (*numpy*, *pandas*, *scipy, scikit-learn*, *keras*, *tensorflow*, *matplotlib*, *seaborn*, etc…)
2. Installed Anaconda IDE software (*Anaconda, Jupyter*, *notebook,* etc...)
3. Import Modules

Experiment-I (Basics of Python and Conditional Statements)

1 Programs on Python Datatypes, Operators.
2 Programs on Input (keyboard, command-line arguments, etc..) and Output
3 Program to read a 7-digit number as an input number using command-line arguments; Check for Palindrome number then, check the same is a Prime number, if both conditions stands true, then print the sum of the digits of the 7-digit number, Otherwise, If the given 7-digit number is not a palindrome then generate a random number of 1-digit nature from 0 to 9 then, search that digit in the given 7-digit number using Binary search.
4 Read the Input as command line argument as follows:
DD-MM-YYYY hh:mm
Print the day number in the total number of 365 days or 366 days (if leap year). Also print,
number of hours : ____
The number of minutes : ____
Weekday Name : ____ (for the given DD)
(Assume Year starts with weekday name as Monday)

Experiment-II (Loop statements and Functions)

*Note: Implement the following programs using User-defined functions. There is no restriction on writing of user-defined functions as needed***.**

1 Print the sum of even positioned Prime numbers in a given range of numbers.
Example: The given range is 1 to 50, then the numbers are: 2,3,5,7,11,13,17,19,23,29,31,37,41,43,47]
Even positioned numbers are 3, 7, 13, 19, 29, 37, and 43. **Print the Sum.**
Write a Python program that uses Command-line arguments to take required inputs. If two arguments were supplied then, it should implement the above given problem, Else If more than

two numbers are given then, find the biggest among those numbers in the list and generate those many Prime numbers and Implement the given problem above.

2 Write the Python Program to compute the following series & pint the sum of 'K' terms

$$\text{Sum} = 1 + \frac{2!}{n*x^2} + \frac{4!}{n^2*x^3} + \frac{6!}{n^3*x^4} + - - -$$

3 Consider, one 8x8 matrix, it has to be filled with random integers from 1 to 8. You should check the following rules while filling:

i. Each row (in sequence order) should be filled with a digit i.e. row1 with '1' and row2 with '2', etc,
ii. Each row should have only one element.
iii. An element can be filled anywhere in the row.
iv. row-m and row-n elements should not clash column-wise.
v. No consecutive columns also should be filled with elements.
vi. No element should be placed in same column (even row is differing)

Write the Python code to implement the above requirements.

Experiment-III (String Handling, List, Tuple and Dictionaries)

1 Programs on String Handling
2 Programs on Lists
3 Programs on Tuple
4 Programs on Dictionaries
5 Consider 5-Strings with different lengths (size of each string should be >=10), read from command line arguments. Now, your program has to take one random string from these 5-strings as input. Display the number of '#' symbols on screen, based on the length of your string taken as input. Now, your program has to read a character from the keyboard, if that character is present in you input string, then display that character should be printed in the place, where it is found. Remaining characters should be displayed with same '#' symbols. If same character occurs twice/thrice/more then, those many places should be printed with that character. If the character is not found, then display appropriate message. You've continue the same process till completion of the word is filled with correct characters. You've to make a counter, for each attempt of the guess. Display the number of attempts made for this guessing to complete the word is filled with all characters.

Example: Random Strings read from command-line arguments:
datamining techniques programming artificial intelligence
(5-commandline arguments, of each size >= 10)
Random string taken as: **artificial**
Displaying it on the string as:
Your word is:##########
Enter your character: b
Sorry, character is not found. Continue to enter your character.
Enter your character: a
Oh Good! Character found. a########a#
Enter your character:i
Oh Good! Character found. a##i#i#i#a#
Complete the above process till all characters filled in place of # symbol.

Write a Python code to implement the above.

6 **Mini-Sudoku:** Consider, a one 6x6 matrix, can be considered as six 3x2 matrices as a grid. You should fill all these matrices with symbols such as + * / - # % in each 3x2 grid.

