MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE

MADANAPALLE

(UGC-AUTONOMOUS)

www.mits.ac.in

COMPUTER SCIENCE & ENGINEERING (IoT)

Course Structure

For the students admitted to

B. Tech. Regular Four Year Degree Programme from the academic year 2020-21

and

B. Tech. Lateral Entry Scheme from the academic year 2021-22

B.TECH. COMPUTER SCIENCE & ENGINEERING (IoT)

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

Branch: COMPUTER SCIENCE & ENGINEERING (IoT)

Total Credits	160 Credits for 2020(Regular) & 121 Credits for 2021(Lateral Entry) Admitted Batch
	163 Credits for 2021(Regular) & 124 Credits 2022(Lateral Entry) Admitted Batch onwards

I. Induction Program and Holistic Development Activities

Sl.No	Title	Duration
1	Induction Program (Mandatory)	Three weeks' duration at the start of First Year (Refer Annexure - I)
2	Holistic Development Activities (Every Student from Semester 2 – 8 should register for at least one activity)	Three hours per week (Activity list is enclosed in Annexure - I)
3	Virtual Laboratory (Students are encouraged to choose and register for any of the Virtual laboratories he /she is interested)	As specified by the Virtual Laboratory

Dept. of Computer Science & Engineering (IoT)

R20 - Curriculum Structure

I Year I Semester

S. No.	Category	Course Code	Course Title	Hours Per Week				Credits
				L	T	P	Total	
1	HSMC	20ENG101	Professional English	3	0	0	3	3
2	BSC	20MAT101	Engineering Calculus	3	1	0	4	4
3	BSC	20CHE101	Engineering Chemistry	3	0	0	3	3
4	ESC	20ME101	Engineering Graphics	2	0	2	4	3
5	ESC	20CSE101	Programming for Problem Solving (Python)	2	0	3	5	3.5
6	BSC	20CHE201	Chemistry Laboratory	0	0	3	3	1.5
7	ESC	20CSE202	Engineering and IT Workshop	0	0	3	3	1.5
Total				**13**	**1**	**11**	**25**	**19.5**

I Year II Semester

S. No.	Category	Course Code	Course Title	Hours Per Week				Credits
				L	T	P	Total	
1	BSC	20MAT110	Linear Algebra	3	0	0	3	3
2	BSC	20PHY102	Applied Physics	3	1	0	4	4
3	ESC	20EEE101	Basic Electrical Engineering	3	1	0	4	4
4	ESC	20CSE102	C Programming and Data Structures	3	0	0	3	3
5	HSMC	20ENG201	English for Professional Purposes Laboratory	0	0	2	2	1
6	BSC	20PHY201	Physics Laboratory	0	0	3	3	1.5
7	ESC	20EEE201	Electrical Engineering Laboratory	0	0	3	3	1.5
8	ESC	20CSE201	C Programming and Data Structures Laboratory	0	0	3	3	1.5
Total				**12**	**2**	**11**	**25**	**19.5**

(L = Lecture, T = Tutorial, P = Practical)

Dept. of Computer Science & Engineering (IoT)

II Year I Semester

S. No.	Category	Course Code	Course Title	Hours Per Week				Credits
				L	T	P	Total	
1	BSC	20MAT111	Probability and Statistics for Computer Science	3	0	0	3	3
2	PCC	20CSO103	Real Time Operating Systems	3	0	0	3	3
3	PCC	20CSO104	Analog and Digital Electronics	3	0	0	3	3
4	PCC	20CSO105	Data Structures and Algorithms	2	1	0	3	3
5	PCC	20CSO106	Object Oriented Programming - Java	2	1	0	3	3
6	PCC	20CSO203	Analog and Digital Electronics Laboratory	0	0	3	3	1.5
7	PCC	20CSO204	Data Structures and Algorithms Laboratory	0	0	3	3	1.5
8	PCC	20CSO205	Object Oriented Programming - Java Laboratory	0	0	3	3	1.5
9	SC		Skill Oriented Course - I (Refer ANNEXURE IV)	1	0	2	3	2
10	MC	20CHE901	Environmental Science	2	0	0	2	0
Total				**16**	**2**	**11**	**29**	**21.5**

II Year II Semester

S. No.	Category	Course Code	Course Title	Hours Per Week				Credits
				L	T	P	Total	
1	HSMC	20HUM101	Economics and Financial Accounting for Engineers	3	0	0	3	3
2	BSC	20MAT112	Discrete Mathematical Structures	3	0	0	3	3
3	ESC	20CSO107	Internet of Things	3	0	0	3	3
4	PCC	20CSO108	Database Management Systems	2	1	0	3	3
5	PCC	20CSO109	Communication Networks	3	0	0	3	3
6	PCC	20CSO206	Internet of Things Laboratory	0	0	3	3	1.5
7	PCC	20CSO207	Database Management Systems Laboratory	0	0	3	3	1.5
8	PCC	20CSO208	Communication Networks Laboratory	0	0	3	3	1.5
9	SC		Skill Oriented Course – II (Refer ANNEXURE IV)	1	0	2	3	2
10	MC	20HUM901	Indian Constitution	2	0	0	2	0
Total				**17**	**1**	**11**	**29**	**21.5**

L = Lecture, T = Tutorial, P = Practical)

Dept. of Computer Science & Engineering (IoT)

III Year I Semester

S. No.	Category	Course Code	Course Title	Hours Per Week				Credits
				L	T	P	Total	
1	PCC	20CSO110	Sensors and Signal Conditioning	3	0	0	3	3
2	PCC	20CSO111	Computer Organization and Architecture	3	0	0	3	3
3	PCC	20CSO112	Data Science for IoT	3	0	0	3	3
4	OE		Open Elective-I	3	0	0	3	3
5	PE		Professional Elective-I	3	0	0	3	3
6	PCC	20CSO209	Sensors and Signal Conditioning Laboratory	0	0	3	3	1.5
7	PCC	20CSO210	Data Science for IoT Laboratory	0	0	3	3	1.5
8	SC		Skill Oriented Course – III (Refer ANNEXURE IV)	1	0	2	3	2
9	MC	20CE901	Disaster Management	2	0	0	2	0
10	PROJ	20CSO701	Summer Internship-1*	0	0	3	3	1.5
Total				**18**	**0**	**11**	**29**	**21.5**

* 2 Months internship during 2nd year summer vacation and to be evaluated in III Year I Semester

III Year II Semester

S. No.	Category	Course Code	Course Title	Hours Per Week				Credits
				L	T	P	Total	
1	PCC	20CSO113	Embedded Systems	3	0	0	3	3
2	PCC	20CSO114	Web Technologies	3	0	0	3	3
3	PCC	20CSO115	Big Data Analytics	3	0	0	3	3
4	OE		Open Elective-II	3	0	0	3	3
5	PE		Professional Elective-II	3	0	0	3	3
6	PCC	20CSO211	Embedded Systems Laboratory	0	0	3	3	1.5
7	PCC	20CSO212	Web Technologies Laboratory	0	0	3	3	1.5
8	PCC	20CSO213	Big Data Analytics Laboratory	0	0	3	3	1.5
9	SC		Skill Oriented Course IV (Refer ANNEXURE IV)	1	0	2	3	2
10	MC	20HUM902** /20HUM102#	Universal Human Values	2/3	0	0	2/3	0/3
Total				**18/19**	**0**	**11**	**29/30**	**21.5/24.5**

** 20HUM902 Universal Human Values is offered as non-credit mandatory course for 2020 (Regular) & 2021 (Lateral Entry) Admitted Batch

20HUM102 Universal Human Values is offered as three credit course for 2021 (Regular) & 2022(Lateral Entry) Admitted Batch onwards

(L = Lecture, T = Tutorial, P = Practical)

Tentative Curriculum Structure from IV Year Onwards

IV Year I Semester

S. No.	Category	Course Code	Course Title	Hours Per Week				Credits
				L	T	P	Total	
1	PE		Professional Elective-III	3	0	0	3	3
2	PE		Professional Elective-IV	3	0	0	3	3
3	PE		Professional Elective-V	3	0	0	3	3
4	OE		Open Elective-III	3	0	0	3	3
5	OE		Open Elective-IV	3	0	0	3	3
6	OE-HSMC		Open Elective-V (Taken from Humanities & Social Science)	3	0	0	3	3
7	SC		Skill Oriented Course - V (Refer ANNEXURE IV)	1	0	2	3	2
8	PROJ	20CSO702	Summer Internship-2*	0	0	6	6	3
Total				**19**	**0**	**8**	**27**	**23**

* 2 Months internship during 2nd year summer vacation and to be evaluated in IV Year I Semester

IV Year II Semester

S. No.	Category	Course Code	Course Title	Hours Per Week				Credits
				L	T	P	Total	
1	PROJ	20CSE703	Project Work, Seminar and Internship in Industry (6 months)	0	0	24	24	12
Total				**0**	**0**	**24**	**24**	**12**

(L = Lecture, T = Tutorial, P = Practical)

ANNEXURE - I

THREE WEEK MANDATORY INDUCTION PROGRAMME

- Yoga and Meditation
- Sports and Games
- NSS
- NCC
- MITS Social Responsibility
- ClubManagement module
- Design Thinking
- Spoken and Written Communication

- *Proficiency modules*
    - Basic Computer Proficiency
    - Interpersonal Skills
    - Computer Graphics
    - Web Programming
    - Mobile Apps
    - Vocabulary Enhancement

HOLISTIC DEVELOPMENT ACTIVITIES

Description of Activities

1. Physical and Health
2. Culture
3. Literature and Media
4. Social Service
5. Self-Development
6. Nature and Environment
7. Innovation

ANNEXURE - II

OPEN ELECTIVE – I (To be offered under MOOC's Category from SWAYAM – NPTEL)			
Sl. No.	**Course Code**	**Course Title**	**Course Offered by Department of**
1	20HUM3M01	Project Management for Managers	Management Studies
2	20HUM3M02	Ethics in Engineering Practice	Management Studies
3	20CE3M01	Integrated Waste Management for Smart City	Civil
4	20CE3M02	Soil and Water Conservation Engineering	Civil
5	20CE3M03	Plastic Waste Management	Civil
6	20CE3M04	Safety in Construction	Civil
7	20ME3M01	Introduction to Industry 4.0 and Industrial Internet of Things	Mechanical
8	20ME3M02	Operations Management	Mechanical
9	20ME3M03	Design Thinking and Innovation	Mechanical
10	20EEE3M01	Non-Conventional Energy Sources	EEE
11	20EEE3M02	Design of Photovoltaic Systems	EEE
12	20ECE3M01	Microprocessors and Interfacing	ECE
13	20ECE3M02	Microprocessors and Microcontrollers	ECE
14	20IE3M01	Intellectual Property Rights and Competition Law	Multidisciplinary
15	20IE3M02	Introduction to Research	Multidisciplinary
16	20IE3M03	Roadmap for Patent Creation	Multidisciplinary
Any new Interdisciplinary Course offered by SWAYAM NPTEL can be appended in future.			

Dept. of Computer Science & Engineering (IoT)

OPEN ELECTIVE – II (To be offered under Conventional Mode)			
Sl. No.	**Course Code**	**Course Title**	**Course Offered by Department of**
1	20MAT301	Advanced Numerical Methods	Mathematics
2	20MAT302	Engineering Optimization	Mathematics
3	20PHY301	Optical Physics and its Applications	Physics
4	20PHY302	LASER Physics and Advanced LASER Technology	Physics
5	20CHE301	Introduction to Petroleum Industry	Chemistry
6	20CHE302	Green Chemistry and Catalysis for Sustainable Environment	Chemistry
7	20CE301	Ground Improvement Techniques	Civil
8	20CE302	Environmental Impact Assessment	Civil
9	20CE303	Watershed Management	Civil
10	20ME301	Materials Science for Engineers	Mechanical
11	20ME302	Elements of Mechanical Engineering	Mechanical
12	20EEE301	Industrial Electrical Systems	EEE
13	20EEE302	Introduction to MEMS	EEE
14	20ECE301	Bio-Medical Electronics	ECE
15	20ECE302	VLSI Design	ECE
Any new Interdisciplinary Course offered by SWAYAM NPTEL can be appended in future.			

OPEN ELECTIVE – III (To be offered under MOOC's Category from SWAYAM – NPTEL)			
Sl. No.	**Course Code**	**Course Title**	**Course Offered by Department of**
1	20CE3M04	Remote Sensing and GIS	Civil
2	20CE3M05	Wastewater Treatment and Recycling	Civil
3	20ME3M04	Power Plant Engineering	Mechanical
4	20ME3M05	Mechatronics and Manufacturing Automation	Mechanical
5	20EEE3M03	Introduction to Smart Grid	EEE
6	20ECE3M05	Introduction to Embedded Systems	ECE
7	20ECE3M06	Embedded System Design with ARM	ECE
Any new Interdisciplinary Course offered by SMAYAM NPTEL can be appended in future			

Dept. of Computer Science & Engineering (IoT)

OPEN ELECTIVE – IV (To be offered under Conventional Mode)			
Sl. No.	**Course Code**	**Course Title**	**Course Offered by Department of**
1	20MAT303	Graph Theory	Mathematics
2	20MAT304	Mathematical Modelling and Numerical Simulation	Mathematics
3	20PHY303	Thin Film Technology and its Applications	Physics
4	20CHE303	Introduction to Nano Science and Technology	Chemistry
5	20CHE304	Computational Methods in Materials Science and Engineering	Chemistry
6	20CE304	Green Building and Energy Conservation	Civil
7	20CE305	Environmental Engineering	Civil
8	20ME303	Internet of Manufacturing Things	Mechanical
9	20ME304	Total Quality Management	Mechanical
10	20ME305	Entrepreneurship	Mechanical
11	20EEE303	Robotics	EEE
12	20EEE304	Electrical Safety	EEE
13	20ECE303	Nano Electronics	ECE
Any new Interdisciplinary Course offered by SWAYAM NPTEL can be appended in future.			

OPEN ELECTIVE – V (HUMANITIES) (To be offered under Conventional Mode)			
Sl. No.	**Course Code**	**Course Title**	**Course Offered by Department of**
1	20HUM301	Principles of Management	Humanities
2	20HUM302	Human Resource Development	Humanities
3	20HUM303	Soft Skills	Humanities
4	20HUM304	National Cadet Corps	Humanities

ANNEXURE –III

LIST OF PROFESSIONAL ELECTIVES

Professional Elective – I		
Sl. No.	**Course Code**	**Course Title**
1.	20CSO401	Data Mining and Data Warehousing
2.	20CSO402	Wireless Sensor Networks
3.	20CSO403	Cryptography and Network Security
4.	20CSO404	IoT Architecture and Protocols
5.	20CSO405	Data Visualization Techniques
Any advanced courses can be appended in future.		

Professional Elective – II (To be offered under MOOC's Category from SWAYAM – NPTEL)		
Sl. No.	**Course Code**	**Course Title**
1.	20CSO4M01	Software Testing
2.	20CSO4M02	Introduction to Soft computing
3.	20CSO4M03	Online Privacy
4.	20CSO4M04	Privacy and Security in Online Social Media
5.	20CSO4M05	Ethical Hacking
6.	20CSO4M06	Mobile Computing
7.	20CSO4M07	Computer Vision
8.	20CSO4M08	Cloud Computing and Distributed Systems
Any other new Disciplinary Course which doesn't exist in the Curriculum can be appended in future.		

Professional Elective – III		
Sl. No.	**Course Code**	**Course Title**
1.	20CSO406	Design of Smart Cities
2.	20CSO407	Real Time Systems
3.	20CSO408	Distributed and Cloud Computing
4.	20CSO409	Information Retrieval
5.	20CSO410	Service Oriented Architecture
6.	20CSO411	Deep Learning

Any advanced courses can be appended in future.

Professional Elective – IV		
Sl. No.	**Course Code**	**Course Title**
1.	20CSO412	Privacy and security in IoT
2.	20CSO413	Digital Forensics
3.	20CSO414	Design Patterns
4.	20CSO415	Data Visualization
5.	20CSO416	Cryptocurrencies
Any advanced courses can be appended in future.		

Professional Elective – V		
Sl. No.	**Course Code**	**Course Title**
1.	20CSO417	IoT for Smart Cities
2.	20CSO418	Software Quality Assurance
3.	20CSO419	Reinforcement Learning
4.	20CSO420	Wireless Network System
5.	20CSO421	Cyber Security
6.	20CSO422	Human Computer Interaction
Any advanced courses can be appended in future.		

ANNEXURE – IV

SKILL ORIENTED COURSES

Skill Oriented Course - I		
Sl. No	**Course Code**	**Course Title**
1	20CSO601	Web Scripting
2	20CSO602	Android Application Development
Any advanced courses can be appended in future		

Skill Oriented Course – II		
Sl. No	**Course Code**	**Course Title**
1	20ENG601	Corporate Communication
Any advanced courses can be appended in future		

Skill Oriented Course - III		
Sl. No	**Course Code**	**Course Title**
1	20CSO603	AI Tools, Techniques and Applications
2	20CSO604	Cryptography and Network Security
Any advanced courses can be appended in future		

Skill Oriented Course - IV		
Sl. No	**Course Code**	**Course Title**
1	20CSO605	Multimedia Computing
2	20CSO606	Software Engineering
Any advanced courses can be appended in future		

Skill Oriented Course - V		
Sl. No	**Course Code**	**Course Title**
1	20CSO607	Data Warehousing and Data Mining Practice
2	20CSO608	Cloud Computing
Any advanced courses can be appended in future		

ANNEXURE - V

Honors in Computer Science and Engineering (IoT)

SI.No	Category	Course Code	Course Title	Hours Per Week				Credits
				L	T	P	Total Contact Hours	
III Year I Semester								
1	**Professional Elective Course (Choose any two from three courses)**	20HDCSO101	GO Programming	3	0	0	3	3
2		20HDCSO102	Advanced Information Systems Security	3	0	0	3	3
3		20HDCSO103	Data Communication	3	0	0	3	3
	Sub Total			**6**	**0**	**0**	**6**	**6**
III Year II Semester								
4	**Professional Elective Course (Choose any two from three courses)**	20HDCSO104	Mining Massive Data Sets	3	0	0	3	3
5		20HDCSO105	GP-GPU Computing	3	0	0	3	3
6		20HDCSO106	Cloud Design - Performance, Scalability and Security	3	0	0	3	3
	Sub Total			**6**	**0**	**0**	**6**	**6**
IV Year I Semester								
7	**Professional Elective Course (Choose any two from three courses)**	20HDCSO107	Natural Language Processing	3	0	0	3	3
8		20HDCSO108	Cryptanalysis	3	0	0	3	3
9		20HDCSO109	Medical Image Data Analysis	3	0	0	3	3
10	**SOC**	20HDCSO601	Blockchain Development Techniques	1	0	2	3	2
	Sub Total			**7**	**0**	**2**	**9**	**8**
	Total			**19**	**0**	**2**	**21**	**20**

I Year I Semester

Dept. of Computer Science & Engineering (IoT)

B. Tech I Year I Semester

20ENG101 PROFESSIONAL ENGLISH

L	T	P	C
3	0	0	3

Pre-requisite: None

Course Description:
Communication takes place in many forms, however the major impact and effectiveness is in its professionalism. This course defines, enlightens and enables learners to engage in Professional Communication by addressing all the areas of communication – Listening, Speaking, Reading and Writing. This course also deals with various types of communication – Verbal, Non-verbal, Storytelling, Crucial Conversations, Written Communication, Vocalics, Eye Contact, Posture, etc.

Course Objectives: This course enables the student to –

1. Engage effectively in a professional environment
2. Understand the intricacies and implications of professional communication
3. Use linguistic skills in any given context
4. Conduct self in a learning environment
5. Be better prepared for employment

UNIT I GRAMMAR & VOCABULARY 9 hours

Grammar - Tense, Reported Speech, Modals, Conditionals; Vocabulary development - prefixes, suffixes, compound words, synonyms & antonyms.

UNIT II READING SKILLS & WRITTEN COMMUNICATION 9 hours

Reading - short comprehension passages, practice in skimming, scanning and predicting; Writing- completing sentences, developing hints; Paragraph writing- topic sentence, main ideas, coherence.

UNIT III VERBAL & NON-VERBAL ASPECTS 9 hours

Verbal - Introducing oneself, exchanging personal information, Using 'Wh'- Questions, asking and answering, yes or no questions- asking about routine actions and expressing opinions; Non-Verbal – Use of body language, combating nervousness.

UNIT IV CONVERSATIONS 9 hours

Listening-short texts & conversing, formal and informal conversations, short group conversations, speaking about oneself, sharing information of a personal kind speaking about one's friend.

UNIT V BUSINESS ENVIRONMENT & ETIQUETTES 9 hours

Greeting & taking leave; Writing e-mails, memos, reports, etc

Course Outcomes:

At the end of the course, students will be able to:

1. Read articles and understand professional communication
2. Participate effectively in informal conversations
3. Introduce themselves and their friends and express opinions in English
4. Comprehend conversations and short talks delivered in English
5. Write short essays of a general kind and personal letters and emails in English.

Text Books:

1. Guy Brook Hart & Norman Whitby; Cambridge English-Business Benchmark: Pre-Intermediate to Intermediate; Published by: Cambridge University Press.

2. Adrian Doff, Craig Thaine, Herbert Puchta, et al; Empower: Intermediate (B1+); Published by: Cambridge University Press.

Reference Books:

1. AJ Thomson & AV Martinet; A Practical English Grammar; Oxford University Press, 2015.
2. Raymond Murphy; English Grammar in Use with CD; Cambridge University Press, 2013.
3. K.S. Yadurajan; Modern English Grammar; Oxford University Press, 2014.
4. William Strunk Jr; The Elements of Style; ITHACA, N.Y.; W.P. HUMPHREY, 2006
5. Joseph Devlin; How to Speak and Write Correctly; ITHACA, N.Y.; W.P. HUMPHREY, 2006
6. Anjana Agarwal; Powerful Vocabulary Builder; New Age Publishers, 2011.
7. Writing Tutor; Advanced English Learners' Dictionary; Oxford University Press, 2012.
8. http://www.cambridgeenglish.org/in/
9. https://www.rong-chang.com/
10. https://www.rong-chang.com/

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Dept. of Computer Science & Engineering (IoT)

B. Tech I Year I Semester

20MAT101 ENGINEERING CALCULUS

L	T	P	C
3	1	0	4

Pre-requisite: Mathematics at Intermediate or Equivalent Level

Course Description:
Communication takes place in many forms, however the major impact and effectiveness is in its professionalism. This course defines, enlightens and enables learners to engage in Professional Communication by addressing all the areas of communication – Listening, Speaking, Reading and Writing. This course also deals with various types of communication – Verbal, Non-verbal, Storytelling, Crucial Conversations, Written Communication, Vocalics, Eye Contact, Posture, etc.

Course Objectives: This course enables the student to –

1. To introduce the basic concepts of definite integrals, improper integrals, Beta and Gamma functions.
2. To acquire knowledge on mean value theorems in calculus.
3. To illustrate various techniques of testing the convergence of infinite series and introduces the functions of sine and cosine series.
4. To familiarize the knowledge of limit, continuity and the derivatives, extreme values in Multivariable.
5. To emphasize the role of Double and Triple integrals in dealing with area and volume of the regions.

UNIT I INTEGRAL CALCULUS 12 hours

Definite integrals; Applications of definite integrals to evaluate area and length of curves, surface areas and volumes of revolutions; Beta and Gamma functions and their properties.

UNIT II DIFFERENTIAL CALCULUS 12 hours

Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders (without proofs); indeterminate forms, Maxima and minima.

UNIT III SEQUENCE AND SERIES 12 hours

Sequence and Series, their Convergence and tests for convergence; Power series, Taylor's series, Series for exponential, trigonometric and logarithmic functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

UNIT IV MULTIVARIABLE DIFFERENTIAL CALCULUS 12 hours

Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers.

UNIT V MULTIVARIABLE INTEGRAL CALCULUS 12 hours

Multiple Integration: double integrals (Cartesian and polar), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes (double integration), triple integrals, gradient, curl and divergence, Green's, Stokes and Gauss divergence theorems (without proofs).

Course Outcomes:

At the end of the course, students will be able to:

1. Evaluate the definite integrals, Beta and Gamma functions and calculate length of curve and underlying area.
2. Relate the results of mean value theorems in calculus to Engineering problems.
3. Use the Power series and Fourier series for ascertaining the stability and convergence of various techniques.
4. Apply the functions of several variables to evaluate the rates of change with respect to time and space variables in engineering.
5. Compute the area and volume by interlinking them to appropriate double and triple integrals.

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 42th Edition, 2012.
2. G. B. Thomas, Maurice D. Weir, Joel Hass, Frank R. Giordano, Thomas' Calculus Pearson education 11th Edition, 2004.

Reference Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2 Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3 Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4 Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5 D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
6 N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination

Dept. of Computer Science & Engineering (IoT)

B. Tech I Year I Semester

20CHE101 ENGINEERING CHEMISTRY

L	T	P	C
3	0	0	3

Pre-requisite: Basic Chemistry at Intermediate or equivalent level.

Course Description:

Deals with the basic principles of various branches of chemistry like physical, organic, inorganic, analytical and nanomaterial chemistry.

Course Objectives:

Students will

1. Understand, analyse and determine the impurities present in the water.
2. Appreciate the synthetic organic reactions used in daily life
3. Learn the principles of spectroscopies to analyse them.
4. Value the basic concepts of thermodynamics and electrochemistry.
5. Be exposed to the importance of nano and engineering materials used in their daily life and industry

UNIT I IMPURITIES PRESENT IN WATER AND WATER TREATMENT — 9 hours

Impurities present in Water: Impurities in water (BIS and WHO standards), Hardness of water-determination of hardness - EDTA Method (numerical problems), Alkalinity of water (numerical problems), Estimation of Dissolved Oxygen by Winkler's method and its importance and Chlorides. Disadvantages (industry level) of using hard water (Boiler corrosion, Caustic embrittlement, Scale and Sludges). Softening of water (Ion exchange method), Treatment of brackish water by Reverse Osmosis method. Water treatment for civic applications: coagulation, sedimentation, filtration, sterilization - chlorination and ozonation. Concept of break point chlorination.

UNIT II PERIODIC PROPERTIES AND ORGANIC REACTIONS — 7 hours

Periodic properties: Electronic configurations, atomic and ionic sizes, ionization energies, oxidation states, molecular geometries. Organic Reactions: Introduction to substitution (SN^1 and SN^2), elimination (E_1 and E_2) - Addition, Condensation and Free Radical Polymerization Reaction (only the mechanism).

UNIT III SPECTROSCOPY — 8 hours

Basic Principle and Applications of UV-Visible, FT-IR, Raman, Microwave and Nuclear Magnetic Resonance (NMR) Spectroscopy

UNIT IV THERMODYNAMICS AND ELECTROCHEMISTRY — 11 hours

Thermodynamics: Systems, State Functions, Thermodynamic Functions: Work, Energy, Entropy and Free energy. Estimations of Entropy in Isothermal, Isobaric and Isochoric processes. Electrochemistry: Free energy and EMF. Cell potentials, the Nernst equation and applications. Batteries (Lead-Acid and Lithium ion) and Fuel-Cells (H_2-O_2).

UNIT V ENGINEERING MATERIALS, NANOSCIENCE & NANOTECHNOLOGY **10 hours**

Engineering Materials: Cement Materials and Manufacturing Process. Reactions in setting and hardening of Cement. Lubricants – definition, Properties of lubricants – Viscosity, Viscosity Index, Flash Point and Pour Point. Nanomaterials: Introduction, Classes/Types, Chemical synthesis of Nanomaterials: Chemical Vapor Deposition method (Carbon Nanotubes), Characterization by powder XRD (Scherrer's equation). Applications of Nanomaterials: Solar Energy and Photocatalytic Dye Degradation (TiO_2).

Course Outcomes:

At the end of the course, students will be able to:

1. Analyse and determine the impurities in water such as hardness, alkalinity for sustainable development.
2. Prepare organic compounds/polymers for environmental, safety and society need.
3. Comprehend the principles and applications of spectroscopies.
4. Apply the concept of free energy in thermodynamics, electrochemistry for solving the problems evolve in the engineering processes.
5. Acquire spotlight to the nanomaterials and basic engineering materials used in academics, industry, and daily life.

Text Books:

1. P. W. Atkins & Julio de Paula, 'The Elements of Physical Chemistry', Ninth edition (Oxford University Press, Oxford 2010)
2. C. N. Banwell, Fundamentals of Molecular Spectroscopy, Fourth Edition, (Tata McGraw Hill, 2008).
3. C. N. Banwell, Fundamentals of Molecular Spectroscopy, Fourth Edition, (Tata McGraw Hill, 2008).
4. Dr. S. S. Dara and Dr. S. S. Umare, A Textbook of Engineering Chemistry,1 st Edition., (S. Chand & Company Ltd, 2000).
5. T. Pradeep, Nano: The Essentials, 1 st Edition, (Tata McGraw-Hill Publishing Company Limited, 2017).

Reference Books

1. 'Physical Chemistry', D. W. Ball, First Edition, India Edition (Thomson, 2007).
2. Perry's Chemical Engineers' Handbook, Don W. Green and Marylee Z. Southard, 9th Edition (McGraw Hill, 2018).
3. Engineering Chemistry, Dr. Suba Ramesh and others, 1st Edition (Wiley India, 2011).
4. Jain and Jain, Engineering Chemistry,16th Edition (Dhanpat Rai Publishing Company (P) Ltd, 2016).
5. Amretashis Sengupta, Chandan Kumar Sarkar (eds.), Introduction to Nano Basics to Nanoscience and Nanotechnology (Springer-Verlag, Berlin, Heidelberg, 2015)

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination

Dept. of Computer Science & Engineering (IoT)

B. Tech I Year I Semester

20ME101 ENGINEERING GRAPHICS

L	T	P	C
2	0	2	3

Pre-requisite: None

Course Description:
Introduction to AutoCAD commands, simple drawings, orthographic projections, projection of points, lines, planes; auxiliary projections; projections and sections of solids; development and intersection of surfaces; isometric projections.

Course Objectives:
1. Engineering Graphics is the primary medium for development and communicating design concepts.
2. Through this course the students are trained in Engineering Graphics concepts with the use of AutoCAD.
3. The latest ISI code of practice is followed while preparing the drawings using AutoCAD.
4. Computerized drawing is an upcoming technology and provides accurate and easily modifiable graphics entities.
5. Storage and Retrieval of Drawings is also very easy and it takes very less time to prepare the drawings. Also enhances the creativity.

UNIT I INTRODUCTION TO AUTO CAD 12 hours

Introduction to AutoCAD commands, simple drawings using AutoCAD, Introduction to orthographic Projections – Theory, techniques, first angle projections and third angle projections.

UNIT II PROJECTIONS OF POINTS & LINES 12 hours

Projections of points: Positions, notation system and projections. Projections of lines: Positions, terms used, different cases, traces of lines and finding true length.

UNIT III PROJECTIONS OF PLANES & SOLIDS 12 hours

Projections of planes: Positions, terms used, different cases and projections procedure.
Projections of Solids: Projections of Regular Solids inclined to one plane (resting only on HP).

UNIT IV SECTIONS AND DEVELOPMENTS OF SOLIDS 12 hours

Section of solids: Sectional view of right regular solids (Prism and cylinder), true shapes of the sections.
Development of Surfaces: Development of surfaces of right regular solids (Prism, Cylinder and their Sectional Parts).

UNIT V INTERSECTIONS & ISOMETRIC PROJECTIONS 12 hours

Intersections of surfaces of solids: Intersection between prism Vs prism, prism Vs cylinder, cylinder Vs cylinder.
Isometric Projections: Theory of isometric drawing and orthographic views, Conversion of isometric view into orthographic views.

Course Outcomes:

Student will be able to

1. Identify various commands in AutoCAD software and apply AutoCAD skills to develop the new designs.
2. Draw the projections of points, straight lines using AutoCAD.
3. Draw the projections of the planes, solids using AutoCAD
4. Sketch the developments of solids, sections of solids using AutoCAD.
5. Draw the conversion of the isometric views to orthographic views and intersections of surfaces using AutoCAD.

