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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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(Networks)

B.Tech. CSE (IoT) - AUTONOMOUS –SCHEME (URR'18)

(for 2020 Batch)

of

(III, IV,V &VI SEMESTERS)

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE: WARANGAL-15
(*An Autonomous Institution under Kakatiya University*)

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

SCHEME OF INSTRUCTION & EVALUATION(Applicable to B20 Batch)
III-SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAM

[7Th+3P+1MC]

S.No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	BSC	U18MH301	Engineering Mathematics – III	3	1	-	4	10	30	40	60	100
2	HSMC	U18MH302	Professional English	_	_	2	1	100	-	100	-	100
3	PCC	U18IN303	Object Oriented Programming through JAVA	3	-	-	3	10	30	40	60	100
4	PCC	U18IN304	Fundamentals of Internet of Things	3	-	-	3	10	30	40	60	100
5	PCC	U18IN305	Computer Organization and Architecture	3	-	-	3	10	30	40	60	100
6	PCC	U18IN306	Computer Networks	3	-	-	3	10	30	40	60	100
7	ESC	U18EI309	Digital Electronics	3	-	-	3	10	30	40	60	100
8	PCC	U18IN310	Object Oriented Programming through JAVA Laboratory	-	-	2	1	40	-	40	60	100
9	PCC	U18IN311	Fundamentals of Internet of Things Laboratory	-	-	2	1	-	-	-	-	-
10	ESC	U18EI311	Digital Electronics Laboratory	_	_	2	1	40	-	40	60	100
11	MC	U18MH315	Essence of Indian Traditional Knowledge	2	-	-	-	10	30	40	60	100
			Total:	20	1	8	23	250	210	460	540	1000

[L= Lecture, T = Tutorials, P = Practicals & C = Credits] **Stream-I: ME, CSE, IT, CSN,CSO** **Stream-II: CE, EIE, EEE, ECE, ECI,CSM**

Total Contact Periods/Week : 29 **Total Credits: 23**

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

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

UNIT-II (9+3)

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

UNIT-III (9+3)

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

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

UNIT-IV (9+3)

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

Text Book:

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

Reference Books:

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 **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme:

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", 3rdEdition 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):

CourseCode:U18MH302		**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):

CourseCode: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**

U18IN303 OBJECT ORIENTED PROGRAMMING THROUGH JAVA

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

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: programming paradigms and java basics
LO2: classes, methods and strings
LO3: types of inheritance, dynamic method dispatch, interfaces and packages
LO4: streams (I/O), exception handling and multi-threading

UNIT-I (9)

Programming Paradigms: Procedural programming, Modular programming, Object oriented programming (OOP), 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)

Classes and Methods: Overloading methods, *this* keyword, Passing and returning objects, Recursion, Variable length arguments, Constructors, Overloading constructors, Garbage collection, Static variables, Static blocks, Static methods, Nested and inner classes, Command line arguments, Wrapper classes
Strings: Exploring String, String Buffer, String Builder and String Tokenizer classes

UNIT-III (9)

Inheritance: Inheritance basics, Types of inheritance, *super* keyword, Method overriding, Order of constructors calling, Dynamic method dispatch, Abstract classes, *final* with inheritance, Object class
Interfaces: Defining an interface, Implementing interfaces, Nested interfaces, Interfaces can be extended
Packages: Packages, Packages and Member Access, Importing packages

UNIT-IV (9)

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, Interthread communication

Text Book:

[1] Herbert Schildt, *Java The Complete Reference*, 11th ed., New Delhi: McGraw-Hill Education,2019.

Reference Books:

[1] KathySierra, BertBates, *HeadFirstJava*, 2nd ed., Boston: O'ReillyPublications,2005.
[2] Uttam K. Roy, *Advanced JAVA Programming*, England: Oxford Publications,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*, New Delhi: Khanna Publishing House, 2010.

Course Research Paper: Research papers (Indexed Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patent: 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, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

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

CO1: distinguish various programming paradigms and develop java fundamental programs
CO2: develop java programs using classes, constructors and various string concepts
CO3: make use of reusability concepts like inheritance, dynamic method dispatch, interfaces and packages to build java programs
CO4: *develop java programs using streams (I/O), exception handling and multithreading concepts*

Course Articulation Matrix (CAM):U18IN303 OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18IN303.1	2	1	1	1	1	1	-	1	1	1	-	2	2	2	2
CO2	U18IN303.2	2	2	2	2	1	1	-	1	1	1	-	2	2	2	2
CO3	U18IN303.3	2	2	2	2	2	1	-	1	1	1	-	2	2	2	2
CO4	U18IN303.4	2	2	2	2	2	1	-	1	1	1	-	2	2	2	2
U18IN303		2	1.75	1.75	1.75	1.5	1	-	1	1	1	-	2	2	2	2

U18IN304 FUNDAMENTALS OF INTERNET OF THINGS

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

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 IoT, sensors, actuators and IoT boards
LO2:basic elements of arduino, i/o functions, interrupts, working with LED and buttons
LO3:analog and digital communication with arduino, UART, I2C and SPI communication protocol
LO4: integration of sensors and actuators with arduino

UNIT-I (9)

Introduction: Introduction to IoT**,** Evolution of IoT**-**IoT versus M2M, IoT versus CPS, IoT versus WoT; Enabled technologies, Networking components, Challenges and applications
Sensors: Definition, Characteristics, Deviations, Types-Scalar, Multimedia, Hybrid and virtual; Considerations
Actuators: Definition, Types-Hydraulic, Pneumatic, Electric, Thermal or Magnetic, Mechanical, Soft and shape memory polymers; Characteristics
Classification of IoT boards: Microcontroller boards, Single board controller, System on Chipboard

UNIT-II (9)

Programming with Arduino: Introduction to arduino, Features, Components, Arduino IDE, Program elements-Structure, Variables and constants, Data types, Operators, Control statements, Loops, Functions, Arrays, String objects; Time, I/O function, Display, Random numbers, GPIO, Controlling LEDs-Blinking led without delay, Connecting an external led, RGB LED, The 7-segment display; Working with buttons-Connecting a button, Button with no resistor, The toggle switch, Button to serial, Button multiplexing; Interrupts

UNIT-III (9)

Analog and Digital Communication with Arduino: Introduction-Serial communication, Parallel communication, Interfacing LCD character display
UART Communication: UART protocol, Serial communication, Interfacing ESP8266 module
I2C Communication: I2C protocol, ADXL345 module, Interfacing BMP180 module
SPI Communication: SPI protocol, SD card interfacing, Ethernet module interfacing

UNIT-IV (9)

Integration of Sensors with Arduino: Interfacing with potentiometer, Temperature sensor, Detecting motion using PIR sensor, Measuring distance using infrared and ultrasonic sensor, Object position using accelerometer and localization using Global Positioning System (GPS)
Integration of Actuators with Arduino: Controlling motors with transistors, Controlling speed with Pulse Width Modulation(PWM), Spinning motors both ways, Servo motor, Stepper motor, Bipolar stepper motors, Brushless motors
Case Study: Smart campus water management system

Text Books:

[1] Sudeep Mishra, Anandarupmukherjee and Arijit Roy, *Introduction to IoT*, New Delhi: University Cambridge Press, 2021. (Chapter 4)

[2] Cornel Amariei, *Arduino Development Cook Book*, Birmingham: Packt Publishing Ltd., 2015. (Chapter 2-6)

Reference Text Books:

[1] Arshdeep Bahga and Vijay Madisetti, *Internet of Things: A Hands-On Approach,* Hyderabad: University Press, 2015.

[2] Marco Schwartz, *Internet of Things with ESP8266*, Birmingham: Packt Publishing Ltd., 2016.

[3] Rajesh Singh, Anita Gehlot, Lovi Raj Gupta, Bhupendra Singh, Mahendra Swain, *Internet of things With Raspberry Pi and Arduino*, Boca Raton: CRC Press, Taylor & Francis Group,2020.

[4] Brian Evans, *Beginning Arduino Programming*, New York: Apress, 2011.

Course Research Paper (CRP): Research papers (Journal/Conference papers) relevant to the course content by the course faculty in Course Web page

Course Patents(CP): Patents relevant to the course content will be posted by the coursefaculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period and the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

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

CO1: identify the basics of IoT, sensors, actuators and IoT boards in real time environment
CO2: make use of syntax of control statements, operators , i/o functions for problem solving
CO3: compare analog and digital communications with arduino
CO4: design a real time application using sensors, actuators and arduino board

Course Articulation Matrix (CAM):**U18IN304 FUNDAMENTALS OF INTERNET OF THINGS**

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18IN304.1	2	2	2	2	2	1	1	1	-	1	-	2	2	2	2
CO2	U18IN304.2	2	2	2	2	2	1	1	1	-	1	-	2	2	2	2
CO3	U18IN304.3	2	2	2	2	2	1	1	1	-	1	-	2	2	3	2
CO4	U18IN304.4	2	2	2	2	2	1	1	1	-	1	-	2	3	3	3
U18IN304		2	2	2	2	2	1	1	1	-	1	-	2	2.25	2.5	2.25

U18IN305 COMPUTER ORGANIZATION AND ARCHITECTURE

Class: B. Tech. III – Semester

Branch: Computer Science and Engineering (IoT)

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: operations of high performance computing systems and GPU Computing

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 vs. memory bus, Isolated vs. 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
GPU Computing: History, Graphics processors, Graphics processing units, GPGPUs. Clock speeds, CPU vs. GPU comparisons

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, 7,8,9)
[2] M. Morris Mano, Computer System Architecture, Revised 3rd ed., New Delhi: Pearson Education, 2019. (Chapters 9, 10, 11, 12,14)

[3] David B. Kirk and Wen-mei W. Hwu, Programming Massively Parallel Processors A Hands-on Approach, 2nd ed., Wyman Street, Waltham, MA: Morgan Kaufmann is an imprint of Elsevier, 2013. (Chapters 1, 2)

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., Boulder, USA: Pearson Education, 2004.

Course Research Paper: Research papers (Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Web page.

Course Patent: 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 instruction formats and addressing modes of assembly language

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

CO3: *categorize cachememory mapping techniques and examine data transfer between processor, memory & I/O*

CO4: *analyze different modes of data transfer, classify interconnection structures and distinguish CPU vs. GPU architectures & computations*

Course Articulation Matrix (CAM): U18IN305 COMPUTER ORGANIZATION AND ARCHITECTURE

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18IN305.1	2	2	2	1	1	-	-	1	1	1	-	1	1	1	1
CO2	U18IN305.2	2	2	2	1	1	-	-	1	1	1	-	1	1	1	1
CO3	U18IN305.3	2	2	2	1	1	-	-	1	1	1	-	1	1	1	1
CO4	U18IN305.4	1	2	2	1	1	-	-	1	1	1	-	1	1	1	1
U18IN305		1.75	2	2	1	1	-	-	1	1	1	-	1	1	1	1

U18IN306 COMPUTER NETWORKS

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

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: 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)

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)

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)

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)

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*, 5thed.New York: Tata McGraw Hill, 2012.

[3] Larry Peterson, Bruce S Davie, *Computer Networks*, 5thed.New York: Elsevier Inc., 2011.

[4] James F. Kurose and Keith W. Ross, *Computer Networking A Top-Down Approach*, 6th ed.London :Pearson Education, 2013.

Course Research Paper: Research papers (Journals/conference papers) relevant to the course content will be posted by the course faculty in Course Web page.

Course Patent: 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: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): U18IN306 COMPUTERNETWORKS

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18IN306.1	2	2	2	2	2	1	-	1	1	1	-	1	2	2	2
CO2	U18IN306.2	2	2	2	2	2	1	-	1	1	1	-	1	2	2	2
CO3	U18IN306.3	2	2	2	2	2	1	-	1	1	1	-	1	2	2	2
CO4	U18IN306.4	1	2	2	1	1	1	-	1	1	1	-	1	2	2	2
U18IN306		1.75	2	2	1.75	1.75	1	-	1	1	1	-	1	2	2	2

U18INI309 DIGITAL ELECTRONICS

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

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

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

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

UNIT – I (9)

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

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

UNIT – III (9)

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

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

UNIT – IV (9)

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

Text Books:

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

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

Reference Books:

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

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

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

Course Code: **U18IN309**Course Name: **Digital Electronics**		
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	U18IN309.1	*apply various minimization techniques to obtain minimal SOP/POS forms of switching functions*
CO2	U18IN309.2	*design different combinational circuits to implement logic functions*
CO3	U18IN309.3	*explain the operation of flip flops and design sequential circuits like counters, shift registers*
CO4	U18IN309.4	*minimize completely and incompletely specified state machines using partition and merger graph/table methods*

Mapping of the Course Learning Outcomes with Program Outcomes:

CO/PO	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PS O 2	PSO 3
U18IN309.1	2	2	-	1	1	-	-	-	-	-	-	1	1	1	1
U18IN309.2	2	2	2	1	1	-	-	-	-	-	-	1	1	1	1
U18IN309.3	2	2	2	1	1	-	-	-	-	-	-	1	1	1	1
U18IN309.4	2	2	2	1	1	-	-	-	-	-	-	1	1	1	1
U18IN309	2	2	2	1	1	-	-	-	-	-	-	1	1	1	1

U18IN310 OBJECT ORIENTED PROGRAMMING THROUGH JAVA LABORATORY

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

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 student's knowledge in / on…

LO1: fundamentals of java
LO2: classes, methods and strings concepts
LO3: inheritance, dynamic method dispatch, interface and package concepts
LO4: streams (I/O), exception handling and multi-threading concepts

List of Experiments

Experiment-I (Unit-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 (Unit-I)

1. Write a program to read an array and display them using for-each control. Finally display the sum of array elements
2. Write a program to read a matrix and display whether it is an identity matrix or not. Use civilized form of break statement
3. Write a program to define a two-dimensional (2D) array where each row contains different number of columns. Display the 2D-array using for-each

Experiment-III (Unit-II)

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

Experiment-IV (Unit-II)

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

Experiment-V (Unit-II)

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

3. Write a program to demonstrate wrapper class by reading N floating point numbers from command line and display their average

Experiment-VI (Unit-II)

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

Experiment-VII (Unit-III)

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

Experiment-VIII (Unit-III)

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

Experiment-IX (Unit-III)

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

Experiment-X (Unit-III)

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

Experiment-XI (Unit-IV)

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

Experiment-XII (Unit-IV)

1. Write a program to demonstrate read/write/copy a file using byte stream
2. Write a program to demonstrate read/write/copy a file using character stream
3. Write a program to create a thread (using Thread class or Runnable interface)
4. Write a program to demonstrate synchronization of threads
5. Write a program to demonstrate Inter thread communication

Laboratory Manual:

[5] *Object Oriented Programming through Java Laboratory Manual*, Dept. of CSE(IoT), KITSW.

Text Book:

[1] Herbert Schildt, *Java The Complete Reference*, 11th ed., New Delhi: McGraw-Hill Education,2019.

Reference Books:

[1] KathySierra,BertBates,*HeadFirstJava*,2nd ed., Boston: O'ReillyPublications, 2005.

[2] Uttam K. Roy, *Advanced JAVA Programming*, England: Oxford Publications,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*, New Delhi: Khanna Publishing House, 2010.