The following constraints must be satisfied while filling:

a. Each row and column must be filled with all 6 symbols.
b. No repeated symbols are allowed in the row / column.
c. Each grid also is filled with all 6 symbols.

Write a python code to implement the above.

6 Your Program to display the two 3X3 matrices in which each matrix should be composed of random numbers of 1-digit nature from 1 to 9. No digit should be repeated in each matrix. In each matrix, there should not be any collision among the in-placed positioned elements i.e., no 2 elements should be placed in the same positions in each matrix. If any collisions may occur, then generate an exception with a message "Collision Occurred".

Example: $\text{Matrix1} \rightarrow \begin{bmatrix} 1 & 6 & 7 \\ 2 & 5 & 8 \\ 3 & 4 & 9 \end{bmatrix}$ $\text{Matrix2} \rightarrow \begin{bmatrix} 2 & 7 & 1 \\ 3 & 6 & 9 \\ 4 & 5 & 8 \end{bmatrix}$

Write a python code to implement the above.

Experiment-IV (File Handling and Numpy)

1 Consider an Input File with the data items of any 10 numbers of 5-digit nature. Send the Output to another file, which is having a list of numbers from 10 numbers of input file, whose sum of digits is an even number.

Example:

Input File
12354
66577
98123

Output File (Numbers whose sum of digits is an even number)
12345
66577

Write a Python code to implement the above.

2 Consider an Input File, which contains a paragraph of random text (minimum 150 characters of your own text. Text to be placed in 5-lines). Display the results as follows:

Total Number of Vowels (in entire file) : _____
Total Number of Vowels in each line : _____
Occurrence of each Vowel in the file as
****
A/a : ____
E/e : ____
I/I : ____
O/o : ____
U/u : ____
****

Write a Python code to implement the above.

3 Consider an Input File, which contains bio-data of yours, it should have minimum of 100 characters in it. Print the details as:

Order of Repeated Characters (in ascending)
Character: <No. of times repeated>
Character: ___

.

Most Repeated Vowel in the file : _____
Total Number of Vowels : _____

Write a Python code to implement the above.

4 **Install and setup *numpy* environment**
Programs on Numpy: *numpy* array and operations on Arrays.
a. Indexing
b. Masking and Filtering
c. Transposing, Sorting, Ordering and Concatenating
d. Aggregating

Experiment-V *(*Pandas and Matplotlib*)*
1 Install and setup *pandas* and *matplotlib* environment
2 Programs on Pandas :
a. Create a series from an n-d array
b. Read data from various files (.csv, xls, etc…) using pandas
c. Indexing and selecting data
d. Data Frame

Experiment-VI *(matplotlib, seaborn libraries – for Data Visualization)*
Note: Consider your own dataset or download a public dataset of machine learning
Use the following scenarios for visualizing the data:
a. Budget a Long Drive
b. Compare Unemployment Rates with Gains in Stock Market
c. Compare Salaries of Batsmen with the Average Runs They Score per Game
d. Compare the Dates in a Month with the Monthly Salary
1 Develop a program to draw a simple line plot
2 Develop a program to draw a histogram plot
3 Customize plots and experiment with different maps plots

Experiments-VII (Classification Algorithm-Linear regression)
1 Installation procedure for *Anaconda IDE*, *Jupyter,* Python library: *scikit-learn*
2 Develop a Python code on Linear Regression algorithm under Classification.
(Sample ideas to workout with Linear Regression algorithm are:
a. Budget a Long Drive
b. Compare Unemployment Rates with Gains in Stock Market
c. Compare Salaries of Batsmen with the Average Runs They Score per Game
d. Compare the Dates in a Month with the Monthly Salary
e. Compare Average Global Temperatures and Levels of Pollution
f. Compare Local Temperature with the Amount of Rain
g. Compare Average age of Humans with the Amount of Their Sleep
h. Compare the Percentage of Sediments in River with its Discharge
i. Compare Budgets of National Film Awards-nominated Movies with the number Movies Winning These Awards
Etc…).