Text Books:

1. D.M. Kulkarni, A.P. Rastogi and A.M. Sarkar., Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi 2009.

2 N D Bhat, Engineering Drawing, Charotar Publishing House, Gujarath,15th Edition, 2010.

3 K.L. Narayana, P. Kanniah, Engineering Drawing, Scitech Publishers, 2nd Edition, 2010.

Reference Books:

1. Dhananjay A Jolhe, Engineering Drawing: with an introduction to AutoCAD, Tata McGraw Hill, 2008.

2 Warren J. Luzadder & Jon M. Duff Fundamentals of Engineering Drawing, 11th edition, Prentice Hall of India, New Delhi.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination

Dept. of Computer Science & Engineering (IoT)

B. Tech I Year I Semester

20CSE101 PROGRAMMING FOR PROBLEM SOLVING (PYTHON)

L	T	P	C
2	0	3	3.5

Pre-requisite: None

Course Description:

Python is a language with a simple syntax, and a powerful set of libraries. It is an interpreted language, with a rich programming environment. While it is easy for beginners to learn, it is widely used in many scientific areas for data exploration. This course is an introduction to the Python programming language for students without prior programming experience.

This course provides knowledge on how to implement programs in python language and to solve computational problems using the various programming constructs including data structures, functions, string handling mechanisms and file handling concepts

Course Objectives:

This course enables students to

1. Learn Python programming constructs.
2. Implement Python programs with conditional structures and loops.
3. Use functions for structuring Python programs.
4. Handle compound data using Python lists, tuples, and dictionaries.
5. Manipulate data using files handling in Python.
6. Getting exposed to the basics of Object Oriented Programming using Python

UNIT I: INTRODUCTION **12 hours**

Algorithms, building blocks of algorithms (flow chart), History of Python, features of Python Programming, Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation. Data Types - Integers, Strings, Boolean.

a) Develop a flowchart for the various arithmetic operations on numbers.
b) Develop a flowchart to check whether the number is positive or negative.
c) Develop a flowchart for finding whether a given number is even or odd.
d) Develop a flowchart for finding biggest number among three numbers.
e) Develop a flowchart for displaying reversal of a number.
f) Develop a flowchart to print factorial of a number using function.
g) Develop a flowchart to generate prime numbers series up to N using function.
h) Develop a flowchart to check given number is palindrome or not using function.
i) Alexa travelled 150 kms by train. How much distance in miles she actually covered?

UNIT II: OPERATORS AND EXPRESSIONS **12 hours**

Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations. Control Flow - if, if-elif else, for, while, break, continue, pass.

a) Swapping of two number with and without using temporary variable.
b) If the age of Ram, Sam, and Khan are input through the keyboard, write a python program to determine the eldest and youngest of the three.
c) Develop a program that performs arithmetic operations (Addition, Subtraction, Multiplication, and Division) on integers. Input the two integer values and operator for performing arithmetic operation through keyboard.

The operator codes are as follows:

- For code '+', perform addition.
- For code '-', perform subtraction.
- For code '*', perform multiplication.
- For code '/', perform division.

d) Implement the python program to generate the multiplication table.

e) Implement Python program to find sum of natural numbers

f) If the first name of a student is input through the keyboard, write a program to display the vowels and consonants present in his/her name.

g) The marks obtained by a student in 5 different subjects are input through the keyboard. Find the average and print the student grade as per the MITS examination policy as shown below.

% OBTAINED GRADE
90 - 100 O (Outstanding)
80 - 89 A+ (Excellent)
70 - 79 A (Very Good)
60 - 69 B+ (Good)
50 - 59 B (Above)
45 - 49 C (Average)
40 - 44 P (Pass)
< 40 F (Fail)

h) Implement Python Script to generate prime numbers series up to N.

i) Given a number x, determine whether it is Armstrong number or not. Hint: For example, 371 is an Armstrong number since 3**3 + 7**3 + 1**3 = 371. Write a program to find all Armstrong number in the range of 0 and 999.

UNIT-III: DATA STRUCTURES 12 hours

Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehensions. Functions - Defining Functions, Calling Functions, Passing Arguments, variable in python-Global and Local Variables.

a) Write a Python script to

- create a list
- access elements from a list
- slice lists
- change or add elements to a list
- delete or remove elements from a list

b) Write a Python script to read the values from a list and to display largest and smallest numbers from list.

c) Write a Python script to compute the similarity between two lists.

d) Write a Python script to read set of values from a Tuple to perform various operations.

e) Write a Python script to perform basic dictionary operations like insert, delete and display.

f) Write a Python program to count the occurrence of each word in a given sentence.

g) Define a dictionary named population that contains the following data.

Keys	Values
Shanghai	17.8
Istanbul	13.3
Karachi	13.0
Mumbai	12.5

h) Write a Python script to create Telephone Directory using dictionary and list to perform basic functions such as Add entry, Search, Delete entry, Update entry, View and Exit.

i) Implement Python script to display power of given numbers using function.

j) Implement a Python program that takes a list of words and returns the length of the longest one using function.

UNIT-IV:

String Handling -Modules: Creating modules, import statement, from import statement, name spacing

Files and Directories:

a) Implement Python program to perform various operations on string using string libraries.

b) Implement Python program to remove punctuations from a given string.

c) Write a Python program to change the case of the given string (convert the string from lower case to upper case). If the entered string is "computer", your program should output "COMPUTER" without using library functions.

d) Implement Python program to capitalize each word in a string. For example, the entered sentence "god helps only people who work hard" to be converted as "God Helps Only People Who Work Hard"

e) Write a Python script to display file contents.

f) Write a Python script to copy file contents from one file to another.

g) Write a Python script to combine two text files contents and print the number of lines, sentences, words, characters and file size.

h) Write a Python commands to perform the following directory operations.

- List Directories and Files
- Making a New Directory
- Renaming a Directory or a File
- Removing Directory or File

UNIT-V:

Python packages: Predefined Packages and User-defined Packages, Package Creation.

Object Oriented Programming using Python: Introduction to OOP, Creating Classes and Objects in Python, Creating Methods in Python

Brief Tour of the Standard Library: Turtle

a) Create a package named Cars and build three modules in it namely, BMW, Audi and Nissan. Illustrate the modules using class. Finally we create the __init__.py file. This file will be placed inside Cars directory and can be left blank or we can put the initialization code into it.

b) Create a class by name Student with instance variables such as roll_no, name, year_of_study, branch, section, and marks in any five subjects. The class should also contain one method for calculating the percentage of marks and the other method for printing a report as follows:

Roll No.	Name	Year	Section	Branch	M1	M2	M3	M4	M5	Percentage
101	Abc	I	A	CSE	58	68	95	47	56	64.8

b) Write a python script to display following shapes using turtle.

Course Outcomes:

At the end of the course, students will be able to

1. Understand problem solving techniques and their applications
2. Understand the syntax and semantics of python.
3. Demonstrate the use of Python lists and dictionaries.
4. Demonstrate the use of Python File processing, directories.
5. Describe and apply object-oriented programming methodology and Standard Library.

Text Books:

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016
(http://greenteapress.com/wp/thinkpython/)
2. Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

References:

1. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
2. John V Guttag, "Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press , 2013.
3. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.
4. Paul Gries, Jennifer Campbell and Jason Montojo, "Practical Programming: An Introduction to Computer Science using Python 3", Second edition, Pragmatic Programmers,LLC,2013.
5. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.

Mode of Evaluation: Continuous Internal Evaluation and End Semester Examination

B. Tech I Year I Semester

20CHE201 CHEMISTRY LABORATORY

L	T	P	C
0	0	3	1.5

Pre-requisite Basic Chemistry at Intermediate or equivalent level.

Course Description:

It deals with basic principles of volumetric and instrumental analytical methods.

Course Objectives:

This Engineering Chemistry Laboratory is common to all branches of I Year B Tech. At the end of the course the student is expected to Students will

1. Learn to estimate the chemical impurities present in water such as hardness, alkalinity, chlorine, etc.
2. Understand and experience the formation of inorganic complex and analytical technique for trace metal determination.
3. Be trained to use the instruments to practically understand the concepts of electrochemistry.
4. Bridge theoretical concepts and their practical engineering applications, thus
5. highlighting the role of chemistry in engineering.

LIST OF EXPERIMENTS

1. Estimation of total, permanent and temporary hardness of water by EDTA method.
2. Estimation of alkalinity of water sample.
3. Estimation of dissolved oxygen by Winkler's method.
4. Determination of molecular weight of a polymer by using Ostwald's viscometer.
5. Determination of rate constant of an ester hydrolysis (Pseudo First Order reaction).
6. Determination of strength of a Strong acid (conc. H_2SO_4) by conductometric titration (Neutralisation Titration).
7. Conductometric titration of $BaCl_2$ Vs Na_2SO_4 (Precipitation Titration).
8. Dissociation constant of weak electrolyte by Conductometry.
9. Determination of percentage of Iron in Cement sample by colorimetry.
10. Estimation of ferrous ion by Potentiometric titration (Redox Titration).
11. Saponification value of oil.
12. Formation of Iron-1,10-phenanthroline complex and determination of iron by colorimetry.

Course Outcomes:

After the completion of the Engineering Chemistry Laboratory experiments, students will be able to

1. Develop and perform analytical chemistry techniques to address the water related problems (for e.g., hardness, alkalinity present in water) technically.
2. Handle electro-analytical instruments like digital conductivity meter and potentiometer to perform neutralization, precipitation, and redox titrations, respectively.
3. Acquire practical skills to handle spectro-photochemical methods to verify Beer Lambert's Law.
4. Operate various instruments for the analysis of materials and produce accurate results in a given time frame.
5. Think innovatively and improve the creative skills that are essential for solving engineering problems.

Textbook:

1. Engineering Chemistry Lab Manual (2017-18), Dept. of Chemistry, Madanapalle Institute of Technology and Science, Madanapalle – 517325, Chittoor Dist., Andhra Pradesh, India.
2. "Vogel's Textbook of Qualitative Chemical Analysis", Arthur Israel Vogel, Prentice Hall, 2000.
3. Laboratory Manual on Engineering Chemistry, by Dr Sudha Rani, Dhanpat Rai Publishing house, 2009.
4. A Textbook on Experiments and calculations in Engineering Chemistry, by SS Dara, S Chand publications, 2015.
5. Laboratory Manual of Organic Chemistry, by Raj K Bansal, Wiley Eastern Limited, New age international limited, 2009.

Mode of Evaluation: Continuous Internal Evaluation and End Semester Examination

B. Tech I Year I Semester

20CSE202 ENGINEERING AND IT WORKSHOP

L	T	P	C
0	0	3	1.5

Prerequisite: None

Course Description:
This course will provide students with a hands-on experience on various basic engineering practices CSE and presenting the final product design.

Course Objectives:

1. Introduction to the use of Tools and Machinery in foundry, forging, tinsmith, carpentry, welding, fitting, working, fabrication of plastic components, fabrication of polymer composite materials, simple machine turning and wood turning, basic electrical connections.
2. Introduction of basic electrical engineering.
3. Fabrication of final product design at end of the semester.

LIST OF EXPERIMENTS

1. Carpentry (Cross half lap Joint and Miter Joint)
2. Fitting (Square and 'V' fit)
3. Sheet Metal - Tin smithy (Square tray)
4. Foundry (Solid and Split pattern)
5. Welding (Arc and Gas welding) – SingleV Butt Joint, T-fillet Joint
6. Plastic fabrication (Pen Stand)
7. Metrology (Internal and External dimension)
8. Introduction of Power Tools and CNC (Demo Only)
9. Introduction to 3D Printing (Demo Only)

Course Outcomes:
On successful completion of this course, the student will be able to

1. Fabricate carpentry components with suitable joint and pipe connections including plumbing works.
2. Practice the welding equipment to join the structures
3. Effective the basic machining operations
4. Create the models using sheet metal and plastic works.
5. Illustrate the operations of foundry, fitting and smithy
6. Fabrication product in composite material and product in plastic material
7. Conduct experiment basic electrical wire connection
8. Design and fabrication of final product design

Mode of Evaluation: Continuous Internal Evaluation and End Semester Examination

Suggested Text/Reference Books:

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.

2. Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.
3. Gowri P. Hariharan and A. Suresh Babu, "Manufacturing Technology – 1" Pearson Education, 2008.
4. Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998. (v) Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGraw Hill House, 2017.

IT WORKSHOP

Prerequisite: None

Course Description:
This course helps the students to understand the basic components of a computer, installation of operating systems, working on office productivity tools word-processor, spreadsheet and presentation slides. Also it gives a basic understanding of using Google tools and various email settings in Gmail.

Course Objectives:
1. The course focuses on enhancing student knowledge in computer peripherals and assembling.
2. To install operating system on computers and create new email account.
3. To understand basic software utilities like compression tools, PDF readers and web browser.
4. To provide technical training to the students on software tools like online forms, calendar applications, online drive, online translation tools and image processing applications.
5. To make the students to install software like Integrated Development Environments (IDE),and compliers for different programming languages.

LIST OF EXPERIMENTS

1. Components of Computer & Assembling a Computer: Learning about the different parts of the computer and its advancement
   - Processor
   - Memory – Types
   - Motherboard
   - Peripheral interfaces – I/O devices
   - Learn about the proper connectivity among the devices inside the PC
   - Assembling the different parts of the computer inside the cabinet
2. Install Operating System
   - Partition the disk drive based on the capacity and the OS to be installed.
   - Install ReactOS/Windows
   - Install Ubuntu or any other GNU/Linux
   - Install VirtualBox or VMWare or QEMU
3. Basic PC Troubleshooting
   - Awareness on the possible issues in a computer
   - Troubleshooting the problems using the available tools
   - Removal and repair of existing software

- Identification of suitable Device driver for Hardware Devices.

4. Learning Basic Software:
   - Installation of simple Productivity tools like file and folder compression utilities and PDF readers.
   - Installation of Image Editor and Web browsers.
   - Basic Software installation in GNU Linux based system.
   - Connect the Printer and Scanner Devices perform printing and scanning operation.
5. Office Productivity Tools:
   - Generate, manipulate, search, aligning content using word processing applications.
   - Creation of spreadsheet with various column and rows applying various formulas on cells.
   - Create Presentation and Visualization – graphs, charts, 2D, 3D.
   - Create a database template using Libreoffice Base, OpenOffice Base or MS Access.
   - Draw flowchart using the Drawing tools – Google Quick draw, sketch up,
6. Introduction to Google Tools
   - Design a Google form and collect a response date among students using Google Form.
   - Schedule One day of your activities using Google Calendar.
   - Store and Retrieve Date from cloud storage using Google Drive.
   - Translate the English language sentence to Telugu sentence using Google Translate
   - Organizing photo and editing photo using Google Photos.
7. Exploring Email
   - Creation, Composing and Sending the E-mail.
   - Use High Priority setting to categories the mail.
   - Create a Folder in different Categories and move the received mail to Folder.
   - Unsubscribing unwanted emails
   - Enable settings for automatic reply

Add on content:

- Networking Commands: ping, ssh, ifconfig, scp, ipconfig, traceroute, nslookup, getmac

Technical Stack: GNU Linux, Windows/ReactOS-Compression Utilities, PDF reader, Office Package.

Course Outcomes:

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

1. Attain complete knowledge of a computer hardware
2. Install Operating Systems and troubleshooting using Utility software.
3. Able to do document task through office productivity software.
4. Attain technically strong usage of Google Tools and Email handling.
5. Able to install basic computer engineering software.

Mode of Evaluation: Continuous Internal Evaluation and End Semester Examination

I Year II Semester

Dept. of Computer Science & Engineering (IoT)

B. Tech I Year II Semester

20MAT110 LINEAR ALGEBRA

L	T	P	C
3	0	0	3

Pre-requisite: 20MAT101

Course Description:

Linear algebra has widespread applications in engineering and science. In this course, various methods of solving system of linear equations, as applicable in the information technology and electrical circuits are highlighted. The concept of reduction of number of variables in systems has been introduced and effect of change of basis from the view point of computer graphics has been explained. Finally, basics involved in search engine operations by orthogonalisation and least squares optimization have been explained.

Course Objectives:

1. Understanding basic concepts of linear algebra (systems of linear equations, matrix calculus, vectors and basic vector operations).
2. Learn about vector spaces and subspaces.
3. To become proficient in solving computational problems of linear algebra.
4. To understand the axiomatic structure of modern mathematics and learn to construct simple proof.
5. To gain basic knowledge of search engine operations and optimization path.

UNIT I LINEAR EQUATIONS AND MATRICES 9 hours

System of linear equations, Gaussian elimination, Gauss-Jordan method, LU and LDU factorization, block matrices, inverse of matrices, elementary matrices, permutation matrix, Eigen value and Eigen vectors, Cayley -Hamilton Theorem (without proof), applications to cryptography and electrical network.

UNIT II VECTOR SPACE 9 hours

The n-space $R\ n$ and vector space, subspaces, bases, linear combination, span, linearindependence, dimensions, finite dimensional, Row and column spaces, Rank and nullity, Bases for subspace, invertibility, application in interpolation.

UNIT III LINEAR TRANSFORMATIONS 9 hours

Basic Properties of Linear transformations, invertible linear transformation, matrices of linear transformations.

UNIT IV VECTOR SPACE OF LINEAR TRANSFORMATIONS 9 hours

Vector space of linear transformations, change of bases, similarity, application to computer graphics.

UNIT V INNER PRODUCT SPACES 9 hours

Dot Products and Inner products, the lengths and angles of vectors, matrix representations of inner products, Gram-Schmidt orthogonalisation, orthogonal projections, relations of fundamental subspaces, orthogonal matrices and isometrics, singular value decomposition (SVD), applications to least square solutions.

Course Outcomes:

At the end of the course, the students should be able to:

1. Solve systems of linear equations using Gaussian elimination and matrix inversion.
2. Understand the concepts of vector space and subspace, linear independence and use them in network systems. Apply principles of matrix algebra to linear transformations in solving engineering problems.
3. Use the concepts of similarity of transformations in computer graphics.
4. Demonstrate understanding of inner products, associated norms and interlink to search operations on network.

Text Books:

1. Jin Ho Kwak and Sungpyo Hong, "Linear Algebra", Second edition, Birkhaüser, 2004.

Reference Books:

1. Stephen Andrilli and David Hecher, Elementary Linear Algebra, 3rd Edition, Academic Press (2006).
2. Charles W. Curtis, Linear Algebra, Springer (2004).
3. Howard Anton and Robert C Busby, Contemporary linear algebra, John Wiley (2003).
4. Gilbert Strang, Introduction to Linear Algebra.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination

Dept. of Computer Science & Engineering (IoT)

B. Tech I Year II Semester

20PHY102 APPLIED PHYSICS

L	T	P	C
3	1	0	4

Pre-requisite: Plus two level physics course

Course Description:

Applied Physics for Electrical, Electronics and Computer Engineers is a basic physics course which provides fundamental knowledge to understand the concepts of Waves, Optics, Quantum Mechanics, Semiconductors, Lasers and Fiber Optics.

Course Objectives:

1. Expose students in understanding the basic laws of nature through wave equation using the principles of oscillations and waves.
2. Analyze and understand the concepts of waves and optics to prepare the students for advanced level courses.
3. Expose students to theoretical and mathematical aspects of Interference, Diffraction techniques, Polarization and Lasers for testing of materials.
4. Develop knowledge and understanding the fundamental concepts of Quantum mechanics, Semiconductors and Fiber Optics.
5. Adaptability to new developments in science and technology.

UNIT I WAVES AND OSCILLATIONS 11 hours

Simple harmonic motion, damped harmonic oscillations, forced harmonic oscillations, resonance, and quality factor. Superposition of vibrations along same direction (equal frequency) and in perpendicular directions, Lissajous figures.

Transverse waves, one dimensional wave equation, solution for wave equation, velocity of a transverse wave along a stretched string, modes of vibration of stretched string, reflection and transmission waves at boundary, standing waves, standing wave ratio.

UNIT II OPTICS 13 hours

Superposition of waves, interference of light by division of wavefront - Young's double slit experiment, interference of light by division of amplitude- interference in thin film by reflection, Newton's rings experiment.

Diffraction, Farunhofer diffraction due to single slit, double slit and Diffraction grating (Nslit).

Polarization, Types of polarization, Polarization by reflection, refraction and double refraction, Nicol's prism. Half wave and Quarter wave plates.

UNIT III QUANTUM MECHANICS 12 hours

De Broglie's hypothesis, Uncertainty principle (Qualitative only), Postulates of quantum mechanics, Time-dependent and time-independent Schrodinger equations for wave function, Free-particle wave function and wave-packets (group velocity & phase velocity), Solution of wave equation: Solution of stationary-state, Schrodinger equation for one dimensional problems – particle in a box, Scattering from a potential barrier and principle of tunnelling- operation of scanning tunnelling microscope.

UNIT IV FREE ELECTRON THEORY & SEMICONDUCTORS 12 hours

Free electron theory of metals (drift velocity and electrical conductivity), Fermi energy level, density of states, Kronig-Penney model (Qualitative only) and origin of energy bands, band structure of metals, semiconductors, and insulators. Direct and indirect bandgap semiconductors, Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier concentration and temperature (equilibrium carrier statistics), Drift and Diffusion Current, Hall effect.

UNIT V LASERS & FIBER OPTICS 12 hours

Introduction to lasers, characteristics of laser, spontaneous and stimulated emission, Einstein's coefficients; population inversion, excitation mechanisms, solid-state lasers – ruby laser, gas Lasers - He-Ne Laser, applications of lasers.

Fiber Optics: Principle, Construction and working of optical fiber, Acceptance angle, Numerical aperture, Types of fiber, Fiber optic communication system.

Course Outcomes:

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

1. Describe a mathematical wave equation using the principles of waves and oscillations
2. Apply the knowledge for materials testing using Interference, Diffraction & Polarization techniques.
3. Understand the idea of wave function and to solve Schrodinger equation for simple potentials.
4. Explain the role of semiconductors in different realms of physics and their applications in both science and technology.
5. Acquire the basic knowledge of lasers and fiber optics.

Text Books:

1. Engineering Physics –Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, S. Chand and Company
2. Engineering Physics –K. Thyagarajan, McGraw Hill Publishers.

Reference Books:

1. H. J. Pain, "The physics of vibrations and waves", Wiley, 2006.
2. Physics Vol I & II, Halliday/Resnick/Krane 5th Edition, John Wiley, 2003.
3. B.G. Streetman, "Solid State Electronic Devices", Prentice Hall of India, 1995.
4. Concepts of Modern Physics by Arthur Beiser, 7th Edition, 2017.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination

Dept. of Computer Science & Engineering (IoT)

B. Tech I Year II Semester

20EEE101 BASIC ELECTRICAL ENGINEERING

L	T	P	C
3	1	0	4

Pre-requisite: Intermediate Physics

Course Description:

This course equips the students with a basic understanding of Electrical circuits and machines for specific applications. In specific, the course covers basic of DC circuit & its analysis, introduction to single-phase and three-phase AC Systems, magnetic materials, transformers, DC & AC electrical machines, basic converters and Components of LT Switchgear.

Course Objectives:

1. To learn the basics of the D.C. circuit analysis.
2. To have an idea about single-phase and three-phase A.C. electrical circuits.
3. To gain knowledge about basic magnetic material and transformers.
4. To learn the construction and operation of D.C. and A.C. machines.
5. To understand the operation of basic rectifiers and various components of LT Switchgear.

UNIT I DC CIRCUIT ANALYSIS 12 hours

Electrical circuit elements, voltage and current sources, Series and parallel resistive circuits, Kirchhoff's current and voltage laws, Nodal and Mesh analysis of simple circuits with dc excitation. Source Transformation, Star-Delta Transformation, Superposition Theorem.

UNIT II AC CIRCUIT ANALYSIS 12 hours

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations. Three phase balanced circuits, voltage and current relations in star and delta connections.

UNIT III MAGNETIC MATERIALS AND TRANSFORMERS 12 hours

Magnetic materials, B-H characteristics, ideal and practical transformer, principle of operation, emf equation, equivalent circuit, losses in transformers, regulation and efficiency.

UNIT IV DC AND AC MACHINES 12 hours

Construction, working, emf equation of DC generator, methods of excitation, speed control of dc motor. Introduction to different types of AC motors, Three Phase Induction Motors - Generation of rotating magnetic fields, construction, working and starting methods: D.O.L, Autotransformer starter. Introduction to Alternators.

UNIT V RECTIFIERS AND ELECTRICAL INSTALLATIONS 12 hours

PN junction diode, half wave, full wave and bridge rectifiers. Components of LT Switchgear: switch fuse unit (SFU), MCB, ELCB, MCCB, types of wires and cables – Current carrying capability, Insulation Strength; Earthing.

Course Outcomes:

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

1. To understand and analyze basic DC electric circuits.
2. To measure and analyze various electrical quantities of single phase and three AC electric circuits.
3. To understand magnetic materials and to analyze the transformers.
4. To study the working principles of electrical machines.
5. To create power converters for domestic applications with LT switchgear.

Text Books:

1. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
2. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
3. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
4. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
5. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

Reference Books:

1. Abhijit Chakrabarti, "Circuit Theory : Analysis and Synthesis", Dhanpat Rai & Co., 2014.
2. J.B. Gupta, "Theory & Performance of Electrical Machines", S. K. Kataria & Sons, 2013.
3. John Bird, "Electrical Circuit Theory and Technology", Fourth edition, Elsevier Ltd., 2010.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Dept. of Computer Science & Engineering (IoT)

B. Tech I Year II Semester

20CSE102 C PROGRAMMING AND DATA STRUCTURES

L	T	P	C
3	0	0	3

Pre-requisite: 20CSE101

Course Description:

This course includes C program basics, control structures, arrays, files, pointers and data structures.

Course Objectives:

1. To make the student understand fundamentals of C programming language and problem solving.
2. To understand the syntax and semantics of C programming language.
3. To develop algorithms for sorting, searching techniques.
4. To design and implement operations on stack, queue, and linked list.

UNIT I INTRODUCTION TO C PROGRAMMING 9 hours

Structure of C Program, C Tokens: Variables, Data types, Constants, Identifiers, key words and Operators, Expressions.

Control Structures: Conditional Statements (Simple if, if-else, Nested -if-else, Switch). Iterative Statements (for, While, Do-While), Jump Statements (break, Continue).

UNIT II FUNCTIONS & ARRAY 9 hours

Functions Introduction, User defined function, Function prototype, Function Definition and Function Call, Storage classes, Recursion **Arrays**: Defining an array, processing an array, one dimensional arrays, two dimensional arrays. Passing array as an argument to function. **Sorting:** Bubble Sort, Insertion Sort, selection sort. **Searching:** Linear and binary search.

UNIT III STRINGS & POINTERS 9 hours

Strings: Declaring and defining a string, Initialization of strings, Strings Library functions.

Pointers: Fundamentals of pointer, Pointer Declarations, Parameter passing: Pass by value, Pass by reference, Dynamic memory allocation.

UNIT IV STRUCTURES & FILES 9 hours

Structures: Defining a structure, processing a structure, Pointer to Structure, Unions.

Files: Opening and closing a data file, Reading and Writing a data file, File I/O Functions.

UNIT V DATA STRUCTURES 12 hours

Stack: stack operations, stack implementations using arrays.

Queue: queue operations, queue implementations using array, Applications of stack and queue.

Linked List: Single linked list operations.

Course Outcomes:

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

1. Understand fundamentals of C programming language and its constructs.
2. Design and implement applications using functions, arrays, sorting and searching techniques.
3. Design and implement applications using strings and pointers.
4. Design and implement applications using structures and File processing.
5. Choose appropriate linear data structure depending on the problem to be solved.

Text Books:

1. The C Programming Language, Brian W. Kernighan and Dennis M. Ritchie, 2nd Edition, Prentice Hall, India 1988.
2. Alfred V. Aho, John E. Hopcroft and Jeffry D. Ullman, Data Structures and Algorithms, Pearson Education, New Delhi, 2006.

Reference Books:

1. Let us C, Yashavant Kanetkar, 15th Edition, BPB Publications, 2016.
2. Problem Solving & Program Design in C, Hanly, Jeri R and Elliot. B Koffman, Pearson Education, 5th edition, 2007.
3. K. N. King ,"C Programming ": A Modern Approach, 2nd Edition 2nd Edition.
4. Byron Gottfried , Jitender Chhabra , Programming with C (Schaum's Outlines Series)

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination

B. Tech I Year II Semester

20ENG201 ENGLISH FOR PROFESSIONAL PURPOSES LABORATORY
(Common to all branches)

L	T	P	C
0	0	2	1

Pre-requisite: None

Course Description:
English language communication is a social phenomenon and students need to be able to function in the society at large as the communicators before entering the professional world. The present course equips the students with the basic functions of English language communication, which are required not only in their day-to-day lives but also profoundly significant for their future professional, academic training and their careers in the industry. The course mainly focuses on the achievement of communicative proficiency of the students coupled with the necessary linguistic inputs.

Course Objectives:
This course enables the student to –

1. Get aquatinted with the basic communicative functions.
2. Engage effectively in learning various functions of English language communication.
3. Enhance their narration abilities in past experiences and future plans and goals/events.
4. Develop their abilities in expressing opinion.
5. Provide speaking practice in speech.

Course contents:

Greeting and Introductions (L & S)
- Greeting on different occasions and responding to greetings **(L & S)**
- Wishing on various occasions, taking leave and saying goodbye **(L & S)**
- Introducing oneself and others **(L & S)**
- Asking for introduction and responding to introduction **(L & S)**
- Developing a short personal profile **(R &W)**

Describing: (L, S, R & W)
- Using adjectives **(Vocab)**
- Degrees of comparison **(Grammar)**
- Common words, phrases, and expressions used for description **(Vocab)**
- Describing people, places and objects **(L, S, R & W)**
- Reading and writing descriptive paragraphs **(R &W)**

Narrating (L, S, R & W)
- Talking about past experiences and events **(L & S)**
- Talking about memorable incidents or events **(L & S)**
- Techniques of narration and narrative tenses **(Grammar)**
- Composing and narrating a story **(R &W)**

Planning and Predicting (L, S, R & W)
- Talking about future events **(L & S)**
- Making promises and giving assurances **(L & S)**
- Predicting future events **(L & S)**

- Writing and organising a short plan of an event **(R &W)**

Instructions and directions (L, S, R & W)
- Forming imperative sentences (Grammar)
- Reading and writing short instruction manuals **(R &W)**
- Writing a recipe/ procedure **(R &W)**
- Giving directions

Enquiring: (L, S, R & W)
- Open and closed ended questions **(Grammar)**
- Asking for information and giving information **(L & S)**
- Telephonic enquiry **(L & S)**
- Official enquiries through emails and letters **(R &W)**

Requesting: (L, S, R & W)
- Polite expressions
- Modal verbs and key phrases for requesting **(Grammar and vocab)**
- Official requests through emails and letters **(R &W)**

Comparing and contrasting: (L, S, R & W)
- Words and phrases used for comparison and contrast **(Vocab)**
- Comparing qualities/properties/quantities of people, places and objects **(L & S)**
- Composing comparison and contrast paragraphs **(R &W)**

Expressing opinion: (L, S, R & W)
- Language expressions used for expressing opinions **(Vocab)**
- Developing opinion based paragraphs **(R &W)**
- Discourse markers and linkers used in opinion based paragraphs **(R &W)**

Public Speaking: (L, S, R & W)
- Techniques and strategies required for public speaking **(L & S)**
- Developing and organising a short speech **(R &W)**
- Presentation skills required for public speaking **(L & S)**

Course Outcomes:

At the end of the course, students will be able to
1. Develop their confidence while giving introduction, describing a place, & giving directions. (3,4,5)
2. Use various functions of English like asking for & giving information**,** inviting people for events/occasions, & requesting people. (3,4,5)
3. Narrate the past experiences and events in speaking and wring (3,4,5)
4. Express their views and opinions logically and appropriately in spoken and written format. (3,4,5,6)
5. Deliver logically organized speeches and present them without hesitations. (3,4,5, 6)

Text Books:

1. Leo Jones; Functions of English, Published by: Cambridge University Press.
2. Leo Jones; Let's Talk Level 1, 2, 3, Published by: Cambridge University Press.
3. Adrian Doff, Craig Thaine, Herbert Puchta, et al; *Empower: Intermediate (B1+)*; Published by: Cambridge University Press.