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

CO1: develop java fundamental programs using operators, control structures and arrays

CO2: develop java programs using classes, constructors and various string concepts

CO3: make use of reusability concepts like inheritance, dynamic method dispatch, interfaces and packages to build java programs

CO4: *develop java programs using, streams (I/O), exception handling and multithreading concepts*

Course Articulation Matrix (CAM): U18IN310 OBJECT ORIENTED PROGRAMMING THROUGH JAVA LABORATORY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18IN310.1	2	1	1	1	1	1	-	1	2	1	-	2	2	2	2
CO2	U18IN310.2	2	2	2	2	1	1	-	1	2	1	-	2	2	2	2
CO3	U18IN310.3	2	2	2	2	2	1	-	1	2	1	-	2	2	2	2
CO4	U18IN310.4	2	2	2	2	2	1	-	1	2	1	-	2	2	2	2
U18IN310		2	1.75	1.75	1.75	1.5	1	-	1	2	1	-	2	2	2	2

U18IN311 FUNDAMENTALS OF INTERNET OF THINGS LABORATORY

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

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: fundamentals of IoT board, system & user defined functions and arrays
LO2: basic elements of arduino, i/o functions and interrupts working with LED and buttons
LO3: analog & digital communication with arduino and UART, I2C& SPI communication protocol
LO4: integration of sensors and actuators with arduino

List of Experiments

Experiment-1

1. Introduction of Arduino IDE
2. Write an arduino program to demonstrate setup () and loop () functions
3. Write an arduino program to demonstrate serial and serial.begin() statements
4. Write an arduino program to demonstrate serial.print() statement
5. Write an arduino program to demonstrate serial.available() statement
6. Write an arduino program to demonstrate serial.read() and serial.write() statements
7. Write an arduino program to demonstrate serial.analogRead() function
8. Write an arduino program to demonstrate user defined functions

Experiment-II

9. Write an arduino program to demonstrate data types.
10. Write an arduino program to demonstrate variables
11. Write an arduino program to demonstrate constants
12. Write an arduino program to demonstrate operators

Experiment-III

13. Write an arduino program to demonstrate if statements
14. Write an arduino program to demonstrate switch case
15. Write an arduino program to demonstrate loops
16. Write an arduino program to demonstrate arrays

Experiment-IV

17. Write an arduino program to demonstrate strings
18. Write an arduino program to demonstrate string object
19. Write an arduino program to demonstrate time based functions
20. Write an arduino program to demonstrate random numbers generation

Experiment-V

21. Write an arduino program to demonstrate digital I/O functions
22. Write an arduino program to demonstrate analog I/O functions

Experiment-VI

23. Write an arduino program to demonstrate light an LED
24. Write an arduino program to demonstrate the 7-segment display.
25. Write an arduino program to demonstrate button
26. Write an arduino program to demonstrate switch

Experiment-VII

27. Write an arduino program to demonstrate interrupts
28. Write an arduino program to demonstrate UART communication protocol

Experiment-VIII

29. Write an arduino program to demonstrate I2C communication protocol

Experiment-IX

30. Write an arduino program to demonstrate SPI communication protocol

Experiment-X

31. Write an arduino program for interfacing with potentiometer.
32. Write an arduino program for interfacing with temperature sensor
33. Write an arduino program for interfacing with PIR sensor

Experiment-XI

34. Write an arduino program for interfacing with infrared and ultrasonic sensor
35. Write an arduino program for interfacing with accelerometer
36. Write an arduino program for interfacing with PWM

Experiment-XII

37. Write an arduino program for interfacing with servo motor
38. Write an arduino program for interfacing with stepper motor
39. Write an arduino program for interfacing with DC motor

Laboratory Manual:

[1] *Fundamentals of Internet of Things Laboratory Manual*, Dept. of CSE(IoT), KITSW

Reference Books:

[1] Brian Evans, *Beginning Arduino Programming*, New York: Apress, 2011.
[2] Cornel Amariei, *Arduino Development Cook Book*,Birmingham: Packt Publishing Ltd., 2015.

Course Learning Outcomes (COs):

On completion of this course, students will be able to

CO1: develop arduino programming for problem solving
CO2: develop arduino programming with LED, button and switch
CO3: interpret analog and digital communications with arduino
CO4: develop arduino programming for connecting sensors and actuators to control the applications

Course Articulation Matrix (CAM):U18IN311 FUNDAMENTALS OF INTERNET OF THINGS LABORATORY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18IN311.1	2	2	2	2	2	1	1	1	-	1	-	1	2	2	2
CO2	U18IN311.2	2	2	2	2	2	1	1	1	-	1	-	1	2	2	2
CO3	U18IN311.3	2	2	2	2	2	1	1	1	-	1	-	2	2	3	3
CO4	U18IN311.4	2	2	2	2	2	1	1	1	-	1	-	2	2	3	3
U18IN311		2	2	2	2	2	1	1	1	-	1	-	1.5	2	2.5	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	-	-	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*, VidyanidhiPrakasham Delhi, 2016 (Chapter 4, 5, 6, 7,8)

Reference Book:

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

CourseCode: **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: **U18MH315**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 (INTERNET OF THINGS)
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE:: WARANGAL – 15
(An Autonomous Institute under Kakatiya University, Warangal)
SCHEME OF INSTRUCTION & EVALUATION(Applicable to B20 Batch)
IV-SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAM

[6Th+2P+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	U18IN404	Theory of Computation	3	-	-	3	10	30	40	60	100
5	PCC	U18IN405	IoT Architecture and Protocols	3	1	-	4	10	30	40	60	100
6	PCC	U18IN406	Python Programming for IoT	3	1	-	4	10	30	40	60	100
7	PCC	U18IN407	Python Programming for IoT Laboratory	-	-	2	1	40	-	40	60	100
8	OE	U18OE411	Open Elective-I Laboratory	_	_	2	1	40	-	40	60	100
			Total:	15	3	6	21	280	180	460	540	1000
9	MC	U18CH416	Environmental Studies*	2	_	_	_	10	30	40	60	100

[L= Lecture, T = Tutorials, P = Practical's & C = Credits] **Total Contact Periods/Week = 24** **Total Credits: 21**

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

U18OE401A APPLICABLE MATHEMATICS

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*: 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 Book:

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

Reference Books:

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

Course Outcomes (COs):

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

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

Coursecode: **U18OE401A** Course Name: **APPLICABLEMATHEMATICS**															
CO Code	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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: t*o introduce the basic concepts of semiconductors and conductivity in semiconductors*
LO2: t*o impart the knowledge on working of semiconductor diode as Rectifier*
LO3: t*o make the students to understand the basic concepts of BJT &DC biasing concepts*
LO4: t*o introduce the fundamental concepts and basic principles of special semiconductor devices.*

UNIT-I(9+3)

Introduction to Electronics:
Analog Signals (DC & AC), Sources (DC & AC), Digital Signals
Semiconductors:
Energy bands in solids, Concept of forbidden gap, Insulator, Metals and Semiconductors, Transport phenomenon in semiconductors: Mobility and conductivity, Intrinsic semiconductor, Donor and Acceptor impurities, Fermi level, Drift currents and Diffusion currents, Temperature dependence of conductivity, Hall Effect

UNIT-II(9+3)

Semiconductor Diode: Junction, Band diagram, Depletion layer, V-I characteristics of P-N Diode, Diode resistance and capacitance, Avalanche and Zener break down mechanisms
Diode Circuits: Rectifier circuits – Half wave, Full wave & Bridge rectifiers, Ripple factor with and without filters, Voltage regulation using Zener diode, Block diagram of DC adapter.

UNIT-III(9+3)

Bipolar Junction Transistor:
Physical structure, Transistor current components, CE, CB & CC configurations and their Input & Output characteristics
DC Analysis of BJT Circuits:
DC load line, Need for biasing, Transistor biasing techniques for CE configuration, Basic transistor applications: Switch and Amplifier.

UNIT-IV(9+3)

Field Effect Transistor: Physical **s**tructure, Operation and Characteristics of a Junction Field Effect Transistor (JFET), MOSFET, DMOSFET,EMOSFET.
Special Semiconductor Devices: Operation and Characteristics- Tunnel Diode, Schottky diode, Photo Diode, Photo Transistor, PIN Diode, LED, LASER, UJT.

Text Books:

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

Reference Books:

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

Course Outcomes (COs)

CourseCode:**U18OE401B**Course Name: **BASIC ELECTRONICS ENGINEERING**		
CO	**CO Code**	Upon completion of this course, the student will be able to..
CO1	**U18OE401B.1**	*Analyze the behavior of semiconductor devices*
CO2	**U18OE401B.2**	*Design half wave and full wave rectifier circuits with filters*
CO3	**U18OE401B.3**	*Characterize BJT configurations with input output characteristics and biasing techniques*
CO4	**U18OE401B.4**	*Acquire knowledge of new emerging areas of science and technology in differentiating semiconductor devices..*

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

CourseCode:**U18OE401B**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**
U18OE401B.1	2	2	1	2	-	-	-	-	-	-	-	-	2	-	1
U18OE401B.2	2	2	2	2	-	-	-	-	-	-	-	-	-	-	-
U18OE401B.3	2	2	2	2	-	-	-	-	-	-	-	-	-	-	-
U18OE401B.4	2	2	1	2	-	-	-	-	-	-	-	2	2	-	1
U18OE401B	**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 &CIengines.*

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*, NewDelhi.
3. Hazra Chowdary. S. K and Bose, "Workshop Technology, Vol. I & II", *Media Promoters and publishers Pvt Ltd,* India.

Course Outcomes (COs):

CourseCode:**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 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

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 typetransducer

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*, 4thedition, 2015, New Delhi. (*Chapters 1 to7*)

Reference Books:

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

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

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

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

Course Outcomes (COs):

Course Code: **U18OE401D** Course Name: **FUNDAMENTALS OF MEASUREMENTS & INSTRUMENTATION**		
CO	**CO Code**	*Upon completion of this course, students will be able to…*
CO1	**U18OE401D.1**	explain about working principle of measurement system, PMMC based meters and applications of DC & AC bridge circuits
CO2	**U18OE401D.2**	describe the principle of operation of Q-meter, DVM, DMM, CRO, DSO and display devices
CO3	**U18OE401D.3**	elaborate on the working principle of resistive, inductive, capacitive and piezoelectric transducers and their applications
CO4	**U18OE401D.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: **U18OE401D** Course Name: **FUNDAMENTALS OF MEASUREMENTS &INSTRUMENTATION**															
CO Code	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
U18OE401D.1	2	1	1	1	-	-	1	-	-	-	-	1	1	1	1
U18OE401D.2	2	1	1	1	-	-	1	-	-	-	-	1	1	1	-
U18OE401D.3	2	1	1	1	-	-	1	-	-	-	-	1	1	1	-
U18OE401D.4	2	1	1	1	-	-	1	-	-	-	-	1	1	1	-
U18OE401D	**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):

Coursecode:**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, NewDelhi
2. Felix A. Farret, M. Godoy Simoes, —Integration of Alternative Sources of Energy, John Wiley & Sons, 2006
3. Bansal N.K, Kaleeman and M.Miller, "Renewable *Energy Sources and Conversion Technology*", TATA Mc Graw-Hill, NewDelhi

Reference Books:

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

Coursecode:**U18OE401F** Course Name: **Renewable 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):

Coursecode:**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

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

Text Books:

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

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

Coursecode:**U18TP402**Course Name: **Soft and Interpersonal Skills**															
CO Code	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 2**
U18TP402.1	-	-	-	-	-	-	-	-	2	3	-	-	1	1	1
U18TP402.2	-	-	-	-	-	-	-	2	3	3	-	-	1	1	1
U18TP402.3	-	-	-	-	-	-	-	-	2	3	-	-	1	1	1
U18TP402.4	-	-	-	-	-	-	-	1	2	3	-	-	1	1	1
U18TP402	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.5**	**2.25**	**3**	**-**	**-**	**1**	**1**	**1**

U18OE403A OBJECT ORIENTED PROGRAMMING

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

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):
This course will develop students' knowledge in/on…
LO1: fundamentals of object oriented and java programming.
LO2: classes, objects and inheritance for implementing object oriented concepts.
LO3: polymorphism, interfaces and packages for realizing object oriented programming.
LO4: manage Exceptional and I/O operations in application developments.

UNIT- I (9)

Fundamentals of Object Oriented Programming: Programming paradigms, Basic concepts of Object Oriented paradigm (OOP), benefits and applications of OOP.
Basics of Java Language: Java language Features, Java Programming Structure, Java Tokens, JVM, Constants, Variables, Data types, Scope of variable, Type Casting, Operators and Expressions, Branching and looping statements, Arrays.

UNIT – II (9)

Classes and Objects: Defining a class, Field declaration, Method declaration, Creating object, Accessing Class Members, Constructors, garbage collection, Static members, Nested and inner classes, Command line arguments, Wrapper classes.
Inheritance: Extending a class, Defining subclasses, Subclass constructor, Multilevel inheritance, Hierarchical inheritance, Access controls, *this* and *super* keywords.

UNIT-III (9)

Polymorphism: Overloading methods, Overloading constructors, Overriding Methods, Dynamic method dispatch, Abstract classes, Final Keyword.
Interfaces: Defining an interface, Implementing interfaces, Nested Interfaces, Variables in interfaces, Extending interfaces
Packages: Packages, java API packages, Using System Packages, Naming Conventions, Creating Packages, Accessing Packages, Adding a class to package, Hiding classes, Static Import.

UNIT – IV (9)

Exception handling: Fundamentals, Exception types, Uncaught exceptions, Using try and catch, Multiple catch clauses, Explicit exceptions with *throw, throws* and *finally* keywords.
String Handling: String constructors, String length, String operations, Character extraction, String comparison, Searching string, Modifying string, Changing string cases, Joining strings**.**
Using I/O: I/O Basics, Reading console Input, Writing console output, Reading and writing files.

Text Books:

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

References Books:

1. P Radha Krishna, "Object Oriented Programming through JAVA", Universities Press, ISBN: 9788173715723,2011.
2. Herbert Schildt,"JAVA The Complete Reference", McGraw-Hill Education India Pvt.Ltd , 9th Edition, ISBN: 9781259002465,2011.
3. Kathy Sierra, Bert Bates, "Head First Java", O'Reilly Publications, 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, meta center, 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 PrivateLtd.,2018
2. Victor Streeter and E. Benjamin Wylie, "*Fluid Mechanics*", McGraw Hill, Singapore, 9thedn.,2017.
3. Frank M. White, "*Fluid Mechanics*", Special Indian Edition, Tata McGraw Hill, New Delhi,2011.
4. A.K. Jain, "*Fluid Mechanics Including Hydraulic Machines*", Khanna Publications,12thedn,2018.

Course Outcomes (COs):

CourseCode:**U18OE403B** Course Name: **Fluid mechanics and hydraulic machines**		
CO	**CO code**	Upon completion of this course, the student will be able to…
CO1	**U18OE403B.1**	*summarize fluid properties using fundamental laws of fluid statics.*
CO2	**U18OE403B.2**	*analyse fluid flows using Bernoulli's equation and model laws.*
CO3	**U18OE403B.3**	*estimate losses in pipes and characterize hydraulic turbines.*
CO4	**U18OE403B.4**	*discuss the working principle and characteristics of pumps.*

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

CourseCode:**U18OE403B** 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**
U18OE403B.1	2	1	-	-	-	-	-	-	1	1	-	1	1	-	-
U18OE403B.2	2	1	-	1	-	-	-	-	1	1	-	1	1	-	-
U18OE403B.3	2	1	-	1	-	-	-	-	1	1	-	1	1	-	-
U18OE403B.4	2	1	-	1	-	1	-	-	1	1	-	1	1	-	-
U18OE403B	**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 :

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: 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 Driver Manager, Statement Interfaces: Statement, Prepared statement, Callable statement, Result Sets.

UNIT-III (9)

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

UNIT-IV (9)

Database using PHP: Exploring Relational Database Model, Records and Primary Keys. Working with SQL Statements. Using PHP and MySql: Checking Configuration, Connecting to Database, Selecting a Database, Adding and Altering a Table in a Database, Inserting and modifying Data in a Table, Retrieving Data from a Table.
XML : Introduction to XML, XML Basics: Syntax, Declaration, Elements, Attributes, Valid XML Documents, Viewing XML, XML Parser, XML Technologies, Document Object Model(DOM).

Text Books:

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

Reference Books:

1. Ivan Bayross, "Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP", *4th Edition,BPB Publications,*ISBN-13: 978-8183330084,2009,
2. 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: **U18OE403E** Course Name: **MICROPROCESSORS**		
CO	**CO Code**	Upon completion of this course, the student will be able to…
CO1	**U18OE 403E.1**	*describe the architecture of 8086 microprocessor and explain instructions with suitable examples*
CO2	**U18OE 403E.2**	*write Assembly Language Programs (ALPs) to perform a given task*
CO3	**U18OE 403E.3**	*design 8086 microprocessor based system for given specifications with memory mapping*
CO4	**U18OE 403E.4**	*explain serial communication modes and discuss it standards*

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

Course code:**U18OE403E**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 andCompany.
2. Gunneswara Rao T. D., MudimbyAndal, "*Strength of Materials", 1st edn.2018*, Cambridge University Press.

Reference Books:

1. Timoshenko and Gere, "*Mechanics of Materials", 1st Edition* Mc Graw HillInternational.
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 UniversityPress.
4. Ramamrutham S., "*Strength of Materials", 2nd Edition,* Dhanpat Rai & Sons, NewDelhi.