Consider the ideas given above or any of your own. Develop the Machine Learning - Linear Regression technique code using Python.

Experiments-VIII (Classification Algorithm-Naïve bayes algorithm)
1 Case Study:
Develop a Python code on *Email - Spam Detection* under Classification using Naïve-bayes algorithm. *(Note: Consider your own dataset or download a public dataset of machine learning)*

Experiments-IX (Decision-Tree Algorithm)
1 Develop a Python code to *Predict the loan eligibility process* from given data using Decision – Tree algorithm under Classification.

(Sample ideas to be developed with the use of Decision Trees are as follows:

a. *A person eligible for a loan or not based on his financial status, family member, salary, etc. can be decided on a decision tree.*
b. *Credit card frauds,*
c. *Bank schemes and offers,*
d. *Loan defaults.*
e. *A patient is suffering from a disease or not based on conditions such as age, weight, sex and other factors.*
f. *Deciding the effect of the medicine based on factors such as composition, period of manufacture, etc.*
g. *In colleges and universities, the shortlisting of a student can be decided based upon his/her merit scores, attendance, overall score etc.*
h. *Promotional strategy of faculties present in the universities*.

Etc…).

Consider any one of the above mentioned ideas or take your own, and implement using Machine Learning *Decision – Tree Algorithm using Python*.

Experiments-X (Clustering algorithm)

1 Consider your own idea(s) or given idea(s) in the above **Experiments (VII & IX)**, and Implement a Python code using Machine Learning *Clustering* algorithm.

Experiments-XI (Convolutional Neural networks)

1 Installation of *keras*, *tensorflow*, *scikit-learn* and *data visualization* libraries
2 Consider your own example(s) or idea(s) to develop a Python code using Neural Networks. (Example ideas are *Image recognition*, *Object Detection*, *Image classification* etc…)
3 Develop a Python code to demonstrate *Backpropagation* technique in Neural networks.

Experiments-XII (Ensemble Learning)

1 Consider your own example(s) or above ideas in **Experiments (VII & IX)** to develop a Python code on Ensemble Learning Technique.

Laboratory Manual:

[1] *Machine Learning with Python Programming Laboratory Manual*, prepared by Department of CSN, KITSW

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.

[3] Jason Bell, "*Machine Learning: Hands-On for Developers and Technical Professionals*", John Wiley & Sons, First Edition, ISBN-13: 978-1118889060, 2014.

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 Python programs using control statements, functions, modules and packages
CO2: write the python programs using strings, list, tuples, dictionaries and files
CO3: design the python programs on classification and clustering techniques using numpy, pandas, matplotlib and scikit-learn python libraries
CO4: create solutions using neural networks with the help of keras, tensorflow and opencv libraries

Course Articulation Matrix (CAM):

U18CN509: MACHINE LEARNING WITH PYTHON PROGRAMMING LABORATORY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN509.1	2	2	2	2	2	-	-	1	1	1	-	1	2	2	2
CO2	U18CN509.2	3	3	3	3	3	-	-	1	1	1	-	1	2	2	2
CO3	U18CN509.3	3	3	3	3	3	-	-	1	1	1	-	1	2	2	2
CO4	U18CN509.4	3	3	3	3	3	-	-	1	1	1	-	1	2	2	2
U18CN509		2.75	2.75	2.75	2.75	2.75	-	-	1	1	1	-	1	2	2	2

U18CN510 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 LearningObjectives(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):U18CN510 SEMINAR															
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	U18CN510.1	1	1	-	1	1	-	1	2	2	2	1	2	1	1	1
CO2	U18CN510.2	1	1	-	-	-	-	-	2	2	2	-	2	1	1	1
CO3	U18CN510.3	-	-	-	-	-	-	1	2	2	2	-	2	1	1	1
CO4	U18CN510.4	-	-	-	-	-	-	-	2	2	2	-	2	1	1	1
U18CN510		**1**	**1**	**-**	**1**	**1**	**-**	1	2	2	2	1	**2**	**1**	**1**	**1**