References:

1. AJ Thomson & AV Martinet; A Practical English Grammar; Oxford University Press,2015.
2. Raymond Murphy; English Grammar in Use with CD; Cambridge University Press 2013.
3. K.S. Yadurajan; Modern English Grammar; Oxford University Press, 2014.
4. William Strunk Jr; The Elements of Style; ITHACA, N.Y.; W.P. HUMPHREY, 2006
5. Joseph Devlin; How to Speak and Write Correctly; ITHACA, N.Y.; W.P.HUMPHREY, 2006
6. Anjana Agarwal; Powerful Vocabulary Builder; New Age Publishers, 2011.
7. Writing Tutor; Advanced English Learners' Dictionary; Oxford University Press, 2012
8. www.cambridgeenglish.org/in/
9. https://learnenglish.britishcouncil.org/en/english-grammar
10. https://www.rong-chang.com/

Mode of Evaluation: Continuous Internal Evaluation and End Semester Examination

B. Tech I Year II Semester

20PHY201 PHYSICS LABORATORY

L	T	P	C
0	0	3	1.5

Course Description:

Physics Practical course is meant for making the students to gain practical knowledge to co relate with the theoretical studies. It covers experiments on Principles of Mechanics and Optics, Measurement of Magnetic field and studying Resonance using LCR Circuit.

Course Objectives:

1. Elucidate the concepts of Physics through involvement in the experiment by applying theoretical knowledge.
2. Illustrate the basics of mechanics, waves and optics to analyze the behavior and characteristics of various materials for its optimum utilization.
3. Develop an ability to apply the knowledge of physics experiments in the later studies.

LIST OF EXPERIMENTS:

{Out of 17 experiments any 12 experiments (minimum 10) must be performed in a semester}

1. Spring constant - Coupled Pendulums.
2. Study of resonance effect in series and parallel LCR circuit.
3. Determination of radius of curvature of a curved surface - Newton's Rings.
4. Wavelength of a laser - Diffraction Grating
5. Wavelength of the spectral lines - Diffraction Grating.
6. Magnetic field along the axis of a current carrying coil - Stewart Gees' Apparatus
7. Thickness of a given wire - Wedge Method.
8. Dispersive power of prism – Spectrometer.
9. Frequency of the tuning fork - Melde's apparatus.
10. Determination of particle size using Laser.
11. Width of single slit - Diffraction due to Single Slit.
12. Torsional Pendulum.
13. Determination of the numerical aperture of a given optical fiber and hence to find its acceptance angle.
14. Measurement of *e/m* of electron (Thomson's method)
15. Energy gap of a material of p-n junction.
16. Determination of Planck's constant.
17. Ferroelectric hysteresis (B-H Curve).

Course Outcomes:

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

1. Apply the scientific process in the conduct and reporting of experimental investigations.
2. Understand measurement technology, usage of new instruments and real time applications in engineering studies.
3. Verify the theoretical ideas and concepts covered in lecture by doing hands on in the experiments.
4. Know about the characteristics of various materials in a practical manner and gain knowledge about various optical technique methods.
5. Acquire and interpret experimental data to examine the physical laws.

Reference Books:

1. Physics Laboratory Manual.
2. Optics, A. Ghatak, 4th Edition, Tata McGraw-Hill, New Delhi 2011.
3. Fundamentals of Optics, F. A. Jenkins and H. E. White, 4th edition, McGraw-Hill Inc., 1981.
4. Engineering Mechanics, 2nd ed. — MK Harbola.
5. Introduction to Electrodynamics- David J Griffiths.

Mode of Evaluation: Continuous Internal Evaluation and End Semester Examination

B. Tech I Year II Semester

20EEE201 ELECTRICAL ENGINEERING LABORATORY

L	T	P	C
0	0	3	1.5

Prerequisite: None

Course Description:

The laboratory facilitates the students to deal with electrical instruments, which further strengthen the concepts & operation of various AC & DC circuits, and machines, and their characteristics. The lab also reinforce the concepts discussed in class with a hands-on approach which enable the students to gain significant experience with electrical instruments such as ammeter, voltmeter, digital multimeter, oscilloscopes, tachometer, switches, fuses and power supplies.

Course Objectives:

1. To provide hands on experience in setting up simple electrical circuits (DC and AC).
2. To get exposure to handle different electrical equipment's.
3. To measure various electrical parameters with different measuring instruments.
4. To get hands on experience in operating DC and AC machines.
5. To understand the operation of basic converters and various components of LT Switchgear..

LIST OF LABORATORY EXPERIMENTS/DEMONSTRATIONS:

DEMONSTRATIONS:

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, wattmeter, multi-meter, oscilloscope. Study of passive components - resistors, capacitors and inductors.
2. Demonstration of voltage and current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents). In star and delta connections.
3. Demonstration of cut-out sections of transformer and DC & AC machines.
4. Demonstration of induction machine. Motor operation and generator operation of an induction machine driven at super-synchronous speed.
5. Wavelength of the spectral lines - Diffraction Grating.
6. Familiarization of (i) different types of cables/wires and switches and their uses, (ii) different types of fuses & fuse carriers; MCB, ELCB, MCCB their ratings and uses (components of LT switchgear).

EXPERIMENTS:

1. Wiring of a simple circuit for controlling (1) a lamp/fan point, (2) Staircase or Corridor Winding.
2. Wiring of a power circuit for controlling an electrical appliance (16A Socket).
3. Verification of Kirchhoff's current and voltage laws (KCL & KVL).
4. Verification of superposition theorem
5. Sinusoidal steady state response of R-L, and R-C circuits (impedance calculation and verification).
6. Measurement of voltage, current and power in a single-phase circuit using voltmeter, ammeter and wattmeter. Also, calculate the power factor of the circuit.
7. Measurement of voltage, current and power in a single-phase circuit using voltmeter, ammeter and wattmeter. Also, calculate the power factor of the circuit.

8. Open-circuit and short-circuit test on a single-phase transformer.
10. Wiring of a power distribution arrangement using single-phase MCB distribution board with ELCB, main switch and energy meter (or residential house wiring).
11. Regulated power supply for generating a constant DC Voltage.
12. Fabrication of a given electronic circuit on a PCB and test the same.

Course Outcomes:

Upon successful completion of the course, the students are expected to

1. Get an exposure to common electrical components and their ratings.
2. Make electrical connections by wires of appropriate ratings.
3. Understand the usage of common electrical measuring instruments.
4. Understand the basic characteristics of transformers and electrical machines.
5. Get an exposure to the working of various power electronic converters.

Mode of Evaluation: Continuous Internal Evaluation and End Semester Examination

Dept. of Computer Science & Engineering (IoT)

B. Tech I Year II Semester

20CSE201 C PROGRAMMING AND DATA STRUCTURES LABORATORY

L	T	P	C
0	0	3	1.5

Prerequisite: 20CSE101

Course Description:

This course includes C program basics, control structures, arrays, files, pointers and data structures.

Course Objectives:

1. To make the student understand fundamentals of C programming language and problem solving.
2. To get hands-on practices with the syntax and semantics of C programming language.
3. To develop algorithms for sorting, searching techniques.
4. To design and implement operations on stacks, queues, and linked lists.

LIST OF EXPERIMENTS

1. a) Write a C program to swap the two numbers.
b) Write a C Program to find the eligibility of admission for a Professional course based on the following criteria:
i. Marks in Maths >=65
ii. Marks in Physics >=55
iii. Marks in Chemistry>=50
OR
iv. Total in all three subject >=180

2. a) Write a C program to compute the factorial of a given number.
b) Write a program that reads numbers which are in the range 0 to 100, till it encounters -1. Print the sum of all the integers that you have read before you encountered -1.

3. a) Write a C program to accept a coordinate point in a XY coordinate system and determine in which quadrant the coordinate point lies.
b) The digital root (also called repeated digital sum) of a number is a single digit value obtained by an iterative process of summing digits. Digital sum of 65536 is 7, because 6+5+5+3+6=25 and 2+5 = 7.Write a program that takes an integer as input and prints its digital root.

4. a) Write a C program to find the series of prime numbers in the given range.
b) Write a C program to generate Tribonacci numbers in the given range.

5. a) Write a C program to find sum of digits, Decimal to Binary conversion, reversal of numbers using functions.
b) Write a C program to find Factorial, Greatest Common Divisor, and Fibonacci using recursion.

6. Your program should take as input: dimension of a square matrix N, two matrices of size N x N with integer values, and one operator symbol (+, - ,*). It must perform the corresponding operation given below;
a) Matrix Addition b) Matrix Subtraction c) Matrix Multiplication

7. Implement the following sorting techniques.
a) Bubble sort b) Insertion sort c) Selection sort.

8. Implement the following searching techniques.
a) Linear Search b) Binary Search

9. a) Write a program in C to find the frequency of characters in a string.
b) Write a C program to implement all string operations (string length, string copy, string compare, string concatenation and string reverse) without using string library functions.

10. a) Write a C program to get *N* elements in an array and sort it using Pointer.
b) Write a C program to swap two integers using pass by reference.
c) Write a C program to find the largest element using Dynamic Memory Allocation.

11. a) Write a program in C to count the number of vowels, consonants, digits, special symbols, words in a string using a pointer.
b) Write a C program to print all permutations of a given string using pointers.

12. a) Write a C program to add two distances in the inch-feet system using structures.
b) Write a C program to calculate difference between Two Time Periods (in *Hours, Minutes, Seconds* format) using structures.

13. Develop an application to match parenthesis of a given expression using Stack.

14. Develop an application to identify Palindrome string using Stack and Queue.

15. Develop an application to add two Polynomial equations using Linked List.

Course Outcomes:

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

1. Understand fundamentals of C programming language and its constructs.
2. Design applications using functions, arrays, sorting and searching techniques.
3. Design and implement solutions using strings and pointers.
4. Design and develop solutions using structures and File processing.
5. Design and develop applications on stack, queue, and linked list depending on the problems to be solved.

Mode of Evaluation: Continuous Internal Evaluation and End Semester Examination

II Year I Semester

Dept. of Computer Science & Engineering (IoT)

B. Tech II Year I Semester

20MAT111 PROBABILITY AND STATISTICS FOR COMPUTER SCIENCE

L	T	P	C
3	0	0	3

Pre-requisite 20MAT101

Course Description:

This course provides an introduction to probability, distributions and statistics with applications. Topics include: Conditional probability, Random variables, Probability distributions, Joint densities, Bayesian inference, descriptive statistics, Correlation and Regression, Estimation, Confidence intervals, Hypothesis testing.

Course Objectives:

The objectives of this course are

1. To extend and formalize knowledge of the theory of probability and random variables.
2. To solve real time problems in engineering and science by using discrete and continuous distributions
3. To analyze and interpret basic summary and modeling techniques for Multi-variate data
4. To analyze the data by using descriptive statistics for decision making
5. To apply the statistical inference involving confidence interval and hypothesis testing in data analysis.

UNIT I PROBABILITY 9 hours

Introduction to Probability, Sample space and events, axioms of probability, theorems on probability, conditional probability, multiplication theorem and independence of events, Baye's theorem.

Random variables (discrete and continuous), probability density functions, distribution function, mathematical expectation, properties. moment generating function.

UNIT II PROBABILITY DISTRIBUTIONS 9 hours

Discrete probability distributions - Binomial, Poisson, Geometric and their properties

Continuous probability distributions - Uniform, Exponential, Gamma, Normal distributions and their properties, Chebychev's inequality.

UNIT III JOINT DISTRIBUTIONS 9 hours

Joint densities and Independence - Marginal distributions (discrete & continuous)- Expectation and Covariance, Correlation, Conditional densities and Regression, Curves of regression, Transformation of random variables.

UNIT IV STATISTICS FOR DATA ANALYSIS 9 hours

Data Visualization, Moments, skewness, kurtosis, correlation, correlation coefficient, rank correlation, principle of least squares, lines of regression, regression coefficients and their properties.

UNIT V STATISTICAL INFERENCE 9 hours

Population, sampling, formulation of null hypothesis, alternative hypothesis, level of significance, types of errors and power of the test. Large Sample Tests: Test for single mean, single proportion, difference of means, difference of proportions, Confidence interval for parameters in one sample and two sample problems, t test for single mean, difference of means, test for ratio of variances.

Course Outcomes:

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

1. Understand the probability concepts and their importance in engineering.
2. Apply discrete and continuous probability distributions to solve various engineering problems.
3. Get an idea about joint density functions, distribution functions to the random variables and analyse the multivariate problems in engineering
4. Apply the method of least squares to estimate the parameters of a regression model.
5. Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases.

Text Book(s)

1. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th Edition, 2007.
2. Dr.B.S.Grewal, " Higher Engineering Mathematics", Khanna Publications, 42nd Edition.

Reference Books

1. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill Edition, 2004.
2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2012.
3. Dean G. Duffy., "Advanced Engineering Mathematics with MATLAB", CRC Press, Third Edition 2013.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

B. Tech II Year I Semester

20CSO103 REAL TIME OPERATING SYSTEMS

L	T	P	C
3	0	0	3

Pre-requisite NIL

Course Description:

This course covers the principles of real-time systems, Modeling of a Real-Time System, Task assignment and scheduling, Resource management, Real-time operating systems, RTOS services, Programming language with real-time support, System design techniques, Inter task communication, Fault tolerant techniques, Reliability evaluation methods; Performance analysis

Course Objectives:

1. To provide knowledge on Real Time operating system concepts.
2. To develop an understanding of various Real Time systems Application
3. To learn about RTOS concepts on multitasking and inter-process communication
4. To learn the basics of RTOS Scheduling and resource sharing.

UNIT I REAL TIME SYSTEMS 9 hours

Introduction- Issues in real time computing- Structure of a real time system- Task classes- Performance measures for real time systems- Task assignment and scheduling algorithms - Mode changes- Fault tolerant scheduling - Real Time Models.

UNIT II µC/OS- II RTOS CONCEPTS 9 hours

Foreground/Background process- Resources - Tasks - Multitasking -Priorities - Schedulers -Kernel - Exclusion - Inter task communication-Interrupts - Clock ticks - µC/OS- II Kernel structure - µC/OS- II -Initialisation - Starting µC/OS- II.

UNIT III µC/OS- II RTOS FUNCTIONS 9 hours

Task Management - Time management - Semaphore management - Mutual exclusion semaphore – Event Management –Message management - Memory management - Porting µC/OS- II – Comparison and Study of Various RTOS like QNX- VX Works-PSOS.

UNIT IV REAL TIME SCHEDULING 9 hours

Common Approaches to Real Time Scheduling: Clock Driven Approach, Weighted Round Robin Approach, Priority Driven Approach, Dynamic Versus Static Systems, Optimality of Effective-Deadline-First (EDF) and Least-Slack-Time-First (LST) Algorithms, Rate Monotonic Algorithm, Offline Versus Online Scheduling, Scheduling Aperiodic and Sporadic jobs in Priority Driven and Clock Driven Systems.

UNIT V RESOURCES SHARING 9 hours

Effect of Resource Contention and Resource Access Control (RAC), Non-preemptive Critical Sections, Basic Priority-Inheritance and Priority-Ceiling Protocols, Stack Based Priority- Ceiling Protocol, Use of Priority-Ceiling Protocol in Dynamic Priority Systems, Preemption Ceiling Protocol, Access Control in Multiple-Module Resources, Controlling Concurrent Accesses to Data Objects.

Course Outcomes:

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

1. Understand concepts of Real-Time systems and modeling.
2. Recognize the characteristics of a real-time system.
3. Understand and develop document on an architectural design of a real-time system
4. Develop and document Task scheduling, resource management, real-time operating systems and fault tolerant applications of Real-Time Systems
5. Able to get a broad understanding of the technologies and applications for the emerging and exciting domain of real-time systems

Text Book(s)

1. Krishna C.M., Kang G. Shin, "Real Time Systems", Tata McGraw-Hill Edition, 2010.

2. Philip A.Laplante, "Real Time Systems Design and Analysis-An Engineers Handbook", II Edition-IEEE Press, IEEE ComputerSociety Press, 2001

3 Real Time Systems – Jane W. S. Liu, Pearson Education Publication

Reference Books

1. Real Time Systems – Jane W. S. Liu, Pearson Education Publication

2. Jean J Labrosse, "MicroC/OS-II The Real Time Kernel" II Edition,CMP Books, 2002
3. Real Time Systems – Mall Rajib, Pearson Education
4 Real-Time Systems: Scheduling, Analysis, and Verification – Albert M. K. Cheng, Wiley.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

B. Tech II Year I Semester

20CSO104 ANALOG AND DIGITAL ELECTRONICS

L	T	P	C
3	0	0	3

Pre-requisite **20EEE101**

Course Description:

The course gives an introduction to operation and design of Analog and digital circuits. It will give an basis for understanding operation and characteristics of simple of Analog electronics and digital electronic circuit elements such as diodes, BJT,FET &MOSFET, operational amplifiers and their input output characteristics and their applications .Also, this course provides detail design of logic families, boolean algebra, logic gates, combinatorial and sequential digital circuits.

Course Objectives:

1. To introduce semiconductor components such as diodes and its applications, BJT.
2. To know the FET, MOSFET, OP-AMP and their characteristics.
3. To give understanding of Applications of op amp and know digital circuits
4. To learn basic techniques for the design of combinational logic circuits digital circuits and fundamental concepts used inthe design of digital systems.
5. To understand the concepts sequential circuits.

UNIT I DIODE AND BJT CIRCUITS 9 hours

P-N junction diode-diode current- diode capacitance, I-V characteristics of a diode; Zener diodes; Tunnel diodes, photo diode, LED- clamping and clipping circuits-BJT-types of configurations-input, output characteristics- small signal model, biasing circuits- fixed bias ,collector to base bias – self bias - stability factor;

UNIT II FET, MOSFET AND OPERATIONAL AMPLIFIER CIRCUITS 9 hours

Introduction to FET–operation-characteristics-MOSFET structure-types -operation- drain and transfer characteristics, Introduction to operational amplifier-ideal op-amp-equivalent circuit-DC and AC characteristics-frequency response- Differential amplifier; instrumentation amplifier; differentiator; Integrator; Programmable gain amplifier

UNIT III OP AMP APPLICATIONS AND DIGITAL CIRCUITS 9 hours

Comparators-Schmitt trigger- Sample and Hold circuit -555 timer-astable operation-PWM generation-Data converters- Digital to analog converters and Analog to digital converters.

Digital Circuits: Digital (binary) operations of a system, OR gate, AND gate, NOT, EXCLUSIVE OR gate, De Morgan Laws, NAND and NOR DTL gates, modified DTL gates, HTL and TTL gates, output stages, RTL and DCTL, CMOS, Comparison of logic families.

UNIT IV COMBINATIONAL LOGIC CIRCUITS 9 hours

Basic Theorems and Properties of Boolean Algebra, Canonical and Standard Forms, Digital Logic Gates, The Map Method, Product-of-Sums Simplification, Don't-Care Conditions, NAND and NOR Implementation, Exclusive-OR Function, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers.

UNIT V SEQUENTIAL LOGIC CIRCUITS 9 hours

Sequential Circuits, Storage Elements: Latches and flip flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Shift Registers, Ripple Counters, Synchronous Counters, Random-Access Memory, Read-Only Memory.

Course Outcomes:

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

1. Know the characteristics of various semiconductors devices such as PN diode,BJT.
2. Know the characteristics of various semiconductors devices such as FET ,MOSFET , OPAMP.
3. Design applications of opamp and Know about the logic families and realization of logic gates

4. Learn Postulates of Boolean algebra and to minimize combinational functions
5. Design and analyze combinational and sequential circuits

Text Book(s)

1. Integrated Electronics: Analog and Digital Circuits and Systems, 2/e, Jacob Millman, Christos Halkias and Chethan D. Parikh, Tata McGraw-Hill Education, India, 2010.
2. Digital Design, 5/e, Morris Mano and Michael D. Cilette, Pearson, 2011

Reference Books

1. Electronic Devices and Circuits, Jimmy J Cathey, Schaum's outline series, 1988
2. Digital Principles, 3/e, Roger L. Tokheim, Schaum's outline series, 1994

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Dept. of Computer Science & Engineering (IoT)

B. Tech II Year I Semester

20CSO105 DATA STRUCTURES AND ALGORITHMS

L	T	P	C
2	1	0	3

Pre-requisite **20CSE102**

Course Description:

This course is aimed to provide basic understanding of different data structures and algorithms. This course covers introduction to algorithms, basic data structures like arrays, linked lists, stacks, queues, sorting, hashing, various types of trees, graphs, hashing and their implementation.

Course Objectives:

1. To introduce the fundamental concept of data structures and to emphasize the importance of data structures in developing and implementing efficient algorithms.
2. To develop skills to choose appropriate data structure to solve real world problem
3. To implement recursive and non-recursive algorithms for different operations on data structures.

UNIT I INTRODUCTION TO ALORITHMS AND REPRESENATION OF LINKED LIST **9 hours**

Introduction: What is an algorithm?, Algorithm specification, Space Complexity, Time Complexity, Orders of Growth, Worst-Case, Best-Case, and Average-Case Efficiencies, Asymptotic notations **Memory Representation**: Linear and Linked Representations, Arrays, and **Linked List**: Singly Linked List and Its Operations, Doubly Linked List and its operations, Circular Lists.

UNIT II STACK & QUEUE **9 hours**

Stack: Array representations, operations on stack. Applications of Stack. **Queue:** Array and linked list representations, operations on queue, applications of queue, circular queue, insertion and deletion, double ended queue.

UNIT III TREES **9 hours**

Tree: Introduction, Terminology, Binary Tree, representation, Binary Tree Traversals. **Binary Search Tree**: Properties, Insertion, Deletion, and Searching operations. **Priority queue**: Definition and Applications, implementation using Heaps, Max Heap, Min Heap, Insertion into a Max Heap, Deletion from Max Heap

UNIT IV DICTIONARY AND GRAPHS **9 hours**

Dictionaries: Hash Table Representation, Static and Dynamic Hashing, Collision Resolution Methods-Open Addressing, Separate Chaining, Double hashing.

Graphs: Terminology, Representation, operations, Graph Traversal techniques.

UNIT V PATTERN MATCHING AND DYNAMIC PROGRAMMING 9 hours

Pattern Matching: Pattern matching Algorithms-Brute force, the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm.

Dynamic Programming: General method, String Editing, Longest Common Subsequence, Matrix Chain Multiplication, 0/1 Knapsack problems, The traveling sales person problem.

Backtracking: General method, N-Queens Problem, Sum of subset problem, Graph Coloring Problem.

Course Outcomes:

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

1. Describe how each data structure is represented using linear and linked representations.
2. Apply stack and queue to solve real world problems
3. Demonstrate different methods for traversing trees
4. Compare various sorting and hashing techniques.
5. Develop applications using Tree and Graph data structures.

Text Book(s)

1. Cormen T.H., Leiserson, C.E., Rivest, R.L., and C. Stein. "Introduction to Algorithms, MIT Press, Second Edition (Indian reprint: Prentice-Hall).
2. Data Structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.

Reference Books

1. Robert L. Kruse, Alexander J. Ryba, Data Structures and Program Design in C++, Prentice Hall, 2ed.
2. Data Structures and Algorithms, Alfred V. Aho, John E. Hopcroft, Jeffery D.Ulman. Pearson; 1st edition
3. Data Structures, Algorithms and Applications in C++ by Sartaj Sahni, McGraw Hill, NY, Second Edition.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Dept. of Computer Science & Engineering (IoT)

B. Tech II Year I Semester

20CSO106 OBJECT ORIENTED PROGRAMMING - JAVA

L	T	P	C
2	1	0	3

Pre-requisite **20CSE102**

Course Description:

Basics of Object-Oriented Programming - objects, classes, polymorphism, inheritance, static and dynamic binding. Object Oriented Programming using Java-classes, interfaces, inheritance, polymorphism, method dispatch, features for encapsulation and modularity.

Course Objectives:

1. Understand object-oriented programming concepts, and apply them in solving problems.
2. Learn the principles of inheritance and polymorphism; and demonstrate how they relate to the design of abstract classes
3. To Introduce the implementation of packages and interfaces
4. Learn the concepts of exception handling and multithreading.
5. Learn the design of Graphical User Interface using applets and swing controls.

UNIT I INTRODUCTION TO OOPS CONCEPTS AND CLASSES 9 hours

Introduction to Object Oriented Programming, Java buzzwords, Java Programming Basics, Sample programs, Data types and operators, Control statements. **Classes:** Classes, Objects, Methods, Constructors, this and static keywords, Method and Constructor Overloading, Access modifiers, Polymorphism **Arrays:** One Dimensional and multi-dimensional arrays

UNIT II STRINGS, INHERITANCE, INTERFACES, AND PACKAGES 9 hours

Strings: Strings, String Handling

Inheritance: Basics, Usage of Super, Multi-level hierarchy, Method overriding, Abstract class, Final keyword.

Interfaces: Creating, Implementing, Using, Extending, and Nesting of interfaces.

Packages: Defining, Finding and Importing packages, Member Access.

UNIT III EXCEPTION HANDLING &MULTI-THREADING 9 hours

Exception Handling: Fundamentals, Types, Multiple catch clauses, Nested try blocks, Thrown Class, Using Finally and Throws, Built-in exceptions, User-defined exceptions.

Multi-threading: Thread Class, Runnable interface, creating multiple threads, life cycle of thread, thread properties, synchronization, thread communication, suspending, resuming and stopping threads.

UNIT IV I/O STREAMS AND COLLECTION FRAME WORK CLASSES **9 hours**

I/O Streams: Byte Stream Classes and Character Stream Classes.

Collection Frame work : Hierarchy of collection framework, Array-List, Linked-List, Vector, Stack, Queue, Priority Queue, Hash Set, Linked Hash Set, Tree Set.

UNIT V SWINGS **9 hours**

Swing – Introduction, limitations of AWT, MVC architecture, components, containers, Event Handling- Handling mouse and keyboard events, Exploring Swing- JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

Course Outcomes:

At the end of the course, students will be able to:

1. Choose object-oriented programming concepts for problem solving.
2. Create and use packages and interfaces.
3. Develop multithreaded applications with synchronization.
4. Provide computed based solutions by using java collection framework and I/O classes
5. Design GUI based applications

Text Book(s)

1. Java The Complete Reference, Herbert Schildt, MC GRAW HILL Education, 9th Edition, 2016.

Reference Books

1. Core Java Volume I – Fundamentals, by Cay S. Horstmann, Gary Cornell Pearson Education Ninth Edition
2. "Java Fundamentals - A Comprehensive Introduction", Herbert Schildt and Dale Skrien, Special Indian Edition, McGrawHill, 2013.
3. "Java – How to Program", Paul Deitel, Harvey Deitel, PHI.
4. "Thinking in Java", Bruce Eckel, Pearson Education.
5. Java and Object Orientation, an introduction, John Hunt, second edition, Springer.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Dept. of Computer Science & Engineering (IoT)

B. Tech II Year I Semester

20CSO203 ANALOG AND DIGITAL ELECTRONICS LABORATORY

L	T	P	C
0	0	3	1.5

Pre-requisite **20EEE101**

Course Description:

The goal of this course is to introduce students to the Electronic components, the analysis and design methods, and the underlying principles that make up the framework for creating and implementing electronic circuits for almost any conceivable task. The main emphasis is on developing an engineering point of view that is a mix of practical experience, good intuition, and the capability to apply the mathematical laws that govern the behaviour of electronic elements and circuits. Both analog and digital circuits will be covered.

Course Objectives:

1. To introduce components such as diodes, BJTs and FETs.
2. To know the applications of components.
3. To give understanding of various types of amplifier circuits
4. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
5. To understand the concepts of combinational logic circuits and sequential circuits.

List of Experiments:

1. Design of Full Wave Rectifier with & without filters
2. Determine the input and output Characteristics of Common Emitter configuration of BJT
3. Determine the input and output Characteristics of Common Base configuration of BJT
4. Determine the drain and transfer characteristics of FET and MOSFET
5. Verify the applications of Op Amp – Adder ,Subtractor , Differentiator , Integrator
6. Design od Data converters – ADC &DAC
7. Realization of Boolean Expressions using Gates
8. Design and realization logic gates using universal gates
9. Generation of clock using NAND / NOR gates
10. Design a 4 – bit Adder / Subtractor
11. Design and realization a Synchronous and Asynchronous counter using flip-flops
12. Study of logic gates using DTL, TTL, ECL, etc.

Course Outcomes:

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

1. Know the characteristics of various Electronic components.
2. Understand the utilization of components.
3. Design and analyze opamp applications and data converters
4. Postulates of Boolean algebra and to minimize combinational functions
5. Design and analyze combinational and sequential circuits
6. Known about the logic families and realization of logic gates.

Text Book(s)

1. Integrated Electronics: Analog and Digital Circuits and Systems, 2/e, Jacob Millman, Christos Halkias and Chethan D. Parikh, Tata McGraw-Hill Education, India, 2010.
2. Digital Design, 5/e, Morris Mano and Michael D. Cilette, Pearson, 2011

Reference Books

1. Electronic Devices and Circuits, Jimmy J Cathey, Schaum's outline series, 1988.
2. Digital Principles, 3/e, Roger L. Tokheim, Schaum's outline series, 1994.

Mode of Evaluation: Continuous Internal Evaluation and End Semester Examination

B. Tech II Year I Semester

20CSO204 DATA STRUCTURES AND ALGORITHMS LABORATORY

L	T	P	C
0	0	3	1.5

Pre-requisite **20CSE102**

Course Description:

This course is aimed to provide hands on experience to implement basic linear and nonlinear data structures. This course covers implementation of stack, queue, list, sorting techniques, binary search trees and graphs.

Course Objectives:

1. To develop skills to analyze and program linear and nonlinear data structures.
2. Develop different data structures with effective usage of arrays, linked lists, arithmetic expression, queue, binary search tree and different sorting techniques.
3. Develop recursive algorithms as they apply to trees and graphs.

List of Programs:

1. Write a C program to perform the following operations on Singly Linked List
   i) Insertion ii) Deletion iii) Traversal.
2. Write a C program to perform the following operations on Circular Doubly Linked List
   i) Insertion ii) Deletion iii) Traversal.
3. Write a C program to add two polynomials using Singly Linked List
4. Write a C program with class to implement Stack using
   i) Arrays ii) Linked list.
5. Write a C program to read an arithmetic expression in infix notation and do the following
   i)convert infix expression into postfix ii) Evaluate the Postfix Expression
6. Write a C program class to implement Queue using
   i) Arrays ii) Linked list.
7. Write a C program to implement Circular Queue using Array
8. Write a C program to perform the following operations on Binary Search Tree
   i) Insertion ii) Deletion iii) Search a given Key
9. Write a C Program to Perform the Tree Traversal Techniques using recursion.
10. Write a C Program to Perform the Tree Traversal Techniques using without recursion.
11. Write a C program to Implement All functions of a Dictionary by using Hashing
12. Write a C program class for implementing the following graph traversal algorithms
    i) Depth First Search ii) Breadth First Search
13. Write a C Program to Implement 0/1 Knapsack problem using Dynamic Programming
14. Write a C program to Implement Traveling Salesperson problem to find the optimal tour using Dynamic Programming
15. Write a C program to Implement N Queen's problem using Back Tracking.

Course Outcomes:

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

1. Implement data structures like array, list, stack, queue.
2. Choose appropriate data structure to solve a real world problem.
3. Design algorithms to perform sorting.
4. Apply searching techniques to search an element in a list.
5. Develop applications using tree and graph data structures.

Text Book(s)

1. Object Oriented Programming with ANSI & Turbo C++, Ashok N.Kamthane, Pearson Education.
2. Data Structures using C++, D.S.Malik, 2nd Edition, Cengage Learning.