Course Outcomes (COs):

Course Code:**U18OE403F**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: **U18OE403F** Course Name: **Strength of Materials**														
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**
U18OE403F.1	2	2	1	1	-	-	-	-	-	1	-	2	1	-	-
U18OE403F.2	2	2	1	-	-	-	-	-	-	1	-	1	1	-	-
U18OE403F.3	2	2	1	1	-	-	-	-	-	-	-	1	-	-	-
U18OE403F.4	2	2	1	2	-	-	-	-	-	1	-	1	1	-	-
U18OE403F	**2**	**2**	**1**	**1.33**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**1.25**	**1**	**-**	**-**

U18IN404 THEORY OF COMPUTATION

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

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: 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, Optimization of deterministic finite automata based pattern matchers

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, Writing grammars, Context free grammars, Parse trees, Construction of syntax trees, Applications of context-free grammars, Ambiguity in grammars and languages, Using ambiguity grammars, 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: 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

Text Books:

[1] John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, *Introduction to Automata Theory, Languages and Computation*, 3rd ed. Hong Kong: Pearson Education Asia, 2013.

Reference Books:

[1] Vivek Kulkarni, *Theory of Computation*, 1st ed. New Delhi: Oxford University Press, 2013.
[2] Mishra K. L. P, Chandrasekaran N, *Theory of Computer Science: Automata, Languages and Computation*, 3rd ed. New Delhi: PHI, 2012.
[3] Michael 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 Research Paper: Research papers (Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patent: 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 finite automata and regular expressions
CO2: distinguish the given language is not regular and construct parse tree to simplify the grammar
CO3: examine the possible ways to convert 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 possible solution for post's correspondence problem

Course Articulation Matrix (CAM): **U18IN404 THEORY OF COMPUTATION**

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18IN404.1	2	2	2	2	-	-	-	1	1	1	-	2	1	1	1
CO2	U18IN404.2	2	2	2	2	-	-	-	1	1	1	-	2	1	1	1
CO3	U18IN404.3	2	2	3	3	-	-	-	1	1	1	-	3	1	1	1
CO4	U18IN404.4	2	2	3	3	-	-	-	1	1	1	-	3	1	1	1
U18IN404		2	2	2.5	2.5	-		-	1	1	1	-	2.5	1	1	1

U18IN405 IOT ARCHITECTURE AND PROTOCOLS

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

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: IoT network architecture, design, connectivity technologies

LO2: interoperability between systems, IoT connectivity technologies

LO3: communication technologies, infrastructure protocols, discovery protocols in IoT

LO4: data protocols, identification protocols, device management, semantic protocols in IoT

UNIT – I (9+3)

IoT Network Architecture and Design: Drivers behind New Network Architectures, The OneM2M IoT Standardized Architecture, The IoT World Forum (IoTWF) Standardized Architecture, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack

IoT Connectivity Technologies: Introduction, IEEE 802.15.4- 802.15 standards, Architecture, Topology, Addressing Modes and Packet Structure, Security, Zigbee-Overview, PHY and MAC Layer, Protocol Stack, Addressing Modes and Packet Structure, Topology, Security; Z-Wave-Overview, Protocol Stack, Addressing, Topology and Routing

UNIT – II (9+3)

IoT Connectivity Technologies: LoRa-Introduction, Physical Layer, MAC Layer and Topology, Physical Layer, MAC Layer, Protocol Stack and Topology, Thread, ISA100.11A, Wireless HART, RFID, NFC, DASH7, Weightless, NB-IoT, Wi-Fi, Bluetooth

UNIT – III (9+3)

IoT Communication Technologies: Introduction Constrained Nodes, Constrained Networks, Types of Constrained Devices, Low Power and Lossy Networks

Infrastructure Protocols: Internet Protocol Version 6 (IPv6), LOADIng, RPL, 6LoWPAN, QUIC, Micro Internet Protocol (uIP), Nano Internet Protocol (nanoIP), Content-centric networking (CCN)

Discovery Protocols: Physical Web, Multicast DNS (mDNS), Universal Plug and Play (UPnP)

UNIT – IV (9+3)

Data Protocols:MQTT-Publish-Subscribe, Architecture, Packet Structure and Communication Format MQTT-SN-Architecture, Topology, Transparent and Aggregating Gateways, Gateway advertisement and Discovery, COAP-Architecture, Message Formats, Usage Example; AMQP, XMPP, SOAT, REST, Websocket

Identification Protocols: EPC, uCode, URIs

Device Management: TR-069, OMA-DM

Semantic Protocols: JSON-LD, Web Thing Model

Text Books:

[1] SudipMisra, Anandarup Mukherjee, Arijit Roy, *Introduction to IoT*, New Delhi: Cambridge University Press, 2020. (Chapter 7,8)
[2] David Hanes, Gonzalo Salgueiro, Patrick Grossetete Robert Barton, Jerome Henry, *IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things*, Indianapolis: Cisco Press, 2017. (Chapter 2)
[3] Perry Lea, *Internet of Things for Architects*, Birmingham: Packet Publishing, 2018.

Reference Books:

[1] Jeeva Jose, *Internet of Things*, New Delhi: Khanna Publishing, 2018.
[2] Kamal Raj, *Internet of Things - Architecture and Design Principles,* New Delhi:McGraw Hill Education India, 2017
[3] MayurRamgir, *Internet of Things- Architecture, Implementation, and Security,* New Delhi:Pearson Education, 2019

Course Research Paper: Research paper (Journal/Conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page

Course Patent: Patent relevant to the course content will be posted by the course faculty in CourseWeb page

Course Project: 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, the students will be able to…
CO1: examine various IoT network architectures and connectivity technologies
CO2:inspect various interoperable IoT protocols for wireless devices
CO3:analyze infrastructure and discovery protocols for IoT
CO4:interpret protocols to track, monitor and manage IoT devices

Course Articulation Matrix (CAM):U18IN405 IOT ARCHITECTURE AND PROTOCOLS

Course Outcomes		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	**U18IN405.1**	2	2	2	1	1	1	1	1	1	1	-	1	2	2	1
CO2	**U18IN405.2**	2	2	2	1	1	1	1	1	1	1	-	1	2	2	1
CO3	**U18IN405.3**	2	2	2	1	1	1	1	1	1	1	-	2	2	2	2
CO4	**U18IN405.4**	2	2	2	1	1	1	1	1	1	1	-	2	2	2	2
U18IN405		2	2	2	1	1	1	1	1	1	1	-	1.5	2	2	1.5

U18IN406 PYTHON PROGRAMMING FOR IOT

Class: B.Tech. IV-Semester

Branch: Computer Science & Engineering (IoT)

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 student's knowledge in/on…

LO1: basics of python programming, operators, control statements and functions in python

LO2: namespaces, modules, string handling methods, collections, data structures &object oriented programming, inheritance and polymorphism

LO3: files, raspberry pi architecture, python packages for IoT and Linux commands

LO4: raspberry pi, python Interpreter, sensors, actuators, cloud for storing data and Image processing with pi

UNIT-I (9+3)

Introduction: Writing and executing python programs with indentation

Python Preliminaries: Literal constants, Variables and identifiers, Data types, Input operation, Comments, Reserved words, Operators, Expressions in python, Type conversion

Decision Control Statements: Selection/conditional branching statements, Loop structures/ iterative statements, Nested loop, The continue statement, The else statement used with loops

Functions: Function definition, Function call, Variable scope and lifetime, There turn statement, Decorator functions, Lambda functions, Recursive functions

UNIT-II(9+3)

Modules and Name Spaces: The from…import statement, Naming module, Packages in python, Standard library modules

Python Strings: String operations, String formatting operator, slice operation, Comparing strings

Data Structures: Arrays**,** Sequences, Lists, Tuple, Sets, Dictionaries

Python Object Oriented Programming: Classes and objects, Class variables and object variables, Class method and self-argument, The __init__() method, Public and private data members and methods, Calling a class method from another class method, Class methods, Static methods, Inheritance and polymorphism, Error and exception handling

UNIT-III (9+3)

Files: Opening and closing files, Reading and writing files, File positions, Renaming and deleting files, Directory methods

Raspberry Pi: Introduction to its architecture, Hardware- Performance, RAM, Special purpose Features, Peripherals, GPIO connectors, Accessories; Software- Pi operating system, Driver API's, Other OS and software development tools

Python packages: Introducing essential packages of python for IoT, Installing OS and designing systems using Raspberry Pi

Linux Commands:ls, cd, touch, mv, rm, man, mkdir, rmdir, tar, gzip, cat, more, less, ps, sudo, cron, chown, chgrp, ping and process related commands

UNIT-IV (9+3)

Raspberry with Python: Installing and upgrading the Pi with necessary python libraries, Installing Pip and invoking python interpreter, Using object oriented code and controlling digital output's of LED's, Interface sensor and actuator with Raspberry Pi, Collecting sensor data and storing it on cloud

Image Processing with Pi: Interfacing camera with Pi, Interfacing display with Pi

Case Study: Smart plant monitoring system

Text Books:

[1] ReemaThareja, *Python Programming using problem solving approach*, New Delhi: Oxford University Press, 2017.(*Chapter 1 to 7*)

[2] Matt Richardson, *Shawn Wallace, Getting Started with Raspberry Pi*, O'Reilly (SPD), 3rd ed., New Delhi: 2016.(*Chapter 2 to 4*)

Reference Books:

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

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

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

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

Course 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 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, student's will be able to…

CO1: make use of syntax, control statements, operators and functions for developing python programs

CO2: design python programs using collections, namespaces, packages and object oriented programming principles

CO3: develop python programs using files,linux commands and implement the architecture of raspberry pi

CO4: build python programs using pi to interface with sensors, actuators, led's, cloud and camera

Course Articulation Matrix(CAM):U18IN406 PYTHON PROGRAMMING FOR IOT																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18IN406.1	2	2	1	1	2	1	-	1	1	1	-	1	2	1	1
CO2	U18IN406.2	2	2	2	1	2	1	-	1	1	1	-	1	2	1	1
CO3	U18IN406.3	2	2	2	2	3	1	-	1	1	1	-	1	2	2	1
CO4	U18IN406.4	2	2	2	2	3	1	-	1	1	1	-	1	2	2	2
U18IN406		**2**	**2**	**1.75**	**1.5**	**2.5**	1	**-**	1	1	1	-	**1**	**2**	**1.5**	**1.25**

U18IN407 PYTHON PROGRAMMING FOR IOT LABORATORY

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

Teaching Scheme :

L	T	P	C
-	-	2	1

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LO):

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

LO1: building blocks of python programming such as variables, operators, control statements & functions

LO2: namespaces, packages, string handling methods, lists and dictionaries of Python

LO3:object oriented programming, creating classes, inheritance, polymorphism, Files, Linux commands, in python

LO4: raspberry pi, Sensors, actuators, cloud and image processing with pi

Experiment-I (Unit-I)

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

Experiment-II (Unit-I)

5. Write a program that takes 2 numbers as command line arguments and print its sum
6. Write a program to calculate GCD of 2 numbers
7. Write a program to find Exponentiation (Power) of a number
8. Write a program to develop a simple calculator

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

9. Write a program to find the Factorial of a given number
10. Write a program to evaluate the Fibonacci series for a given number 'n'
11. Write a program to find the Armstrong for a given number
12. Write a program to find sum of N numbers

Experiment-IV (Unit-II)

13. Write a program to take a number as input, and print countdown from that number to zero (use while loop)
14. Write a program to find circulating 'n' values
15. Write a program to implement a module using import statement
16. Write a program to implement from…import statement

Experiment-V (Unit-II)

17. Write a program to demonstrate use of slicing in strings
18. Write a program to compare two strings
19. Write a program which prints the reverse of a given input string. (use a function with name Reverse string and call this function for performing the operation)
20. Write a program to demonstrate list and related functions

Experiment-VI (Unit-II)

21. Write a program to demonstrate tuple, set and related functions
22. Write a program to demonstrate dictionaries
23. Write python program to demonstrate classes and objects
24. Write python program to demonstrate class method and static method
25. Write python program to demonstrate inheritance.

Experiment-VII (Unit-III)

26. Write python program on file operations for the following
27. To open and read data from a file
28. To write data into a file
29. To compute number of characters, words, lines in a file

Experiment-VIII (Unit-III)

30. Installation of OS onto Raspberry Pi
31. 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
32. Start Raspberry Pi and try various Linux commands in command terminal window:
    i. sudo, cron, chown, chgrp, Ping etc.
33. process-related commands

Experiment-IX (Unit-III)

34. Run a python program on Pi to Read your name and print Hello message with name
35. Run a python program on Pi to Read two numbers and print their sum, difference, product and division
36. Run a python program on Pi to read a word and count characters in that word

Experiment-X(Unit-IV)

37. Run a python program on Pi to demonstrate Light an LED through Python program
38. Run a python program on Pi to get input from two switches and Switch ON corresponding LED's
39. Run a python program on Pi to Flash an LED at a given on time and off time cycle, where the two times are taken from a file
40. Run a python program on Pi to Flash an LED based on cron output (acts as an alarm)

Experiment-XI (Unit-IV)

41. Get input from DHT sensor and upload on cloud
42. Get input from ultrasonic sensor and upload on cloud
43. Working with LED, button, Pir sensor

Experiment-XII (Unit-IV)

44. Working with 7-segment display using Raspberry Pi
45. Interfacing Camera with Pi for image processing
46. Interfacing display with Pi

Laboratory Manual:

[1] *Python Programming Laboratory Manual*, Dept. of CSE (IoT), KITSW.

Reference Books:

[1] Reema Thareja, *Python Programming using problem solving approach*, New Delhi: Oxford university press, 2017.(*Chapter 1 to 7*)

[2] Matt Richardson, *Shawn Wallace, Getting Started with Raspberry Pi*, O'Reilly (SPD), 3rd ed., New Delhi: 2016.(*Chapter 2 to 4*)

Course Learning Outcomes (COs):

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

CO5: develop python programs using operators, control statements & functions

CO6: apply namespaces, packages, string handling methods, OOP principles of Python for writing programs

CO7: apply files concepts and implementarchitecture of raspberry pi using linux commands

CO8: build python programs using pi to interface with sensors, actuators, led's, cloud, camera and display unit

Course Articulation Matrix(CAM):U18IN407 PYTHON PROGRAMMING FOR IOT LABORATORY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18IN407.1	2	2	2	2	2	1	-	1	1	1	-	1	2	1	1
CO2	U18IN407.2	2	2	2	2	2	1	-	1	1	1	-	1	2	1	1
CO3	U18IN407.3	2	2	2	2	3	1	-	1	1	1	-	2	2	2	2
CO4	U18IN407.4	2	2	2	2	3	1	-	1	1	1	-	2	2	2	2
U18IN407		**2**	**2**	**2**	**2**	**2.5**	1	**-**	1	1	1	-	**1.5**	**2**	**1.5**	**1.5**

U18OE411A OBJECT ORIENTED PROGRAMMING LABORATORY

Class: B.Tech. VI- Semester **Branch:** Open Elective Based Laboratory

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: 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 ofjava.
2. Write a program to demonstrate type casting and operatorprecedence.
3. Write a program to demonstrate different types ofif-statements.
4. Write a program to demonstrateswitch-case.

Experiment-II

1. Write a program to demonstrating loop controlstatements.
2. Write a program to demonstrate for-each controlloop.
3. Implement programs using single dimensionalarrays.
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 andmethods.
2. Write a program to demonstrate creating multipleobject.
3. Write a program to demonstrate passing objects tomethods.
4. Write a program to demonstrate constructors and garbage collector by invoking itexplicitly.

Experiment -IV

1. Write a program to demonstrate static members.
2. Write a program to demonstrate command lineargument.
3. Write a program to demonstrate variable lengthargument.
4. Write a program to demonstrate wrapperclasses.

Experiment -V

1. Write a program to demonstrate inheritance using extendskeyword.
2. Write a program to demonstrate multilevelinheritance.
3. Write a program to demonstrate hierarchicalinheritance.
4. Write a program to demonstrate accesscontrols.

Experiment -VI

1. Write program to demonstrate *this* and *supper* keywords.
2. Write program to demonstrate dynamic methoddispatch.
3. Write a program to demonstrate final variable andmethods.
4. Write a program to demonstrate use of abstractclass.

Experiment -VII

1. Write a program to define an Interface and implement it into aclass.
2. Write a program to implement multiple interfaces into singleclass.
3. Write a program to extendinterfaces.
4. Write a program to implement nestedinterfaces.

Experiment -VIII

1. Write a program to create a package, and demonstrate to import a package to aclass.
2. Write a program to demonstrate access protection ofpackages.
3. Write a program to demonstrate static import ofpackage.

Experiment-IX

1. Write a program to demonstrate *try* and *catch* statement for exceptionhandling
2. Handle *ArrayIndexOfBoundsException*, *NumberFormatException*and*DivideByZeroException*using multiple catchblocks.
3. Write a program to demonstrate user defined exception with *throwkeyword*
4. Write a program to demonstrate *finally*block.