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (NETWORKS)
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
[5Th+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	U18CN603	Professional Elective - II / MOOC-II	3	-	-	3	10	30	40	60	100
4	PCC	U18CN604	Cryptography and Network Security	3	-	-	3	10	30	40	60	100
5	PCC	U18CN605	Cloud Computing	3	-	-	3	10	30	40	60	100
6	PCC	U18CN606	Internet of Things	3	-	-	3	10	30	40	60	100
7	PCC	U18CN607	Cryptography and Network Security Laboratory	-	-	2	1	40	-	40	60	100
8	PCC	U18CN608	Cloud Computing Laboratory	-	-	2	1	40	-	40	60	100
9	PCC	U18CN609	Internet of Things Laboratory	-	-	2	1	40	-	40	60	100
10	PROJ	U18CN610	Mini Project	-	-	2	1	100	-	100	-	100
Total:				**17**	**1**	**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: 26** **Total Credits: 19**

Open Elective-III:	**Professional Elective-II / MOOC-II:**
U18OE602A: Disaster Management	**U18CN603A: Mobile Computing**
U18OE602B: Project Management	**U18CN603B: Wireless Sensor Networks**
U18OE602C: Professional Ethics in Engineering	**U18CN603C: Wireless Communications**
U18OE602D: Rural Technology and Community Development	**U18CN603M: 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 LearningObjectives (LOs):
This course will develop students' knowledge on /in…
LO1: self-exploration, happinessand 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.

Additional 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, Socialvulnerability, 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: listthe 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															
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 ofvirtues and code of ethics

LO3: safety & risk benefit analysis, professional and intellectual property rights

LO4: environmental & computer ethics and various roles of engineers in acompany

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,* New Delhi: 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**		

U18CN603A MOBILE COMPUTING

Class: B.Tech. VI- Semester **Branch:** Computer Science and Engineering (Networks)

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 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, Super 3G and 4G: 3GPP LTE and WiMax 802.16e standards, Features of 4G: LTE Advanced and Advanced WiMax 802.16m, 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 smartphones, 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

Textbooks:

[1] Jochen Schiller, Mobile Communications, 2nd ed. Addison-Wesley, 2008. (*Chapters 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): U18CN603A Mobile Computing

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**U18CN603A**.1	2	2	2	2	1			1	1	1		2	2	1	2
CO2	**U18CN603A**.2	2	2	2	2	1			1	1	1		2	2	1	2
CO3	**U18CN603A**.3	3	3	2	3	1			1	1	1		2	2	1	2
CO4	**U18CN603A**.4	3	3	3	3	1			1	1	1		2	3	1	3
U18CN603A		2.5	2.5	2.25	2.5	1			1	1	1		2	2.25	1	2.25

U18CN603B WIRELESS SENSOR NETWORKS

Class: B.Tech. VI-Semester **Branch:** Computer Science and Engineering(Networks)

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 concepts, applications and technology of wireless sensor networks
LO2: medium access control protocols and routing protocols for wireless sensor networks with case studies
LO3: design issues, performance, examples of transport control protocols for wireless sensor networks and principles and architecture of middleware for wireless sensor networks
LO4: models, design issues, architecture of network management for wireless sensor networks and operating system design issues and performance modeling of WSNs

UNIT-I (9)

Overview of Wireless Sensor Networks: Introduction, Basic overview of the technology
Applications of Wireless Sensor Networks: Introduction, Background, Examples of category-2 WSN applications and Examples of Category-1 WSN applications
Basic Wireless Sensor Technology: Sensor node technology, Sensor taxonomy, Wireless node operating environment, Wireless node trends

UNIT-II (9)

MAC Protocols for Wireless Sensor Networks: Introduction, Background, Fundamentals of MAC protocols, MAC protocols for WSNs, Sensor-MAC case study, IEEE 802.15.4 LR WPANs standard case study
Routing Protocols for Wireless Sensor Networks: Introduction, Background, Data dissemination and gathering, Routing challenges and design issues, Routing strategies in wireless sensor networks

UNIT-III (9)