Reference Books

1. Data Structures through C++, YashavantP.Kanetkar, BPB Publication.
2. Data Structures using C and C++, YedidyahLangsam.MosheJ.Augenstein Aaron M.Tenenbaum, 2nd Edition, PHI.

Mode of Evaluation: Continuous Internal Evaluation and End Semester Examination

Dept. of Computer Science & Engineering (IoT)

B. Tech II Year I Semester

20CSO205 OBJECT ORIENTED PROGRAMMING – JAVA LABORATORY

L	T	P	C
0	0	3	1.5

Pre-requisite **20CSE102**

Course Description:

Basics of Object-Oriented Programming - objects, classes, polymorphism, inheritance, static and dynamic binding. Object Oriented Programming using Java-classes, interfaces, inheritance, polymorphism, method dispatch, features for encapsulation and modularity.

Course Objectives:

1. Understand object-oriented programming concepts, and apply them in solving problems.
2. Learn the principles of inheritance and polymorphism; and demonstrate how they relate tothe design of abstract classes
3. To Introduce the implementation of packages and interfaces
4. Learn the concepts of exception handling and multithreading.
5. Learn the design of Graphical User Interface using applets and swing controls

List of Programs:

1 a) Write a Java program that prints all real solutions to the quadratic equation ax2 + bx + c =

0. Read in a, b, c and use the quadratic formula. If the discriminant b2-4ac is negative, display a message stating that there are no real solutions.

b) Write a Java program that find prime numbers between 1 to n.

c) Write a Java Program that find the factorial of a number

.

2 a) The Fibonacci sequence is defined by the following rule: The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a Java program that print the nth value in the Fibonacci sequence.

b) Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a Palindrome.

c) Write a Java program for sorting a given list of names in ascending order

3. a) Write a java program to split a given text file into n parts. Name each part as the name of the original file followed by .part<n> where n is the sequence number of the part file

b) Write a java program to convert an ArrayList to an Array.

c) Write a Java program to make frequency count of vowels, consonants, special symbols, digits, words in a given text.

4. a) Write a Java program that reads a file name from the user, then displays information about

whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.

b) Write a Java program that reads a file and displays the file on the screen, with a line number before each line.

c) Implement Stack using queues.

5. a) Write a java program to make rolling a pair of dice 10,000 times and counts the number of times doubles of are rolled for each different pair of doubles. Hint: Math.random()

b) Write java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read display it only if it‘s not a duplicate of any number already read display the complete set of unique values input after the user enters each new value.

c) Write a java program to read the time intervals (HH:MM) and to compare system time if the system time between your time intervals print correct time and exit else try again to repute the same thing. By using StringToknizer class.

6. a) Write java program to create a super class called Figure that receives the dimensions of two dimensional objects. It also defines a method called area that computes the area of an object. The program derives two subclasses from Figure. The first is Rectangle and second is Triangle. Each of the sub class overridden area() so that it returns the area of a rectangle and a triangle respectively.

b) Write a Java program that creates three threads. First thread displays ―Good Morning every one second, the second thread displays ―Hello every two seconds and the third thread displays ―Welcome every three seconds

7. a) Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.

b) Use inheritance to create an exception super class called EexceptionA and exception sub class ExceptionB and ExceptionC, where ExceptionB inherits from ExceptionA and ExceptionC inherits from ExceptionB. Write a java program to demonstrate that the catch block for type ExceptionA catches exception of type ExceptionB and ExceptionC

8. Write a Java Program to design login window using AWT components.

9. Develop an application for simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result

Course Outcomes:

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

1. Solve real world problems using OOP techniques.
2. Implement string handling and file handling methods.
3. Design multithreaded applications with synchronization.
4. Develop web applications using AWT components.
5. Create GUI based applications

Text Book(s)

1. Java The Complete Reference, Herbert Schildt, MC GRAW HILL Education, 9th Edition, 2016.

Reference Books

1. Core Java Volume I – Fundamentals, by Cay S. Horstmann, Gary Cornell Pearson Education Ninth Edition
2. "Java Fundamentals - A Comprehensive Introduction", Herbert Schildt and Dale Skrien, Special Indian Edition, McGrawHill, 2013.

Mode of Evaluation: Continuous Internal Evaluation and End Semester Examination

Dept. of Computer Science & Engineering (IoT)

Mandatory Course

B. Tech II Year I Semester

20CHE901 ENVIRONMENTAL SCIENCE

L	T	P	C
2	0	0	0

Pre-requisite Basic knowledge about sciences up to intermediate or equivalent level

Course Description:

The course deals with basic concepts of environment, its impact on human, universe, consumption of energy sources, effects, controlling methods for pollution and the environmental ethics to be followed by human beings.

Course Objectives:

1. To make the students aware about the environment and its inter-disciplinary nature and to emphasize the importance of the renewable energy sources.
2. To familiarize the concept of Ecosystem and their importance.
3. To bring the awareness among students about the importance of biodiversity and the need for its conservation.
4. To make the students understand the adverse effects of environmental pollution, its causes and measures to control it.
5. To introduce the environmental ethics and emphasize the urgency of rain water harvesting along with water shed management.

UNIT I MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES **9 hours**

Definition, Scope and Importance – Need for Public Awareness. Renewable energy Resources: Solar energy - solar cells, wind energy, tidal energy. Non-renewable energy resources: LPG, water gas, producer gas. Overgrazing, effects of modern agriculture – fertilizer and pesticides.

UNIT II ECOSYSTEMS **9 hours**

Concept of an ecosystem. Structure – functions – Producers, Consumers and Decomposers – Ecological succession – Food chains, Food webs and Ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystems: Forest, Desert and Lake.

UNIT III BIODIVERSITY AND ITS CONSERVATION **9 hours**

Introduction, Definition: Value of biodiversity: consumptive use, productive use, social, ethical and aesthetic values. Biogeographical zones of India. Threats to biodiversity: habitat loss, poaching of wildlife, Endangered and Endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT IV ENVIRONMENTAL POLLUTION **9 hours**

Definition, Cause, effects and control measures of pollution – Air, Water, Soil and Noise. Solid Waste Management: Effects and control measures of urban and industrial wastes.

UNIT V SOCIAL ISSUES AND THE ENVIRONMENT 9 hours

Urban problems related to Water conservation, rain water harvesting and watershed management; Climate changes: global warming, acid rain, ozone layer depletion, nuclear accidents. Case Studies: Population growth, variation among nations and population explosion.

Course Outcomes:

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

1. Ability to understand the natural environment, its relationship with human activities and need of the day to realize the importance of the renewable energy sources.
2. The knowledge of various ecosystems and their importance along with the concepts of food chains, food webs and ecological pyramids.
3. Familiarity with biodiversity, its importance and the measures for the conservation of biodiversity.
4. The knowledge about the causes, effects and controlling methods for environmental pollution, along with disaster management and solid waste management.
5. Awareness about the sustainable development, environmental ethics, social issues arising due to the environmental disorders.

Text Book(s)

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press, 2005.
2. Environmental Studies by R. J. Ranjith Daniels and Jagdish Krishnaswamy, (Wiley Re-print version 2014).
3. Chemistry for Environmental Engineering/C.N. Sawyer, P.L. McCarty, G.F. Parkin (TataMcGraw Hill, Fifth Edition, 2003).
4. Environmental Chemistry by B.K. Sharma, (Goel Publishing House, 2014).
5. Environmental Studies by Benny Joseph (TataMcGraw Hill, Second Edition, 2009).

Reference Books

1. Environmental Science & Engineering by Dr. A. Ravikrishnan, Hitech Publishing Company Pvt. Ltd. 2013.
2. Perspectives in Environmental Studies, Second edition, Anubha Koushik and C.P. Koushik, New Age International (P) Limited, Publishers, 2004.

Mode of Evaluation: Assignments, Mid Term Tests.

II Year II Semester

B. Tech II Year II Semester

20HUM101 ECONOMICS AND FINANCIAL ACCOUNTING FOR ENGINEERS

L	T	P	C
3	0	0	3

Pre-requisite NIL

Course Description:

The Engineering Economics and Financial Accounting aims to provide an insight into production, cost analysis, market structure, Accounting Basic concepts and financial Statement Analysis. The course is designed to give emphasis on the application of real life examples on various fundamental issues of economics and accounts. This course introduces the accounting system, principles, types of accounts, and financial statements etc. The ratio analysis and financial analysis are useful to know the positions of financial statements are explained to know the analysis of financial matters.

Course Objectives:

1. Describe the nature of engineering economics in dealing with the issues of scarcity;

2. Know the supply, demand, production and cost analysis to analyze the impact of economic events on markets;

3. Explain the performance of firms under different market structures and Price determination in various market conditions.

4. Explain the accounting principles, types of accounting and preparation of final accounts; and

5. Describe the financial statement analysis and investment evaluation through ratios and capital budgeting techniques.

UNIT I DEMAND ANALYSIS 9 hours

Scope and Significance of Economics- Understanding the problem of scarcity and choice - Elements of market Economy: Demand, Supply and Market Equilibrium- Theory of Demand, Elasticity of Demand, Supply and Law of Supply.

UNIT II PRODUCTION AND COST ANALYSIS 9 hours

Production Function – Short-run and long- run production – Cost Analysis: Cost concepts - Cost Structure of Firms and output decision- Break-Even Analysis (BEA) – Managerial significance and limitations of BEA - Determination of Break Even Point (Simple Problems).

UNIT III MARKET STRUCTURE AND PRICING 9 hours

Classification of Markets - General Equilibrium and efficiency of Perfect competition, Monopoly, Monopolistic, Oligopoly, Duopoly – Price determination under various market conditions- Pricing objectives- Methods.

UNIT IV BASICS OF ACCOUNTING 9 hours

Uses of Accounting - Book Keeping Vs Accounting - Double Entry System - Accounting Principles - Classification Of Accounts - Rules Of Debit & Credit- Accounting Cycle: Journal, Ledger, Trial Balance. Final Accounts: Trading Account - Profit & Loss Account - Balance Sheet with Adjustments, (Simple Problems).

UNIT V FINANCIAL RATIO ANALYSIS AND CAPITAL BUDGETING 9 hours

Ratio Analysis - Liquidity, Leverage, Solvency, Activity and Profitability Ratios - Capital Budgeting. (Simple Problems).

Course Outcomes:

At the end of the course, students will be able to:

1. Understand Engineering economics basic concepts,

2. Analyze the concepts of demand, elasticity, supply, Production, Cost Analysis and its essence in floating of an organization,

3. Compare different market structures and identify suitable market,

4. Demonstrate an understanding and analyzing the accounting statements, and

5. Exhibit the ability to apply knowledge of ratio analysis and capital budgeting techniques in financial statement analysis and investment evaluation respectively.

Text Book(s)

1. Case E. Karl & Ray C. Fair, "Principles of Economics", Pearson Education, 8th Edition, 2007
2. Financial Accounting, S. N. Maheshwari, Sultan Chand, 2009
3 Financial Statement Analysis, Khan and Jain, PHI, 2009
4 Financial Management, Prasanna Chandra, T.M.H, 2009

Reference Books

1. Lipsey, R. G. & K. A. Chrystal , "Economics", Oxford University Press, 11th Edition, 2007

2 Samuelson P. A. & Nordhaus W. D. "Economics", Tata McGraw-Hill 18th Edition, 2007

3 Financial Management and Policy, Van Horne, James, C., Pearson, 2009.

4. Financial Management, I. M. Pandey, Vikas Publications

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Dept. of Computer Science & Engineering (IoT)

B. Tech II Year II Semester

20MAT112 DISCRETE MATHEMATICAL STRUCTURES

L	T	P	C
3	0	0	3

Pre-requisite 20MAT110

Course Description:

This course introduces the concepts of discrete mathematics and their applications in computer science. It covers algebraic structures, combinatory and finite state machines. It also provides insight into the concepts of graph theory and their applications.

Course Objectives:

1. To introduce the concepts of logic, rules of inference and predicates.
2. To discuss the concepts on combinatory.
3. To explain the concepts of algebraic structures.
4. To familiarize the principles of Lattices and Boolean algebra.
5. To illustrate the problems in graph theory.

UNIT I MATHEMATICAL LOGIC AND STATEMENT CALCULUS 9 hours

Introduction -Statements and Notation - Connectives – Tautologies – Two State Devices and Statement logic - Equivalence - Implications - The Theory of Inference for the Statement Calculus –-The Predicate Calculus - Inference Theory of the Predicate Calculus.

UNIT II COMBINATORY 9 hours

The Basics of Counting- The Pigeonhole Principle -Permutations and Combinations - Binomial Coefficients - Generalized Permutations and Combinations –Generating Permutations and Combinations.

UNIT III ALGEBRAIC STRUCTURES 9 hours

Semigroups and Monoids - Grammars and Languages –Types of Grammars and Languages – Groups – Subgroups – Lagrange's Theorem –Homomorphism: Introduction –Properties - Group Codes.

UNIT IV LATTICES AND BOOLEAN ALGEBRA 9 hours

Relations - Partially Ordered Relations - Hasse Diagram - Poset - Lattices - Boolean algebra - Boolean Functions - Representation and Minimization of Boolean Functions - Karnaugh map representation.

UNIT V GRAPH THEORY 9 hours

Basic Concepts of Graph Theory - Isomorphic graph - Matrix Representation of Graphs – Trees - Kruskal's and Dijkstra's algorithms - Storage Representation and Manipulation of Graphs - Introduction to Finite State Machines.

Course Outcomes:

At the end of the course, students will be able to:

1. Evaluate elementary mathematical arguments and identify fallacious reasoning (not just fallacious conclusions) for develop syntax of programming languages.
2. Apply the concepts inclusion/exclusion principle and the pigeonhole methodology in data structure and algorithm.
3. Learn elementary proofs and properties of modular arithmetical results; and explain their applications such as in coding theory and cryptography.
4. Apply proof techniques towards solving problems in Boolean algebra and computer circuit designing.
5. Apply graph theory models and finite state machines concepts to solve critical networking issues, shortest path problems, scheduling, etc.

Text Book(s)

1. J.P. Trembley and R.Manohar, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill – 13th reprint, 2012.
2. Kenneth H. Rosen, Discrete Mathematics and its applications, 6th Edition, Tata McGraw Hill, (2011)

Reference Books

1. Richard Johnsonbaugh, "Discrete Mathematics", 6th Edition, Pearson Education, 2011
2 S. Lipschutz and M. Lipson, "Discrete Mathematics", Tata McGraw Hill, 3rd Edition, 2010.
3 B.Kolman, R.C.Busby and S.C.Ross, "Discrete Mathematical structures", 6th Ed, PHI, 2010
4. C.L.Liu, "Elements of Discrete Mathematics", Tata McGraw Hill, 3rd Edition, 2008.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Dept. of Computer Science & Engineering (IoT)

B. Tech II Year II Semester

20CSO107 INTERNET OF THINGS

L	T	P	C
3	0	0	3

Pre-requisite NIL

Course Description:

The Internet of Things (IoT) is a network of a wide variety of devices like vehicles, humans, soil etc. These devices gather data using sensors, which can be used for monitoring or control. This course is an introduction to the embedded devices, communication protocols and APIs used in IoT.

Course Objectives:

1. Introduce the fundamental concepts of IoT and physical computing
2. Expose the student to a variety of embedded boards and IoT Platforms
3. Create a basic understanding of the communication protocols in IoT communications.
4. Familiarize the student with application program interfaces for IoT.
5. Enable students to create simple IoT applications

UNIT I OVERVIEW OF IOT **9 hours**

The Internet of Things: An Overview; The Flavor of the Internet of Things; The "Internet" of Things"; The Technology of the Internet of Things; Enchanted Objects; Who is Making the Internet of Things?; Design Principles for Connected Devices; Calm and Ambient Technology; Privacy; Keeping Secrets; Whose Data Is It Anyway?; Web Thinking for Connected Devices; Small Pieces, Loosely Joined; First-Class Citizens On The Internet; Graceful Degradation; Affordances

UNIT II EMBEDDED DEVICES – I (ARDUINO) **9 hours**

Embedded Computing Basics; Microcontrollers; System-on-Chips; Choosing Your Platform; Arduino; Developing on the Arduino; Some Notes on the Hardware; Openness;

UNIT III EMBEDDED DEVICES – II (RASPBERRY PI) **9 hours**

Raspberry Pi ; Cases and Extension Boards; Developing on the Raspberry Pi; Some Notes on the Hardware; Openness; Other notable platforms; Mobile phones and tablets; Plug Computing: Always-on Internet of Things

UNIT IV COMMUNICATION IN THE IOT **9 hours**

Internet Principles; Internet Communications: An Overview ; IP; TCP; The IP Protocol Suite (TCP/IP); UDP ; IP Addresses; DNS ; Static IP Address Assignment ; Dynamic IP Address Assignment; IPv6 ; MAC Addresses ; TCP and UDP Ports ; An Example: HTTP Ports ; Other Common Ports; Application Layer Protocols- HTTP; HTTPS: Encrypted HTTP ;Other Application Layer Protocols.

UNIT V PROTOTYPING ONLINE COMPONENTS 9 hours

Getting Started with an API; Mashing Up APIs; Scraping; Legalities; Writing a New API; Clockodillo; Security; Implementing the API; Using Curl to Test; Going Further; Real-Time Reactions; Polling; Comet; Other Protocols ; MQ Telemetry Transport; Extensible Messaging and Presence Protocol; Constrained Application Protocol.

Course Outcomes:

At the end of the course, students will be able to:

1. Interpret the design principles that govern connected devices and select a platform for a particular embedded computing application
2. Develop simple applications using Arduino microcontroller
3. Develop simple applications using Raspberry Pi
4. Utilize the Internet communication protocols for IoT applications
5. Design and develop a solution for a given application using APIs

Text Book(s)

1. Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, Wiley Publications, 2014, ISBN:978-1-118-43062-0.
2. Arshdeep Bahga, Vijay Madisetti, Internet of Things: A Hands-On Approach, Universities Press, 2015. ISBN: 978-8173719547

Reference Books

1. Pethuru Raj, Anupama C. Raman, The Internet of Things, Enabling technologies and use cases, CRC Press. 2017. ISBN: 978-1498761284.
2 Matt Richardson & Shawn Wallace, Make:Getting Started with Raspberry Pi, O'Reilly, 3rd Edition, 2016, ISBN:978-1-680-45246-4.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Dept. of Computer Science & Engineering (IoT)

B. Tech II Year II Semester

20CSO108 DATABASE MANAGEMENT SYSTEMS

L	T	P	C
2	1	0	3

Pre-requisite NIL

Course Description:

This course is designed to provide a basic understanding of database systems and their design. The course material is further used for developing any web-based applications in which the database is back end. The course covers all basic and advanced queries of SQL, PL/SQL programs, Relational algebra and calculus, normal forms, low-level details such as representing data elements of the database and indexed structures, transaction management, and data recovery.

Course Objectives:

1. To understand the concept of DBMS and ER Modelling.
2. To comprehend the structure of SQL Queries and commands to manage data from the databases
3. To learn PL/SQL concepts that help in seamless processing of SQL
4. To explain the normalization, Query optimization, and relational algebra
5. To apply Transaction processing, concurrency control, recovery, security, and indexing for the real-time data
6. To gain knowledge on Database Attacks, Recovery, and Recent Trends

UNIT I INTRODUCTION 9 hours

Database Systems Concepts and Architecture: History and motivation for database systems-characteristics of database approach Advantages of using DBMS approach- Architectures for DBMS– Classification of database management systems.

Database Modelling: Types of Attributes, Entities, Relationships, ER Model.

Introduction to Relational Model: Introduction, Logical database design, Introduction to views.

UNIT II RELATIONAL MODEL 9 hours

Relational Data Model: Concept of relations, schema-instance distinction, keys, referential integrity, foreign keys, relational algebra operators, SQL - Introduction, data definition in SQL, table, key, and foreign key definitions. Querying in SQL, notion of aggregation, Integrity constraints, aggregation functions group by and having clauses.

PL/SQL concepts: Embedded SQL, Dynamic SQL, triggers and active databases, Cursors, Introduction to JDBC, Stored Procedures.

Relational Algebra and Calculus: Preliminaries, Relational algebra- Selection and Projection, Set Operations, Renaming, Joins, Division. Relational Calculus.

UNIT III DATABASE DESIGN & SCHEMA REFINEMENT 9 hours

Database Design: Dependencies and Normal forms, dependency theory - functional dependencies, Armstrong's axioms for FD's, closure of a set of FDs.

Normalization: 1NF, 2NF, 3NF, BCNF, 4NF, and 5NF decompositions and desirable properties.

UNIT IV TRANSACTION PROCESSING & INDEXING 9 hours

Transaction processing - Concepts of transaction processing, ACID properties, concurrency control, Time-stamp based and lock-based protocols for concurrency control. Serializability of scheduling
Index Structures – Indexes on Sequential Files – Secondary Indexes – B-Trees – Hash Tables.

UNIT V DATABASE ATTACKS, RECOVERY, AND RECENT TRENDS 9 hours

Database Attacks and Recovery: SQL Injection, Recovery based on deferred update – Recovery techniques based on immediate update - Shadow Paging
Recent Trends: Need of NoSQL, CAP Theorem, different NoSQL data models.

Course Outcomes:
Upon successful completion of the course, students will be able to

1. Apply design principles for database design, ER model
2. Demonstrate the basics of query evaluation and heuristic query optimization techniques
3. Access normalization relations of the relational model using normal forms
4. Implement transaction processing techniques in the database.
5. Design database security plan for database

Text Book(s)

1. Database Management Systems, Raghu RamaKrishnan, Johannes Gehrke, 3rd Edition, 2003, McGraw Hill.
2. Database Systems, The Complete Book, Hector Garcia-Molina, Jeffrey D. Ullman, and Jennifer Widom, 3rd impression, 2009, Pearson.

Reference Books

1. Silberschatz,H.F.Korth S.Sudershan, Database System Concepts, McGraw Hill, 6th Ed., 2010.
2. R. Elmasri S. B. Navathe, Fundamentals of Database Systems, Addison Wesley, 2015
3. Thomas Connolly, Carolyn Begg, Database Systems: A Practical Approach to Design, Implementation, and Management,6th Edition,2012.
4. Pramod J. Sadalage and Marin Fowler, NoSQL Distilled: A brief guide to merging world of Polyglot persistence, Addison Wesley, 2012

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Dept. of Computer Science & Engineering (IoT)

B. Tech II Year II Semester

20CSO109 COMMUNICATION NETWORKS

L	T	P	C
3	0	0	3

Pre-requisite NIL

Course Description:

The main emphasis of this course is to introduce to computer communication, TCP/IP layers functionalities, and operations of network protocols.

Course Objectives:

1. To study the evolution of computer networks, foundational principles, architectures, and techniques employed in computer networks.
2. To study the concepts of communication networks from layered perspective
3. To provide students with a theoretical and practical base in computer networks issues
4. Student will be able purse his study in advanced networking courses
5. To Prepare students for easy transfer from academia into future directions of research.

UNIT I INTRODUCTION AND THE PHYSICAL LAYER 9 hours

Introduction: Networks, Network Types, Internet History, Standards and Administration, Network Models: Protocol Layering, TCP/IP Protocol Suite, The ISO Model. **The physical layer:** Data and Signals, Transmission impairment, Data rate limits, Performance, Transmission media: Introduction, Guided Media, Unguided Media, Switching: Introduction, Circuit Switched

UNIT II THE DATA LINK LAYER 9 hours

Introduction, Link layer addressing, Error detection and Correction: Cyclic codes, Checksum, Forward error correction, **Data link control**: DLC Services, Data link layer protocols, HDLC, Point to Point Protocol, Media Access control: Random Access, Controlled Access, Channelization, connecting devices and virtual LANs: Connecting Devices.

UNIT III THE NETWORK LAYER 9 hours

Network layer design issues, Routing algorithms, Congestion control algorithms, Quality of service, Internetworking, The network layer in the Internet: IPV4 Addresses, IPV6, Internet Control protocol, OSPF, BGP, IP, ICMPv4, IGMP.

UNIT IV THE TRANSPORT LAYER 9 hours

The Transport Service, Elements of Transport Protocols, Congestion Control, The internet transport protocols: UDP, TCP, Performance problems in computer networks, Network performance measurement.

UNIT V THE APPLICATION LAYER 9 hours

Introduction, Client Server Programming, WWW and HTTP, FTP, e-mail, TELNET, Secure Shell, Domain Name System, SNMP. Case study- Computer Networks in health care.

Course Outcomes:

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

1. Ability to choose the transmission media depending on the requirements.
2. Ability to identify the different types of network topologies and protocols.
3. Ability to configure a computer network logically, by enumerating the layers of the TCP/IP.
4. Understanding and analyzing the concepts of routing, congestion control
5. Ability to use the protocols, and analyzing it for any network

Text Book(s)

1. "Data communications and networking", Behrouz A. Forouzan, Mc Graw Hill Education,5th edition, 2012.
2. "Computer Networks", Andrew S. Tanenbaum, Wetherall, Pearson,5th edition, 2010.

Reference Books

1. "Internetworking with TCP/IP – Principles, protocols, and architecture", Volume 1, Douglas E. Comer, 5th edition, PHI
2. "Introduction to Computer Networks and Cyber Security", Chawan- Hwa Wu, Irwin, CRC Publications.
3. "Computer Networks", 5E, Peterson, Davie, Elsevier.
4. "Data Communication and Networks", Bhushan Trivedi, Oxford University press

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Dept. of Computer Science & Engineering (IoT)

B. Tech II Year II Semester

20CSO206 INTERNET OF THINGS LABORATORY

L	T	P	C
0	0	3	1.5

Pre-requisite NIL

Course Description:

This course provide hands-on practices on IoT using Arduino & Raspberry microcontrollers with various interfaces such as sensors, actuators, mobile app, cloud, social media.

Course Objectives:

1. To understand working principles of IoT devices
2. To get exposure towards the IoT internals
3. To understand the concepts of real world designs, industrial automation and commercial needs for designing IOT enabled solution

List of Programs:

1**. Study on IoT Platform**

a) Getting information and study of IOT microcontrollers (Arduino, Resperrypi)

2. Study on IoT Platform

a) Getting information about Sensors (IR, temperature, pressure, gas sensor)

b) Getting information about actuators. (Piezoelectric actuator, pneumatic actuator)

3. Programming with Arduino platform

a) Installation of Arduino in computer and verifying any errors in connection.

b) Control LED using Arduino

c) Traffic Light Control

4.Programming with Arduino platform and Reading from Sensors

a) interfacing sensors to Arduino board and getting information from them (any two sensors).

b) Experiment with both analog and digital sensors.

5.Programming with Resperrypi

a) Displaying Date on Serial Monitor

b) Automated Door Opening System

6.Connecting Android Phone with Arduino

a) Connecting Arduino with Mobile Device Using the Bluetooth Module.

b) Control any two actuators connected to the development board using Bluetooth.

7. Integrating Ethernet Shield.

Read data from sensor and send it to a requesting client using socket communication. Note: The client and server should be connected to same local area network

8. Creating Mobile App

a) Create a mobile app to control an actuator.

b) Control Electronic Devices from anywhere across the world using Internet & Mobile App.

9. Interfacing Cloud

a) Push sensor data to cloud - Use Arduino to Upload data from Environmental Sensors to Cloud Server.

b) Control an actuator through cloud

10. Data analysis and Visualization
Access the data pushed from sensor to cloud and apply any data analytics or visualization services.
11. Social media with IoT
Creating Program for Local Host Web Server for controlling devices and update status on Twitter through Arduino.
12. Mini Project
Identify a problem in your local area or college which can be solved by integrating the things you learned so far and create a prototype to solve it.

Course Outcomes:
Upon successful completion of the course, students will be able to
1. Choose the sensors and actuators for an IoT application
2. Select protocols for a specific IoT application
3. Utilize the cloud platform and APIs for IoT application
4. Experiment with embedded boards for creating IoT prototypes
5. Design and develop a solution for a given IoT application

Text Book(s)
1. Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, Wiley Publications, 2014, ISBN:978-1-118-43062-0.
2. Arshdeep Bahga, Vijay Madisetti, Internet of Things: A Hands-On Approach, Universities Press, 2015. ISBN: 978-8173719547

Reference Books
1. Pethuru Raj, Anupama C. Raman, The Internet of Things, Enabling technologies and use cases, CRC Press. 2017. ISBN: 978-1498761284.
2. Matt Richardson & Shawn Wallace, Make:Getting Started with Raspberry Pi, O'Reilly, 3rd Edition, 2016, ISBN:978-1-680-45246-4.

Mode of Evaluation: Continuous Internal Evaluation and End Semester Examination

Dept. of Computer Science & Engineering (IoT)

B. Tech II Year II Semester

20CSO207 DATABASE MANAGEMENT SYSTEMS LABORATORY

L	T	P	C
0	0	3	1.5

Pre-requisite NIL

Course Description:

This course is designed to provide a basic understanding of database systems and their design. The course material is further used for developing any web-based applications in which the Database is back end. The course covers all basic and advanced queries of SQL, PL/SQL programs, low-level details such as representing data elements of Databases.

Course Objectives:

1. To understand the concept of DBMS and ER Modelling.
2. To understand the components of DBMS and to study database design.
3. To comprehend the structure of SQL Queries and commands to manage data from the databases
4. To comprehend the structure of SQL Queries to query, update, and manage a database.
5. To understand all constraints to develop a business application using cursors, triggers, and stored procedures

List of Programs:

1. Analyze the below problem carefully and come up with the entities in it. Identify what data has to be persisted in the Database. This contains the entities, attributes, etc. Identify the primary keys for all the entities. Identify the other keys like candidate keys, partial keys, if any. The student is required to submit a document by writing the Entities and keys.). Indicate the type of relationships (total/partial). Try to incorporate generalization, aggregation, specialization, etc. whenever required

   A) Draw an ER diagram for Library Management System
   B) Draw an ER diagram for Hospital Management System

2. Students should be allowed to choose appropriate DBMS software, install it, configure it and start working on it. Create sample tables, and insert the data into them, and perform the following using DDL and DML commands
   a. Insert the data given above in employee, department, and project tables.
   b. Retrieve all the employees' information for a particular department number
   c. Get Employee name along with his SSN and Supervisor SSN.
   d. Retrieve the employee names whose bdate is' 29-MAR-1959.'
   e. Get salaries of the employees without duplications.
   f. Retrieve the MgrSSN, MgrStartDate of the manager of 'Research' department.
   g. Change the department number of an employee having fname as 'Joyce' to 3

h. Alter Table department add column ContactNo of NUMBER data type and insert values into this column only.
i. Change table department by modifying the size of field ContactNo.
j. Modify the field name ContactNo of departments table to MobileNo.
k. Change the name of Table Department to DEPT.
l. Alter Table department by removing column MobileNo.
m. Create a table COPYOFDEPT as a copy of the table DEPT.
n. Remove the rows from COPYOF DEPT table with department number as 5.
o. Remove COPYOF DEPT table

3. Perform following queries
   a. Retrieve all data from employee, jobs, and deposit.
   b. Give details of account no. and deposited rupees of customers having an account opened between dates 01-01-06 and 25-07-06.
   c. Display all jobs with a minimum salary is greater than 4000.
   d. Display name and salary of the employee whose department no is 20. Give alias name to name of the employee.
   e. Display employee no, name, and department details of those employees whose department lies in(10,20)

4. To study various options of LIKE predicate
   a. Display all employees whose name starts with 'V' and the third character is 'v.'
   b. Display name, number, and salary of those employees whose name is 5 characters long and the first three characters are 'Vic.'
   c. Display the non-null values of employees and employee name second character should be 'n,' and the string should be 5 characters long.
   d. Display the null values of an employee, and also employee name's third character should be 'a'.
   e. What will be output if you are giving LIKE predicate as '%_%' ESCAPE '\'

5. To Perform various data manipulation commands, aggregate functions, and sorting concepts on all created tables.
   a. List total deposit from the deposit.
   b. List total loan from karolbagh branch
   c. Give maximum loan from branch vice.
   d. Count the total number of customers
   e. Count total number of customer's cities.
   f. Create table supplier from the employee with all the columns.
   g. Create table sup1 from the employee with the first two columns.
   h. Create table sup2 from the employee with no data
   i. Insert the data into sup2 from an employee whose second character should be 'n' and string should be 5 characters long in the employee’s name field.
   j. Delete all the rows from sup1.
   k. Delete the detail of the supplier whose sup_no is 103.
   l. Rename the table sup2.

m. Destroy table sup1 with all the data.
n. Update the value dept_no to 10 where second character of emp. name is 'm'.
o. Update the value of employee name, whose employee number is 103.