Experiment-X

1. Write a program to demonstrate string handlingfunctions.
2. Write a program to demonstrate string searchingfunctions.
3. Write a program to demonstrate string comparisonfunctions.
4. Write a program to demonstrate string modificationfunctions.

Experiment-XI

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

Experiment-XII

1. Write a program to create a file using byte streamclasses
2. Write a program to create a file using character streamclasses
3. Write a program to open the specificfile
4. Write a program to copy the content of one file toanother.

Laboratory Manual:

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

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.
2. Determination of Coefficient of Discharge for given notches (triangular/rectangular)
3. Determination of Coefficient of Discharge for given orifice and mouth piece.
4. Verification of Bernoulli's theorem.
5. Estimation of coefficients of various head losses in pipes due to major and minor losses (sudden enlargement, sudden contraction and bend).
6. Determine of Reynolds's number using Reynolds's apparatus.
7. Determination of coefficient of impact for a jet on given vane.
8. Determination of performance characteristics of Francis Turbine
9. Determination of performance characteristics of Pelton Wheel.
10. Determination of performance characteristics of Centrifugal Pump.
11. Determination of performance characteristics of Submersible Pump.
12. 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):

CourseCode:**U18OE411B** CourseName:		**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 lossin 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:**U18OE411B**				Course Name: **Fluid Mechanics And Hydraulic Machines Laboratory**											
CO Code	**PO 1**	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
U18OE411B.1	2	1	-	1	-	-	-	-	1	-	-	1	2	-	-
U18OE411B.2	2	1	-	1	-	-	-	-	1	-	-	1	2	-	-
U18OE411B.3	2	1	-	1	-	-	-	-	1	-	-	1	2	-	-
U18OE411B.4	2	1	-	1	-	-	-	-	1	1	-	1	2	-	-
U18OE311B	**2**	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**1**	**2**	**-**	**-**

U18OE411C MECHATRONICS LABORATORY

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

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

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: **MECHATRONICSLABORATORY**		
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 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**
U18OE411C.1	1	2	1	2	-	-	-	-	-	1	-	1	1	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 PROGRAMMING LABORATORY

Class: B.Tech. IVSemester
Branch : Computer Science and Engineering(IoT)

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 followingattributes:
   a. BasicTags.
   b. HeadingTags.
   c. List (Ordered andUn-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 givenbelow).
- ***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 Rightframe.
- ***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 likebelow:

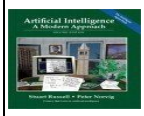
Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	Login : Password: **Submit** **Reset**			

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 characterslength).

c. E-mailid(shouldnotcontainanyinvalidandmustfollowthestandardpattern ***(name@domain.com)***

d. Phone number (Phone number should contain 10 digitsonly). Note: You can also validate the login page with theseparameters.

4. CSS

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

a. Use different font, styles and set a backgroundimage
b. Control the repetition of theimage
c. Define styles forlinks
d. Work with layers and add a customizedcursor

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 tothese selectors to activate thestyles.

b. Set a background image for both the page and single elements on the page. You can define the background image for the page likethis:

c. Control the repetition of the image with the background-repeat property. As background-repeat:repeat

d. Define styles forlinks

e. Work withlayers:

f. Add a customizedcursor:

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

5. Embedding JavaScript in HTMLpages.

6. Design a registration form and validate its field by usingJavaScript.

Experiment-5

7. To design the scientific calculator and make event for each button usingJavaScript.

8. WAP to create popup boxes inJavaScript.

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 onefloat.

Experiment-6

10. Print current date &time
11. JSP Program to auto refresh apage
12. JSP Program to count no. of visitors onwebsite
13. JSP program for errorhandling
14. Demonstrate expressiontag
15. Detect locale, language settings & local specifictime
16. Demonstrate JSP implicitobject
17. JSP Program to display given number inwords

Experiment-7

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

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 nothold.
23. Create a JSP Page with and run in JSPEngines.
24. Demonstrate Session Tracking inJSP.
25. JSP Program to validate username andpassword

Experiment-9

26. Create Database Connectivity with JSP page with different JDBCDrivers.
27. JSP Program to Select record fromdatabase
28. JSP Program to Insert a record into thedatabase
29. Create a CRUD operation for JSP Page usingMySQL
30. JSP Program to upload file intoserver

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 errormessages.
32. Write a PHP which does the followingjob:
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 UserName 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 usingPHP.

34. Create and delete MYSQL database usingPHP.

Experiment-12

35. Create a PHP program to demonstrate opening and closing afile.

36. Create a PHP program to demonstrate reading a file and writing in afile.

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 JavaScripts
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: **MICROPROCESSORS LABORATORY**		
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: **MICROPROCESSORS 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**	**PSO1**	**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) TORsteel.
2. Determination of the compressive strength of wood and punching shears 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 steels pecimen.
10. Shear test for Mild steels pecimen.
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 MaterialsLaboratory Manual*, prepared by faculty of Civil Engineering, KITSW

Reference Books:

1. Harmer E. DavisandGeorge Earl Troxell, "*Testing an Inspection of Engineering Materials*",McGraw-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.

Course Outcomes (COs):

CourseCode:**U18OE411F** CourseName:		**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):

CourseCode:**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**	**PS O 1**	**PS O 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**

U18OE411D WEB PROGRAMMING LABORATORY

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

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 in/on…

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

EXPERIMENT – 1 (UNIT-1)

1.Design the following static web pages with the following attributes:

a) BasicTags.
b) HeadingTags.
c) List (Ordered andUn-Ordered).
d) Textbox,Buttons.

EXPERIMENT – 2 (UNIT-1)

2. HTML

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

a) HOMEPAGE:
b) LOGINPAGE
c) CATALOGUEPAGE

DESCRIPTION:

a.HOMEPAGE

The static home page must contain three frames.

•*Top frame:* Logo and thecollege name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be givenbelow).

•*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 Rightframe.

•*Right frame:* The pages to the links in the left frame must be loaded here. Initially this page contains description of the website.

Logo	Website Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIV	*Description of website*			

b. LOGIN PAGE

EXPERIMENT – 3(UNIT-1)

c.

Logo	Website Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIV	Username: Password: Submit Reset			

CATALOGUE PAGE:

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 and Publisher.
- Price and Add to cart button.

Logo	Website Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIV		Book: Web Technologies Author: Kogent Publication: Dreamtech Press	$50	Add to Cart
		Book: JSP Complete Reference Author: Phil Hanna Publication: McGraw Hill	$28.5	Add to Cart
		Book: Web Technologies Author: Uttam K. Roy Publication: Oxford Higher Ed	$40	Add to Cart

EXPERIMENT – 4(UNIT-1)

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 lengthshould not be less than 6 characters).
b) Password (Password should not be less than 6 characterslength).
c) emailid(shouldnotcontainanyinvalidandmustfollowthestandardpattern(name@domain.com)
d) Phone number (Phone number should contain 10 digitsonly).

Note: You can also validate the login page with theseparameters.

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 (Cascading Style Sheets) 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 forlinks
e) Work with layers:
f) Add a customized cursor:

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

5. Write a program to embed JavaScript in HTMLpages.
6. Design a registration form and validate its field by usingJavaScript.
7. Write a program to create popup boxes inJavaScript

EXPERIMENT – 5(UNIT-II)

8. JSP programto print current date &time
9. JSP program to auto refresh apage
10. JSP program to count no. of visitors onwebsite
11. JSP program for errorhandling
12. JSP program to demonstrate expressiontag
13. JSP program to Detect locale, language settings & local specifictime

EXPERIMENT – 6 (UNIT-II)

14. Demonstrate JSP implicit object
15.JSP Program to display given number inwords
16.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 using JSP

EXPERIMENT -7 (UNIT-II)

17.Create a JSP Page with and run in JSP Engines
18.DemonstrateSession Tracking in JSP
19.JSP Program to validate username andpassword

EXPERIMENT – 8(UNIT-II)

20.Create Database Connectivity with JSP page with different JDBCDrivers.
21.JSP Program to Select record fromdatabase
22.JSP Program to Insert a record into thedatabase
23.Create a CRUD operation for JSP Page usingMySQL
24.JSP Program to upload file intoserver

EXPERIMENT – 9(UNIT-III)

25. Design a PHP page to display student details.
26 .PHP program to demonstrate string functions
27. PHP program to demonstrate arrays (Numeric, Associative, Multi dimensional)
28. PHP program to demonstrate cookies
29. Write a PHP program to store page views count in SESSION, to increment the count on each refresh, and to show the count on web page.
30. PHP program to demonstrate Date() and Time() functions

EXPERIMENT – 10(UNIT-III, IV)

31. PHP program to demonstrate Forms with GET, POST methods.
32. Create a student registration form and perform form validations and display error messages using PHP.
33.Design a Login Form in a neat format with CSS and Validate that form using PHP
34. Write a PHP program to implement MySQL connectivity
35. Create and delete MYSQL database usingPHP
36. Create and delete table in MySQL using PHP

EXPERIMENT – 11 (UNIT-IV)

37. Demonstrate CRUD operations in MySQL using PHP
38. 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 student registration form (experiment-32) authenticate the user when he submits the login form using the UserNameand Password from the database (instead of cookies)
39.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 waythat you should connect to the database and extract data from the tables and display them inthe catalogue page using PHP

EXPERIMENT - 12 (UNIT-IV)

40.Create a PHP program to demonstrate opening and closing a file
41.Create a PHP program to demonstrate reading a file and writing in afile
42. Design a form which upload & display image using PHP
43. Write a PHP program to demonstrate parsing an XML document
44. Write a PHP program to generate an XML Document

Laboratory Manual:

[1] *Web Programming Laboratory Manual,* Dept. of CSE, KITS Warangal.

Text Book:

[1] Kogent, *Web Technologies HTML, CSS, JavaScript, ASP.NET, Servlets, JSP, PHP, ADO.NET, JDBC and XML*, 1st ed., New Delhi: Dreamtech Press (Black Book), 2013*(Chapters 2, 3, 4, 5, 6, 7, 8, 12, 13)*
[2] Phil Hanna*, JSP: The Complete Reference*, 2nd ed., Noida: McGraw-Hill, 2001*(Chapters 5, 6, 7, 8, 9, 10, 13, 14)*

Reference Books:

[1] Ivan Bayross, *Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP*, 4th ed., New Delhi: BPB Publications, 2009

[2] Uttam K.Roy, *Web Technologies*, 7th ed., New Delhi: Oxford Higher Education, 2010
[3] S Luke Welling, Laura Thomson, *PHP and MySQL Web Development*, 3rd ed., Chennai: Samspublications, 2005
[4] Jayson Falkner, Kevin Jones, *Servlets and Java Server Pages,* 1st ed., Chennai: Pearson, 2003

Course Learning Outcomes (COs):

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

CO1: build static web pages using HTML Tags, CSS properties and Java scripts
CO2: build dynamic web pages using JSP concepts.
CO3: develop server side scripts for web applications using PHP
CO4: develop databases for web-based applications using PHP and MySQL, XML

Course Articulation Matrix (CAM):U18OE411 WEB PROGRAMMING LABORATORY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18OE411.1	2	2	2	1	1	-	-	1	1	1	-	2	2	2	2
CO2	U18OE411.2	2	2	2	2	3	-	-	1	1	1	-	2	2	2	3
CO3	U18OE411.3	2	2	2	2	3	-	-	1	1	1	-	2	2	2	3
CO4	U18OE411.4	2	2	2	2	3	-	-	1	1	1	-	2	2	2	3
U18OE411		2	2	2	1.75	2.5	-	-	1	1	1	-	2	2	2	2.75

U18CH416 ENVIRONMENTAL STUDIES

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

Teaching Scheme:

L	T	P	C
2	-	-	2

Examination Scheme:

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

Course Learning objectives (LOs):

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

UNIT-I (6)

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

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

UNIT-II (6)

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

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

UNIT-III (6)

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

UNIT-IV (6)

Social Issues and the Environment: **Role of Individual and Society** - Role of individual in prevention of pollution, water conservation, Rain water harvesting and watershed management; **Environmental Protection / Control Acts** - Air (Prevention and control of Pollution) Act- 1981, water (Prevention and Control of Pollution) Act-1974, water Pollution Cess Act-1977, Forest conservation Act (1980 and 1992), wildlife Protection Act 1972 and environment protection Act

1986, issues involved in enforcement of environmental legislations; **Human Population and Environment** - Population growth, family welfare programmes, women and child welfare programmes, role of information technology in environment and 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 UniversityPress*, Second Edition,2011.

Course Outcomes (COs):

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

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

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

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

SCHEME OF INSTRUCTION & EVALUATION (Applicable to B20 batch)
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	U18IN502	Professional Elective - I / MOOC-I	3	-	-	3	10	30	40	60	100
3	PCC	U18IN503	IoT with Cloud Computing	3		-	3	10	30	40	60	100
4	PCC	U18IN504	Advanced Data Structures	3	-	-	3	10	30	40	60	100
5	PCC	U18IN505	Compiler Design	3	-	-	3	10	30	40	60	100
6	PCC	U18IN506	Database Management Systems	3	1	-	4	10	30	40	60	100
7	PCC	U18IN507	Advanced Data Structures Laboratory	-	-	2	1	40	-	40	60	100
8	PCC	U18IN508	IoT with Cloud Computing Laboratory	-	-	2	1	40	-	40	60	100
9	PCC	U18IN509	Database Management Systems Laboratory	-	-	2	1	40	-	40	60	100
10	PROJ	U18IN510	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 = Practical& C = Credits] **Total Contact Periods/Week :26** **Total Credits :21**

Professional Elective-I / MOOCs-I:U18IN502A: Operating Systems
U18IN502B: Digital Image Processing
U18IN502C: Data Mining and Data Warehousing
U18IN502M: MOOCs course

U18TP501 QUANTITATIVE APTITUDE AND LOGICAL REASONING

Class: B.TechV-Semester **Branch(s):** Computer Science and Engineering (IoT)

Teaching Scheme:

L	T	P	C
2	-	-	1

Examination Scheme:

ContinuousInternalEvaluation	40marks
EndSemesterExam	60marks

Course Learning Objectives(LOs):

This course will develop students'knowledgeon/in…
LO1: quantitative aptitude & problem solving
skillsLO2:computingabstractquantitativeinformation
LO3:applicationofbasicmathematicsskills&criticalthinkingtodrawconclusions
LO4:evaluatingthevalidity&possiblebiasesinargumentspresentedinauthenticcontexts

UNIT-I(6)

QuantitativeAptitude-I: Numbersystem,Averages,Percentages,Ratios&proportions,Time,Speed&distance,Timeandwork,Datainterpretation

UNIT- II(6)

QuantitativeAptitude-II: SimpleInterest,CompoundInterest,Profit&loss,Ages,Permutations&Combinations,Probability

UNIT- III(6)

LogicalReasoning-I: Seriescompletion,Analogy,Codinganddecoding,Bloodrelations,Number,Ranking&Timesequencetest,Linear&Circulararrangements

UNIT -IV(6)

LogicalReasoning-II: Datasufficiency,LogicalVenndiagram,Syllogisms,Statement&Arguments,Statement&Assumptions,Directionsensetest

TextBooks:

[1] RSAgarwal,*QuantitativeAptitudeforCompetitiveExaminations*,3rded.NewDelhi:S.ChandPublications,2019. *(Chapters1,6,7,8,10,11,12,15,17,21,22,30,31)*

[2] R S Agarwal, *AModern Approachto VerbalandNon-Verbal Reasoning*, 3rd ed. New Delhi: S. ChandPublications,2019.*(ChaptersSectionI:1,3,4,5,6,8,16,SectionII:2,3)*

ReferenceBooks:

[1] DineshKhattar,*QuantitativeAptitudeforCompetitiveExaminations*,NewDelhi:Pearson India,2019.
[2] NishitKSinha,*ReasoningforCompetitiveExaminations*,NewDelhi:PearsonIndia,2019.
[3] R.N.Thakur,*GeneralIntelligenceandReasoning*,NewDelhi:McGrawHillEducation,2017.