Transport Control Protocols for Wireless Sensor Networks: Traditional transport control protocols, Transport protocol design issues, Examples of existing transport control protocols, Performance of transport control protocols
Middleware for Wireless Sensor Networks: Introduction, WSN middleware principles, Middleware architecture, Existing middleware

UNIT-IV (9)

Network Management for Wireless Sensor Networks: Introduction, Network management requirements, Traditional network management models, Network management design issues, Network management architecture -MANNA, Naming and Localization
Operating Systems for Wireless Sensor Networks: Introduction, Operating system design issues, Examples of operating systems
Performance and Traffic Management: Introduction, Background, WSN design issues, Performance modeling of WSNs, Case study- Simple computation of the system life span

Text Book:

[1] Kazem Sohraby, Daniel Minoli and Taieb Znati, *Wireless Sensor Networks- Technology, Protocols and applications*, New Jersy: John Wiley & Sons. 2007.

Reference Books:

[1] C.S. Raghavendra, K. M. Sivalingam, T. Znati, *Wireless Sensor Networks*, New York: Springer US, 2006.

[2] Holger Karl and Andreas Willig, *Protocols and Architectures for Wireless Sensor Networks,* Chichester: John Wiley & Sons. 2007.

[3] Ankur Dumka, Sandip K. Chaurasiya, Arindam Biswas, Hardwari Lal Mandoria, *A Complete Guide to Wireless Sensor Networks from Inception to Current Trends,* Florida: CRC Press, 2019.

[4] Feng Zhao, Leonidas Guibas, *Wireless Sensor Networks-An Information processing approach,* Burlington: Morgan Kaufmann, 2004.

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…

CO5: develop wireless sensor networks to support a wide range of applications

CO6: design medium access control protocols and routing protocols for wireless sensor networks

CO7: assess the performance of transport control protocols and understand the principles & architecture of middleware for wireless sensor networks

CO8: design new network management models by identifying the design issues of network management & operating system for wireless sensor networks

Course Articulation Matrix (CAM): U18CN603B WIRELESS SENSOR NETWORKS

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN603B.1	2	2	2	1	-	-	-	1	1	1	-	1	1	1	-
CO2	U18CN603B.2	2	2	2	-	-	-	-	1	1	1	-	1	1	2	-
CO3	U18CN603B.3	2	2	2	-	1	-	-	1	1	1	-	1	1	2	-
CO4	U18CN603B.4	2	2	2	1	1	-	-	1	1	1	-	1	1	1	-
U18CN603B		2	2	2	1	1	-	-	1	1	1	-	1	1	1.5	

U18CN603C WIRELESS COMMUNICATIONS

Class: B.Tech. VI – Semester **Branch:** Computer Science and Engineering (Networks)

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 student's knowledge in/on…

LO1: evolution of wireless communications and modern wireless communications systems

LO2: the design of a cellular system and mobile radio propagation

LO3: modulation techniques for mobile radio, pulse shaping techniques and linear modulation techniques

LO4: multiple access techniques for wireless communications and wireless systems & standards

UNIT – I (9)

Introduction to Wireless communications systems: Evolution of mobile radio communications, mobile radio systems around the world, examples of wireless communication systems, trends in cellular radio and personal communicationsg

Modern Wireless communication systems: Second generation (2G) cellular networks, third generation (3G) wireless networks, wireless local loop(WLL) and LMDS, wireless local area networks(WLANs), bluetooth and personal area networks(PANs)

UNIT - II (9)

The Cellular concept – system design Fundamentals: Introduction**,** frequency reuse - channel assignment strategies - hand off strategies - interference & system capacity, trunking & grade of service – Improving coverage & capacity in cellular systems

Mobile radio propagation: **Large-scale path loss –** Introduction to radio wave propagation, free space propagation model, the three basic propagation mechanisms, outdoor propagation models, indoor propagation models **Small scale fading and multipath -** small scale multipath propagation, small scale multipath measurements, types of small-scale fading

UNIT - III (9)