6. To know how the constraints are used to make a table contain valid data.
   Execute the following Queries on the Database to note the violations integrity constraints by any of the following operations
   a. Insert ('Robert', 'F', 'Scott', '987987987 ', '21-JUN-42', '2365 Newcastle Rd, Bellaire, TX', M, 58000, '888665555', 1) into EMPLOYEE.
   b. Insert ('Ramez', 'F', 'Scott', ' ', '21-JUN-42', '2365 Newcastle Rd, Bellaire, TX', M, 58000, '888665555', 1) into EMPLOYEE.
   c. Insert ('677678989', null, '40.0') into WORKS_ON.
   d. Insert ('453453453', 'John', M, '12-DEC-60', 'SPOUSE') into DEPENDENT
   e. Insert ('343453453', 'Varun','', '12-DEC-60', 'SON') into DEPENDENT
   f. Delete WORKS_ON tuples with ESSN= '333445555'.
   g. Modify MGRSSN and MGRSTARTDATE of the DEPARTMENT tuple with DNUMBER=5 to '123456789' and '01-OCT-88', respectively.

7. To study Single-row functions.
   a. Write a query to display the current date.
   b. For each employee, display the employee number, job, salary, and salary increased by 15% and expressed as a whole number. Label the column New Salary
   c. Modify your query no 2 to add a column that subtracts the old salary from the new salary. Label the column Increase
   d. Write a query that displays the employee's names with the first letter capitalized and all other letters lowercase, and the length of the names, for all employees whose name starts with J, A, or M. Give each column an appropriate label. Sort the results by the employees' last names.
   e. Write a query that produces the following for each employee: <employee last name> earns <salary> monthly
   f. Write a query to calculate the annual compensation of all employees (sal+comm)

8. Displaying Data from Multiple Tables (join)
   a. Give details of customers Vivek
   b. Give the names of the customers who are borrowers and depositors and having living city Madanapalle
   c. Give city as their city name of customers having the same living branch.
   d. Write a query to display the last name, department number, and department name for all employees.
   e. Create a unique listing of all jobs that are in department 30. Include the location of the department in the output
   f. Write a query to display the employee name, department number, and department name for all employees who work in NEW YORK.

g. Display the employee's last name and employee number along with their manager's last name and manager number. Label the columns Employee, Emp#, Manager, and Mgr#, respectively.
h. Create a query to display the name and hire date of any employee hired after employee SCOTT.

9. To apply the concept of Aggregating Data using Group functions.
   a. List total deposit of customer having account date after 1-Jan-96.
   b. List total deposit of customers living in city Nagpur.
   c. List maximum deposit of customers living in Bombay.
   d. Display the highest, lowest, sum, and average salary of all employees. Label the columns Maximum, Minimum, Sum, and Average, respectively. Round your results to the nearest whole number.
   e. Write a query that displays the difference between the highest and lowest salaries. Label the column DIFFERENCE
   f. Create a query that will display the total number of employees and, of that total, the number of employees hired in 1995, 1996, 1997, and 1998
   g. Find the average salaries for each department without displaying the respective department numbers.
   h. Write a query to display the total salary being paid to each job title within each department.
   i. Find the average salaries > 2000 for each department without displaying the respective department numbers.
   j. Display the job and total salary for each job with a total salary exceeding 3000, which excludes the present and sorts the list by the total salary.
   k. List the branches having the sum of deposit more than 5000 and located in city Bombay.

10. To solve queries using the concept of the subquery.
    a. Write a query to display the last name and hire date of any employee in the same department as SCOTT. Exclude SCOTT
    b. Give the name of customers who are depositors having same branch city of Mr. Arul.
    c. Give deposit details and loan details of the customer in the same city where Pramod is living.
    d. Create a query to display the employee numbers and last names of all employees who earn more than the average salary. Sort the results in ascending order of salary.
    e. Give names of depositors having the same living city as Mr. Hari and having deposit amount greater than 2000
    f. Display the last name and salary of every employee who reports to ford.
    g. Display the department number, name, and job for every employee in the accounting department.
    h. List the name of the branch having the highest number of depositors.
    i. Give the name of cities wherein the maximum number of branches are located.
    j. Give the name of customers living in the same city where maximum depositors are located.

11. . Write a PL/SQL block to change the address of a particular employee by taking their employee number interactively.
    b. Write a cursor program to display manager details for each department
12. a. Create a trigger which checks whether an employee with Emp_no is present in the Employee table before inserting it into EMP.
    b. Write a procedure to insert a record into the ORDER table by validating the qty limit of the item and also check whether that item exists

Project-Based Learning:

Design and implementation of Student Information System

Choose a Mini Project and apply the database concepts as given below.

- Draw ER Diagram
- Tables Creation
- Establish the relationship between relevant tables Apply Normalization (if necessary)
- Create GUI
- Establish Connection between front end and back end as Oracle
- Prepare Project Report

Course Outcomes:

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

1. Perform DDL and DML operations on database tables.
2. Design and implement complex queries to access the data using SQL join.
3. Implement stored procedures in PL/SQL.
4. Implement exceptions and triggers to solve real-time problems.
5. Design and develop a real-world application to access and render data.

Text Book(s)

1. A. Silberschatz, H. F. Korth S. Sudershan, Database System Concepts, McGraw Hill, 7th Edition 2021.
2. R. Elmasri S. B. Navathe, Fundamentals of Database Systems, Addison Wesley, 2015.

Reference Books

1. Raghu Ramakrishnan,Database Management Systems,Mcgraw-Hill,4th edition,2015.
2. Thomas Connolly, Carolyn Begg, Database Systems: A Practical Approach to Design, Implementation and Management,6th Edition,2012.

Mode of Evaluation: Continuous Internal Evaluation of the Lab Experiments, Record, Viva-voce, and External Lab Examination.

Dept. of Computer Science & Engineering (IoT)

B. Tech II Year II Semester

20CSO208 COMMUNICATION NETWORKS LABORATORY

L	T	P	C
0	0	3	1.5

Pre-requisite NIL

Course Description:

This course helps the students to understand comprising simulation of various protocols and performance; TCP/IP Level Programming, Routing Algorithms and internetworking.

Course Objectives:

1. To provide students with a theoretical and practical base in computer networks issues
2. Student will be able purse his study in advanced networking courses
3. Prepare students for easy transfer from academia into practical life

List of Programs:

1. Implementation of stop and wait protocol and sliding window protocol
2. Write a code simulating ARP /RARP protocols
3. Write a code simulating ping/traceroute command
4. Write a program to generate CRC code for checking error.
5. Create a socket for HTTP for webpage upload and download
6. Implementation of Sub Netting
7. Applications using TCP and UDP Sockets like DNS, SNMP and File Transfer
8. Transferring data between two nodes using NS
9. Simulation of data transfer and packet loss using NS
10. Simulation of Congestion Control Algorithms using NS
11. Protocol analysis with Wireshark
12. Packet Capture & Traffic Analysis with Wireshark

Course Outcomes:

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

1. Implementation of congestion control protocols.
2. Implementation of various sockets.
3. Implement error detection and correction techniques.
4. Simulate the various network and transport layer protocols.
5. Analyze packets using packet analyzer tools.

Text Book(s)

1. Data Communications and Networking, Behrouz A. Forouzan, Fourth Edition, Tata McGraw Hill.
2. Understanding Communications and Networks, Third Edition, W.A.Shay, Cengage Learning.

Reference Books

1. Computer Networking: A Top-Down Approach Featuring the Internet, James F.Kurose, K.W.Ross, Third Edition, Pearson Education.
2. "Internetworking with TCP/IP – Principles, protocols, and architecture", Volume 1, Douglas E. Comer, 5th edition, PHI
3. "Data Communication and Networks", Bhushan Trivedi, Oxford University press

Mode of Evaluation: Continuous Internal Evaluation and End Semester Examination

Mandatory Course
B. Tech. II Year II Semester

20HUM901 INDIAN CONSTITUTION

L	T	P	C
2	0	0	0

Pre-requisite NIL

Course Description:

The Constitution of India is the supreme law of India. Parliament of India can not make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the "basic structure" of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of "Constitutionalism" – a modern and progressive concept historically developed by the thinkers of "liberalism" – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state.

Course Objectives:

The course is intended to:

To know about Indian constitution;
To know about central and state government functionalities in India; and
To know about Indian society.

UNIT I INTRODUCTION **6 hours**

Historical Background – Constituent Assembly of India – Philosophical foundations of the Indian Constitution – Preamble – Fundamental Rights – Directive Principles of State Policy – Fundamental Duties – Citizenship – Constitutional Remedies for citizens.

UNIT II STRUCTURE AND FUNCTION OF CENTRAL GOVERNMENT **6 hours**

Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review.

UNIT III STRUCTURE AND FUNCTION OF STATE GOVERNMENT **6 hours**

State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature –Judicial System in States – High Courts and other Subordinate Courts.

UNIT IV CONSTITUTION FUNCTIONS **6 hours**

Indian Federal System – Center – State Relations – President's Rule – Constitutional Amendments –Constitutional Functionaries - Assessment of working of the Parliamentary System in India.

UNIT V INDIAN SOCIETY 6 hours

Society: Nature, Meaning and definition; Indian Social Structure; Caste, Religion, Language in India Constitutional Remedies for citizens – Political Parties and Pressure Groups; Right of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections.

Course Outcomes:

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

1. Understand the functions of the Indian government; and
2. Understand and abide the rules of the Indian constitution.

Text Books:

1. Durga Das Basu, "Introduction to the Constitution of India ", Prentice Hall of India, New Delhi..
2. R.C.Agarwal, (1997) "Indian Political System", S.Chand and Company, New Delhi.
3 Maciver and Page, " Society: An Introduction Analysis ", Mac Milan India Ltd., New Delhi.
4 K.L.Sharma, (1997) "Social Stratification in India: Issues and Themes", Jawaharlal Nehru University, New Delhi.

Reference Books:

1. **S**harma, Brij Kishore, " Introduction to the Constitution of India:, Prentice Hall of India, New Delhi.
2 U.R.Gahai, "Indian Political System ", New Academic Publishing House, Jalaendhar.
3 R.N. Sharma, "Indian Social Problems ", Media Promoters and Publishers Pvt. Ltd.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

III Year I Semester

B. Tech III Year I Semester

20CSO110 SENSORS AND SIGNAL CONDITIONING

		L	T	P	C
Pre-requisite	**20EEE101**	**3**	**0**	**0**	**3**

Course Description:

The course introduces fundamentals of sensors and provides essential knowledge about design of signal conditioning circuits for the purpose of interfacing with embedded hardware. The course will be useful to gain knowledge of the latest developments in measurement theory and practice, and also helps to learn typical characteristics and capabilities of the range of sensors and instruments that are currently in use.

Course Objectives:

1. To expose the students to various sensors and transducers for measuring mechanical quantities.
2. To learn the basic conditioning circuits for various sensors and transducers
3. To understand the specifications of sensors and transducers.
4. Employ commonly used sensors in industry for measurement of temperature, position, accelerometer, vibration sensor, flow and level.
5. Apply the use of sensors for measurement of displacement, force and pressure.

UNIT I INTRODUCTION TO MEASUREMENT AND SIGNAL CONDITIONING — 9 hours

Introduction: General concepts and terminology of measurement systems, general input-output configuration, static and dynamic characteristics of a measurement system, Statistical analysis of measurement data. Standards and Calibration. Transducers and sensors, classification, emerging fields of sensor technologies.

UNIT II VARIABLE RESISTANCE TRANSDUCERS & STRAIN GAUGE APPLICATIONS — 9 hours

Variable Resistance Transducers: Potentiometers, metal and semiconductor strain gauges and their signal conditioning circuits, **Strain Gauge Applications:** Load and torque measurement. Instrumentation amplifier-circuits and applications

UNIT III INDUCTIVE TRANSDUCERS — 9 hours

Inductive Transducers - Transformer type, synchro's, eddy current transducers, proximity detectors. Tacho generators and stroboscope. Capacitive transducers, capacitive microphone

UNIT IV SELF GENERATING SENSORS AND SIGNAL CONDITIONING **9 hours**

Piezoelectric Transducers, charge amplifier and signal conditioning of PE transducers; photoelectric transducers, photo-voltaic cell, proximity sensors, Hall effect sensors, Magnetostrictive transducers. **Thermocouples**: Thermoelectric effects, laws of thermocouple, cold junction compensation techniques, thermocouple types, construction, measuring circuits, thermocouple burn out detection and high temperature measurement methods.

UNIT V DIGITAL AND INTELLIGENT SENSORS **9 hours**

Position Encoders: Incremental position encoders, Absolute position encoders; **Resonant Sensors**: Sensors based on quartz resonators, Vibrating cylinder sensors, Digital flowmeters; **Conversion to Frequency, Period, or Time Duration:** Voltage-to-frequency conversion, Direct quantity-to-frequency conversion; Introduction to Direct Sensor - Microcontroller Interfacing.

Course Outcomes:

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

1. Analysis the basic condition of various sensors and signal conditioning
2. Priorities measuring mechanical quantities of sensors and transducers
3. Interpret on working condition of inductive sensors
4. Understand the various characteristics of self-generating sensors.
5. Understand advances in sensor technology

Text Book(s)

1. Murthy D. V. S, “Transducers and Instrumentation”, Prentice Hall, New Delhi, Jan-2008.
2. Patranabis, “Sensors and Transducers”, 2nd Edition, Prentice Hall India Pvt. Ltd.Jan 2003.
3. Ramon Pallaá S-Areny , John G. Webster “Sensors And Signal Conditioning”, JOHN WILEY & SONS, INC., Second Edition, 2001
4. Doebelin E.O, “Measurement Systems - Application and Design”, 4th Edition, McGraw-Hill, New York, 2003

Reference Books

1. Neubert H.K.P, “Instrument Transducers - An Introduction to their Performance and Design”, 2nd Edition,Oxford University Press, Cambridge.
2. Waldemar Nawrocki, “Measurement Systems and Sensors”, Artech House
3. S.M. Sze, “Semiconductor sensors”, John Wiley & Sons Inc., Singapore
4. B. C. Nakara & Chaudhry, “Instrumentation Measurement and Analysis”, TATA McGraw-Hill, New Delhi.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Dept. of Computer Science & Engineering (IoT)

B. Tech III Year I Semester

20CSO111 COMPUTER ORGANIZATION AND ARCHITECTURE

	L	T	P	C
Pre-requisite Nil	**3**	**0**	**0**	**3**

Course Description:

This course aims at introducing the concepts of computer architecture and organization. It involves design aspects, and deals with the current trends in computer architecture. It also aims to improve system performance by effective utilization of system resources such as memory and I/O subsystems.

Course Objectives:

1. To make students understand the basic structure and operation of digital computer.
2. To understand the hardware-software interface.
3. To familiarize the students with arithmetic and logic unit and implementation of fixed point andfloating-point arithmetic operations.
4. To expose the students to the concept of pipelining.
5. To familiarize the students with hierarchical memory system including cache memories and virtualmemory.
6. To expose the students with different ways of communicating with I/O devices and standard I/Ointerfaces

UNIT I OVERVIEW & INSTRUCTIONS 9 hours

Eight ideas – Components of a computer system – Technology – Performance – Power wall – Uniprocessors to multiprocessors; Instructions – operations and operands – representing instructions – Logical operations – control operations – Addressing modes.

UNIT II ARITHMETIC OPERATIONS 9 hours

Signed/Unsigned integer representation- ALU - Addition and subtraction – Multiplication – Sequential multiplication- Booths Algorithm- Modified Booths Algorithm- Division- restoring and non-restoring division – Floating point representation- floating point arithmetic – floating point addition/subtraction- floating point multiplication/division.

UNIT III PROCESSOR AND CONTROL UNIT 9 hours

Basic MIPS implementation – Building datapath – Pipelining – Pipelined datapath and control – Handling Data hazards & Control hazards: Dynamic Branch Prediction – Exceptions.

UNIT IV PARALLELISM 9 hours

Instruction-level-parallelism: Static and dynamic multiple issue processors – Parallel processing challenges – Flynn's classification – Hardware multithreading – Multicore processors.

UNIT V MEMORY AND I/O SYSTEMS 9 hours

Memory hierarchy - Memory technologies – Cache basics – Cache Mapping Techniques - Measuring and improving cache performance – Virtual memory, TLBs - Input/output system, programmed I/O, DMA and interrupts, I/O processors.

Course Outcomes:

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

1. To understand instructions and addressing modes of a computer system.
2. To Design arithmetic and logic unit.
3. Design and anlayse pipelined control units.
4. Understand parallel processing architectures.
5. Evaluate performance of memory systems

Text Book(s)

1. David A. Patterson and John L. Hennessey, "Computer organization and design", Morgan Kauffman / Elsevier, Fifth edition, 2014.
2. V.Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky, "Computer Organisation", VI th edition, Mc Graw-Hill Inc, 2012

Reference Books

1. William Stallings "Computer Organization and Architecture" , Seventh Edition , Pearson Education, 2006.
2. Vincent P. Heuring, Harry F. Jordan, "Computer System Architecture", Second Edition, Pearson Education, 2005.
3. Govindarajalu, "Computer Architecture and Organization, Design Principles and Applications", first edition, Tata McGraw Hill, New Delhi, 2005.
4. John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata Mc Graw Hill, 1998.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Dept. of Computer Science & Engineering (IoT)

B. Tech III Year I Semester

20CSO112 DATA SCIENCE FOR IOT

L	T	P	C
3	0	0	3

Pre-requisite: Nil

Course Description:
This course is designed to provide strong foundation for data science and application area related to it and understand the underlying core concepts and emerging technologies in data science.

Course Objectives:

1. To describe the life cycle of Data Science and computational environments for data scientists using Python.
2. To describe the fundamentals for exploring and managing data with Python.
3. To examine the various data analytics techniques for labeled/columnar data using Python.
4. To demonstrate a flexible range of data visualizations techniques in Python.
5. To describe the various Machine learning algorithms for data modeling with Python.

UNIT I INTRODUCTION TO DATA SCIENCE 9 hours

Introduction to Data Science and its importance - Data Science and Big data-, The life cycle of Data Science- The Art of Data Science - Work with data – data Cleaning, data Managing, datamanipulation. Establishing computational environments for data scientists using Python with IPython and Jupyter

UNIT II INTRODUCTION TO NUMPY 9 hours

NumPy Basics: Arrays and Vectorized Computation- The NumPy ndarray- Creating ndarrays- Data Types for ndarrays- Arithmetic with NumPy Arrays- Basic Indexing and Slicing - Boolean Indexing-Transposing Arrays and Swapping Axes. Universal Functions: Fast Element-Wise Array Functions- Mathematical and Statistical Methods-SortingUnique and Other Set Logic.

UNIT III DATA MANIPULATION WITH PYTHON 9 hours

Introduction to pandas Data Structures: Series, DataFrame, Essential Functionality: Dropping EntriesIndexing, Selection, and Filtering- Function Application and Mapping- Sorting and Ranking. Summarizing and Computing Descriptive Statistics- Unique Values, Value Counts, and Membership. Reading and Writing Data in Text Format.

UNIT IV DATA CLEANING, PREPARATION AND VISUALIZATION 9 hours

Data Cleaning and Preparation: Handling Missing Data - Data Transformation: Removing Duplicates, Transforming Data Using a Function or Mapping, Replacing Values, Detecting and Filtering Outliers- String Manipulation: Vectorized String Functions in pandas. Plotting with pandas: Line Plots, Bar Plots, Histograms and Density Plots, Scatter or Point Plots.

UNIT V MACHINE LEARNING USING PYTHON 9 hours

Introduction Machine Learning: Categories of Machine Learning algorithms, Dimensionality Reduction-Introducing ScikitApplication: Exploring Hand-written Digits. Feature Engineering-Naive Bayes Classification - Linear Regression - kMeans Clustering

Course Outcomes:

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

1. Identify phases involved in the life cycle of Data Science.
2. Preprocess and manage the data for efficient storage and manipulation in Python.
3. Realize the various data analytics techniques for labeled/columnar Data using PythonPandas.
4. Explore a flexible range of data visualizations approaches in Python.
5. Analyze various Machine learning algorithms for data modeling with Python.

Text Book(s)

1. Python Data Science Handbook-Essential Tools for Working with Data, Jake Vander Plas, O'Reilly Media, 2016
2. Data Science from Scratch: First Principles with Python, Joel Grus, O'Reilly, 2015.

Reference Books

1. Python for Data Analysis, Wes Mckinney, O'Reilly Media, 2013.
2. Field Cady, “Data Science Hand Book”, John Wiley & Sons, 2017.
3. Fundamentals of Data Science, Samuel Burns, Amazon KDP printing and Publishing, 2019
4. Shai Vaingast, “Beginning Python Visualization Crafting Visual Transformation Scripts”, Apress, 2nd edition, 2014

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Dept. of Computer Science & Engineering (IoT)

B. Tech III Year I Semester

20CSO209 SENSORS AND SIGNAL CONDITIONING LABORATORY

Pre-requisite	**20EEE201**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1.5**

Course Description:
The aim of this lab is to fortify the students with an adequate work experience in the measurement of different quantities and also then expertise in handling the instruments involved.

Course Objectives:

1.To learn the basic conditioning circuits for various sensors and transducers
2.To understand the specifications of sensors and transducers.
3.To measuring mechanical quantities of sensors and transducers
4.To interpret on working condition of sensors and transducers.
5.Apply the use of sensors for measurement of displacement, force and pressure.

List of Programs:

1. Characteristics of Resistance Measurement system
2. Characteristics of Piezoelectric measurement system
3. Measurement of displacement using LVDT
4. Characteristics of Hall effect sensor
5. Measurement of strain using strain gauges
6. Measurement of torque using Strain gauges
7. Measurement using proximity sensors
8. Characteristics of capacitive measurement systems
9. Characteristics of Photovoltaic cell.
10. Design of Opto-coupler using photoelectric transducers
11. Interfacing of Voltage sensor to microcontroller and signal processing
12. Study of speed measuring devices and Gyroscope

Course Outcomes:
Upon successful completion of the course, students will be able to
1. Design a signal conditioning circuits for transducers and test its characteristics.
2. Draw the specification of transducer for a given application.
3. Measuring mechanical quantities of sensors and transducers
4. Interpret on working condition of sensors and transducers.
5.Apply the use of sensors for measurement of displacement, force and pressure.

Text Book(s)

1. John P. Bentley, Principles of Measurement Systems, Pearson Education, 4th Edition, 2005.
2. Ernest.O.Doebelin and Dhanesh.N.Manik, Doebelin's Measurement Systems, McGraw Hill Education, 6th Edition, 2011.

Reference Books

1. Murthy D. V. S, "Transducers and Instrumentation", Prentice Hall, New Delhi, Jan-2008
2. B. C. Nakara & Chaudhry, "Instrumentation Measurement and Analysis", TATA McGraw-Hill, New Delhi.

Mode of Evaluation: Continuous Internal Evaluation and End Semester Examination

Dept. of Computer Science & Engineering (IoT)

B. Tech III Year I Semester

20CSO210 DATA SCIENCE FOR IOT LABORATORY

L	T	P	C
0	0	3	1.5

Pre-requisite: Nil

Course Description:

This course is designed to equipping students to be able to use python programming for solving data science problems.

Course Objectives:

1. To train the students in solving computational problems
2. To elucidate solving mathematical problems using Python programming language
3. To understand the fundamentals of Python programming concepts and its applications.
4. Practical understanding of building different types of models and their evaluation

List of Programs:

1. Create NumPy arrays from Python Data Structures, Intrinsic NumPy objects and Random Functions.
2. Manipulation of NumPy arrays- Indexing, Slicing, Reshaping, Joining and Splitting.
3. Computation on NumPy arrays using Universal Functions and Mathematical methods.
4. Import a CSV file and perform various Statistical and Comparison operations on rows/columns.
5. Load an image file and do crop and flip operation using NumPy Indexing.
6. Write a program to compute summary statistics such as mean, median, mode, standard deviation and variance of the given different types of data.
7. Create Pandas Series and DataFrame from various inputs.
8. Import any CSV file to Pandas DataFrame and perform the following:
    a. Visualize the first and last 10 records
    b. Get the shape, index and column details.
    c. Select/Delete the records(rows)/columns based on conditions.
    d. Perform ranking and sorting operations.
    e. Do required statistical operations on the given columns.
    f. Find the count and uniqueness of the given categorical values.
    g. Rename single/multiple columns
9. Import any CSV file to Pandas DataFrame and perform the following:
    a. Handle missing data by detecting and dropping/ filling missing values.
    b. Transform data using apply() and map() method.

c. Detect and filter outliers.
d. Perform Vectorized String operations on Pandas Series.
e. Visualize data using Line Plots, Bar Plots, Histograms, Density Plots and ScatterPlots

10. Write a program to demonstrate Linear Regression analysis with residual plots on a given data set
11. Write a program to implement the Naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets
12. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions using Python ML library classes
13. Write a program to implement k-Means clustering algorithm to cluster the set of data storedin .CSV file. Compare the results of various "k" values for the quality of clustering.

Course Outcomes:

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

1. Illustrate the use of various data structures.
2. Analyze and manipulate Data using Numpy and Pandas.
3. Creating static, animated, and interactive visualizations using Matplotlib.
4. Understand the implementation procedures for the machine learning algorithms.
5. Identify and apply Machine Learning algorithms to solve real-world problems using appropriate data sets.

Text Book(s)

1. Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", O'Reilly, 2nd Edition,2018.

2. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", O'Reilly, 2017.

Reference Books

1. Y. Daniel Liang, "Introduction to Programming using Python", Pearson,2012.
2. Francois Chollet, Deep Learning with Python, 1/e, Manning Publications Company, 2017.
3. Peter Wentworth, Jeffrey Elkner, Allen B. Downey and Chris Meyers, "How to Think Like a Computer Scientist: Learning with Python 3", 3rd edition, Available at https://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf

4. Paul Barry, "Head First Python a Brain Friendly Guide" 2nd Edition, O'Reilly, 2016 4. Dainel Y.Chen "Pandas for Everyone Python Data Analysis" Pearson Education, 2019.

Mode of Evaluation: Continuous Internal Evaluation and End Semester Examination

Dept. of Computer Science & Engineering (IoT)

Mandatory Course

III Year I Semester

20CE901 DISASTER MANAGEMENT

L	T	P	C
2	0	0	0

Pre-requisite: None

Course Description:

The goal of this course is to expose the under graduate students regarding different types of disasters and preparedness needed to mitigate their effects. The course matrix will cover various natural, biological, chemical and emerging hazards and risks that may cause property, loss of lives, and livestock's. Thus, the future engineers will understand the social responsibility for the preparedness and mitigation of the damages caused by the disasters.

Course Objectives:

1. To make aware the students about disasters and their impact on living beings.
2. 2. To ensure the students for the understanding on vulnerability, disasters, disaster prevention
3. and risk reduction.
4. To gain a preliminary understanding of approaches for the Disaster Risk Reduction (DRR)
5. To enhance awareness of institutional processes available in the country for the disaster risk mitigation.

UNIT I INTRODUCTION **6 hours**

Introduction, Etymology of disaster, Concepts and definitions: disaster, hazard, vulnerability, risks, Resilience, prevention and mitigation.

UNIT II TYPES OF DISASTERS **6 hours**

Types of Disaster; natural disasters (earthquakes, volcanoes, forest fires and explosions, heat and cold waves, floods, draught, cyclones, tsunami, landslides, soil erosion); manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills, transportation accidents, terrorist strikes, etc.), hazard and vulnerability profile of India, mountain and coastal areas, ecological fragility.

UNIT III DISASTER IMPACTS **6 hours**

Disaster Impacts (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate change and urban disasters.

UNIT IV DISASTER RISK MITIGATION MEASURES **6 hours**

Disaster Risk Reduction (DRR) - Disaster management- four phase approach; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post disaster environmental response (water, sanitation, food safety, waste management, disease control, security, communications), DRR programmers in India and the activities of National Disaster Management Authority. Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction.

UNIT V IMPACT OF DEVELOPMENTAL ACTIVITIES 6 hours

Disasters, Environment and Development - Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, landuse changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction and development methods.

Course Outcomes:

The students after completing the course will be able to:

1. Explain various disaster concepts
2. Differentiate between categories of disasters
3. Analyze impact of various types of disasters
4. Select disaster risk mitigation measures
5. Identify the impact of development activities

Text Books:

1. Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation

Data Books:

1. C P Kothandaraman & S Subramanyan, Heat and Mass Transfer data book, New Age International Publishers, Eight Edition.

Reference Books:

1. http://ndma.gov.in/ (Home page of National Disaster Management Authority)
2. http://www.ndmindia.nic.in/ (National Disaster management in India, Ministry of Home affairs).
3. Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.
4. Singh B.K., 2008, Handbook of Disaster Management: Techniques & Guidelines, Rajat Publication.
5. Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State of California, EMSA no.214, June 2003
6. Inter Agency Standing Committee (IASC) (Feb. 2007). IASC Guidelines on Mental Health and Psychosocial Support in Emergency Settings. Geneva: IASC

Mode of Evaluation: Assignments, Mid Term Tests

III Year II Semester

Dept. of Computer Science & Engineering (IoT)

B. Tech III Year II Semester

20CSO113 EMBEDDED SYSTEMS

	L	T	P	C
Pre-requisite Nil	**3**	**0**	**0**	**3**

Course Description:
This course provides introduction to embedded systems consisting of various processors and interfaces. It also describes concepts of real time operating systems.

Course Objectives:

1. To provide the knowledge on embedded systems and Architectures of family of 8051 microcontrollers and its interfacing techniques
2. To study about software concepts, computing Platforms of Embedded Systems.
3. To study and understand the advanced computer architectures like ARM etc.
4. To study about Architecture, Development tools of software and RTOS Concepts.

UNIT I INTRODUCTION TO EMBEDDED SYSTEMS 9 hours

Definition of Embedded System, Embedded Systems Vs General Computing Systems, Classification of Embedded Systems, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems. RISC and CISC Architectures. Memories, I /O Devices, Software in Embedded Systems

UNIT II 8051 MICROCONTROLLER AND ITS PROGRAMMING 9 hours

Architecture of microcontroller-8051 Microcontroller- internal and external memories – Interrupt Vectors and Priority -counters and timers-synchronous serial-cum asynchronous serial communication-interrupts. Addressing modes of 8051, Instructor set of 8051, Assembly Language Programming with 8051 using Keil. Embedded C vs Assembly language.

UNIT III INTERFACING 9 hours

External Memories - Switch, keypad and key board Interfacing- LED and Array LEDs - Interfacing of LCDs, Relays, DC Motors, Stepper Motors, Analog input and analog output interfacing, Emulator, ICE and Debuggers- Device Driver Concepts

UNIT IV RTOS 9 hours

Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling. Task Communication, Task Synchronization Task Communication /Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS.

UNIT V ADVANCED MICROCONTROLLERS 9 hours

ARM Design Philosophy, ARM Architecture (LPC 2148) and Organization, Registers, Program Status Register, Instruction Pipeline, Interrupts and Vector Table, ARM/ Thumb Instruction set, ARM Assembly Programming and C Programming Concepts.

Course Outcomes:

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

1. Gain knowledge of the Embedded System concepts and its Architectures of family of 8051 microcontrollers and its interfacing techniques.
2. Apply software concepts, computing Platforms of Embedded Systems.
3. Design real time embedded systems using the concepts of RTOS.
4. Understand the different Software Development Tools and RTOS Concepts
5. Become aware of interrupts, hyper threading and software optimization.