Course Research Paper: Research paper (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patent: Patent 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:solvearithmeticrelationshipsandinterpretdatausingmathematicalmodels
CO2:computeabstractquantitativeinformation
CO3:applybasicmathematics&criticalthinkingskillstodrawconclusionsandsolveproblems
CO4:evaluatethevalidity&possiblebiasesinargumentspresentedinauthenticcontextslogically&sensibly

CourseArticulationMatrix(CAM):U18TP501QUANTITATIVEAPTITUDEANDLOGICALREASONING

Course Outcome		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**

U18IN502A OPERATING SYSTEMS

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

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 system, system structure and process
LO2: cpu scheduling, process synchronization and deadlocks
LO3: main memory, virtual memory and mass-storages
LO4: protectiontechniques and advantages of distributed system

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
Operating System Structures: Operating system services, System calls, Types of system calls, System programs, Operating system structure, System boot
Processes: Process concept, Process scheduling, Interprocess communication
Case study: The Linux system

UNIT - II (9)

CPU Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms– First come first served, Shortest job first, Priority, Round robin, Multilevel queue, Multilevel feedback queue
Process Synchronization: Background, The critical section problem, Petersons' solution, Synchronization hardware, Mutex locks, Semaphores, Classic problems of synchronization, Monitors
Deadlocks: System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock

UNIT - III (9)

Main Memory: Background, Swapping, Contiguous memory allocation, Segmentation, Paging
Virtual Memory: Background, Demand paging, Page replacement, Allocation of frames, Thrashing
Mass-Storage Structure: Overview of mass storage structure, Disk structure, Disk scheduling

UNIT - IV (9)

File-System Interface: File concept, Access methods, Directory and Disk Structure
File-System Implementation: Allocation methods, Free-space management
Protection: Goals of protection, Principles of protection, Domain of protection, Access matrix
Distributed Systems: Advantages of distributed systems, Types of network-based operating systems, Communication structure, Robustness

Text Book:

[1] Abraham Silberschatz, Peter B Galvin, Gerg Gagne, *Operating System Concepts*, 9th ed., United States of America: Wiley, 2016.*(Chapters: 1,2,3,4,5,6,7,8,9,10,11,12,13)*

Reference Books:

[1] EktaWalia, *Operating Systems*, 2nd ed., New Delhi: Khanna Publishing House, 2019.

[2] William Stalling, *Operating Systems*, 9th ed., United States of America: Person, 2018.

[3] Dhananjay M. Dhamdhere, *Operating Systems A Concept-Based Approach*, 3rd ed., New Delhi: McGraw Hill, 2017.

[4] Andrew S. Tanenbaum, Herbert BOS, *Modern Operating Systems*, 4th ed., United States of America: Person, 2016.

Course Research Paper: Research paper (Indexed journals/conference papers) relevant to the course content will be posted by the course faculty in Course Web page.

Course Patent: Patent 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:apply the fundamental concepts of operating system and processes to solve the essential problems related to operating systems
CO2: analyseCPU scheduling, process synchronizationand deadlocks for effective management of processes
CO3: analyse the page replacement and disk scheduling algorithmsfor effective allocation of the memory
CO4: design the secured distributed systems using the concepts ofprotection methods and distributed systems

Course Articulation Matrix (CAM): U18IN502A OPERATING SYSTEM

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18IN502A.1	2	2	2	2	-	-	-	1	1	1	-	2	2	2	2
CO2	U18IN502A.2	2	2	2	2	-	-	-	1	1	1	-	2	2	2	2
CO3	U18IN502A.3	2	2	2	2	-	-	-	1	1	1	-	2	2	2	2
CO4	U18IN502A.4	2	2	2	2	-	-	-	1	1	1	-	2	2	2	2
U18IN502A		2	2	2	2	-	-	-	1	1	1	-	2	2	2	2

U18IN502B DIGITAL IMAGE PROCESSING

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

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 superpixels, 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:

[3] Rafael C. Gonzalez, Richard E. Woods,*Digital Image Processing*, 4th ed., New Delhi: Pearson, 2018. *(Chapters 1 to 4, 9 to 12)*

Reference Books:

[5] Anil K. Jain, *Fundamentals of Image Processing*, 1st ed., Chennai: Pearson, 2015.

[6] B. Chanda, D. Dutta Majunder, *Digital Image Processing and Analysis*, 2nd ed., New Delhi: Prentice Hall of India, 2011.

[7] S. Sridhar, *Digital Image Processing*, 2nd ed., Noida: Oxford University Press, 2016.

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

Course Research Paper: Research paper (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patent: Patent 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: apply 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: 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):U18IN502B DIGITAL IMAGE PROCESSING																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18IN502B.1	2	2	2	2	1	-	-	1	1	1	-	1	1	1	1
CO2	U18IN502B.2	3	3	3	3	1	-	-	1	1	1	-	3	1	1	1
CO3	U18IN502B.3	3	3	3	3	1	-	-	1	1	1	-	3	1	1	1
CO4	U18IN502B.4	3	3	3	3	1	-	-	1	1	1	-	3	1	1	1
U18IN502B		2.75	2.75	2.75	2.75	1	-	-	1	1	1	-	2.5	1	1	1

U18IN502C DATA MINING AND DATA WAREHOUSING

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

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. (Chapters: 1 to 10)

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*, 2nd ed. New Delhi: Prentice-Hall of India, 2002.
[3] ArunK.Pujari, *Data Mining Techniques*, 2nd ed. Hyderabad: Universities press, 2010.

Course Research Paper: Research paper (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patent: Patent 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: 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): U18IN502C DATA MINING AND DATA WAREHOUSING																
Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18IN502C.1	2	2	2	2	2	-	-	1	1	1	-	2	2	-	-
CO2	U18IN502C.2	2	2	2	2	2	-	-	1	1	1	-	2	2	-	-
CO3	U18IN502C.3	2	2	2	2	2	-	-	1	1	1	-	2	2	-	-
CO4	U18IN502C.4	2	2	2	2	2	-	-	1	1	1	-	2	2	-	-
U18IN502C		2	2	2	2	2	-	-	1	1	1	-	2	2	-	-

U18IN503 IOT WITH CLOUD COMPUTING

Class: B.Tech. V- Semester

Branch: Computer Science and Engineering(IoT)

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: basic concepts of cloud and computing environments and cloud architecture
LO2: virtualization techniques, cloud platform industry and cloud applications
LO3: sensor-cloud, data flow, pricing and networking and sensor-cloud for IoT
LO4: IoT-cloud convergence and cloud based smart city using IoT

UNIT – I (9)

Introduction: Cloud computing at a glance, Historical developments, Building cloud computing Environment, Computing platforms and technologies
Cloud Computing Architecture: Introduction, Cloud reference model, Types of cloud, Economics of the cloud, Open challenges

UNIT – II (9)

Virtualization: Introductions, Characteristics of virtualized environments, Taxonomy of Virtualization techniques, Virtualization and Cloud computing, Pros and Cons of virtualization, Technology examples, Introduction to docker
Cloud Platform in Industry: Amazon web services, Google app engine and Microsoft azure
Cloud Applications: Scientific applications-ECG analysis in the cloud, Business and consumer applications- CRM and ERP.

UNIT – III (9)

Sensor-Cloud: Introduction to sensor-cloud, Background, Sensor virtualization, Applications
Data-Flow in the Sensor Cloud: Introduction, Composition of virtual sensor, Data management
Pricing and Networking in the Sensor cloud: Scenario of pricing, The model of pricing, pH: pricing attributed to hardware, pI: Pricing Attributed to Infrastructure, Networking, System description, Formal definition of the problem, Complexity analysis
Sensor-Cloud for IoT: Introduction, Enabling IoT through sensor-cloud

UNIT - IV (9)

IoT-cloud Convergence: Challenges and open issues, Architecture for convergence, Data offloading and computation, Dynamic resource provisioning, Security aspects
Cloud-Based Smart City using IoT: Introduction to smart city, Characteristics, Standards and protocols for cloud-based smart city, Applications: Traffic management, Smart healthcare, Disaster management, Air pollution monitoring and waste management

Text Books:

[1] RajkumarBuyya, Christian Vecchiola, ThamaraiSelvi, *Mastering Cloud Computing*, New Delhi: McGraw Hill, 2013 (reprint 2019). (chapters: 1,2,3,4,5)

[2] SudipMisra, Subhadeep Sarkar, Subarna Chatterjee, *Sensors, Cloud, and Fog: The Enabling Technologies for the Internet of Things*, London: CRC press, Taylor & Francis group, 2019. (Chapters: 6,7,8,9)

[3] Parikshit N. Mahalle, Nancy Ambritta P., Gitanjali Rahul Shinde and ArvindVinayak Deshpande, *The Convergence of Internetof Things and Cloud for Smart Computing*, UK: CRC press, Taylor & Francis group, 2022. (Chapters: 10)

[4] Pradeep Tomar, *Integration and Implementation of the Internet of Things Through Cloud Computing,* India: Gautam Buddha University, New Delhi: IGI Global book series Advances in Web Technologies and Engineering (AWTE) (ISSN: 2328-2762 eISSN: 2328- 2754) 2021(Chapter:11)

Reference Books:

[1] 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 Paper: Research paper (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patent: Patent 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: design enterprise level applications in hosted cloud environments using Storage as aService (STaaS)
CO2: analyze virtual environments for running applications using virtual machines
CO3: analyze the services provided in the cloud for integrating sensor networks
CO4: analyze the IoT-cloud convergence and design solutions to smart city based applications using cloud and IoT

Course Articulation Matrix (CAM):U18IN503 IOT WITH CLOUD COMPUTING																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18IN503	**2**	**2**	**2**	**2**	**2**	**-**	**-**	**1**	**1**	**1**	**-**	**2**	**2**	**2**	**2**
CO2	U18IN503	**2**	**2**	**2**	**2**	**2**	**-**	**-**	**1**	**1**	**1**	**-**	**2**	**2**	**2**	**2**
CO3	U18IN503	**2**	**2**	**2**	**2**	**2**	**-**	**-**	**1**	**1**	**1**	**-**	**2**	**2**	**2**	**2**
CO4	U18IN503	**2**	**2**	**2**	**2**	**2**	**-**	**-**	**1**	**1**	**1**	**-**	**2**	**2**	**2**	**2**
U18IN503		**2**	**2**	**2**	**2**	**2**	-	-	1	1	1	-	**2**	**2**	**2**	**2**

U18IN504 ADVANCED DATA STRUCTURES

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

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

UNIT – I (9)

Stacks and Queues Extended: Multiple stacks, Deques, Priority queues.
Linked Lists: Circular linked lists, doubly linked lists, circular doubly linked list and its operations (Insertion, Deletion, Searching, and Traversal)

UNIT – II (9)

Binary Tree: Construction of binary tree using tree traversal results, Applications of trees.
Binary Search Tree: Binary search tree operations- Insertion, Deletion, Search, Recursive and Non-recursive traversals, Threaded binary trees
AVL Trees: AVL trees operations –Insertion, Deletion and Traversal

UNIT - III (9)

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

UNIT – IV (9)

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

Text Book:

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

Reference Books:

1. E. Balagurusamy, "Data Structure Using C", *McGraw Hill Education*, 1st Edn., ISBN-13: 978-125-902-9547, 2017
2. Richard F. Gilberg and Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", *Cengage Learning*, 2nd Edn., ISBN-13: 9788131503140, 2007

Course Research Paper (CRP): Research paper (Indexed journal/conference papers) relevant to the course content by the course faculty in Course Web page. Students have to write a two page summary on CRP and submit as part of special assignment.

Course Patent (CP): Patent relevant to the course content will be posted by the course faculty in Course Web page. Students have to write a two page summary on CP and submit as part of special assignment.

Course Projects: Course project is an independent project carried out by the student during the course period, the supervision of course faculty. Course faculty will post few course projects titles in Course Webpage. 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: implement programs using circular single linked list and double linked list.

CO2: represent the data with non linear data structure using binary trees, binary search trees and AVL trees.

CO3: analyze balanced search trees such as B-trees, B+-trees and Splay trees.

CO4: organize and retrieve the data using minimum spanning trees, searching, sorting and hashing techniques

Course Articulation Matrix (CAM):U18IN504 ADVANCED DATA STRUCTURES																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18IN504.1	2	2	2	2	-	-	-	-	-	1	-	1	**2**	**2**	**2**
CO2	U18IN504.2	2	2	2	2	-	-	-	-	-	1	-	1	**2**	**2**	**2**
CO3	U18IN504.3	2	3	3	2	-	-	-	-	-	1	-	2	**2**	**2**	**2**
CO4	U18IN504.4	2	2	3	2	-	-	-	-	-	1	-	1	**2**	**2**	**2**
U18IN504		2	2.25	2.5	2	-	-	-	-	-	1	-	1.25	2	**2**	**2**

U18IN505 COMPILER DESIGN

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

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 Paper: Research paper (Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patent: Patent 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: construct intermediate code for the given programming statements
CO4: develop target code from the intermediate form and apply code optimization techniques to improve the performance of the code

Course Articulation Matrix (CAM):U18IN505 COMPILER DESIGN																
CO		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18IN505.1	3	3	2	2	1	-	-	1	1	1	-	2	1	1	1
CO2	U18IN505.2	3	3	2	2	1	-	-	1	1	1	-	2	1	1	1
CO3	U18IN505.3	3	3	3	3	1	-	-	1	1	1	-	3	1	1	1
CO4	U18IN505.4	3	3	3	3	1	-	-	1	1	1	-	3	1	1	1
U18IN505		3	3	2.5	2.5	1	-	-	1	1	1	-	2.5	1	1	1

U18IN506 DATABASE MANAGEMENT SYSTEMS

Class: B.Tech. V- Semester

Branch: Computer Science and Engineering (IoT)

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: 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

NOSQL Databases: Introduction to NOSQL systems

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 recoverability, Characterizing schedules based on serializability
Concurrency Control Techniques: Two-Phase locking techniques for concurrency control, Concurrency control based on timestamp ordering
Database Recovery Techniques: Recovery concepts, NO-UNDO/REDO Recovery Based on Deferred Update, Recovery techniques based on immediate update, Shadow paging
Database Security and Authorization: Introduction to database security issues, Discretionary access control based on granting and revoking privileges, Mandatory access control and role-Based access control for multilevel security

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Text Book:

1. RamezElmasri, Shamkanth B. Navathe, *Fundamentals of Database Systems*, 7th ed., New Delhi: Pearson Education, 2017. (Chapters: 1 to 15)

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, GovindVerma, *Database Management Systems*, 1st ed., New Delhi: Khanna publications, 2016
4. Thomas Connolly, Carolyn Begg, *Database Systems*, 3rd ed., Chennai: Pearson Education, 2003

Course Research Paper: Research paper (Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.
Course Patent: Patent relevant to the course content will be posted by the course faculty in CourseWeb page.
Course Project: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

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

CO1:analyze the schemata, illustrate the relational data model and consistency constraints effectively, and develop effective queries
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: apply multi-level security, correctness of data and control over access on database

Course Articulation Matrix (CAM): U18IN506 DATABASE MANAGEMENT SYSTEMS																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18IN506.1	2	2	2	2	1	1	-	1	1	1	-	2	2	1	2
CO2	U18IN506.2	3	3	3	3	1	1	-	1	1	1	-	3	3	1	3
CO3	U18IN506.3	3	3	3	3	1	1	-	1	1	1	-	3	2	1	2
CO4	U18IN506.4	2	2	2	2	1	1	-	1	1	1	-	2	3	1	2
U18IN506		2.5	2.5	2.5	2.5	1	1	-	1	1	1	-	2.5	2.5	1	2.25

U18IN507ADVANCED DATA STRUCTURES LABORATORY

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

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: organizing and retrieving the data using binary tree, binary search trees
LO2: organizing and retrieving the data using AVL trees, B-Trees, Red black trees and Splay trees.
LO3: organizing and retrieving the data using Interval tree, Hash tree, Tries, sorting and searching.
LO4: organizing and retrieving the data using graphs and spanning trees

List of Experiments

Experiment-I

1. Program to perform following binary tree operations
   i) Creation ii) Insertion of a node iii) Traversal using recursion

Experiment-II

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

Experiment III

3. Program to perform following binary search tree traversal operations without recursion
   (i) Inorder ii) Preorder iii) Postorder iv) Spiral order

Experiment-IV

4. Program to implement AVL tree construction

Experiment-V

5. Program to implement B-tree construction

Experiment-VI

6. Program to implement search and insert operationson Trie
7. Program to implement Fibonacci search

Experiment-VII

8. Program to implement Quick sort
9. Program to implement Merge sort

Experiment-VIII

10. Program to implement heap sort
11. Program to implement Bitonic generator sort

Experiment-IX

12. Program to implement Topological sort
13. Program to implement the following Minimum cost spanning trees
    a) Prim's algorithm b) Kruskal's algorithm

Experiment-X

14. Program to implement the following graph traversal techniques
    a) Depth first search b) Breadth first search
15. Program to implement Kosaraju's algorithm

Experiment-XI

16. Program to implement Naive Algorithm
17. Program to implement Knuth - Morris - Pratt (KMP) Algorithm

Experiment-XII

18. Program to implement Boyer Moore Algorithm
19. Program to implement Rabin Karp Algorithm

Laboratory Manual:

[1] Advanced Data Structures' laboratory manual, *prepared byfaculty of Dept. of Computer Science &Engineering.*

Reference Books:

[1] DebasisSamanta,*Classic Data Structures*, 2nd ed., New Delhi: Prentice Hall India, 2009.