Modulation techniques for mobile radio: Frequency modulation(FM) Vs Amplitude modulation(AM), Amplitude modulation - single sideband AM and Demodulation of AM signals, Angle modulation – spectra and bandwidth of FM signals, FM Modulation and detection techniques, digital modulation, line coding

Pulse shaping techniques: Nyquist criterion for ISI cancellation, raised cosine rolloff filter, gaussian pulse-shaping filter, **Linear modulation techniques:** Binary phase shift keying (BPSK), differential phase shift keying (DPSK), quadrature phase shift keying (QPSK), QPSK transmission and detection techniques, M-ary phase shift Keying(MPSK), M-ary phase quadrature amplitude modulation(QAM)

UNIT - IV (9)

Multiple access techniques for wireless communications: Introduction to multiple access, frequency division multiple access(FDMA), time division multiple access(TDMA), spread spectrum multiple access, space division multiple access(SDMA), carrier sense multiple access(CSMA), orthogonal frequency division multiplexing(OFDM), packet radio, capacity of cellular systems

Wireless Systems and Standards: Global System for Mobile(GSM), Personal Access Communication Systems(PACS)

Text Books:

[2] Rappaport, T.S., *Wireless communications*, 2nd ed., New Jersey: Pearson Education, 2010

Reference Books:

[5] Andrea Goldsmith, *Wireless Communication*, 2nd ed., Cambridge: Cambridge University Press, 2011
[6] Van Nee, R. and Ramji Prasad, *OFDM for wireless multimedia communications,* Artech House, 2000
[7] David Tse and Pramod Viswanath, *Fundamentals of Wireless Communication*, Cambridge University Press, 2005
[8] Upena Dalal, *Wireless Communication,* Oxford University Press, 2009

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: utilize the evolution and generations of wireless communications
CO2: analyze the cellular system based on resource availability and traffic demands
CO3: make use of modulation techniques for mobile radio
CO4: utilize multiple access techniques for wireless communications and wireless systems & standards

Course Articulation Matrix (CAM): U18CN603C WIRELESS COMMUNICATIONS																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18CN603C.1	1	1	1	1	1	-	-	1	1	1	-	1	1	1	1
CO2	U18CN603C.2	2	2	2	2	2	-	-	1	1	1	-	1	1	1	1
CO3	U18CN603C.3	2	2	2	2	2	-	-	1	1	1	-	1	1	1	1
CO4	U18CN603C.4	2	2	2	2	2	-	-	1	1	1	-	1	1	1	1
U18CN603C		1.75	1.75	1.75	1.75	1.75	-	-	1	1	1	-	1	1	1	1

U18CN604 CRYPTOGRAPHY AND NETWORK SECURITY

Class: B. Tech.VI–Semester **Branch:** Computer Science and Engineering (Networks)

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 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: understand the concept of 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 algorithms

Public-Key Cryptography and RSA: Principles of public-key cryptosystems, The RSA algorithm

Other Public-Key Crypto systems: 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 a symmetric 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 counter measures

Firewalls: The need for firewalls, Firewall characteristics, Types of firewalls

Text Book:

[1] William Stallings, *Cryptography and Network Security: Principles and Practice,* 6th ed. Pearson Education, 2014.

Reference Books:

[1] Behrouz A. Forouzan and Deb deep 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] D, *Cryptography and Data Security*, United Kingdom: Addison Wesley, 1982.

[4] V.K.Iain, *Cryptography and Network Security*, New Delhi: Khanna Publishing House, 2013.

Video Lectures

[1] http://nptel.ac.in/courses/106105031/lecture by Dr.Deb deep Mukhopadhyay 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: analyze different security attacks, services, mechanisms and symmetric key cryptographic algorithms

CO2: apply mathematical concepts in cryptographic algorithms for providing security & key exchange

CO3: categorize the hash & 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 malicious software's