Text Book(s)

1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill.

2. ARM Systems Developer's Guides- Designing & Optimizing System Software – Andrew N. Sloss,Dominic Symes, Chris Wright, 2008, Elsevier.
3. Raj Kamal, "Microcontroller Architecture, programming, Interfacing and System design" Pearson Education, New Delhi.

Reference Books

1. Muhammad Ali Mazidi, Janice Gillespie Mazidi and Rolin D. McKinley, "The 8051 Microcontroller and Embedded Systems", Pearson Education, Second Edition, 2008.
2. Embedded System Design - Frank Vahid, Tony Givargis, John Wiley.

3. Wolf, Wayne, Computers as Components – Principles of Embedded Computing System Design,Elsevier, Second Edition, 2008.

Mode of Evaluation: Continuous Internal Evaluation and End Semester Examination

B. Tech III Year II Semester

20CSO114 WEB TECHNOLOGIES

L	T	P	C
3	0	0	3

Pre-requisite NIL

Course Description:

This course will expose students to the techniques used in programming web pages for interactive content. The course begins by reviewing basic web technologies (HTML, CSS style sheets) and exploring the use of event-driven programming in JavaScript to add interactive elements such as buttons and text fields to web pages. Next, students will use AJAX tools to build web pages that connect to servers like Google to dynamically access data (maps, search results, videos, images, etc.). Finally, the course will show students how to write their own xml code to provide access to a custom database.

Course Objectives:

1. To introduce Markup Languages for client side scripting
2. To introduce JavaScript and DOM and Java Servlets with Java
3. To introduce XML and processing of XML Data with Java
4. To introduce Server side programming with Java Servlets and JSP
5. To introduce various java web services and SOAP

UNITI WEB ESSENTIALS 9 hours

Web Essentials: Clients, Servers, and Communication. The Internet-Basic Internet Protocols -The World Wide Web-HTTP request message-response message-Web Clients Web Servers-Case Study. Markup Languages: XHTML. An Introduction to HTML History-Versions-Basic XHTML Syntax and Semantics-Some Fundamental HTML Elements-Relative URLs-Lists-tables-Frames-Forms-XML Creating HTML Documents-Case Study.

UNIT II STYLE SHEETS AND CLIENT SIDE PROGRAMMING 9 hours

Style Sheets: CSS-Introduction to Cascading Style Sheets-Features-Core Syntax-Style Sheets and HTML Style Rule Cascading and Inheritance-Text Properties-Box Model-Normal Flow Box Layout-Beyond the Normal Flow-Other Properties-Case Study. Client-Side Programming: The JavaScript Language-History and Versions Introduction to JavaScript in Perspective-Syntax-Variables and Data Types-Statements-Operators-Literals-Functions-Objects-Arrays-Built-in Objects - JavaScript Debuggers.

UNIT III HOST OBJECTS 9 hours

Host Objects: Browsers and the DOM-Introduction to the Document Object Model DOM History and Levels-Intrinsic Event Handling-Modifying Element Style-The Document Tree-DOM Event Handling-Accommodating Noncompliant Browsers Properties of Window-Case Study. Server-Side Programming: Java Servlets- Architecture -Overview-A Servelet-Generating Dynamic Content-Life Cycle- Parameter Data-Sessions-Cookies- URL Rewriting-Other Capabilities-Data Storage Servlets and Concurrency-Case Study- Related Technologies.

UNIT IV REPRESENTING WEB DATA 9 hours

Representing Web Data: XML-Documents and Vocabularies-Versions and Declaration- Namespaces JavaScript and XML: Ajax-DOM based XML processing Event-oriented Parsing: SAX-Transforming XML Documents-Selecting XML Data: XPATH-Template based Transformations: XSLT-Displaying XML Documents in Browsers-Case Study-Related Technologies. Separating Programming and Presentation: JSP Technology-Introduction-JSP and Servlets-Running JSP Applications Basic JSP-JavaBeans Classes and JSP-Tag Libraries and Files-Support for the Model-View-Controller Paradigm.

UNIT V WEB SERVICES 9 hours

Web Services: JAX-RPC-Concepts-Writing a Java Web Service-Writing a Java Web Service Client-Describing Web Services: WSDL- Representing Data Types: XML Schema-communicating Object Data: SOAP Related Technologies-Software Installation-Storing Java Objects as Files-Databases and Java Servlets, Web Applications and Security.

Course Outcomes:

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

1. Gain knowledge of client side scripting, validation of forms and AJAX programming
2. Have understanding of server side scripting with JSP language
3. Have understanding of what is XML and how to parse and use XML Data with Java
4. To introduce Server side programming with Java Servlets and JSP
5. Design and implement the various Web services concepts of JAX-RPC

Text Book(s)

1. Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006.

Reference Books

1. Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, PearsonEducation, 2011 .
2. Deitel, Deitel, Goldberg, "Internet & World Wide Web How To Program", Fouth Edition, Pearson Education, 2008.
3. Marty Hall and Larry Brown,"Core Web Programming" Second Edition, Volume I and II, Pearson Education, 2001.

Mode of Evaluation: Assignments, Internal Mid Examinations, External End Examination.

Dept. of Computer Science & Engineering (IoT)

B. Tech III Year II Semester

20CSO115 BIG DATA ANALYTICS

L	T	P	C
3	0	0	3

Pre-requisite: Nil

Course Description:

This course is aimed to provide basic understanding business decisions and fundamental concepts of Big data analysis. This Course covers introduction to analyse the big data using intelligent techniques and visualization techniques.

Course Objectives:

1. To optimize business decisions and create competitive advantage with Big Data Analytics.
2. To explore the fundamental concepts of Big Data Analytics.
3. To learn to analyze the big data using intelligent techniques.
4. To understand the various search methods and visualization techniques.
5. To learn to machine learning techniques with big data.

UNIT I INTRODUCTION TO BIG DATA 9 hours

Introduction to big data : Introduction to Big Data Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processesand Tools - Analysis vs Reporting.

UNIT II BIG DATA ANALYTICS OF STREAM DATA MODEL AND ARCHITECTURE 9 hours

Mining data streams : Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness ina Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - CaseStudies - Real Time Sentiment Analysis- Stock Market Predictions.

UNIT III INTODUCTION TO BIG DATA FOR HADOOP 9 hours

Hadoop: History of Hadoop- the Hadoop Distributed File System – Components of Hadoop Analysing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFS Basics- Developing a Map Reduce Application-How MapReduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle andSort – Task execution - Map Reduce Types and Formats- Map Reduce Features- Hadoop environment.

UNIT IV INTODUCTION TO BIG DATA APPLICATIONS 9 hours

Frameworks: Applications on Big Data Using Pig and Hive – Data processing operatorsin Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphere BigInsights and Streams.

UNIT V INTRODUCTION OF BIG DATA MACHINE LEARNING 9 hours

Predictive Analytics- Simple linear regression- Multiple linear regression- Interpretation of regression coefficients. Visualizations - Visual data analysis techniques- interaction techniques - Systems and applications.

Course Outcomes:

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

1. Understand the fundamentals of various Big Data Analytics techniques.
2. Understand the stream data model and real time analytics using architecture
3. Analyze the HADOOP and Map Reduce technologies associated with Big Data Analytics.
4. Work with big data platform and explore the big data analytics techniques business applications.
5. Understand the concept of big data analytics using machine learning.

Text Book(s)

1. Arshdeep Bahga, Vijay Madisetti, "Big Data Science & Analytics: A Hands-On Approach" ,VPT, 2016
2. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge DataStreams with Advanced Analytics", John Wiley& sons, 2012
3. Jason Bell, "Machine Learning for Big Data", John Wiley, 2014.

Reference Books

1. Paul Zikopoulos, Dirkde Roos, Krishnan Parasuraman, Thomas Deutsch, James Giles , David Corrigan, "Harness the Power of Big Data The IBM Big Data Platform", Tata McGraw Hill Publications, 2012
2. Bart Baesens "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications (WILEY Big Data Series)", John Wiley & Sons,2014

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Dept. of Computer Science & Engineering (IoT)

B. Tech. III Year II Semester

20CSO211 EMBEDDED SYSTEMS LABORATORY

	L	T	P	C
Course Prerequisite: Nil	**0**	**0**	**3**	**1.5**

Course Description:

This course provides introduction to embedded systems consisting of various processors and interfaces.It also describes concepts of real time operating systems.

Course Objectives:

1. To provide the knowledge on embedded systems and Architectures of family of 8051 microcontrollers and its interfacing techniques.
2. To study about software Concepts, Computing Platforms of Embedded Systems.
3. To study and understand the advanced computer architectures like ARM etc.
4. To study about Architecture, Development tools of software and RTOS Concepts.

LIST OF EXPERIMENTS

Part A

1. Write a 8051 Program to
   a. Read inputs from switches.
   b. To make LEDs blink.
2. Write an 8051 Program for interfacing 4x4 Matrix Keyboard.
3. Write an 8051 Program to Display Message in LCD 8 Bit Mode.
4. Write an ALP Program for serial communication (UART).
5. Write a program to Interfacing ADC and DAC to 8051.
6. Write a program to Interfacing Stepper motor.
7. Familiarization of Microcontroller Operating System (RTOS).

Part B: Experiments with ARM Board

1. Familiarization with ARM board.
2. RS-232C interface with PC.
3. Traffic Light Controller.
4. SPI/CAN interface.
5. ADC interfacing.

Dept. of Computer Science & Engineering (IoT)

Course Outcomes:

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

1. Understand the embedded System Concepts and its Architectures of family of 8051Microcontrollers and its interfacing techniques.
2. Implement the software Concepts, Computing Platforms of Embedded Systems.
3. Apply the advanced computer architectures for embedded system design.
4. Use Software Development Tools.
5. Familiarize with Microcontroller Operating system (RTOS)

Mode of Evaluation: Continuous Internal Evaluation, Practical Examination.

Dept. of Computer Science & Engineering (IoT)

B. Tech III Year II Semester

20CSO212 WEB TECHNOLOGIES LABORATORY

L	T	P	C
0	0	3	1.5

Pre-requisite NIL

Course Description:

This course is designed to provide basic understanding on Web page design. The course material further used for developing any web based applications in which database is back end. Course covers from all basic and advanced queries of MYSQL programs and real time implementation.

Course Objectives:

1. To understand the concepts of Web page design using HTML/XML and style sheets
2. To understand the concepts of creation of user interfaces using Java frames.
3. To Learn to create dynamic web pages using server side scripting.
4. To Learn to write Client Server applications.
5. To provide sufficient skill to utilize the various applications with AJAX

List of Programs:

1. Create a web page with the following using HTML.
   a) To embed an image map in a web page.
   b) To fix the hot spots.
   c) Show all the related information when the hot spots are clicked.
2. Create a web page with the following
   a. Cascading style sheets.
   b. Embedded style sheets.
   c. Inline style sheets. Use our college information for the web pages
3. Create and save an XML document at the server, which contains 10 users Information. Write a Program, which takes user Id as an input and returns the User details by taking the user information from the XML document.
4. Client Side Scripts for Validating Web Form Controls using DHTML.
5. To Write programs in Java using Servlets:
   a) To invoke servlets from HTML forms.
   b) Session Tracking.
6. Write programs in Java to create three-tier applications using JSP and Databases
   a. For conducting online examination
   b. For displaying student mark list. Assume that student information is available in a database which has been stored in a database server.
7. Programs using XML – Schema – XSLT/XSL.
8. Programs using DOM and SAX parsers.

9. To Write a programs in Java using Ajax.

10.Consider a case where we have two web Services- an airline service and a travel agent and the travel agent is searching for an airline. Implement this scenario using Web Services and Database.

Course Outcomes:

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

1. Design Web pages using HTML/DHTML and style sheets.
2. Create dynamic web pages using server side scripting.
3. Implement the Client Server applications.
4. Implement and use the frameworks JSP Strut.
5. Design and develop a real world application with AJAX

Text Book(s)

1. Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition,Pearson Education, 2007 .

Reference Books

1. Deitel, Deitel, Goldberg, "Internet & World Wide Web How To Program", Third Edition, Pearson Education, 2006.
2. Marty Hall and Larry Brown,"Core Web Programming" Second Edition, Volume I and II, Pearson Education, 2001.

Mode of Evaluation: Continuous Internal Evaluation and End Semester Examination

Dept. of Computer Science & Engineering (IoT)

B. Tech III Year II Semester

20CSO213 BIG DATA ANALYTICS LABORATORY

L	T	P	C
0	0	3	1.5

Pre-requisite: Nil

Course Description:
This course is designed an in-depth understanding of terminologies and the core concepts behind big data problems, applications, systems and the techniques that underlie today's big data computing technologies.

Course Objectives:
1. Optimize business decisions and create competitive advantage with Big Data analytics.
2. Imparting the architectural concepts of Hadoop and introducing map reduce paradigm.
3. Introducing Java concepts required for developing map reduce programs.
4. Derive business benefit from unstructured data.

List of Programs:

1. Study of Big data tools and Installation.
2. Implement the following file management tasks in Hadoop:
    a. Adding files and directories
    b. Retrieving files
    c. Deleting files
3. Write a java map-reduce program for counting the number of occurrences of each word in a text file.
4. Implement Stop word elimination problem with the following input and output:
   Input: A large textual file containing one sentence pers line and A small file containing a set of stop words (One stop word per line)
   Output: A textual file containing the same sentences of the large input file without the words appearing in the small file.
5. Analysis the Purchase data set with the following criteria
    a. Instead of breaking the sales down by store, give us a sales breakdown by product category across all of our stores
    b. What is the value of total sales for the following categories?
        i. Toys
        ii. Consumer Electronics
    c. Find the monetary value for the highest individual sale for each separate store

6. Write a java map-reduce program for mines healthcare data and perform various analysis on healthcare dataset.
7. Write Pig Latin scripts to illustrate Load, Store, Describe, Dump operators.
8. Write Pig Latin scripts to illustrate Group, Co-group, Filter Operators.
9. Write Pig Latin scripts to illustrate join, union and Split Operators.
10. Write a Pig Latin scripts for finding TF-IDF value for book dataset (A corpus of eBooksavailable at: Project Gutenberg).
11. Develop a Map-reduce programming with Hive to create, alter, and drop databases, tables, views, functions, and indexes.
12. Install, Deploy & configure Apache Spark Cluster. Run apache spark applications usingScala.

Course Outcomes:

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

1. Preparing for data summarization, query, and analysis.
2. Applying data modelling techniques to large data sets
3. Creating applications for Big Data analytics
4. Building a complete business data analytic solution
5. Understand to concept of Scala application framework.

Text Book(s)

1. Arshdeep Bahga, Vijay Madisetti, “Big Data Science & Analytics: A Hands-On Approach “,VPT, 2016
2. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge DataStreams with Advanced Analytics”, John Wiley& sons, 2012

Reference Books

1. Paul Zikopoulos, Dirkde Roos, Krishnan Parasuraman, Thomas Deutsch, James Giles , David Corrigan, “Harness the Power of Big Data The IBM Big Data Platform”, Tata McGraw Hill Publications, 2012
2. Bart Baesens “Analytics in a Big Data World: The Essential Guide to Data Science and its Applications (WILEY Big Data Series)”, John Wiley & Sons,2014

Mode of Evaluation: Continuous Internal Evaluation and End Semester Examination

Mandatory Course
B. Tech III Year II Semester

20HUM902 /20HUM102* UNIVERSAL HUMAN VALUES

L	T	P	C
2/3*	0	0	0/3*

Pre-requisite None.

Course Description:

This course discusses student's role in their family and briefly touches issues related to their role in the society and the nature.

Course Objectives:

This course enables students to

1. Understand Happiness and Prosperity correctly and basic Human Aspirations
2. Able to self-verify the Harmony in the Human Being
3. Visualize a universal harmonious order in society which leads to Undivided Society at Universal Order- from family to world family.
4. Understanding Harmony in the Nature and Existence - Whole existence as Coexistence
5. Implicate the UHV in professional ethics.

UNIT I THE PROCESS FOR VALUE EDUCATION - BASIC HUMAN ASPIRATIONS **8 hours**

L1: Purpose and motivation for the course, recapitulation from Universal Human Values-I

L2: Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration

L3: Continuous Happiness and Prosperity- A look at basic Human Aspirations

L4: Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority

L5: Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario

L6: Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

T1 & T2: Discussion on natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

UNIT II UNDERSTANDING HARMONY IN THE HUMAN BEING - HARMONY IN MYSELF! **8 hours**

L7: Understanding human being as a co-existence of the sentient 'I' and the material 'Body'

L8: Understanding the needs of Self ('I') and 'Body' - happiness and physical facility

L9: Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)

L10: Understanding the characteristics and activities of 'I' and harmony in 'I'

L11: Understanding the harmony of I with the Body: Self-regulation and Health; correct appraisal of Physical needs, meaning of Prosperity in detail.

L12: Programs to ensure Self-regulation and Health.

T3 & T4: Discussion on the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

UNIT III UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY **7 hours**

L13: Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship

L14: Understanding the meaning of Trust; Difference between intention and competence

L15: Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship

L16: Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals

L17: Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

T5 & T6: Reflection on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

UNIT IV UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE **6 hours**

L18: Understanding the harmony in the Nature

L19: Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self- regulation in nature

L20: Understanding Existence as Co-existence of mutually interacting units in all-pervasive space

L21: Holistic perception of harmony at all levels of existence.

T7 & T8: Discussion on human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

UNIT V IMPLICATIONS OF HOLISTIC UNDERSTANDING OF HARMONY ON PROFESSIONAL ETHICS **11 hours**

L22: Natural acceptance of human values

L23: Definitiveness of Ethical Human Conduct

L24: Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order

L25; 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, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

L26: Case studies of typical holistic technologies, management models and production systems

L27: 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

L28: Sum up.

T9-T14: Exercises and Case Studies For e.g. Individual discussion on the conduct as an engineer or scientist etc.

Course Outcomes:

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

1. Understood the natural acceptance in human being as the innate acceptance,
2. More aware of themselves,
3. Maintain harmony with family and society by recognizing Harmony in Human-Human Relationship,
4. Try to get Harmony in the Nature and Existence by realizing existence as Coexistence
5. More responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind with better critical ability.

Text Book(s)

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.

2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

3. The Story of Stuff (Book).

4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi

Mode of Evaluation: Assignment / Quiz, Classroom participation, Mini project / Report, Internal Mid Examination and external semester end examination.

Open Elective - II

Dept. of Computer Science & Engineering (IoT)

Open Elective - II

20MAT301 ADVANCED NUMERICAL METHODS

L	T	P	C
3	0	0	3

Pre-requisite: 20MAT101, 20MAT107, 20MAT110

Course Description:

This course reviews and continues the study of computational techniques for evaluating interpolations, derivatives and integrals; solving system of algebraic equations, transcendental equations, ordinary differential equations and partial differential equations. The course emphasizes on numerical and mathematical methods of solutions with appropriate error analysis. The students use MATLAB as the computer language to obtain solutions to a few assigned problems.

Course Objectives:

1. To introduce computation methods of solving algebraic and transcendental equations.
2. To avail the basics of numerical techniques for solving the system of linear equations
3. To familiarize the knowledge of interpolation and numerical calculus.
4. To use numerical calculus for solving ordinary differential equations.
5. To introduce the computational techniques for solving partial differential equations.

UNIT I SOLUTIONS OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS — 9 hours

Introduction to MATLAB, errors, sources of errors, floating point arithmetic, significant digits, relative error, propagation of errors, how to avoid loss of significant digits, evaluation of polynomial - Bisection method, False-position method, Secant method, Fixed-point iteration method, Newton's method – single and multiple roots, Order of convergence of the methods.

Exercises of Bisection method and Newton's method through MATLAB

UNIT II SOLUTIONS OF SYSTEM OF ALGEBRAIC EQUATIONS — 9 hours

Gaussian Elimination, LU decomposition, Thomas algorithm for the tridiagonal systems, Norms-Euclidean, mini-maxi, Frobenius and 1-,2- and ∞-norms, Condition numbers and errors in computed solutions. Jacobi's method, Gauss-Seidel method, Power method for obtaining eigenvalues and eigenvectors of matrices.Exercises of Gaussian Elimination and Gauss-Seidel method through MATLAB

UNIT III INTERPOLATION & NUMERICAL CALCULUS — 9 hours

Existence and Uniqueness of interpolating polynomial, Lagrange polynomials, Divided differences, Evenly spaced points, Error of interpolation, cubic spline, Inverse interpolation, Derivatives from difference table, Higher order derivatives, Trapezoidal rule, Simpsons rule, a composite formula, Gaussian Quadrature - Exercises of Divided differences and Simpson's rule through MATLAB

UNIT IV NUMERICAL SOLUTIONS TO ORDINARY DIFFERENTIAL EQUATIONS — 9 hours

Taylor series method, Euler and Modified Euler's method, Runge-Kutta methods for initial value problems, Shooting method, Finite difference method for boundary value problems.

Exercises of Runge-Kutta method and Shooting method through MATLAB.

UNIT V NUMERICAL SOLUTION TO PARTIAL DIFFERENTIAL EQUATIONS **9 hours**

Finite difference methods for one-dimensional Wave and Heat equations; Laplace and Poisson equations (five-point formula) - Exercises of Finite difference method (forward, central and backward differentiation) and Crank-Nicolson method through MATLAB

Course Outcomes:

At the end of the course, students will be able to:

1. Solve the system of algebraic and transcendental equations.
2. Apply the numerical techniques to find the solution to system of equations.
3. Calculate and analyze the rate of variations and numerical sum of such changes using numerical calculus relevant to the field of Engineering.
4. Find the accurate numerical solutions to ordinary differential equations representing some Engineering problems.
5. Compute the solutions for engineering problems represented by partial differential equations.

Text Books:

1. Curtis F. Gerald, Patrich O. Wheatley, Applied Numerical Analysis, Pearson Education, 7th Edition, 2003.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.

Reference Books:

1. B.S. Grewal, Higher Engineering Mathematics, 43rd edition (2014), Khanna publishers.
2. Burden and Faires, Numerical Analysis 7th ed., Thomson Learning, 2001.
3. Advanced Engineering Mathematics by E. Kreyszig, 10th ed., Wiley, 2010.
4. Applied Numerical Methods with MATLAB for Engineers and Scientists by Steven C. Chapra, 3rd ed., Mc Graw Hill, 2012.
5. M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering, New Age International Ltd., 5th Edition, 2010.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination

Open Elective - II

20MAT302 ENGINEERING OPTIMIZATION

L	T	P	C
3	0	0	3

Pre-requisite: 20MAT101, 20MAT106, 20MAT104, 20MAT108, 20MAT109, 20MAT110.

Course Description:
Unconstrained and constrained optimization, Linear programming problem, transportation and assignment problems, dynamic programming problem, project management and queuing models.

Course Objectives:
1. Understand the optimization techniques for solving engineering problems.
2. Formulate and solve linear programming problem.
3. Obtain the optimal solution for transportation and assignment problems.
4. Avail knowledge to solve dynamic programming problem using recursive relations.
5. Analyze the techniques of project management and queuing models.

UNIT I CLASSICAL OPTIMIZATION 9 hours

Introduction to optimization, unconstrained optimization with single variable and multi variable. Constrained multivariable optimization with equality constraints- Lagrange multipliers method, constrained multivariable optimization with inequality constraints - Kuhn-Tucker conditions.

UNIT II LINEAR PROGRAMMING PROBLEM 9 hours

Linear Programming Problem (LPP), Mathematical formulation, graphical solution, simplex method. Artificial variable technique - Big M-method and two phase simplex method. Duality, dual Simplex method.

UNIT III TRANSPORTATION PROBLEM AND ASSIGNMENT PROBLEM 9 hours

Transportation problem: definition and algorithm, transshipment problem. Assignment problem, travelling salesman problem.

UNIT IV DYNAMIC PROGRAMMING 9 hours

Introduction, developing optimal decision policy, Dynamic Programming Problem (DPP) under certainty, DPP approach for solving LPP.

UNIT V PROJECT MANAGEMENT AND QUEUING MODELS 9 hours

Network analysis: Network representation, Critical Path Method (CPM) and Project Evolutionary and Review Technique (PERT). Introduction to queuing system, single server queuing models (M/M/1) :(∞/FCFS), (M/M/1): (N/FCFS).

Course Outcomes:

At the end of the course, students will be able to:

1. Understood the importance of unconstrained and constrained optimization to solve engineering problems.
2. Get an idea about the linear programming techniques.
3. Solve transportation and assignment problems in engineering situations.
4. Apply the Bellman principle of optimality to solve dynamic programming problem.
5. Analyze the problems of network analysis for project management and Queuing systems engineering & industry.

Text Books:

1. J K Sharma, Operations Research: Theory and Practice, Macmillan Publishers India Ltd, 5th edition,2013.
2. B.S. Grewal, Higher Engineering Mathematics, 43rd edition (2014), Khanna publishers.

Reference Books

1. Hamdy A Taha, Operations Research: An Introduction, Pearson Education, 9/E, 2011.
2. FS Hillier and GJ Lieberman, Introduction to Operations Research, TMH, 8/E, 2006.
3. JC Pant, Introduction to Optimization: Operations Research, Jain Brothers, New, 6/E, 2004.
4. A Ravindran, DT Philips and JJ Solberg, Operations Research: Principles and Practice, John Wiley& Sons, Singapore, 2nd edition.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination

Dept. of Computer Science & Engineering (IoT)

Open Elective - II

20PHY301 OPTICAL PHYSICS AND ITS APPLICATIONS

L	T	P	C
3	0	0	3

Pre-requisite: None

Course Description:
The course will cover Geometrical optics, Aberrations, Physical Optics, Diffraction and Optical fibers.

Course Objectives:
Students will

1. Knowledge of basic principles and concepts in optics and the techniques used to deal with them.
2. Explain the limitations associated with spherical and chromatic aberration
3. Describe optical systems such as microscopes and telescopes with reference to parameters such as angular magnification and depth of field
4. Provide students with a working knowledge of optical physics, including interference, diffraction and physical optics.
5. Introduce construction and concepts of basic fiber optic communication system and to make the students learn about its important applications for societal needs.

UNIT I INTRODUCTION 9 hours

Corpuscular and wave theory, Fermat's principle, Matrices for translation, refraction and reflection, Unit and nodal planes, Eigenvalues and Eigenvectors.

UNIT II ABERRATIONS AND OPTICAL INSTRUMENTS 9 hours

Types of aberrations, Chromatic and monochromatic aberrations. Different types of monochromatic aberrations. Simple and Compound microscopes, Astronomical and Terrestrial telescopes. Ramsden's and Huygens' eye pieces.

UNIT III WAVE OPTICS & INTERFERENCE 9 hours

Huygens's principle, Superposition of waves, Fourier transforms, representation of slits and apertures, Two beam interference by Division of wave front. Applications of Interference, Nonlinear interaction of light with matter (self-study).

UNIT IV DIFFRACTION & POLARISATION 9 hours

Fraunhoffer diffraction, Diffraction from single slit, double slit & multiple slits, Fresnel half-period zones, Zone plate, Applications of diffraction, Polarization, Malus' law, double refraction. Applications of polarization.

UNIT V FIBER OPTICS 9 hours

Construction and working principle of optical fibers, Numerical aperture and acceptance angle, Types of optical fibers. Attenuation and losses in optical fibers, Analog and Digital optical fiber communication system. Applications of optical fibers in communications, sensors and medicine.

Course Outcomes:

At the end of the course, students will be able to:

1. Recollect the fundamental characteristics of light and their mathematical principles.
2. Learn the principles of superposition, Interference and Diffraction
3. Understand nonlinear optics and photonics phenomena.
4. Be exposed to the application of optical techniques in cutting edge research areas.
5. Describe the basic laser physics, working of lasers and principle of propagation of light in optical fibers.

Text Books:

1. Optics by Ghatak, 4th Edition, Tata McGraw Hill (2011).

Reference Books

1. Optics by Lipson, Lipson & Lipson, 4th Edition, Cambridge Univ Press (2010).
2. Optics by Hecht, 4th Edition, Addison-Wesley (2002).

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination

Open Elective – II

20PHY302 LASER PHYSICS AND ADVANCED LASER TECHNOLOGY

L	T	P	C
3	0	0	3

Pre-requisite: Basic knowledge of atomic structure at intermediate (10+2) level is sufficient

Course Description:
Laser usage is rampant in various technological applications. Several fields gaining attention in the usage of lasers. This course covers the introduction to the theory and mechanism of laser action, various types of lasers and their applications and future use.

Course Objectives:
1. Make the student to understand the detailed principles of various lasers.
2. Profound understanding of different variety of lasers will provide them to think of superior selection and usage of lasers in practical technological applications.
3. Students are aware of latest developments in certain areas of Laser technology which have important applications for societal needs.
4. Explain how material processing is accomplished with lasers. Estimate laser operation parameters for material processing.
5. Exposure about Lasers applications in engineering, communications, spectroscopy and material process etc.

UNIT I INTRODUCTION TO LASER TECHNOLOGY 9 hours

Laser characteristics, The Einstein Coefficients, Absorption and Emission Cross Sections, Spontaneous and Stimulated emission of radiation, Population inversion, Methods of Population Inversion, Laser Rate Equations, stable two minor optical resonators, Mode selection, Gain in the regenerative laser cavity.

UNIT II GASES AND LIQUIDS LASING MEDIUM 9 hours

Energy levels & Radiative properties of Atoms and molecules; Atomic lasers: He-Ne laser, Argon Ion laser; Molecular Lasers: Carbon dioxide laser, Liquid energy levels and their radiative properties, Organic Dye laser.

UNIT III SOLID STATE LASERS 9 hours

Energy Levels in solids-dielectric medium, Solid-state lasing materials, Narrow line width laser materials, broad band line width laser materials, solid state lasers: Nd:YAG, Nd:YLF; Ti:Sapphire (introduction only)

Energy Levels in solids-semiconductor medium, direct and indirect band gap semiconductors, Semiconductor diode laser, Quantum dot lasers (Introduction only);

UNIT IV PULSED OPERATION OF LASERS 9 hours

Nanosecond: Q-Switching, Techniques of Q-Switching: electro-optic, Acousto-Optic.

Femtosecond: Relationship between pulse duration and Spectral Width, Passive mode-locking, Active mode locking, Kerr lens mode locking, Amplification of femtosecond pulses.

UNIT V LASER APPLICATIONS 9 hours

Laser processing of materials: laser cutting, laser drilling, welding; Lasers in metrology- Accurate measurement of length, light wave communications; Laser spectroscopy: Laser fluorescence and Raman scattering.

Course Outcomes:

Upon completion of this course the students shall be able to:

1. Understand the principle of phenomenon of laser and identify the operating principle involved in various type of lasers.
2. Estimate stability requirements in producing laser light by different types of sources
3. Differentiate or list the various types of lasers and their means of excitation.
4. Assess (Identify) which laser would best meet the need for a particular industrial or research task.
5. Student can knowledge of latest technological developments in laser technology. Femtosecond laser etc.

Text Books:

1. Laser Fundamentals: William T Silfvast. Cambridge Publication.
2. Laser Theory and Applications: A.K. Ghatak and K. Thyagarajan, Springer
3. Femtosecond Laser Pulses Principles and Experiments: Claude Rulli`ere, Springer
4. Principles of Laser: O. Svelto
5. Laser Physics: Peter W Miloni, Joseph H Eberly.

Reference Books

1. Solid State Laser Engineering: Walter Koechner. Springer series in optical sciences.
2. Ultrafast Optics, Andrew M. Weiner
3. Laser spectroscopy: Demtroder
4. Laser Applications: Monte Ross

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination

Open Elective - II

20CHE301 INTRODUCTION TO PETROLEUM INDUSTRY

L	T	P	C
3	0	0	3

Pre-requisite: Basic Chemistry at Intermediate or equivalent level.

Course Description:
It deals with basic principles of petroleum engineering and the processes involved in petroleum industry.