[2] ReemaThareja, *Data Structures Using C,* 2nded., New Delhi: Oxford University Press, 2014.

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

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):

Upon completion of this course, students will be able to

CO1: develop programs using binary trees, binary search trees.
CO2: utilize balanced search trees such as B-trees, B+-trees, Red black and Splay trees in solving the problems.
CO3: organize and retrieve the data using Interval tree, Hash tree, Tries , sorting and searching .
CO4:organize and retrieve the data using Graphs and different types of spanning trees.

Course Articulation Matrix (CAM):U18IN507ADVANCED DATA STRUCTURES LABORATORY																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18IN507.1	1	1	3	1	1	1	-	1	1	1	-	2	1	1	3
CO2	U18IN507.2	1	1	2	2	1	1	-	1	1	1	-	2	1	1	2
CO3	U18IN507.3	1	1	3	3	2	1	-	1	1	1	-	2	1	1	3
CO4	U18IN507.4	1	1	3	2	3	2	-	1	1	1	-	2	1	1	3
U18IN507		1	1	2.75	2	1.75	1.25	-	1	1	1	-	2	1	1	2.75

U18IN508 IOT WITH CLOUD COMPUTING LABORATORY

Class: B.Tech.,V- Semester

Branch: Computer Science and Engineering(IoT)

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 student's knowledge in/on…

LO1: basic concepts of cloud and computing environments and cloud architecture
LO2: virtualization techniques, cloud platform industry and cloud applications
LO3: Thingspeak cloud to write and read, analyze and visualize data
LO4: IoT Data and device management though cloud

List of Experiments

Experiment-1

1. Introduction to various cloud platforms.
2. Create a storage account and a hosted service component.
3. Deploying an application using platform management portal.

Experiment-II

4. Create a word document of your class time table and store on the cloud with docx and pdf format.
5. Write a program to generate 'n' even numbers and deploy in cloud.
6. Write a program to display n^{th} largest number from the given list and deploy in cloud.

Experiment-III

7. Write a program to validate user, create a database login (username, password) and deploy in cloud.
8. Write a program to validate user, create a database to store user info and deploy in cloud.

Experiment-IV

9. Find procedure to run the virtual machine of different configuration, check how many virtual machines can be utilized at particular time.

Experiment-V

10. 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.

Experiment-VI

11. Create your own Virtual Private Cloud (VPC).

12. Create public and private subnet.

Experiment-VII

13. Install a 'C' compiler in the virtual machine and execute sample programs.

Experiment-VIII

14. Develop an IoT application for writing and reading the data in ThingSpeak

Experiment-IX

15. Develop an IoT application for analyzing and visualizing the data in ThingSpeak

Experiment-X

16. Develop an IoT application toconnect and configure IoT devices to the cloud.

Experiment-XI

17. Develop an application to register, organize, monitor, and remotely manage IoT devices.

Experiment-XII

18. Demonstrate cloud based IoT Data protection.
19. Demonstrate cloud based IoT device protection.

Laboratory Manual:

[1] Cloud Computing Laboratory Manual, prepared by the faculty of Department of CSE, 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, 2012.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them

Course Learning Outcomes (COs):

On completion of thiscourse, student's 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: design IoT applications to connect, store, analyze and visualize the sensor data in various clouds such as ThingSpeak, AWS IoT etc.
CO4: design cloud based protection for data and IoT device

Course Articulation Matrix (CAM):U18IN508 IOT WITH CLOUD COMPUTING LABORATORY																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18IN508.1	2	2	2	2	2	-	-	1	1	1		2	2	2	2
CO2	U18IN508.2	2	2	2	2	2	-	-	1	1	1		2	2	2	2
CO3	U18IN508.3	2	2	2	2	2	-	-	1	1	1		2	2	2	2
CO4	U18IN508.4	2	2	2	2	2	-	-	1	1	1		2	2	2	2
U18IN508		2	2	2	2	2		-	1	1	1		2	2	2	2

U18IN509 DATABASE MANAGEMENT SYSTEMS LABORATORY

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

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 student's knowledge in/on…

LO1: SQL queries related to DDL, DML, TCL and DCL constructs using Oracle
LO2: SQL queries related to functions, joins, indexes, sequences and user defined data types
LO3: PL/SQL programs using PL/SQL block, cursors, parameterized cursors, and exceptions
LO4: PL/SQL programs using procedures, functions, packages and triggers

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 and triggers

Laboratory Manual:

[1] *Database Management Systems Laboratory Manual,* Dept. of CSE (AI & ML), KITS Warangal

Reference Books:

[1] Ivan Bayross, *SQL, PL/SQL: The Programming Language of Oracle,* 4thed., New Delhi: BPB publications, 2010

[2] P.S. Deshpande, *SQL & PL/SQL for Oracle 11g Black Book,*New Delhi: Wiley Publisher, 2011

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 SQL queries using the concepts related to DDL, DML, TCL and DCL constructs of Oracle
CO2: develop SQL queries using functions, joins, indexes, sequences and views
CO3: develop SQL queries using the PL/SQL programs, cursors and exceptions
CO4: create PL/SQL programs using procedures, functions, packages and triggers

Course Articulation Matrix (CAM): U18IN509 DATABASE MANAGEMENT SYSTEMS LABORATORY																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18IN509.1	**2**	**2**	**2**	**2**	**2**	**1**	**-**	**1**	**2**	**1**	**-**	**2**	**2**	**1**	**2**
CO2	U18IN509.2	**2**	**2**	**2**	**2**	**2**	**1**	**-**	**1**	**2**	**1**	**-**	**2**	**2**	**1**	**2**
CO3	U18IN509.3	**2**	**2**	**2**	**3**	**2**	**1**	**-**	**1**	**3**	**1**	**-**	**2**	**2**	**1**	**3**
CO4	U18IN509.4	**2**	**2**	**3**	**3**	**2**	**1**	**-**	**1**	**3**	**1**	**-**	**2**	**3**	**1**	**3**
U18IN509		**2**	**2**	**2.25**	**2.5**	**2**	**1**	**-**	**1**	**2.5**	**1**	**-**	**2**	**2.25**	**1**	**2.5**

U18IN510 SEMINAR

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

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	100 marks
End Semester Examination	-

Course Learning Objectives(LOs):

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

Studenthas 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):U18IN510 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	PSO1	PSO 2	PSO 3
CO1	U18IN510.1	1	1	-	1	1	-	1	2	2	2	1	2	1	1	1
CO2	U18IN510.2	1	1	-	-	-	-	-	2	2	2	-	2	1	1	1
CO3	U18IN510.3	-	-	-	-	-	-	1	2	2	2	-	2	1	1	1
CO4	U18IN510.4	-	-	-	-	-	-	-	2	2	2	-	2	1	1	1
U18IN510		**1**	**1**	**-**	**1**	**1**	**-**	1	2	2	2	1	**2**	**1**	**1**	**1**

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (INTERNET OF THINGS)KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE:: WARANGAL – 15

(An Autonomous Institute under Kakatiya University, Warangal)

SCHEME OF INSTRUCTION & EVALUATION (Applicable to B20 batch)

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

[5Th+3P+1MC+Miniproject]

	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
								CIE			ESE	Total Marks
				L	T	P	C	TA	MSE	Tota l		
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	U18IN603	Professional Elective - II / MOOC-II	3	-	-	3	10	30	40	60	100
4	PCC	U18IN604	Design and Analysis of Algorithms	3	-	-	3	10	30	40	60	100
5	PCC	U18IN605	Artificial Intelligence for IoT	3	-	-	3	10	30	40	60	100
6	PCC	U18IN606	Industrial IoT	3	-	-	3	10	30	40	60	100
7	PCC	U18IN607	Advanced Java Programming Laboratory	-	-	2	1	40	-	40	60	100
8	PCC	U18IN608	Artificial Intelligence for IoT Laboratory	-	-	2	1	40	-	40	60	100
9	PCC	U18IN609	Industrial IoT Laboratory	-	-	2	1	40	-	40	60	100
10	PROJ	U18IN610	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 = Practical& C = Credits]Total Contact Periods/Week: 26 Total Credits:19

Open Elective-III:	**Professional Elective-II / MOOC-II:**
U18OE602A: Disaster Management	**U18IN603A: Software Engineering**
U18OE602B: Project Management	**U18IN603B: Mobile Computing**
U18OE602C: Professional Ethics in Engineering	**U18IN603C: Sensor Technology**
U18OE602D: Rural Technology and Community Development	**U18IN603M:MOOCs Course**

U18MH601 UNIVERSAL HUMAN VALUES - II

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

Teaching Scheme:

L	T	P	C
2	1	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

* Pre-requisite:U18MH111 Universal Human Values - I (*Induction Programme)*

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: self-exploration, happiness and prosperity as the process of value education
LO2: 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

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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, *Jeevan Vidya: 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 Research Paper: Research paper (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patent: Patent 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: 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 fulfilment
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		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18MH601.1	-	-	-	-	-	1	-	2	1	1	-	2	-	-	1
CO2	U18MH601.2	-	-	-	-	-	1	-	2	1	1	-	2	-	-	1
CO3	U18MH601.3	-	-	-	-	-	1	-	2	1	1	-	2	-	-	1
CO4	U18MH601.4	-	-	-	-	-	1	-	2	1	1	-	2	_	-	1
U18MH601		-	-	-	-	-	1	-	2	1	1	-	2	–	-	1

U18OE602A DISASTER MANAGEMENT

Class: B.Tech. VI – Semester **Branch(s)**: ME, CSE, IT & CSN

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40
End Semester Examination	60

Course Learning Objectives (LOs):

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

LO1:disaster types, its impacts & national policy on disaster management

LO2:prevention, preparedness and mitigation measures for different disasters, emergency support functions and relief camps

LO3: different types of vulnerability, macroeconomic, financial management of disaster and its related losses

LO4:disaster management for infrastructure, treatment of plants, geo spatial information in agriculture, multimedia technology in disaster risk management and training

UNIT – I (9)

Introduction & Principles of Disaster Management: Nature - Development, Hazards and disasters; Natural disasters - Earth quakes, Floods, Fire, Landslides, Cyclones, Tsunamis, Nuclear; Chemical dimensions and Typology of disasters - Public health disasters, National policy on disaster management

UNIT –II (9)

Prevention Preparedness and Mitigation Measures: Prevention, Preparedness & mitigation measures for various disasters, Post disaster reliefs and logistics management, Emergency support functions and their coordination mechanism, Resources and material management, Management of relief camp

UNIT– III (9)

Risk and Vulnerability: Building codes and land use planning, Social vulnerability, Environmental vulnerability, Macroeconomic management and sustainable development, Climate change, Risk rendition, Financial management of disaster and related losses

UNIT - IV (9)

Role of Technology in Disaster Management: Disaster Management for infrastructures, Taxonomy of infrastructure, Treatment plants and process facilities, Electrical sub stations, Roads and Bridges, Geo spatial information in agriculture, Drought assessment, Multimedia technology in disaster risk management and training

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Text Book:

[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 Research Paper: Research paper (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patent: Patent 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 the disasters and discuss natural & non-natural disasters, their implications, the institutional& legal framework for national policy on disaster management in India

CO2: identify mitigation strategies, preparedness & prevention measures and prioritizes the rescue &relief operations to reduce the impact of a disaster

CO3: list the vulnerable groups in disaster; examine the concepts of macroeconomic & sustainability & impact of disaster on development

CO4: discuss disaster management for infrastructure, utilize geospatial information in agriculture and apply multimedia technology for disaster risk management &training

Course Articulation Matrix (CAM): U18OE602A DISASTER MANAGEMENT

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18OE602A.1	-	-	-	-	-	2	2	1	-	-	1	1		
CO2	U18OE602A.2	-	-	-	-	-	2	2	1	-	-	1	1		
CO3	U18OE602A.3	-	-	-	-	-	2	2	1	-	-	1	1		
CO4	U18OE602A.4	-	-	-	-	-	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 Book:

[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 Research Paper: Research paper (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patent: Patent 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 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 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	1	-	-	-
CO2	U18OE602B.2	-	-	-	-	-	1	-	2	-	1	1	-	-	-
CO3	U18OE602B.3	1	1	-	-	-	1	-	-	-	1	1	-	-	-
CO4	U18OE602B.4	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 & CSO

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40
End Semester Examination	60

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on …

LO1: human values and engineering ethics
LO2: professionalism, theory of virtues and code of ethics
LO3: safety & risk benefit analysis, professional and intellectual property rights
LO4: environmental & computer ethics and various roles of engineers in a company

UNIT – I(9)

Human Values: Morals, Values & ethics, Integrity, Work ethic, Service learning, Civic virtue, Respect for others, Living peacefully, Caring, Sharing, Honesty, Courage, Valuing time, Co-operation, Commitment, Empathy, Self-confidence, Character, Spirituality

Engineering Ethics: Senses of "Engineering Ethics", Variety of moral issues, Types of inquiry, Moral dilemmas, Moral autonomy, Kohlberg's theory, Gilligan's theory - Consensus and controversy

UNIT – II(9)

Profession and professionalism: Profession and its attributes, Models of professional roles

Theory of Virtues: Definition of virtue and theories of virtues, Self-respect, Responsibility and senses, Modern theories of virtues, Uses of ethical theories

Engineering as social experimentation: Engineering as experimentation, Engineers as responsible experimenters, Codes of ethics, A balanced outlook on law, The challenger case study

UNIT –III (9)

Safety, Responsibilities and Rights: Safety and risk, Assessment of safety and risk, Risk benefit analysis and reducing risk - Three Mile Island and Chernobyl case studies; Collegiality and loyalty, Respect for authority, Collective bargaining, Confidentiality, Conflicts of interest, Professional rights, Employee rights, Intellectual Property Rights (IPR), Discrimination

UNIT – IV (9)

Global Issues: Multinational corporations - Environmental ethics, Computer ethics, Engineers as managers, Consulting engineers, Engineers as expert witnesses and advisors, Moral leadership, Sample code of ethics *(Specific to a particular engineering discipline)*

Text Book:

[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: McGrawHill,2014.

[3] Charles D. Fleddermann, *Engineering Ethics*, 4th ed. New Delhi: Prentice Hall, 2004.

Course Research Paper: Research paper (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patent: Patent 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: 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 PROFESSIONAL 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.1	-	-	-	-	-	1	-	2	1	-	-	1		
CO2	U18OE602C.2	-	-	-	-	-	1	-	2	1	-	-	1		
CO3	U18OE602C.3	-	-	-	-	-	1	-	2	1	-	-	1		
CO4	U18OE602C.4	-	-	-	-	-	1	-	2	1	-	-	1		
U18OE602C		**-**	**-**	**-**	**-**	**-**	**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

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, Vermi compost, 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

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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 Research Paper: Research paper (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patent: Patent 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: 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.1	-	-	1	-	-	1	2	-	-	-	-	1		
CO2	U18OE602D.2	-	-	1	-	-	1	2	-	-	-	-	1		
CO3	U18OE602D.3	-	-	1	-	-	1	2	-	-	-	-	1		
CO4	U18OE602D.4	-	-	-	-	-	1	2	-	-	-	-	-		
U18OE602D		-	-	**1**	-	-	**1**	**2**	-	-	-	-	**1**		

U18IN603A SOFTWARE ENGINEERING

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

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: 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

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Text Book:

[1] Roger S.Pressman and Bruce R.Maxim, *Software Engineering: A Practitioner's Approach,*8th ed., NewDelhi:McGraw Hill, 2019*(Chapters: 1,2,3,4,5,6,7,8,9,10,11,12,13,14)*

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 Research Paper: Research paper (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patent: Patent 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: implement the appropriate software model for a given real time application like customer service systems, or bank ATMs

CO2: develop different types of software designs & patterns for recurring problems that software engineers come across often.