Course Articulation Matrix (CAM): U18CN604 CRYPTOGRAPHYAND NETWORK SECURITY																
Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN604.1	3	2	2	1	2	-	-	1	1	1	-	1	2	1	2
CO2	U18CN604.2	3	2	2	1	2	-	1	1	1	1	-	1	2	2	1
CO3	U18CN604.3	3	2	2	2	2	1	-	1	1	1	-	1	2	2	2
CO4	U18CN604.4	3	2	2	2	2	1	-	1	1	1	-	1	2	2	2
U18CN604		3	2	2	1.5	2	1	1	1	1	1	-	1	2	1.75	1.75

U18CN605 CLOUD COMPUTING

Class: B.Tech. VI- Semester **Branch:** Computer Science and Engineering (Networks)

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 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 Books:

[1] RajkumarBuyya, 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):U18CN605 CLOUD COMPUTING																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18CN605.1	2	2	2	1	2	-	-	1	1	1	-	1	2	1	1
CO2	U18CN605.2	2	2	2	1	2	-	1	1	1	1	-	1	2	1	1
CO3	U18CN605.3	2	2	2	2	2	1	-	1	1	1	-	1	2	1	2
CO4	U18CN605.4	2	2	2	2	2	1	-	1	1	1	-	1	2	1	2
U18CN605		2	2	2	1.5	2	1	1	1	1	1	-	1	2	1	1.5

U18CN606 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): U18CN606INTERNET 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	U18CN606.1	1	2	2	2	1	-	-	-	1	1	1	1	2	2	2
CO2	U18CN606.2	1	2	2	2	-	-	-	-	1	1	-	1	2	2	2
CO3	U18CN606.3	1	2	2	2	1	-	-	-	1	1	-	1	2	2	2
CO4	U18CN606.4	1	2	2	2	-	-	-	-	1	1	1	1	2	2	2
U18CN606		1	2	2	2	1	-	-	-	1	1	1	1	2	2	2

U18CN607 CRYPTOGRAPHY AND NETWORK SECURITY LABORATORY

Class: B. Tech.VI–Semester **Branch:** Computer Science and Engineering (Networks)

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40marks
End Semester Examination	60marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: the basic concepts of security mechanisms, building fundamental programs related to traditional techniques
LO2: designing programs effectively for symmetric and asymmetric algorithms
LO3: implementing programs on management and exchange of keys
LO4: implementing ssl, port scan, network scan, IDS

LIST OF EXPERIMENTS

Experiment–1:

1. Write a program that contains a string (char pointer) with a value \Hello World'. The program should XOR each character in this string with 0 and displays the result
2. Write a program that contains a string (char pointer) with a value \Hello World'. The program should AND or and XOR each character in this string with 127 and display the result

Experiment–II:

3. Write a program to implement Ceaser cipher algorithm
4. Write a program to implement Hill Cipher

Experiment–III:

5. Write a program to implement playfair cipher
6. Write a program to implement Verman Cipher

Experiment–IV:

7. Write a program to implement Vignere Cipher

Experiment–V:

8. Write a program to implement one time pad

Experiment–VI:

9. Write a program to implement DES algorithm
10. Write a program to implement the AES

Experiment–VII:

11. Write a program to implement RSA
12. Write a program to implement Diffie - Hellman key exchange

Experiment–VIII:

13. Write a program to implement SHA - 512
14. Introduction to cryptography software tool: CRYPTOOL

Experiment–IX:

15. Implement and analyze DES using CRYPTOOL
16. Write a program to implement SSL connection

Experiment–X:

17. Demonstrate IP address scanning in a network to identify active hosts, using GUI tool (Advanced IP Scanner)

18. Write a program to implement port scan of a device in a network and identify the open ports
19. Demonstrate port scanning in a network using a GUI tool (Advanced Port Scanner) and identify open ports
20. Demonstrate software firewall rules to allow or block ports of a computer

Experiment–XI:

21. Demonstrate the following using security scanner GUI tool (nmap or zenmap):
    a. Find the active hosts in a network
    b. Find the operating system version of a remote system
    c. write complete details of a remote system

Experiment–XII:

22. Demonstrate intrusion detection system (IDS) using a GUI tool (SNORT)

Laboratory Manual:

[1] *Cryptography and Network Security Laboratory Manual,* Dept. of CSE(N), KITS Warangal.