Course Objectives:
Students will

1. To understand the basic concepts of crude oil, distillation process, internals, petroleum products and their properties, Instruments used for fuel testing.
2. To understand the type of chemicals and their application in petroleum industry.
3. To introduce the basic principles of hydroprocessing and fluid catalytic cracking and familiarize the processes involved there.
4. To familiarize the basic concepts of catalysis, bioprocesses in the refinery.
5. Health, environment, process safety and management in petroleum companies.

UNIT I BASIC PROCESSES IN PETROLEUM REFINING AND FUEL TESTING — 9 hours

Source of Crude oils and types, Overview of refinery process, Atmospheric Distillation, Vacuum distillation, Desalter, Desulphurization, Cracking, catalysis, Effluent treatment plant. Density, viscosity, pour point, flashpoint, octane number, cetane number, Fire point, Chromatography, Ductility, Water content, Sulphur analysis, MCRT, SARA, HFRR, calorofic value etc.

UNIT II CHEMICALS AND THEIR IMPORTANCE IN PETROLEUM INDUSTRY — 9 hours

Types of products in the refinery and their structural properties, Netralizing amines, Corrosion inhibitors, Multifunctional additives, viscosity improvers, drag reducing agents, antioxidants, Lubricity improvers, Antifoam additives, Oil spill absorbers, Dispersants and their applications, Types of Catalysts used in the refinery, Chemicals for ETP plant.

UNIT III ROLE OF HYDROPROCESSING AND FLUID CATALYTIC CRACKING IN PETROLEUM INDUSTRY — 9 hours

Objectives, Hydrocracking Reactions, Hydrocracking feedstocks, Modes of Hydrocracking, Effects of process variables, Hydro treating process and catalysts Resid hydro processing, FCC Cracking, Catalyst coking and regeneration, Design concepts, New Designs for Fluidized-Bed Catalytic Cracking Units

UNIT IV ROLE OF CATALYSTS, BIOPROCESSES IN PETROLEUM INDUSTRY — 9 hours

Types of catalyst and their importance, Design of catalyst, selection of catalyst, Catalytic processes. Introduction to biotechnology, oil recovery from reservoirs, refining of petroleum using biodesulphurisation, Bioremediation, commercial processes for bioethanol, propanol.

UNIT V HEALTH, ENVIRONMENT, PROCESS SAFETY AND MANAGEMENT IN PETROLEUM INDUSTRY **9 hours**

Safety policy, Personal protective equipment, Different type of extinguishers, Types of gloves and their application, Hydrants and their role, Safety indicators, Safety contact, Environmental pollution, precaution and first aid, precautions safety, Occupational safety and management, different elements and their role.

Course Outcomes:

At the end of the course, students will be able to:

1. Be able to understand the overview of petroleum industry
2. Be able to understand the concepts of crude oil, types of crude oils, properties of fuels such as octane number, cetane number, viscosity, density etc. Instruments.
3. Be familiarized with importance and their use of chemicals involved in the petroleum industry.
4. Be familiarized with the processes involved in hydroprocessing and fluid catalytic cracking.
5. Be familiarized the types of catalysts and bioprocesses in the petroleum industry.
6. Understanding the PPE, different types of extinguishers, First aid, process safety and management in the petroleum industry.

Text Books:

1. Mohamed A. Fahim, Taher A. Al-Sahhaf, Amal Elkilani, Fundamentals of Petroleum Refining, Elsevier,2009
2. David T Day, Handbook of the Petroleum Industry, Volume 1, ISBN: 137595962X, CHIZINE PUBN, 2017
3. S. P. Srivastava Jenő Hancsók, *Fuels and fuel additives*, Wiley VCH Verlag Gmbh & Co, Weinheim, 2004.
4. Robert O. Anderson, *Fundamentals of the Petroleum Industry*–University of Oklahoma Pres, 1987.
5. James G.Speight, *Handbook of Petroleum Product Analysis,* John Wiley & Sons, Inc, 2015
6. Physical Chemistry by G.W. Castellan (Addison Wesley Publishing Company)

Reference Books

1. Sankara Papavinasam, Corrosion Control in the Oil and Gas Industry, Elsevier, 2013
2. Petroleum Engineering Handbook (Vol. 1 through VIII). Editor in Chief: Larry W. Lake, Society of Petroleum Engineers.
3. Srinivasan Chandrasekaran. Health, safety and Environmental Management for offshore and Petroleum Engineers, John Wiley and Sons, U.K., ISBN: 978-11-192-2184-5, 2016.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination

Open Elective – II

20CHE302 GREEN CHEMISTRY AND CATALYSIS FOR SUSTAINABLE ENVIRONMENT

L	T	P	C
3	0	0	3

Pre-requisite: Basic Chemistry at Intermediate or equivalent level.

Course Description:
This course aims to introduce the interdisciplinary concept for engineering's to enhance their knowledge that they need to contribute with relevance and confidence in developing green technologies. This course covers feedstocks, green metrics and the design of safer, more efficient processes, as well as the role catalysts and solvents and green processes for Nanoscience.

Course Objectives:
Students will

1. Learn an interdisciplinary approach to the scientific and societal issues arising from industrial chemical production, including the facets of chemistry and environmental health sciences that can be integrated to promote green chemistry
2. Sensitize the students in redesigning of chemicals, industrial processes and products by means of catalysis.
3. Understand the use of alternatives assessments in using environmentally benign solvents.
4. Emphasize current emerging greener technologies and the need of alternative energies.
5. Learn to adopt green chemistry principles in practicing Nanoscience.

UNIT I PRINCIPLES AND CONCEPTS OF GREEN CHEMISTRY 9 hours

Introduction, Green chemistry Principles, sustainable development and green chemistry, atom economy, atom economic: Rearrangement and addition reactions and un-economic reactions: Substitution, elimination and Wittig reactions, Reducing Toxicity. Waste - problems and Prevention: Design for degradation.

UNIT II CATALYSIS AND GREEN CHEMISTRY 9 hours

Introduction to catalysis, Heterogeneous catalysts: Basics of Heterogeneous Catalysis, Zeolites: Catalytic cracking, ZSM-5 catalyst and high silica zeolites, TS1 Oxidation catalyst, Catalytic Converters, Homogeneous catalysis: Hydrogenation of alkenes using wilkinson's catalyst, Phase transfer catalysis: Hazard Reduction, C–C Bond Formation, Oxidation Using Hydrogen Peroxide.

UNIT III ORGANIC SOLVENTS: ENVIRONMENTALLY BENIGN SOLUTIONS 9 hours

Organic solvents and volatile organic compounds, solvent free systems, supercritical fluids: Super critical carbondioxide, super critical water and water as a reaction solvent: water based coatings, Ionic liquids as catalyst and solvent.

UNIT IV EMERGING GREENER TECHNOLOGIES AND ALTERNATIVE ENERGY SOURCES **9 hours**

Biomass as renewable resource, Energy: Fossil Fuels, Energy from Biomass, Solar Power, Fuel Cells(Hydrogen—oxygen fuel cell), Photochemical Reactions: Advantages of and Challenges Faced by Photochemical Processes, Examples of Photochemical Reactions(caprolactum), Chemistry Using Microwaves: Microwave Heating, Microwave-assisted Reactions, Sonochemistry.

UNIT V GREEN PROCESSES FOR GREEN NANOSCIENCE **9 hours**

Introduction and traditional methods in the nanomaterials synthesis, Translating green chemistry principles for practicing Green Nanoscience. Green Synthesis of Nanophase Inorganic Materials and Metal Oxide Nanoparticles: Hydrothermal Synthesis, Reflux Synthesis, Microwave-Assisted Synthesis, Other methods for Green synthesis of metal and metal oxide nanoparticles, Green chemistry applications of Inorganic nanomaterials

Course Outcomes:

Upon completion of this course the students should:

1. Recognize green chemistry concepts and apply these ideas to develop respect for the interconnectedness of our world and an ethic of environmental care and sustainability.
2. Understand and apply catalysis for developing eco-friendly processes.
3. Be in a position to use environmental benign solvents where ever possible.
4. Have knowledge of current trends in alternative energy sources.
5. Apply green chemistry principles in practicing green Nanoscience.

Text Books:

1. M. Lancaster, Green Chemistry an introductory text, Royal Society of Chemistry, 2002.

2. Paul T. Anastas and John C. Warner, Green Chemistry Theory and Practice, 4th Edition, Oxford University Press, USA

Reference Books

1. Edited by Alvise Perosa and Maurizio Selva , Hand Book of Green chemistry Volume 8: Green Nanoscience, wiley-VCH

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination

Open Elective – II

20CE301 GROUND IMPROVEMENT TECHNIQUES

L	T	P	C
3	0	0	3

Pre-requisite: None

Course Description:
Identification of problematic soils; ground improvement techniques; densification in granular soils; densification in cohesive soils; soil stabilization; confinement; reinforced earth; geo-synthetics; improvement of expansive soils.

Course Objectives:
Students will

1. To introduce engineering properties of soft, weak and compressible deposits, principles of treatment for granular and cohesive soils and various stabilization techniques.
2. To bring out concepts of reinforced earth.
3. Applications of geotextiles in various civil engineering projects.

UNIT I DEWATERING & GROUTINHG — 9 hours

Introduction- Need for engineered ground improvement, classification of ground modification techniques; suitability, feasibility and desirability of ground improvement technique.
Methods of de-watering- sumps and interceptor ditches- wells- drains- Electro- osmosis. Objectives of grouting- grouts and their properties-grouting methods.

UNIT II DENSIFICATION — 9 hours

In - situ densification methods in cohesionless Soils: - Vibration at the ground surface, Impact at the Ground Surface, Vibration at depth, Impact at depth. In - situ densification methods in cohesive soils: - preloading or dewatering, Vertical drains - Sand Drains- Sand wick geo-drains
- Stone and lime columns - thermal methods.

UNIT III STABILIZATION — 9 hours

Methods of stabilization-mechanical-cement- lime-bituminous-chemical stabilization with calcium chloride- sodium silicate and gypsum.

UNIT IV REINFORCED EARTH & GEOSYNTHETICS — 9 hours

Principles - Components of reinforced earth - factors governing design of reinforced earth walls design principles of reinforced earth walls. Geotextiles- Types, Functions and applications - geo- grids and geo-membranes - functions and applications.

UNIT V EXPANSIVE SOILS — 9 hours

Problems of expansive soils - tests for identification - methods of determination of swell pressure. Improvement of expansive soils - Foundation techniques in expansive soils - under reamedpiles.

Course Outcomes:

After successful completion of the course, student will be able to

1. Evaluate basic deficiencies of various soil deposits and able to decide various dewatering methods to improve the soil.
2. Implement different techniques of soil densification.
3. Choose the best method for stabilizing the soil for a given soil condition.
4. Choose-the best geosynthetic materials in different engineering applications.
5. Assessing various types of foundation techniques and methods to control swelling of soil

Text Books:

1. Dr. Purushotham Raj, P., Ground Improvement Techniques, Laxmi Publications, New Delhi.

2. Dr. Sivakumar Babu, GL, An Introduction to Soil Reinforcement & Geosynthetics, Universities Press

Reference Books

1. Hausmann M.R., Engineering Principles of Ground Modification, McGraw-Hill International Edition, 1990.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination

Open Elective – II

20CE302 ENVIRONMENTAL IMPACT ASSESSMENT

L	T	P	C
3	0	0	3

Pre-requisite: None

Course Description:
The course will focus on Basic concept of Environmental Impact Assessment (EIA), EIA Methodologies, Impact of Developmental Activities and Land use in soil, water, and vegetation, Environmental Audit, Post Audit activities, The Environmental pollution Acts.

Course Objectives:
Students will
1. To impart knowledge on Environmental management and Environmental Impact Assessment.
2. To give the student the brief knowledge about various legislations and audit protocols.
3. To give student knowledge about the framing of environmental audit through case studies.

UNIT I CONCEPTS AND METHODOLOGIES IN EIA — 9 hours

Introduction - Elements of EIA - Factor affecting EIA -Impact evaluation and analysis - Preparation of Environmental Base map - Classification of environmental parameters. Criteria for the selection of EIA Methodology - EIA methods: Ad-hoc methods - matrix methods - Network method - Environmental Media Quality Index Method -overlay methods - cost/benefit Analysis.

UNIT II IMPACT OF DEVELOPMENTAL ACTIVITIES — 9 hours

Introduction and Methodology for the assessment of soil and ground water - Delineation of study area - Identification of actives. Procurement of relevant soil quality - Impact prediction - Assessment of Impact significance -Identification and Incorporation of mitigation measures. EIA in surface water - Air and Biological environment.

UNIT III IMPACT ON VEGETATION AND WILD LIFE — 9 hours

Assessment of Impact of development Activities on Vegetation and wildlife - environmental Impact of Deforestation - Causes and effects of deforestation.

UNIT IV ENVIRONMENTAL AUDIT — 9 hours

Environmental Audit & Environmental legislation objectives of Environmental Audit - Types of environmental Audit - Audit protocol - stages of Environmental Audit - onsite activities - evaluation of audit data and preparation of audit report - Post Audit activities.

UNIT V ENVIRONMENTAL POLLUTION ACTS — 9 hours

The water Act-1974 - The Air Act-1981 (Prevention & Control of pollution Act.) - Wild life Act- 1972 - Indian Forest Conservation Act-1980 -National Green Tribunal Act –2010 - Biological Diversity Act-2002.

Course Outcomes:

The students after completing the course will be able to:

1. Apply the various methods used in predicting environmental impacts.
2. Apply site information to interpret impacts on land and groundwater.
3. Evaluate environmental impacts of various development activities on existing ecosystem.
4. Apply the procedures and various protocols involved in preparation of environmental audit report.
5. Apply the implications of environmental prevention and protection acts in relation to environmental impact assessment.

Text Books:

1. Anjaneyulu, Y., Environmental Impact Assessment Methodologies, B.S. Publication, Sultan Bazar, Kakinada.

Reference Books

1. Glynn, J. and Gary W. Hein Ke., Environmental Science and Engineering, Prentice Hall Publishers
2. Suresh K. Dhaneja Environmental Science and Engineering, S.K., Katania& Sons Publication, New Delhi.
3. Dr. Bhatia, H.S., Environmental Pollution and Control, Galgotia Publication (P) Ltd, Delhi.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination

Open Elective – II

20CE303 WATERSHED MANAGEMENT

L	T	P	C
3	0	0	3

Pre-requisite: None

Course Description:
Topic covers basic concepts of watershed, sustainable watershed management approached and practices, integrated watershed management and modelling, social aspect in watershed management, quantification of water quality and quantity at the catchment outlet using modern techniques, drought, flood and storm management at catchment scale.

Course Objectives:
1. To discuss various aspects of water resources development and management on watershed basis.
2. To proliferate the sustainable use and development of natural resources.
3. To enrich the students for change in the hydrological fluxes due altered physiographic condition (land use or elevation) on a watershed scale.
4. To improve the quantitative problem solving skills of the students for natural resources management.

UNIT I CONCEPT OF WATERSHED 9 hours

Concept of watershed - classification of watershed - introduction to watershed management - objective of watershed development - Hydrological cycle - water balance equation - different stakeholders and their relative importance - watershed management policies and decision making. Factor Affecting Watershed Development**:** Morphological characteristics: linear - Arial and Relief aspect - land use - vegetation - soil and geological characteristics - Hydrology and geology and socio-economic characteristics.

UNIT II WATERSHED MODELING 9 hours

Watershed delineation - modelling of rainfall - runoff process - Concept of integrated watershed management conjunctive use of water resources - Integrated water resources management. PRA - Private sector participation - Institutional issues - Socio- economy issues - Integrated development - Water legislation and implementations - Tools and emerging technologies for watershed management and planning.

UNIT III EROSION AND SEDIMENTATION 9 hours

Types of erosion - factor affecting erosion - effect of erosion on land fertility and capacity - estimation of soil loss due to erosion: universal soil loss equation - Prevention And Control To Erosion: contour techniques - ploughing - furrowing- trenching - bunding - terracing - gully control - rockfill dams - check dams - brushwood dam - Gabion structure.

UNIT IV WATER HARVESTING 9 hours

Rain water harvesting - catchment harvesting - harvesting structures - soil moisture conservation - check dams - artificial recharge from pond - percolation tanks - Flood And Drought Management: Definition of flood - Flood frequency analysis: Weibul - Gumbel - and log Pearson methods - Definition and

classification of drought - drought analysis techniques - drought mitigation planning - Management Of Water Quality: Water quality and pollution - types and Sources of pollution - water quality modelling-environmental guidelines for water quality.

UNIT V COVER MANAGEMENT 9 hours

Land use land cover change estimation through satellite imageries - land capability classification - management of forest - agricultural - grassland and wild land - Reclamation of saline and alkaline soil. Classification of columns based on slenderness ratio - reinforcement & loading - Design of rectangular and circular columns subjected to axial load - (axial load + uni-axial bending) and (axial load + bi-axial bending). Different Types of Footings - Design of isolated - square - rectangular and circular footings. Integrated Cropping System For Watersheds: Intercropping - mix cropping strip and terrace cropping - sustainable agriculture - cover cropping (biomass conservation) - horticulture - dryland agriculture and afforestation.

Course Outcomes:

The students after completing the course will be able to:

1. Classify watershed and Identify factors to consider for watershed Development.
2. Apply the concepts of watershed development and planning
3. Evaluate the erosion rate and total amount of soil loss from a watershed
4. Select the flood and drought mitigation measures
5. Quantify the change in land use land/cover and its impact on hydrological processes.

Text Books:

1. Kenneth N. Brooks Peter F. Ffolliott Joseph A. Magner. Hydrology and the Management of Watersheds. A John Wiley & Sons, Inc., Publication (4th Edition)
2. VVN, Murthy. Land and Water Management- Kalyani Pblication

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination

Dept. of Computer Science & Engineering (IoT)

Open Elective – II

20ME301 MATERIAL SCIENCE FOR ENGINEERS

L	T	P	C
3	0	0	3

Pre-requisite: None

Course Objectives:

1. To understand the relation between structure and properties of metallic materials.
2. To understand the strengthening mechanism of metals
3. To comprehend the various electrical and electronic properties of materials.
4. To understand origins and various types of magnetism and its applications.
5. To comprehend the transmission of light in various solids and study of photonic behavior.

UNIT I STRUCTURE OF MATERIALS 9 hours

Introduction: Historical prospective - importance of materials - Classification of Materials and its Properties. Bonding in solids: bonding forces and energies - primary and secondary bonding. Crystallography and Metallic structures: Unit cell - Crystallographic directions and planes, FCC, BCC, HCP, SC and other structure – miller indices, Linear and planar densities - close- packed crystal structures. Packing of atoms in solids. Packing factor

UNIT II CRYSTAL IMPERFECTIONS AND DIFFUSION 9 hours

Crystal Imperfections: Types, Vacancies and interstitials, Dislocations, and grain boundaries. Diffusion: Fick's Law of diffusion – Diffusion mechanism – Steady state and non-steady state, factors affecting diffusion.

UNIT III ELECTRICAL PROPERTIES OF MATERIALS 9 hours

Introduction and Electrical Conduction: Ohm's Law, Electrical Conductivity, Electronic and Ionic Conduction - Energy Band Structures in Solids, Electron Mobility - Electrical Resistivity of Metals Semi conductivity: Intrinsic and Extrinsic Semiconduction - Temperature Dependence of Carrier Concentration, Factors that Affect Carrier Mobility, The Hall Effect, Semiconductor Devices. Conduction in Ionic Materials, Electrical Properties of Polymers. Dielectric Materials: Capacitance, Ferroelectric Materials, Piezoelectric Materials.

UNIT IV MAGNETIC PROPERTIES OF MATERIALS 9 hours

Introduction and Basic Concepts, Diamagnetism, Paramagnetism, Ferromagnetism, Anti ferromagnetism, Ferrimagnetism, Influence of Temperature on Magnetic Behavior, Domains and Hysteresis, Magnetic Anisotropy, Soft and Hard Magnetic Materials, Magnetic Storage, Superconductivity.

UNIT V PHOTONIC MATERIALS 9 hours

Introduction, Electronic Radiation in Vacuum; Reflection, Refraction, and absorption in materials; Absorption and Chemical Bonding: Color, X-Ray absorption, Photon absorption Devices - Photon Emission: X-Ray Emission, Emission of electromagnetic radiation and devices: LED's, OLEDs and LASERs. Optical Fibers in communication

Course Outcomes:

At the end of the course students will be able:

1. To develop deep knowledge of crystal structure and effect of structure on the properties of the materials
2. To demonstrate knowledge of various imperfections in crystal, and diffusion mechanism in materials
3. To explain the origins of various electronic and electrical properties in the materials
4. To understand the concept of magnetism, its origin and types, while choosing the right material for the given application
5. To summarize various optical properties of the material and light's transmission behavior

Text Books:

1. W. Callister, "Materials Science and Engineering", Wiley, 7th Edition, 2007.
2. Charles M. Gilmore, "Materials Science and Engineering Properties", Cengage Learning, SI Edition, 2016

Reference Books

1. Donald R. Askeland, Pradeep P. Phule, "The Science and Engineering of Materials", Cengage Learning, 5th Edition, 2006.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination

Open Elective – II

20ME302 ELEMENTS OF MECHANICAL ENGINEERING

L	T	P	C
3	0	0	3

Pre-requisite: None

Course Objectives:

Students belonging to all branches of Engineering are made to learn following fundamental topics related to mechanical engineering:

1. To teach students the basic concepts of Thermodynamics.
2. To teach students the basic Classification and working principles of boilers and turbines.
3. To teach students about IC engines, Refrigeration, and Air-Conditioning systems.
4. To teach students about engineering materials and casting manufacturing processes.
5. To teach students and machines tools and manufacturing systems.

UNIT I THERMODYNAMICS 9 hours

Basic concepts of Thermodynamics: Introduction, Important terminologies used in thermodynamics, Specific heat capacity, First law of thermodynamics, Second law of thermodynamics, Reversible and irreversible processes, the Carnot cycle and the Clausius inequality.

UNIT II BOILERS, TURBINES AND PUMPS 9 hours

Boilers: Introduction to boilers, Classification of boilers, requirements of a good boiler, Cochran, Babcock, Locomotive, and Lancashire boilers.

Turbines: Hydraulic Turbines-Classification and specification, Principles, and operation of Pelton wheel turbine, Francis turbine, and Kaplan turbine (elementary treatment only).

Hydraulic Pumps: Introduction, Classification, and specification of pumps, reciprocating pump, and centrifugal pump.

UNIT III IC ENGINES AND REFRIGERATION SYSTEMS 9 hours

Internal Combustion Engines: Classification, I.C. Engines parts, 2 and 4 stroke petrol and 4-stroke diesel engines, Working principle of IC engines, Valve timing diagrams, Otto cycle, Diesel cycle, and Dual cycle. Refrigeration and Air conditioning Refrigeration – Introduction, Refrigerator, and Heat pump, Components of refrigeration system, Types of refrigeration system, and Type of refrigerants.

UNIT IV MATERIALS, CASTING AND TRANSMISSION 9 hours

Engineering Materials: Introduction, mechanical properties of engineering materials, mechanical testing of engineering materials, Impact test, and Classification of engineering materials.

Casting: Introduction to casting processes, Classification of casting processes, Sand casting, and special casting methods.

Power Transmission Devices: Introduction, belt drive, rope drive, Chain drive, Gear drive, Classification of gears.

UNIT V TOOLS AND MANUFACTURING SYSTEMS 9 hours

Machine Tools: Introduction, Mechanism of metal cutting, Geometry of single point cutting tool, Orthogonal and oblique metal cutting, Lathe, and Milling machines.

Manufacturing Systems Introduction, Computer Integrated Manufacturing, CAD/CAM, Numerical Control (NC), Computer Numerical Control, and Dynamics Numerical Control.

Course Outcomes:

On successful completion of the course, the student will be able to:

1. State first, second and third law of thermodynamics.
2. Sketch components of boilers and turbines.
3. State working principle of IC engines and R& AC systems.
4. Fair understanding of application and usage of various engineering materials, Casting process, and different types of drives with applications.
5. Explain the role of Computers in manufacturing systems.

Text Books:

1. "Basic Mechanical Engineering" by Pravin Kumar, Pearson Edition ISBN: 9789332505759, 9789332505759.

Reference Books

1. George E Dieter, "Mechanical Metallurgy", 3rd Edition, McGraw Hill, 2017
2. S. Kalpakjian and S. R. Schmid, "Manufacturing Engg, and Technology", 7th Edition, Pearson, 2018
3. P K Nag, "Engineering Thermodynamics", 6th Edition, McGraw Hill, 2017

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination

Dept. of Computer Science & Engineering (IoT)

Open Elective – II

220EEE301 INDUSTRIAL ELECTRICAL SYSTEMS

L	T	P	C
3	0	0	3

Pre-requisite: 20EEE101

Course Description:
This course deals with basics of electrical wiring systems for residential, commercial and industrial consumers, and its representation with standard symbols and drawings, various components of industrial electrical systems and its sizing and control aspects of industrial electrical system using PLC and SCADA.

Course Objectives:
1. To understand the electrical wiring systems for residential, commercial and industrial consumers.
2. To learn the representation of systems with standard symbols and drawings.
3. To understand the various components of industrial electrical systems.
4. To analyze and select the proper size of several electrical system components.
5. To study the control aspects of industrial electrical system using PLC and SCADA

UNIT I ELECTRICAL SYSTEM COMPONENTS 9 hours

LT system wiring components, selection of cables, wires, switches, distribution box, metering system, Tariff structure, protection components- Fuse, MCB, MCCB, ELCB, inverse current characteristics, symbols, single line diagram (SLD) of a wiring system, Contactor, Isolator, Relays, MPCB, Electric shock and Electrical safety practices.

UNIT II RESIDENTIAL AND COMMERCIAL ELECTRICAL SYSTEMS 9 hours

Types of residential and commercial wiring systems, general rules and guidelines for installation, load calculation and sizing of wire, rating of main switch, distribution board and protection devices, earthing system calculations, requirements of commercial installation, deciding lighting scheme and number of lamps, earthing of commercial installation, selection and sizing of components.

UNIT III ILLUMINATION SYSTEMS 9 hours

Understanding various terms regarding light, lumen, intensity, candle power, lamp efficiency, specific consumption, glare, space to height ratio, waste light factor, depreciation factor, various illumination schemes, Incandescent lamps and modern luminaries like CFL, LED and their operation, energy saving in illumination systems, design of a lighting scheme for a residential and commercial premises, flood lighting.

UNIT IV INDUSTRIAL SUBSTATION SYSTEMS 9 hours

HT connection, industrial substation, Transformer selection, Industrial loads, motors, starting of motors, SLD, Cable and Switchgear selection, Lightning Protection, Earthing design, Power factor correction – kVAR calculations, type of compensation, Introduction to PCC, MCC panels. Specifications of LT Breakers, MCB and other LT panel components.

UNIT V INDUSTRIAL SYSTEM AUTOMATION 9 hours

DG Systems, UPS System, Electrical Systems for the elevators, Battery banks, Sizing the DG, UPS and Battery Banks, Selection of UPS and Battery Banks.

Study of basic PLC, Role of in automation, advantages of process automation, PLC based control system design, Panel Metering and Introduction to SCADA system for distribution automation.

Course Outcomes:

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

1. Discuss the various component representation involved in the design of electrical wiring for Low Tension.
2. Understand the guidelines for wiring of household and commercial buildings.
3. Understand the various components of illumination in industrial electrical systems.
4. Select the proper size of various electrical system components required for designing different electrical wiring systems.
5. Understand the control aspects of industrial electrical system using PLC and SCADA.

Text Books:

1. S. L. Uppal and G. C. Garg, "Electrical Wiring, Estimating & Costing", Khanna publishers, 2008
2. K. B. Raina, "Electrical Design, Estimating & Costing", New age International, 2007.

Reference Books

1. S. Singh and R. D. Singh, "Electrical estimating and costing", Dhanpat Rai and Co., 1997.
2. H. Joshi, "Residential Commercial and Industrial Systems", McGraw Hill Education, 2008.
3. https://www.bis.gov.in/

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination

Open Elective – II

20EEE302 INTRODUCTION TO MEMS

L	T	P	C
3	0	0	3

Pre-requisite: 20EEE101

Course Description:
This course describes about manufacturing, modeling and applications of MEMS.

Course Objectives:

1. To know the fundamentals of MEMS materials, their physical properties and Principles of operation of MEMS devices.
2. To know various MEMS microfabrication technologies.
3. To provide various MEMS technology for mechanical, optical, and chemical sensors and actuator

UNIT I INTRODUCTION 9 hours

Overview – History and industry perspectives – Working principles – Mechanics and dynamics — Scaling law

UNIT II MICRO SENSORS & ACTUATORS 9 hours

Micro sensors: Pressure sensors, accelerometers, gyroscopes-Micro actuators: comb drive actuators – Micro-electromechanical systems.

UNIT III MICRO MANUFACTURING 9 hours

Materials for MEMS and Microsystems- Micro fabrication processes: Photolithography, Ion Implantation, Diffusion, Oxidation, Chemical Vapour Deposition- Physical Vapour Deposition, Micro manufacturing: Bulk micromachining, surface micromachining, LIGA Process- Packaging.

UNIT IV MODELING IN MEMS 9 hours

Micro system design: Finite Element Methods-– Modeling of simulation – piezoelectric, Gyroscope

UNIT V MEMS APPLICATIONS 9 hours

Micro fluids-sensors for turbulence measurement and control, micro-actuators for flow control, RFMEMS- filters, Oscillators and phase shifters, Optical MEMS, micro robotics – Case studies

Course Outcomes:

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

1. Explain the fundamentals of MEMS materials, their physical properties and Principles of operation of MEMS devices.
2. Analyze the Micro sensors and actuators and its fabrication.
3. Explain the materials for MEMS and Microsystems.
4. Design MEMS using microfabrication techniques.
5. Explain the advantages of MEMS technology for mechanical, optical, and chemical sensors and actuator

Text Books:

1. Chang Liu, 'Foundations of MEMS', Pearson Education Inc., 2006

2. G.K. Ananthsuresh et al ,'Micro and Smart Systems', Wiley, India, 2010

Reference Books

1. NadimMaluf, "An introduction to Micro electro mechanical system design", ArtechHouse, 2000.
2. Mohamed Gad-el-Hak, editor, "The MEMS Handbook", CRC press Baco Raton, 2000.
3. James J.Allen, micro electro mechanical system design, CRC Press published in 2005
4. Stephen D. Senturia, Microsystem Design, Kluwer Academic Publishers, 2001

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination

Open Elective – II

20ECE301 BIO-MEDICAL ELECTRONICS

L	T	P	C
3	0	0	3

Pre-requisite: None

Course Description:
This course provides the fundamental knowledge on applications of electronics in bio-medical signal measurements and processing, bio-medical instrumentation and imaging techniques.

Course Objectives:
This course enables students to

1. Acquire the basic knowledge on human physiology and biological transducers.
2. Learn about bio-electrodes and bio-amplifiers used in bio-signal acquisition.
3. Understand the working principle of bio-medical measuring instruments.
4. Study various types of imaging techniques used in medicine.
5. Learn the applications of medical instrumentation in designing artificial medical aids

UNIT I HUMAN PHYSIOLOGY AND BIOMEDICAL TRANSDUCERS 9 hours

Introduction to human physiology - Biomedical transducers for measuring displacement, velocity, force, acceleration, potential, dissolved ions and gases.

UNIT II BIO-ELECTRODES AND AMPLIFIERS 9 hours

Introduction to bio-potential, Bio-electrodes, Typical waveforms and characteristics of ECG, EMG and EEG, Bio-potential amplifiers for ECG, EMG and EEG – Lead systems and recording methods.

UNIT III BIOMEDICAL MEASURING INSTRUMENTS 9 hours

Measurement of blood pressure and temperature, Blood flow meter, Cardiac output measurement, Respiratory measurement, Blood cell counter, Impedance plethysmography.

UNIT IV MEDICAL IMAGING 9 hours

X-ray, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Nuclear imaging, Ultrasonic Imaging.