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) U18IN603A SOFTWARE ENGINEERING

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18IN603A.1	1	1	1	1	-	-	-	1	1	1	2	1	2	1	2
CO2	U18IN603A.2	1	1	1	1	-	-	-	1	1	1	2	1	1	1	2
CO3	U18IN603A.3	2	2	1	1	-	1	1	1	1	1	2	1	2	1	2
CO4	U18IN603A.4	2	2	2	1	-	1	1	1	1	1	2	1	2	1	2
U18IN603A		1.5	1.5	1.25	1	-	1	1	1	1	1	2	1	1.75	1	2

U18IN603B MOBILE COMPUTING

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

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: 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
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: Windows CE based devices, Mac OS 4 based devices, Symbian OS based devices, 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)

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, 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

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Textbooks:

[1] Jochen Schiller, *Mobile Communications*, 2nd ed. Addison-Wesley, 2003.*(Chapter: 7,8)*

[2] Raj Kamal, *Mobile Computing*, 2nd ed. Oxford University Press, 2007. *(Chapter: 1,2,3,4,5,6,9,10,11)*

Reference Books:

[1] Ivan Stojmenovic, *Handbook of Wireless Networks and Mobile Computing*, 2nd ed. John Wiley & 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 Paper: Research paper (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patent: Patent 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: explain the mobile computing architecture and importance of mobile computing

CO2: describe the cellular systems features and components using different operating system-based devices

CO3: explain the packet delivery and handover management methodology through the mobile network layer

CO4: analyze data dissemination and synchronization to develop different mobile applications

Course Articulation Matrix (CAM): U18IN603B MOBILE COMPUTING																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**U18IN603B**.1	**2**	**2**	**1**	**1**	**1**	**-**	**-**	**1**	**1**	**1**	**-**	**1**	**2**	**1**	**2**
CO2	**U18IN603B**.2	**2**	**2**	**2**	**1**	**1**	**-**	**-**	**1**	**1**	**1**	**-**	**1**	**2**	**1**	**2**
CO3	**U18IN603B**.3	**2**	**2**	**2**	**3**	**1**	**-**	**-**	**1**	**1**	**1**	**-**	**2**	**2**	**1**	**2**
CO4	**U18IN603B**.4	**2**	**2**	**3**	**3**	**1**	**-**	**-**	**1**	**1**	**1**	**-**	**2**	**3**	**1**	**3**
U18IN603B		**2**	**2**	**2**	**2**	**1**	-	-	**1**	**1**	1	-	**1.5**	**2.25**	**1**	**2.25**

U18IN603C SENSOR TECHNOLOGY

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

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: diverse concepts of sensor, data acquisition, and sensor charactertics
LO2: optical components of sensor with their circuit and motion detectors
LO3: various sensor and its specifications, how they can be use in fields
LO4: Explore modern approaches for sensing using materials.

UNIT – I (9)

Data acquisition: Sensors, signals and systems, Sensor classification, Unit measurements.
Sensor charactertics: Transfer function, Calibration, Computation of stimulus, Special properties, Dynamic charactertics, Application charactertics.
Physical principles of sensing: Electric charges, fields and potentials, Capacitance, Magnetism, Induction, Resistance, Piezoelectric effect, Pyroelectric effect, Hall effect, Thermoelectric effects, Sound waves, Temperature and Thermal properties of materials ,Heat transfer, Light, Dynamic models of sensor elements.

UNIT - II (9)

Optical components of sensors: Radiometry, Photometry, Windows, Mirrors, Lenses, Fresnel Lenses, Fiber optics and waveguides, Concentrators, Coatings for thermal absorption, Nano-optics.
Interface electronic circuits: Input Characteristics of interface circuits, Amplifiers, Light-to-voltage converters, Excitation circuits, Analog-to-digital converters, Direct digitization, Bridge circuits, Data transmission, Noise in sensors and circuits, Batteries for low-power sensors.
Occupancy and motion detectors: Ultrasonic detector, Microwave motion detectors, Capacitive occupancy detectors, Triboelectric detectors, Optoelectronic motion detectors, Optical presence sensors, Pressure-gradient sensors.

UNIT - III (9)

Position, Displacement and Level: Potentiometric sensors, Capacitive sensors, Inductive and magnetic sensors, Optical sensors, Ultrasonic sensors, Radar sensors, Thickness and level sensors, Pointing devices.
Velocity and Acceleration: Characteristics of capacitive, Piezoresistive, Piezoelectric accelerometers, Thermal accelerometer, Gyroscopes, Gravitational sensors.
Various Sensors: Force, Strain and Tactile sensors, Pressure sensors, Flow sensors, Acoustic sensors.

UNIT - IV (9)

Various Sensors: Humidity sensors, Moisturesensors, Light detectors, Radiation detectors, Temperature sensors, Chemical sensors.
Sensor materials and technologies: Materials, Surface Processing, Microtechnology.

Text Book:

[1] Jacob Fraden, *Handbook of Modern Sensors Physics, Designs, and Applications*, Springer Publications, Fourth Edition, 2010.*(Chapters 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18)*

Reference Books:

[1] D. Patranabis, *Sensor & transducers*, 2nd edition, PHI
[2] H.K.P. Neubert,*Instrument transducers*, Oxford University press.
[3] E.A.Doebelin,*Measurement systems: application & design*, Mc Graw Hill

Course Research Paper: Research paper (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patent: Patent 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 data acquisition in sensors, its charactertics & along with its physical properties to build a system
CO2: identify and understand advanced, optical components and detectors with interface of electronic circuits
CO3: apply how to use various sensors in know with their charactertics like velocity displacement, acceleration.
CO4: discover the various sensors and material required to sense them

Course Articulation Matrix (CAM): U18IN603C SENSOR TECHNOLOGY

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18IN603C.1	**2**	**-**	**-**	**1**	**-**	**-**	**-**	**1**	**1**	**1**	**-**	**2**	**2**	**2**	**-**
CO2	U18IN603C.2	**2**	**2**	**2**	**-**	**-**	**-**	**1**	**1**	**1**	**1**	**1**	**2**	**2**	**2**	**-**
CO3	U18IN603C.3	**2**	**3**	**3**	**1**	**2**	**-**	**-**	**1**	**1**	**1**	**2**	**2**	**2**	**2**	**-**
CO4	U18IN603C.4	**2**	**3**	**3**	**2**	**2**	**2**	**2**	**1**	**1**	**1**	**1**	**2**	**2**	**2**	**-**
U18IN603C		**2**	**2.6**	**2.6**	**1.3**	**2**	2	1.5	1	1	1	1.3	**2**	**2**	**2**	**-**

U18IN604 DESIGN AND ANALYSIS OF ALGORITHMS

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

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on…

LO1: time and space complexity, asymptotic notations, set operations, problem solving with divide and conquer strategy

LO2: greedy and backtracking methods to solve computational problems

LO3: principle of optimality and problem solving with dynamic programming method

LO4: branch and bound method, classes of P,NP,NP-Hard and NP-Complete

UNIT-I (9)

Introduction: Algorithm analysis, Performance analysis, Space complexity and time complexity, Big 'O' notation, Omega notation, Theta notation, Different mathematical approach's for solving time complexity of algorithms

Sets and Disjoint Set Union: Introduction, Union, Find operations

Divide and Conquer: General method, Binary search, Merge sort, Quick sort, Strassen's matrix multiplication

UNIT-II (9)

Greedy Method: General method, Knapsack problem, Job sequencing with deadlines, Optimal storage on tapes, Optimal merge patterns, Single source shortest paths

Back Tracking: General method, N-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 salesperson problem

NP Hard and NP Complete Problems: Basic concepts - Nondeterministic algorithms, The classes NP hard and NP complete; COOK's theorem, NP hard graph problems - Clique decision problem, Node cover decision problem, Traveling sales person decision problem

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Text Book:

[1] E.Horowitz, S.Sahni, S.Rajasekaran, *Fundamentals of Computer Algorithms,* 2nd ed.Hyderabad:Universities Press, 2018*(Chapters:1,2,3,4,5,6,7)*

Reference Books:

[2] Thomas H.Cormen, Charles E.Leiserson, Ronald L.Rivest, Cliford Stein, *Introduction toAlgorithms*, 3rd ed. New Delhi:Prentice-Hall of India, 2010

[3] GajendraSharma,*Design and Analysis of Algorithms*,4thed. Rajput: Khanna Publishing,2019
[4] S.Sridhar, *Design and Analysis of Algorithms*,3rded. UK: Oxford University Press, India, 2015
[5] Mark Allen Weiss, *Data Structures and Algorithm Analysis in Java,* 3rd ed. New Delhi: Pearson,2012.
[6] Rajiv Chopra ,ShipraRaheja, *Design and Analysis of Algorithms*, New Delhi: New AgeInternational Publishers,2019

Course Research Paper: Research paper (Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patent: Patent 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: apply divide and conquer strategy for searching and sorting techniques with performance
CO2: analyze 0/1 Knapsack problem, optimal merge pattern and single source shortest path algorithms using greedy method and N-Queen problem, graph colouring problem using backtracking method
CO3: design of algorithms using dynamic programming approach to find the shortest path
CO4: analyze and categorize of NP-Hard and NP-Complete problems for the classes P, NP ,NP

Course Articulation Matrix (CAM):U18IN604 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	PSO 1	PSO 2	PSO 3
CO1	**U18IN604.1**	3	3	2	2	1	-	-	1	1	1	-	1	2	1	2
CO2	**U18IN604.2**	3	3	3	2	1	-	-	1	1	1	-	1	2	1	2
CO3	**U18IN604.3**	3	3	3	2	1	-	-	1	1	1	-	1	2	1	2
CO4	**U18IN604.4**	2	2	2	2	1	-	-	1	1	1	-	1	2	1	2
U18IN604		**2.75**	**2.75**	2.5	2.5	2	-	-	1	1	1	-	1	2	1	2

U18IN605 ARTIFICIAL INTELLIGENCE FOR IOT

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

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: fundamentals of Artificial Intelligence, agents, problem solving approaches & searching techniques
LO2: fundamentals of Machine learning, regression and decision tree learning, cluster analysis
LO3: instance based learning, Bayesian learning and deep learning
LO4: convolutional neural networks, recursive neural networks and deep learning application

UNIT – I (9)

Data Access and Distribution Processing for IoT: Data format, Importance of processing of IoT, Processing topologies, IoT device design and selection considerations, Processing offloading, Data access and distributed Processing for IoT, Role of AI in IoT
Artificial Intelligence (AI): Definition, Intelligent agents, perception and language processing, problem solving, heuristic searching, game playing, logical reasoning, Forward vs Background, knowledge representation

UNIT - II (9)

Machine Learning(ML): Introduction, Advantages, Challenges, types
Regression and Decision Tree Learning: Linear regression, Logistic regression, The basic decision tree learning algorithm
Cluster Analysis: Unsupervised learning, Hierarchical clustering, K-means clustering, Hierarchical clustering, DBSCAN clustering in ML, Density based clustering, Spectral clustering, K-medoids clustering

UNIT - III (9)

Instance based learning: K- nearest neighbor learning, Locally weighted regression, Radial basis function, Case-based reasoning
Bayesian Learning: Bayes theorem and concept learning, Maximum likelihood and least-squared error hypothesis, Naïve bayes classifier, Bayesian belief networks
Introduction to Deep learning: Architecture, Historical trends, Deep feed forward networks, Gradient based learning, Hidden units, Back propagations and differentiation algorithms

UNIT - IV (9)

Convolutional Neural Networks: Overview of CNN, Pooling layer, padding, types of padding in CNN layer
Recursive Neural networks: Overview of RNN Architecture, and implementation of RNN
Artificial Intelligence of Things (AIoT) for Smart Cities: Components of smart city, processing of different types of data, Time series modeling, Preprocessing textual data, Data

augmentation for images, Handling videos files, Audio files as input data

Text Books:

[1] Stuart Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach*, 3rd ed., New Delhi: Prentice Hall Series in AI, 2010.*(Chapter:2)*

[2] Stephen Marsland, Taylor & Francis, *Machine Learning: An Algorithmic Perspective*, CRC, ISBN -13: 978-1420067187, 2009.*(Chapter: 3,4,5,6,7)*

[3] Ian Goodfellow and YoshuaBengio and Aaron Courville, *Deep Learning*, 1st ed., MIT Press, 2017. *(Chapter:8,,9,10)*

Reference Books:

[1] Jason Bell, *Machine Learning: Hands-On for Developers and Technical Professionals*, John Wiley & Sons, 1st ed., ISBN-13: 978-1118889060, 2014.

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

[3] William W Hsieh, *Machine Learning Methods in the Environmental Sciences, Neural Networks*, Cambridge University Press, ISBN -13: 978-0805822410, 2009.

[4] Anil K. Jain, *Fundamentals of Image Processing*, 1st ed., Chennai: Pearson, 2015.

Course Research Paper: Research paper (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patent: Patent 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: apply fundamentals of artificial intelligence for various IoT applications
CO2: design and analyze IoT applications using regression and cluster analysis algorithms
CO3: design and analyze IoT applications using Bayesian and deep learning algorithms
CO4: design and analyze IoT application using CNN, RNN and image processing applications

Course Articulation Matrix (CAM):U18IN605 ARTIFICIAL INTELLIGENCE FOR IOT

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18IN605.1	2	2	2	2	1	-	-	1	1	1	-	1	2	2	2
CO2	U18IN605.2	3	3	3	3	1	-	-	1	1	1	-	3	2	2	2
CO3	U18IN605.3	3	3	3	3	1	-	-	1	1	1	-	3	2	2	2
CO4	U18IN605.4	3	3	3	3	1	-	-	1	1	1	-	3	2	2	2
U18IN605		2.75	2.75	2.75	2.75	1	-	-	1	1	1	-	2.5	2	2	2

U18IN606 INDUSTRIAL IOT

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

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: basic concepts of industry 4.0, IIoT and reference architecture

LO2: off-site and On-site technologies and industrial data transmission

LO3: data acquisition, machine learning and data science applications in industry and case studies

LO4: case studies like traffic management, health care, machine predictive maintenance in the industry

UNIT – I (9)

Industry 4.0: Introduction, Design requirements, Drivers, Sustainability assessment, Smart business perspective, Cyber security, impact of industry 4.0

Industrial Internet of Things (IIOT): Introduction, Industrial internet systems, Industrial sensing, Industrial processes

Business model and Reference Architecture of IIoT: Introduction, Business model of IoT & IIoT, Reference architecture of IoT & IIoT, IIRA, Key performance indicators for occupational safety and health, RAMI 4.0

UNIT – II (9)

Off-site Key Technologies: Introduction, Cloud computing, Fog computing

On-site key Technologies: Introduction, Augmented reality, Virtual reality, Big data and advanced analytics, smart factories, Lean manufacturing systems

Industrial Data Transmission: Introduction, Foundation fieldbus, Profibus, HART,Interbus, Bitbus, CC-link, Modbus, Batibus, DigitalSTROM, Controler area network, DeviceNet, LonWorks, ISA 100.11a, Wireless HART, LoRa and Lora WAN, Recent and upcoming technologies

UNIT – III (9)

Industrial Data Acquisition: Distributed control system, PLC, SCADA

IIoT Analytics: Necessity of analytics, IIOT analytics

Machine Learning and Data Science applications in the Industry: Categorization and applications of ML in industry, Data science in industry, Deep learning and its applications in industry

Case Studies: Inventory management and quality control, Manufacturing industry, Automotive industry, Mining industry

UNIT - IV (9)

Case Studies: IoT enabled Smart traffic control system, IoT framework for health care environment, An effective IoT drainage system for detection of drainage pipes, Predictive

maintenance for retail machine industries, Integrating ANN and IoT for Predictive maintenance machine industry, Society 4.0, Society 5.0

Text Books:

[1] SudipMisra, Chandan Roy, AnandarupMukharjee, *Introduction to Industial Internet of Things and Industry 4.0*, Oxon: CRC press, Taylor & Francis group, 2021. (Chapters: 1,2,3,4,5,6,7,8,9,10)

[2] A. Suresh, MalarvizhiNandagopal, Pethuru Raj, E.A. Neeba, Jenn-Wei Lin, *Industrial IoT Application Architecture and Use Cases*, Sulte: CRC press, Taylor & Francis group, 2020. (Chapters: 11)

Reference Book:

[1] Alasdair Gilchrist, *Industry 4.0:The industrial Internet of Things*, Thailand: Apress, 2016.

Course Research Paper: Research paper (indexed Journals/conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patent: Patent 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 will be able to…

CO1: Identify the drivers & industrial sensing and analyze the business & reference architecture IIoT
CO2: analyze various off-site and on-site key technologies associated with IIoT
CO3: design and analyze the industrial application using machine learning and data science
CO4: design IIOT solutions to real world problems such as healthcare, machine predictive maintenance etc.