Reference Books:

[1] William Stallings*, Cryptography and Network Security: Principles and Practice*, 6th ed. Pearson Education, 2014.

[2] Menezes, P.C. van Oorschot, S.A. Vanstone: *Handbook of Applied Cryptography:* CRC Press, 1996.

[3] Abhijit Das and C.E.VeniMadhavan, *Public-key Cryptography: Theory and Practice*, Pearson, 2009.

[4] Darrel Hankerson, Alfred Menezes, Scott Vanstone, *Guide to Elliptic Curve Cryptography,* Springer-Verlag, 2004.

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 traditional algorithms.
CO2: Apply mathematical concepts required for various cryptographic algorithms.
CO3: Design and develop various security algorithms.
CO4: Analyze security aspects in networks using modern tools.

Course Articulation Matrix (CAM): U18CN607 CRYPTOGRAPHYAND NETWORK SECURITY Laboratory															
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18CN607.1	**2**	**2**	**2**	**2**	**2**	**-**	**-**	**1**	**1**	**1**	**1**	**1**	**2**	**2**	**2**
CO2	U18CN607.2	**2**	**2**	**2**	**2**	**2**	**-**	**-**	**1**	**1**	**1**	**1**	**1**	**2**	**2**	**2**
CO3	U18CN607.3	**2**	**2**	**2**	**2**	**2**	**-**	**-**	**1**	**2**	**1**	**1**	**1**	**2**	**2**	**2**
CO4	U18CN607.4	**2**	**2**	**2**	**2**	**2**	**-**	**-**	**1**	**1**	**1**	**1**	**1**	**2**	**2**	**2**
U18CN607		**2**	**2**	**2**	**2**	**2**	**-**	-	1	1.25	1	1	**1**	**2**	**2**	**2**

U18CN608 CLOUD COMPUTING LABORATORY

Class: B.Tech. VI- Semester **Branch:** Computer Science and Engineering (Networks)

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 applications*
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(N), KITS Warangal.

Text Books:

[1] RajkumarBuyya, 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, 2018.

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): U18CN608 CLOUD COMPUTING LABORATORY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18CN6089.1	2	2	2	2	2	-	-	1	1	1	1	1	2	1	2
CO2	U18CN608.2	2	2	2	2	2	-	-	1	1	1	1	1	2	1	2
CO3	U18CN608.3	2	2	2	2	2	-	-	1	2	1	1	1	2	1	2
CO4	U18CN608.4	2	2	2	2	2	-	-	1	1	1	1	1	2	1	2
U18CN608		2	2	2	2	2	-	-	1	1.25	1	1	1	2	1	2

U18CN609 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 charactersin 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 *DivideByZero*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 afile.
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): U18CN609 Internet of Things Laboratory

Course Outcomes		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	U18CN609.1	-	2	2	-	-	-	-	-	-	-	-	-	2	1	1
CO2	U18CN609.2	1	2	2	-	2	-	-	-	-	-	-	-	2	1	1
CO3	U18CN609.3	1	2	2	-	2	-	-	-	-	-	1	1	2	1	1
CO4	U18CN609.4	1	2	2	-	2	-	-	-	-	1	1	1	2	1	1
U18CN609		1	2	2	-	2	-	-	-	-	1	1	1	2	1	1

U18CN610 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…

LO1: implementing a project independently by applying knowledge to practice
LO2: literature review and well-documented report writing
LO3: creating PPTs and effective technical presentation skills
LO4: 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): U18CN610 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	U18CN610.1	1	1	2	2	1	1	1	2	2	2	1	2	2	2	2
CO2	U18CN610.2	1	1	-	2	-	-	-	2	2	2	-	2	2	2	2
CO3	U18CN610.3	-	-	-	-	-	-	1	2	2	2	-	2	2	2	2
CO4	U18CN610.4	-	-	-	-	-	-	-	2	2	2	-	2	2	2	2
U18CN609		**1**	**1**	**2**	**2**	**1**	**1**	1	2	2	2	1	**2**	**2**	**2**	**2**