Course Articulation Matrix (CAM):U18IN606 INDUSTRIAL IOT

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	U18IN606	**2**	**2**	**2**	**2**	**2**	**-**	**-**	**1**	**1**	**1**	**-**	**1**	**2**	**2**	**2**
CO2	U18IN606	**2**	**2**	**2**	**2**	**2**	**-**	**-**	**1**	**1**	**1**	**-**	**3**	**2**	**2**	**2**
CO3	U18IN606	**2**	**2**	**2**	**2**	**2**	**-**	**-**	**1**	**1**	**1**	**-**	**3**	**2**	**2**	**2**
CO4	U18IN606	**2**	**2**	**2**	**2**	**2**	**-**	**-**	**1**	**1**	**1**	**-**	**3**	**2**	**2**	**2**
U18IN606		**2**	**2**	**2**	**2**	**2**	-	-	1	1	1	-	**2.5**	**2**	**2**	**2**

U18IN607 ADVANCED JAVA PROGRAMMING LABORATORY

Class:B. Tech.VI-Semester **Branch:** Computer Science & Engineering (IoT)

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: developing GUI based programs using the concept of swings
LO2: the concepts of generics and collections
LO3: sorting user-defined data using Comparable& Comparator interfaces and performing the unit testing with JUnit
LO4: lambda expressions and Stream API

List of Experiments

Experiment-I

1. Create aJFrameprogram to display "Good Morning" if current time is between "6 AM to 12 PM" and "Good Afternoon" if the current time is between "12 PM to 6PM", and "Good Evening" if the current time is between "6PM to 12AM"
2. Create a JFrame program to performbasic arithmetic calculationson given two numbers with the help of button events

Experiment-II

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

Experiment -III

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

Experiment -IV

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

Experiment -V

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

Experiment -VI

1. Write a java program to perform following operations on ArrayList, LinkedList, HashSet and LinkedHashSet
    i. Insertion
    ii. Deletion
    iii. Traversing using traditional-for, for-each, Iterator and ListIterator
    iv. Display the elements in reverse order
2. Write a program that will have a Vector which is capable of storing Employee objects. Use an Iterator and enumeration to list all the elements of the Vector

Experiment –VII

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

Experiment -VIII

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

Experiment-IX

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

Experiment-X

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

Experiment-XI

1. Write a java program to demonstrate lambda expression with no parameter

2. Write a java program to demonstrate lambda expression with single and multiple parameters
3. Write a java program to iterate the List and Map using lambda expressions
4. Create two threads using lambda expressions, where one thread displays even numbers for every half second and the other thread displays odd numbers for every second

Experiment-XII

1. Write a java program to demonstrate following methods using streams on a List
   a) filter **b)** sorted **c)** distinct **d)** limit **e)** count
2. Write a java program to read a string and extract upper case characters, lower case characters & digits into differentArrayListobjects using streamAPI and display them

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Laboratory Manual:

[1] Advanced Java Programming Laboratory Manual, Dept. of CSE(Networks), KITSW.

Reference Books:

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

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

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

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

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

Course 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 GUI programs by using the concept of swings

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

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

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

Course Articulation Matrix (CAM): U18IN607 ADVANCED JAVA PROGRAMMING LABORATORY																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18IN607.1	2	2	2	1	2	-	-	1	2	1	-	2	3	1	3
CO2	U18IN607.2	2	2	2	1	-	-	-	1	2	1	-	2	3	1	2
CO3	U18IN607.3	2	2	2	1	2	-	-	1	2	1	-	2	3	3	3
CO4	U18IN607.4	2	2	2	1	-	-	-	1	2	1	-	2	3	1	2
U18IN607		2	2	2	1	2	-	-	1	1	1	-	2	3	1.5	2.5

U18IN608 ARTIFICIAL INTELLIGENCE FOR IOT LABORATORY

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

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 student's knowledge in/on…

LO1: fundamentals of numpy, pandas, matplotlib
LO2: fundamentals of Machine learning, regression and decision tree learning, cluster analysis
LO3: fundamentals of instance based learning, Bayesian learning and deep learning
LO4: convolutional neural networks, recursive neural networks and deep learning application

List of Experiments

Experiment-I

1. Install Python IDEsoftware(*Anaconda,Jupyter,notebook,*etc...).
2. Install and setup numpy environment.
3. ProgramsonNumpy:Numpyarrayandoperationson Arrays*(Indexing, Masking,Filtering,Transposing,Sorting,Ordering, Concatenatingand Aggregating).*

Experiment-II

1. Installandsetup*pandas*and*matplotlib*environment
2. ProgramsonPandas:
   a) *Createaseriesfromann-darray.*
   b) *Readdatafromvariousfiles(.csv, xls,etc…)usingpandas.*
   c) *Indexingandselectingdata.*
   d) *DataFrame.*

Experiment-III

Note:Consideryourowndatasetor download dapublicdatasetofmachinelearning

Usethefollowingscenariosforvisualizingthedata:

a) *BudgetaLongDrive*
b) *CompareUnemploymentRateswithGainsinStockMarket*
c) *CompareSalariesofBatsmenwiththeAverageRunsTheyScoreperGame*
d) *ComparetheDatesinaMonthwiththeMonthlySalary*

1 Developa program to draw a simple lineplot.
2 Developa program todraw ahistogram plot.
3 Customizeplotsandexperimentwithdifferentmapsplots.

Experiments-IV

1 InstallationprocedureforPythonlibrary:*scikit-learn*
2 DevelopaPythoncodeonLinearRegressionalgorithmunderclassification.(Sampleid

easto workoutwithLinearRegressionalgorithmare:

a. *CompareUnemploymentRateswithGainsinStockMarket*
b. *BudgetaLongDrive*
c. *CompareSalariesofBatsmenwiththeAverageRunsTheyScoreperGame*
d. *ComparetheDatesinaMonthwiththeMonthlySalary*
e. *CompareAverageGlobalTemperaturesandLevelsofPollution*
f. *CompareLocalTemperaturewiththeAmountofRain*
g. *CompareAverageageofHumanswiththeAmountofTheirSleep*
h. *ComparethePercentageofSedimentsinRiverwithitsDischarge*
i. *CompareBudgetsofNationalFilmAwards-nominatedMovieswiththenumberMovies*
j. *WinningTheseAwards*

Considertheideasgivenaboveoranyofyourown.DeveloptheMachineLearning-LinearRegressiontechniquecodeusingPython.

Experiments-V

1 DevelopaPythoncodeon*Email-SpamDetection*underClassificationusingNaïve-bayesalgorithm.*(Note: Consideryourown datasetor downloadapublic dataset to ofmachinelearning)*
2 DevelopaPythoncodeto*Predictthe loaneligibility process*fromgivendatausingDecision–Treealgorithm underClassification.
(SampleideastobedevelopedwiththeuseofDecisionTreesareasfollows:

a. *A person eligible for a loan or not based on his financial status, family member, salary,etc.can be decided ona decisiontree.*
b. *Creditcardfrauds, bankschemesandoffers, loandefaults.*
c. *A patient is suffering from a disease or not based on conditions such as age, weight, sexandotherfactors.*
d. *Deciding the effect of the medicine based on factors such as composition, period ofmanufacture,etc.*
e. *In colleges and universities, the shortlisting of a student can be decided based uponhis/hermeritscores,attendance,overallscore etc.*
f. *Promotionalstrategyoffaculties presentintheuniversities*

Consideranyoneoftheabovementionedideasortakeyourown,andimplementusingMachineLearning*Decision–TreeAlgorithmusingPython*.

Experiments-VI

1. Develop a PythoncodeusingMachineLearning*Clustering*algorithm.
2. Installationof*keras*,*tensorflow*,*scikit-learn*and*datavisualization*libraries

Consideryourownexample(s)oridea(s)todevelopaPythoncodeusingNeuralNetworks.(Exampleideasare*Imagerecognition*,*ObjectDetection*,*Imageclassification*etc…)

3. DevelopaPythoncodetodemonstrate*Backpropagation*techniqueinNeuralnetworks.

Experiments-VII

1. Demonstrate Convolutional Neural Networks with suitable example.

Experiments-VIII(Clustering algorithm & Convolutional Neural networks)

1. DevelopaPythoncodetodemonstrate**CNN**algorithm with suitable example.

Experiments-IX(Clusteringalgorithm & ConvolutionalNeuralnetworks)

1. DevelopaPythoncodetodemonstrate RNN algorithm with suitable example.

Experiments-X(Clusteringalgorithm & ConvolutionalNeuralnetworks)

1. Demonstratedigital image processing using deep learning with suitable example.

Experiments-XI

1. Demonstrate time series modelling for smart city applications.

Experiments-XII

1. Demonstrate the handling video and audio files with suitable example.

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] StephenMarsland, 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 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, student's will be able to…

CO1: *develop python code for implementing numpy, pandas, matplotlib libraries*

CO2: develop python code for implementingregression and cluster analysis algorithms used in IoT applications

CO3: develop python code for implementing Bayesian and deep learning algorithms used in IoT applications

CO4:develop python code for implementing CNN, RNN and image processing applications used in IoTapplications

Course Articulation Matrix (CAM):U18IN608 ARTIFICIAL INTELLIGENCE FOR IOT LABORATORY																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18IN608.1	2	2	2	2	2	-	-	1	1	1	-	1	2	2	2
CO2	U18IN608.2	2	2	2	2	2	-	-	1	1	1	-	3	2	2	2
CO3	U18IN608.3	2	2	2	2	2	-	-	1	1	1	-	3	2	2	2
CO4	U18IN608.4	2	2	2	2	2	-	-	1	1	1	-	3	2	2	2
U18IN608		2	2	2	2	2		-	1	1	1		2.5	2	2	2

U18IN609 INDUSTRIAL IOT LABORATORY

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

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 student's knowledge in/on…

LO1: industrial IoT equipment, cisco packet tracer
LO2: smart city application such as home automation, traffic management etc.
LO3: smart agriculture applications such as water management, disease prediction, etc.
LO4: greenhouse forming

List of Experiments

Experiment-1

1. Introduction to industrial IoT laboratory
2. Demonstration of CISCO packet tracer
3. Demonstrating IIoT simulation software's

Experiment-II

4. Design and develop smart home automation system

Experiment-III

5. Design and develop whether forecasting system

Experiment-IV

6. Design and develop environmental monitoring system

Experiment-V

7. Design and develop fire protection system

Experiment-VI

8. Design and develop traffic management system

Experiment-VII

9. Design and development of water management in irrigation system

Experiment-VIII

10. Design and develop soil monitoring system

Experiment-IX

11. Design and develop climate monitoring system

Experiment-X

12. Design and develop crop growth monitoring system

Experiment-XI

13. Design and develop disease prediction and analysis system for smart farming

Experiment-XII

14. Design and develop Greenhouse monitoring system

Laboratory Manual:

[1] Industrial IoT Laboratory Manual, prepared by the faculty of Departmentof CSE(Networks), KITS Warangal.

Text Books:

[1] Sudip Misra, Chandan Roy, Anandarup Mukharjee, *Introduction to Industial Internet of Things and Industry 4.0*, Oxon: CRC press, Taylor & Francis group, 2021.

[2] A. Suresh, Malarvizhi Nandagopal, Pethuru Raj, E.A. Neeba, Jenn-Wei Lin, *Industrial IoT Application Architecture and Use Cases*, Sulte: CRC press, Taylor & Francis group, 2020.

[3] Alasdair Gilchrist, *Industry 4.0:The industrial Internet of Things*, Thailand: Apress, 2016.

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, student's will be able to…

CO1: Identify equipment of IIoT and demonstration of CISCO packet tracer
CO2: build home automation, traffic management system
CO3: build smart irrigation system and plant disease prediction system
CO4: build greenhouse farming model

Course Articulation Matrix (CAM):U18IN609 INDUSTRIAL IOT LABORATORY																
Course Outcomes		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	U18IN609.1	**2**	**2**	**2**	**2**	**2**	**-**	**-**	**1**	**1**	**1**	**-**	**1**	**2**	**2**	**2**
CO2	U18IN609.2	**2**	**2**	**2**	**2**	**2**	**-**	**-**	**1**	**1**	**1**	**-**	**3**	**2**	**2**	**2**
CO3	U18IN609.3	**2**	**2**	**2**	**2**	**2**	**-**	**-**	**1**	**1**	**1**	**-**	**3**	**2**	**2**	**2**
CO4	U18IN609.4	**2**	**2**	**2**	**2**	**2**	**-**	**-**	**1**	**1**	**1**	**-**	**3**	**2**	**2**	**2**
U18IN609		2	**2**	**2**	**2**	**2**	**-**	-	1	1	1	-	2.5	**2**	**2**	**2**

U18IN610 MINI PROJECT

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

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

CourseLearningObjectives(LOs):
Thiscoursewilldevelopstudents'knowledgeon/in…
LO1:implementingaprojectindependentlybyapplyingknowledgetopractice
LO2:literaturereviewandwell-documented reportwriting
LO3:creatingPPTsandeffectivetechnicalpresentationskills
LO4:writingtechnicalpaperinscientificjournalstyle&formatandcreatingvideopitch

Student has to take up independent mini project on innovative ideas, innovative solutions to common problems using theirknowledge relevant to courses offered in their program of study, which would supplement and complement the programassigned toeachstudent.

Guidelines:

1. TheHoDshallconstitutea*DepartmentMiniProjectEvaluationCommittee(DMPEC)*
2. DMPECshallallotafacultysupervisortoeachstudentforguidingon(i)selectionoftopic(ii)literaturesurveyandworktobecarriedout(iii)preparingareportinproperformat and(iv)effectiveminiprojectoralpresentation
3. ThereshallbeonlyContinuousInternalEvaluation(CIE)forminiproject
4. TheCIE forseminarisasfollows:

Assessment	Weightage
MiniProjectSupervisorAssessment	20%
Working model/process/software package/system developed	20%
MiniProjectreport	20%
MiniProjectpaper	10%
Videopitch	10%
*DMPEC*Assessment:*OralpresentationwithPPTan dviva-voce*	20%
TotalWeightage	100%

Note: Itismandatoryforthestudenttoappearfororalpresentation and viva-voce toqualifyforcourseevaluation

(a) **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

(b) **WorkingModel**:Eachstudentisrequestedtodevelopaworkingmodel/process/systemonthechosenworkanddemonstratebeforethe*DMPEC*asperthedatesspecifiedby*DMPEC*

(c) **Report:**Eachstudentisrequiredtosubmitawell-documentedreportonthechosenseminartopicasperthe formatspecifiedby*DMPEC*

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

(e) **Presentation:** Each student should prepare PPT with informative slides and make an effective oral presentationbeforethe*DMPEC*asperthescheduleNotifiedbythedepartment

(f) **VideoPitch:**EachstudentshouldcreateapitchVideo,whichisavideopresentationonhis/herminiproject.Videopitchshouldbenolongerthan5minutesbykeepingthepitchconciseandtothepoint, whichshallalsoincludekeypointsabouthis/herbusinessidea/plan(*ifany*)andsocialimpact.

(g) ThestudenthastoregisterfortheMiniprojectassupplementaryexaminationinthefollowingcases:
- i. he/sheisabsentfororalpresentationandviva-voce
- ii. he/shefailstosubmitthereportinprescribedformat
- iii. he/shefailstofulfilltherequirementsofMiniprojectevaluationasperspecifiedguidelines

(h) i) The CoE shall send a list of students registered for supplementary to the HoD concerned

(i) 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

CourseLearningOutcomes(COs):

Oncompletionof thiscourse,studentswillbeableto…

CO1:applyknowledgetopracticetodesign&conductexperimentsandutilizemoderntoolsfordevelopingworkingmodels/process/systemleading toinnovation & entrepreneurship

CO2:demonstratethecompetenciestoperformliteraturesurvey,identifygaps,analyzetheproblemandprepareawell-documentedMiniprojectreport

CO3:make an effective oral presentation throughinformative PPTs, showingknowledge on the subject&sensitivitytowardssocialimpactoftheMiniproject

CO4:writea"Miniprojectpaper"inscientificjournalstyle&formatfromthepreparedMiniprojectreportandcreateavideopitch onMiniproject

Course Articulation Matrix(CAM):U18IN610 MINI PROJECT

Course Outcomes		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	U18IN610.1	1	1	2	2	1	1	1	2	2	2	1	2	2	2	2
CO2	U18IN610.2	1	1	-	2	-	-	-	2	2	2	-	2	2	2	2
CO3	U18IN610.3	-	-	-	-	-	-	1	2	2	2	-	2	2	2	2
CO4	U18IN610.4	-	-	-	-	-	-	-	2	2	2	-	2	2	2	2
U18IN609		**1**	**1**	**2**	**2**	**1**	**1**	1	2	2	2	1	**2**	**2**	**2**	**2**