UNIT V PROSTHESES AND AIDS 9 hours

Pacemakers, Defibrillators, Heart-lung machine, Artificial kidney, Aids for the handicapped, Safety aspects

Course Outcomes:
Upon successful completion of the course, students will be able to

1. Understand the applications of biological transducers in medical field.
2. Analyze the design of bio-electrodes and bio-amplifiers.
3. Apply suitable measuring instruments to measure various medical parameters.
4. Understand and test various imaging techniques used in bio-medical diagnosis.
5. Analyze the applications of artificial medical aids.

Text Books:

1. W.F. Ganong, Review of Medical Physiology, 26th Edition, Tata McGraw-Hill, New Delhi, 2019.

2. J.G. Websster, ed., Medical Instrumentation, 3rd Edition, Wiley India Pvt. Ltd. 2009

Reference Books

1. A.M. Cook and J.G. Webster, eds., Medical Devices and Human Engineering, Taylor & Francis, 2014

2. R.S.Khandpur,"Handbook of Biomedical Instrumentation", 2nd edition, Tata McGraw - Hill, New Delhi, 2005

3. LeslieCromwell,"BiomedicalInstrumentationandMeasurement",Prentice-Hall, New Delhi, 2011.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination

Dept. of Computer Science & Engineering (IoT)

Open Elective – II

20ECE302 VLSI DESIGN

L	T	P	C
3	0	0	3

Pre-requisite: None

Course Description:
This course describes about various VLSI design methodologies, fundamentals of CMOS technology. It incorporates basics of MOSFET models, CMOS design rules, Design of VLSI Systems, combinational logic design, sequential logic design, logic families and VLSI Design flow.

Course Objectives:
This course enables students to

1. Study the fundamentals of CMOS circuits and its characteristics
2. Learn the design and realization of combinational digital circuits.
3. Learn the design and realization of sequential digital circuits.
4. Architectural choices and performance tradeoffs involved in designing and realizing the circuits in CMOS technology are discussed
5. Learn the different FPGA architectures and testability of VLSI circuits.

UNIT I INTRODUCTION TO MOS TRANSISTOR 9 hours

MOS Transistor, CMOS logic, Inverter, Pass Transistor, Transmission gate, Layout Design Rules, Gate Layouts, Stick Diagrams, Long-Channel I-V Charters tics, C-V Charters tics, Non ideal I-V Effects, DC Transfer characteristics, RC Delay Model, Elmore Delay, Linear Delay Model, Logical effort, Parasitic Delay, Delay in Logic Gate, Scaling.

UNIT II COMBINATIONAL MOS LOGIC CIRCUITS 9 hours

Circuit Families: Static CMOS, Ratioed Circuits, Cascode Voltage Switch Logic, Dynamic Circuits, Pass Transistor Logic, Transmission Gates, Domino, Dual Rail Domino, CPL, DCVSPG, DPL, Circuit Pitfalls.
Power: Dynamic Power, Static Power, Low Power Architecture.

UNIT III SEQUENTIAL CIRCUIT DESIGN 9 hours

Static latches and Registers, Dynamic latches and Registers, Pulse Registers, Sense Amplifier Based Register, Pipelining, Schmitt Trigger, Monostable Sequential Circuits, Astable Sequential Circuits.
Timing Issues: Timing Classification Of Digital System, Synchronous Design.

UNIT IV DESIGN OF ARITHMETIC BUILDING BLOCKS AND SUBSYSTEM 9 hours

Arithmetic Building Blocks: Data Paths, Adders, Multipliers, Shifters, ALUs, power and speed tradeoffs, Case Study: Design as a tradeoff.

Designing Memory and Array structures: Memory Architectures and Building Blocks, Memory Core, Memory Peripheral Circuitry.

UNIT V IMPLEMENTATION STRATEGIES AND TESTING 9 hours

FPGA Building Block Architectures, FPGA Interconnect Routing Procedures. Design for Testability: Ad Hoc Testing, Scan Design, BIST, IDDQ Testing, Design for Manufacturability, Boundary Scan

Course Outcomes:

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

1. Realize the concepts of digital building blocks using MOS transistor.
2. Design combinational MOS circuits and power strategies
3. Design and construct Sequential Circuits and Timing systems.
4. Design arithmetic building blocks and memory subsystems.
5. Apply and implement FPGA design flow and testing.

Text Books:

1. Neil H.E. Weste, David Money Harris "CMOS VLSI Design: A Circuits and Systems Perspective", 4th Edition, Pearson , 2017.
2. Jan M. Rabaey ,Anantha Chandrakasan, Borivoje. Nikolic, "Digital Integrated Circuits:A Design perspective", Second Edition , Pearson , 2016.

Reference Books

1. Operating Systems - Internals and Design Principles. Stallings, 6th Edition2009. Pearson education.
2. William Stallings, "Operating Systems – Internals and Design Principles", 7th Edition, Prentice Hall, 2011.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination

Professional Elective I

Professional Elective - I

20CSO401 DATA MINING AND DATA WAREHOUSING

L	T	P	C
3	0	0	3

Pre-requisite: Nil

Course Description:

In this course we explore how this interdisciplinary field brings together techniques from databases, statistics, machine learning, and information retrieval. We will discuss the main data mining methods currently used, including data warehousing and data cleaning, clustering, classification, association rules mining, and web mining.

Course Objectives:

1. To understand the principles of Data warehousing and Data Mining.
2. To be familiar with the Data warehouse architecture and its Implementation.
3. To know the Architecture of a Data Mining system.
4. To understand the various Data preprocessing Methods.
5. To perform classification and prediction of data.

UNIT I INTRODUCTION TO DATA MINING 9 hours

Introduction: Introduction to Data Mining Systems – Knowledge Discovery Process – Data Mining Techniques – Issues – applications- Data Objects and attribute types, Statistical description of data, Data Preprocessing – Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures.

UNIT II MINING FREQUENT PATTERNS 9 hours

Mining Frequent Patterns, Associations and Correlations – Mining Methods- Pattern Evaluation Method – Pattern Mining in Multilevel, Multi Dimensional Space – Constraint Based Frequent Pattern Mining, Classification using Frequent Patterns

UNIT III CLASSIFICATION AND PREDICTION 9 hours

Issues Regarding Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section.

UNIT IV CLUSTER ANALYSIS 9 hours

Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High-Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis.

UNIT V APPLICATIONS IN DATA MINING 9 hours

Mining Object, Spatial, Multimedia, Text and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects – Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web.

Course Outcomes:

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

1. Student is able to preprocess any real world dataset by using preprocessing techniques
2. Able to distinguish the OLTP and OLAP.
3. Able to implement data mining techniques such as Associations, classification.
4. Able to implement clustering techniques and its applications.
5. Students can identify the applications where data mining techniques can be applied

Text Book(s)

1. Tan, Pang-Ning& others. “Introduction to Data Mining” Pearson Education, 2006.

2. Han J &Kamber M, “Data Mining: Concepts and Techniques”, Morgan Kaufmann Publishers,Second Edition, 2006

Reference Books

1. Dunhum M.H. & Sridhar S. “Data Mining-Introductory and Advanced Topics”, Pearson Education, 2006.
2. S. Sumathi& S.N. Sivanandam “Introduction to Data mining and its applications”, Springerverlag.
3. Alex Berson and Stephen J. Smith “Data Warehousing, Data Mining & OLAP”, Tata McGraw – Hill Edition, Tenth Reprint 2007.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Dept. of Computer Science & Engineering (IoT)

Professional Elective - I

20CSO402 WIRELESS SENSOR NETWORKS

L	T	P	C
3	0	0	3

Pre-requisite **20CSO109**

Course Description:
This course introduces the concept of Wireless Sensor Network (WSN) to the students. It articulates the classification of WSN and related issues & challenges. It also describes different types of routing, MAC, dissemination protocols and explains design principles of wireless sensor networks.

Course Objectives:
1. Understand the concept of WSN, issues and challenges, classification of WSN.
2. Acquire knowledge on the hardware components, design constraints and Operating systems used in WSNs.
3. Acquire the knowledge involved in the classification of routing and MAC protocols.
4. Understand the skills required for data base management in large sensor network.
5. Explain the design principles related to gateway of WSNs.

UNIT I BASICS OF WSN **9 hours**

Introduction to Sensor Networks, unique constraints and challenges, Advantage of Sensor Networks, Applications of Sensor Networks, Types of wireless sensor networks. Mobile Ad-hoc Networks (MANETs) and Wireless Sensor Networks, Enabling technologies for Wireless Sensor Networks. Issues and challenges in wireless sensor networks.

UNIT II DESIGN CONSIDERATION FOR WSN **9 hours**

Single-node architecture, Hardware components& design constraints. Operating systems and execution environments, introduction to TinyOS and nesC.

UNIT III WIRELESS PROTOCOLS **9 hours**

Routing protocols, MAC protocols: Classification of MAC Protocols, S-MAC Protocol, B-MAC protocol, IEEE 802.15.4 standard and ZigBee.

UNIT IV DATA PROCESSING **9 hours**

Dissemination protocol for large sensor network. Data dissemination, data gathering, and data fusion; Quality of a sensor network; Real-time traffic support and security protocols.

UNIT V GATEWAY OF WSN **9 hours**

Design Principles for WSNs, Gateway Concepts Need for gateway, WSN to Internet Communication, and Internet to WSN Communication.

Course Outcomes:

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

1. Describe the phases, identify, list and compare Wireless Sensor Network.
2. Discuss and identify the choice of OS with architectural framework.
3. Understand the characteristics and selection of suitable MAC protocol for wireless sensor network.
4. Understand and describe the database management mapping onto the network topology of wireless sensor network.
5. Design the gateway on application-level information for WSN.

Text Book(s)

1. Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks Theory and Practice", John Wiley & Sons Publications, 2011.
2. Soloman, Sabrie," Sensors Handbook" Second Edition McGraw-Hill Education, 2010.

Reference Books

1. Feng Zhao, Leonidas Guibas, "Wireless Sensor Networks", Elsevier Publications,1st edition 2004.
2. Sohraby, Kazem, Daniel Minoli, and Taieb Znati. Wireless sensor networks: technology, protocols, and applications. John wiley & sons, 2007.
3. Levis, Philip, and David Gay. TinyOS programming. Cambridge University Press, 2009.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Professional Elective - I

20CSO403 CRYPTOGRAPHY AND NETWORK SECURITY

L	T	P	C
3	0	0	3

Course Pre-requisite: 20CSE110

Course Description:
We cover in this course principles and practice of cryptography and network security: classical systems, symmetric block ciphers (DES, AES, other contemporary symmetric ciphers), linear and differential cryptanalysis, perfect secrecy, public-key cryptography (RSA, discrete logarithms), algorithms for factoring and discrete logarithms, cryptographic protocols, hash functions, authentication, key management, key exchange, signature schemes, email and web security, viruses, firewalls, digital right management, and other topics.

Course Objectives:

1. Understand the fundamental principles of access control models and techniques, authentication and secure system design.
2. Have a strong understanding and describe of different cryptographic protocols and techniques be able to use them.
3. Become knowledgeable in various methods and protocols to maintain E-mail security, and web security.
4. Analyze & develop methods for authentication, access control, intrusion detection and prevention.
5. Identify and mitigate software security vulnerabilities in existing systems.

UNIT I SYMMETRIC CIPHERS 9 hours

Introduction: Security Attacks, Services & Mechanisms, A Model for Network security. Symmetric Key Cryptography: Classical encryption techniques, Block cipher operations, DES, AES.

UNIT II ASYMMETRIC CIPHERS 9 hours

Introduction: Modular arithmetic (addition, multiplication, inverse, exponentiation and Euler's Theorem) Public key Cryptography principles, RSA: generating keys, encryption and decryption. Other Public-key cryptosystems: Diffie-Hellman, El-Gamal cryptosystems.

UNIT III CLASSIFICATION AND PREDICTION 9 hours

Authentication requirements, Message Authentication Code, Cryptographic Hash functions: Applications of Cryptographic Hash functions, Secure Hash Algorithm., HMAC, Digital Signatures, Digital Signature Standard.

UNIT IV MUTUAL TRUST 9 hours

Key management and Distribution: Symmetric key distribution using Symmetric and Asymmetric encryption, Distribution of public keys, User authentication Protocols- Kerberos X.509 certificates.

UNIT V NETWORK AND INTERNET SECURITY 9 hours

Transport level security: Web security issues, Secure Socket Layer (SSL), Transport Layer Security(TLS),E-mail Security: PGP,S/MIME System Security: Intruders and Viruses, Firewalls, Intrusion Detection.

Course Outcomes:

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

1. Explain the basic definitions and concepts of the information security
2. Analyze & differentiate between several types of security schemes
3. Design & develop information security schemes
4. Illustrate the threats.
5. Implement security schemes to protect information system resources

Text Book(s)

1. Stallings, W., Cryptography and Network Security: Principles and Practice, 5th ed., Prentice Hall PTR.,2011.
2. Cryptography and Network Security; 2nd ed. , Behrouz A. Forouzan , Debdeep Mukhopadhyay, McGraw Hill,2011.

Reference Books

1. Atul Kahate, Cryptography and Network Security, 2nd ed., Tata Mcgraw Hill education Private Limited, 2011.
2. Computer Security, Dieter Gollman,3rd ed, Wiley Publications,2011.
3. Introduction to Computer Security, Matt Bishop,1st ed,Addison-Wesley Professional,2004.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Professional Elective - I

20CSO404 IoT ARCHITECTURE AND PROTOCOLS

L	T	P	C
3	0	0	3

Pre-requisite NIL

Course Description:

The purpose of this course is to impart knowledge on IoT Architecture and various protocols, also study their implementations in real world applications.

Course Objectives:

1. To Understand the Architectural Overview of IoT.
2. To Understand the IoT Reference Architecture and Real-World Design Constraints.
3. To Understand the various IoT Protocols at Datalink, Network Layer.
4. To Analyse various IoT Protocols at transport & session layer.
5. To Analyse various IoT Protocols at Service Layer & Security related Issues.

UNIT I OVERVIEW OF IoT ARCHITECTURE 9 hours

IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management

UNIT II IoT REFERENCE ARCHITECTURE 9 hours

IoT Architecture - State of the Art – Introduction, State of the art, Reference Model and architecture, IoT reference Model - IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

Real-World Design Constraints- Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control.

UNIT III IoT DATA LINK LAYER & NETWORK LAYER PROTOCOLS 9 hours

PHY/MAC Layer - (3GPP MTC, IEEE 802.11, IEEE 802.15), Wireless HART, Z-Wave, Bluetooth Low Energy, Zigbee Smart Energy, DASH7

Network Layer-IPv4, IPv6, 6LoWPAN, 6TiSCH, ND, DHCP, ICMP, RPL, CORPL, CARP

UNIT IV TRANSPORT & SESSION LAYER PROTOCOLS 9 hours

Transport Layer - (TCP, MPTCP, UDP, DCCP, SCTP) - (TLS, DTLS)

Session Layer- HTTP, CoAP, XMPP, AMQP, MQTT

UNIT V SERVICE LAYER PROTOCOLS & SECURITY 9 hours

Introduction to Databases- File System Vs Database System - Data Models- Schemas and Instances - DBMS Architecture- Centralized - Client Server - Database Applications.

Service Layer -oneM2M, ETSI M2M, OMA, BBF – **Security in IoT Protocols** – MAC

802.15.4, 6LoWPAN, RPL, Application Layer**, Case Study** - Environment Monitoring System

Course Outcomes:

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

1. Comprehend the essentials of IoT and its applications.
2. Understand the concepts of IoT Architecture Reference model and IoT reference architecture
3. Analyze various IoT data link layer Protocol & Network Layer Protocol.
4. Apply IP based protocols and Authentication Protocols for IoT.
5. Design IoT-based systems for real-world problems.

Text Book(s)

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014.
2. Peter Waher, “Learning Internet of Things”, PACKT publishing, BIRMINGHAM – MUMBAI

Reference Books

1. Bernd Scholz-Reiter, Florian Michahelles, “Architecting the Internet of Things”, ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer
2. Implementation and Management,6th Edition,2012. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, “IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things”, CISCO Press, 2017
3. Vijay Madisetti and ArshdeepBahga, “Internet of Things (A Hands-on- Approach)”, 1st Edition, VPT, 2014.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Dept. of Computer Science & Engineering (IoT)

Professional Elective - I

20CSO405 DATA VISUALIZATION TECHNIQUES

L	T	P	C
3	0	0	3

Pre-requisite NIL

Course Description:

This course is all about data visualization, the art and science of turning data into readable graphics. Students will explore how to design and create data visualizations based on data available and tasks to be achieved. Students will also learn to evaluate the effectiveness of visualization designs, and think critically about each design decision, such as choice of color and choice of visual encoding.

Course Objectives:

1. Provide the foundations necessary for understanding and extending the current state of the art in data visualization.
2. Understand why visualization is an important part of data analysis
3. Understand the components involved in visualization design including graphical perception and techniques for visual encoding and interaction.
4. Exposure to interaction techniques corresponding analysis tasks.
5. The ability to read and discuss research papers from the visualization literature.

UNIT I OVERVIEW OF DATA VISUALIZATION 9 hours

Why Visualize Data? – Data abstraction: Dataset Types, Attribute Types, Semantics - Task Abstraction: Actions, Targets - Analyzing and Deriving - Marks and Channels - Defining Marks and Channels - Using Marks and Channels - Channel Effectiveness.

UNIT II TABLES, SPATIAL DATA, NETWORKS AND TREES 9 hours

Arrange Tables: Arrange by Keys and Values, Scatterplots, Bar Charts, Stacked Bar Charts, Stream graphs, Dot and Line Charts, Cluster Heat maps, Scatterplot Matrix, Pie Charts – ArrangeSpatial data: Geometry, Scalar Fields, Vector Fields, Arrange Networks and Trees: Connection, Matrix Views, Costs and Benefits.

UNIT III COLOR AND SIZE IN VISUALIZATION 9 hours

Color Theory–Colormaps - Other Channels - Manipulate View: Change View over Time, Select Elements Changing Viewpoint, Reducing Attributes.

UNIT IV INTERACTION TECHNIQUES 9 hours

Facet into Multiple views: Coordinate Views, Partition into Views, Superimpose Layers, Static Layers, Dynamic Layers.

UNIT V DATA REDUCTION AND CASE STUDY 9 hours

Reduce Items and Attributes: Filter, Aggregate – Analyse case studies: VisDB, Hierarchical Clustering Explorer, PivotGraph, InterRing.

Course Outcomes:

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

1. Craft visual presentations of data for effective communication.
2. Conduct exploratory data analysis using visualization.
3. Design and evaluate color palettes for visualization based on principles of perception.
4. Use knowledge of perception and cognition to evaluate visualization design alternatives.
5. Apply data transformations such as aggregation and filtering for visualization.

Text Book(s)

1. Tamara Munzner, Visualization Analysis and Design (A K Peters Visualization Series), 1st Edition, A K Peters/CRC Press, 2014. [ISBN-10: 9781466508910]

Reference Books

1. Edward R. Tufte, The Visual Display of Quantitative Information, 2nd Edition, Graphics Press, 2001. [ISBN-10: 9780961392147]
2. Yau Nathan, Visualize This: The Flowing Data Guide to Design, Visualization, and Statistics. Wiley, 2011. [ISBN-13 : 978-0470944882]
3. Yau Nathan, Data Points: Visualization that means something, John Wiley & Sons, 2013.[ISBN-13 : 978-1118462195]

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Skill Oriented Courses

Dept. of Computer Science & Engineering (IoT)

Skill Oriented Course – I
B. Tech. II Year I Semester

20CSO601 WEB SCRIPTING

L	T	P	C
1	0	2	2

Pre-requisite NIL

Course Description:
This course will expose students to the techniques used in programming web pages for interactive content. The course begins by reviewing basic web technologies (HTML, CSS style sheets, XML, JavaScript (Node and Angular) and jQuery and exploring the use of event-driven programming in JavaScript to add interactive elements such as buttons and text fields to web pages.
This course provides the knowledge necessary to design and develop dynamic, database-driven web pages using PHP. Students also learn how to configure PHP and Web Servers like Apache, IIS, WAMP and XAMPP.

Course Objectives:
1. To build web applications using HTML, CSS and PHP with client side validations.
2. To build XML documents with DTD, Schemas and style sheets.
3. To maintain session management tracking using cookies & HTTP Sessions.
4. To develop a web application with database interaction using Node JavaScript and Angular JavaScript
5. To build jQuery enabled web applications.

UNIT – I: HTML & CSS
Introduction to HTML, HTML5 New Features, Structural, Content, Application-focused tags.
History of CSS, The Power of CSS, Selectors and Pseudo Classes, Fonts and Text Effects, Colors.

a. Creation College Website using HTML.
b. Design a website using style sheets so that the pages have uniform style.

UNIT – II: INTRODUCTION TO JAVASCRIPT
Introduction to JavaScript, Comments, Variables, Exploring JavaScript Data Types, Popup Boxes, Objects, Functions, Conditions, Loops, Form Validation.

a. Design a form and validate all the controls placed on the form using Java Script.
b. Write a JavaScript program to measure the time taken by a function to execute.

UNIT – III: jQuery WITH HTML
Introduction to jQuery, Installation, Selectors, Events, Effects, Callbacks, jQuery and HTML, jQuery

a. Working on Blink text using jQuery.
b. Using jQuery right click to toggle background color.

UNIT – IV: INTRODUCTION TO XML AND PHP DATABASE

Introduction to XML, Creating XML Documents, XSL, PHP Concepts: Sessions, authenticating users Database Access: Database Concepts, MYSQL database connectivity and operations.

a. Display Library information using XML.

b. 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,

c. Write a PHP program to connect to that database and extract data from the tables and display them. Experiment with various SQL queries.

UNIT – V: NODEJS AND ANGULAR JS

Introduction to Node JS, Advantage of Node JS, File System: Using file operation. Data base Connectivity: Connecting strings and configuring. Database operations on create table data -Angular JS forms.

a. Working on file write, read and delete using Node.js

b. Write a Node JavaScript program to connect to that database and extract data from the tables and display them.

c. Using AngularJS to read input value from text box and will be displayed it.

d. Using AngularJS to demonstrate Arithmetic operations of two numbers.

Course Outcomes:

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

1. Design pages with HTML and CSS attributes.
2. Design and develop web applications with the support of client side validations.
3. Use well-formed XML documents and develop PHP scripts with may support of object oriented features.
4. Manage the session in web browser through Cookies & Sessions and able to communicate with other web pages through form GET and POST methods.
5. Design and develop web applications with the database interactions (thorough SQL queries) and apply Node JavaScript and Angular JavaScript for faster performance.

Text Books

1. PHP 5 Recipes A problem Solution Approach Lee Babin, Nathan A Good, Frank M.Kromann and Jon Stephens.
2. Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP, J.Leeand B.Ware(Addison Wesley) Pearson Education.
3. Professional Angular JS, Valeri Karpov and Diego Netto, John Willey Edition.
4. Beginning Node.JS by Basarat Syed, 2014.

Reference Books

1. HTML & CSS:The Complete Reference ,Thomas.A Powel “Fifth Edition”Kindle Edition,2017
2. Marty Hall and Larry Brown,”Core Web Programming” Second Edition, Volume I andII, Pearson Education, 2001. Learning jQuery, Jonathan Chaffer, Karl Swedberg, Third Edition, Packt Publishing Ltd

3. HTML & CSS:The Complete Reference ,Thomas.A Powel “Fifth Edition”Kindle Edition,2017
4. Marty Hall and Larry Brown,”Core Web Programming” Second Edition, Volume I andII, Pearson Education, 2001. Learning jQuery, Jonathan Chaffer, Karl Swedberg, Third Edition, Packt Publishing Ltd

Mode of Evaluation: Model Lab Examinations, External Lab End Examination

Dept. of Computer Science & Engineering (IoT)

Skill Oriented Course – I
B. Tech. II Year II Semester

20CSO602 ANDROID APPLICATION DEVELOPMENT

L	T	P	C
1	0	2	2

Pre-requisite **NIL**

Course Description:
This course is concerned with the development of applications on Android platform. Android is used as a basis for the development of mobile applications. This course starts with the basic concepts of Java, history of android and architecture. It also covers the development of applications using widgets, events, networking. It provides ideas on sensors, their types and writing programs based on sensor classes for application development. They will design and develop Mobile applications with the use of J2ME, like SMS, MMS, Gaming, Multimedia, JavaFX & Android.

Course Objectives:
While studying this course student will be able to
1. Understand Android history and its fundamentals and know the building blocks of android
2. Get idea on the creation of android user interface and its testing mechanisms
3. Identify the usage of threads, broadcast receivers, indents, services and their working methodology
4. Know about the storage mechanism in android using SQLite and the usage of content providers
5.Recognize the usage of android widgets and sensors in android based applications

UNIT- I INTRODUCTION AND INSTALLATION OF ANDROID TOOLS
Installation and Use of Android Tools: Installing the Android SDK - Anatomy of an Android Project Drawable Resources – XML Introduction - Creating user interface using XML – Overview of Android Building Blocks.
a) Develop an android application to display a simple text in the emulator
b) Develop an android application to display the internal keyboard in the emulator

UNIT- II USER INTERACTION
Input Components – Text View – Image View – List View and Alert Dialogues – Menus: Popup, Options and Context Menus – Screen Navigation through App Bar – Recycler View – Material Design – Testing the User Interface
a) Write an android program to display a message in the toast
b) Write an android program to input a text through a text and the same must be displayed in the toast when a button is clicked on the screen
c) Develop an application to perform 5 arithmetic operations: Addition, Subtraction, Multiplication, Division and Modulo operation with necessary user interface creation
d) Develop an android application to process a student mark list by creating proper UI using the necessary controls

UNIT-III THREADS, LOADERS AND ASYNCTASK LOADER, SERVICES

Threading in Android – AsyncTask – Loaders – AsyncTask Loader -Alarms and system services – Examples on alarms and services – Services: Services Life Cycle – Intent Service – Implementing Intent Service – Notifications.

a) Write an android application to create a calculator
b) Create an android UI that consists of Different Departments of a company namely Production, Finance, Marketing and HR. If the user clicks on any department it should show details of that department. Use indents.

UNIT IV: SAVING, RETRIEVING AND LOADING DATA:

Android File systems and Files, Databases on Android - SQLite - Status Contract Class, Update Refresh Service – Cursors – Backups - Content Providers: Overview – Role of Content Providers, Content Resolver.

a) Design an android application to display a list of items on the android screen. If the user clicks any one of the list items a dialogue box should show that the user has clicked that particular item (Use array adopters)
b) Develop an android application to show some categories such as education, entertainment, health, provisions etc., If the user clicks on any one of the items it should show the sub categories of the category and if is again clicked it should the details of those items. (Use indents and lists)
c) i. Design an android application to create a service that shows the service is running in the background in the form of a toast

UNIT-V APPLICATIONS WIDGETS, INTERACTION AND SENSORS

App Widgets: Creation of Application Widgets - Interaction and Animation- Sensors: Sensor API in Android - Motion Sensor, Position Sensor, Sensor Values, Sensor Manager Class, Sensor Event class, Sensor Event Listener.

a) Develop an android application to demonstrate the concept of Fragments in Android
b) Develop an android application to demonstrate the database connectivity with the SQLite database to post and retrieve data through the User Interface
(Example: Student mark list processing, Email Registration and Login, Products and sales)
c) Demonstrate the usage of Sensors in android by developing proper application.

Course Outcomes:

Upon successful completion of this course, students can able to:

1. Work on android basic components and Install android
2. Create User Interfaces with various Layouts and views using android building blocks
3. Work with Broadcast Receivers and Services
4. Create Database in Android, Store and Retrieve data using SQLite and Content Providers
5. Develop widgets, Wall papers for an android application and write programs based on Sensors

Text Books

1. Android Programming-The Big Nerd Ranch Guide, Bill Philips, Christ Stewart, Kristin Mariscano, Big Nerd Ranch publishers, 3rd Edition,2017

2. Android Programming for Beginners, John Horton, PACKT publishers,2018

3 Learning Android, By Marko Gargenta& Masumi Nakamura, O'Reilly, II Edition,2014

4 Android Application Development All in One for Dummies, Barry Burd, Wiley, 2nd Edition,2015

Reference Books

1. Android application Development-Black Book, Pradeep Kothari, dreamtech,2014

2. Android Programming - Unleashed, B.M.Harwani, Pearson Education, 2013

3 Head First Android Development: A Brain-Friendly Guide, Dawn Griffiths and David Griffiths, O'Reilly, 2nd Edition,2017

4 Android System Programming, Roger Ye, PACKT publishers,2017

5 Programming Android,ByZigurdMednieks,LairdDornin,G.BlakeMeike& Masumi Nakamura,O'Reilly,2011

Mode of Evaluation: Model Lab Examinations, External Lab End Examination

Dept. of Computer Science & Engineering (IoT)

Skill Oriented Course – II
B. Tech. II Year II Semester

20ENG601 CORPORATE COMMUNICATION

L	T	P	C
1	0	2	2

Pre-requisite: **18ENG201**

Course Description:
English is practical and it is a must for any institution to provide students with opportunities to indulge in actively applying their language skills. Thus the Communication Skills Lab facilitates students with adequate opportunities to put their communication skills in use. It also accommodates peer learning by engaging students in various interactive sessions. This lab will be accompanied by a practical lab component.

Course Objectives:

This course enables the students to –

1. Focus on their interactive skills
2. Develop their communicative competency
3. Fortify their employability skills
4. Empower their confidence and overcome their shyness
5. Become effective in their overall performance in the industry

UNIT I LISTENING SKILLS **8 hours**

Listening/watching interviews, conversations, documentaries, etc.; Listening to lectures, discussions from TV/Radio/Podcast.

UNIT II SPEAKING **10 hours**

Articulation of sounds; Intonation.; Conversational skills (Formal and Informal); Group Discussion; Making effective Oral presentations**:** Role play.

UNIT III READING SKILLS **8 hours**

Reading for main ideas; Applying background knowledge to predict content; Skimming; Scanning; Making inferences; Reading different genres of texts ranging from newspapers to creative writing; Reading Comprehension.

UNIT IV WRITING SKILLS **9 hours**

Writing an introduction; Essay structure; Descriptive paragraphs; Writing a conclusion.
Writing job applications and resume; Emails; Letters; Memorandum; Reports; Writing abstracts and summaries; Interpreting visual texts.

UNIT V INTERVIEW SKILLS **10 hours**

Different types of interviews: Answering questions and offering information; Mock interviews; Body Language.

Course Outcomes:

At the end of the course, learners will be able to—

1. Read articles from magazines and newspapers
2. Participate effectively in informal conversations
3. Introduce themselves and their friends and express opinions in English
4. Comprehend conversations and short talks delivered in English
5. Write short essays of a general kind, draft Reports and personal letters and emails in English.

Text Books:

1. Sanjay Kumar and Pushp Lata; Communication Skills; Oxford University Press, 2012.
2. Sabina Pillai and Agna Fernandez; Soft Skills and Employability Skills; Cambridge University Press, 2018.
3. S.P. Dhanavel; English and Communication Skills for Students of Science and Engineering; Orient Blackswan, 2009.
4. M. Ashraf Rizvi; Effective Technical Communication; Tata Mc Graw Hill Co. ltd, 2005.

Reference:

1. Dr. M.Adithan; Study Skills for Professional Students in Higher Education; S.Chand & Co. Pvt., 2014.
2. Guy Brook Hart & Vanessa Jakeman; Complete IELTS: Cambridge University Press, 2014.
3. Vanessa Jakeman & Clare Mcdowell; Action Plan for IELTS: Cambridge University Press, 2006.
4. Guy Brook Hart; Instant IELTS; Cambridge University Press, 2004.
5. S.P.Bakshi & Richa Sharma; Descriptive General English; Arihant Publications, 2012.
6. Charles Browne, Brent Culligan 7 Joseph Phillips; In Focus (level 2); Cambridge University Press.
7. Steven Gershon; Present Yourself 2 (second edition); Cambridge University Press.
8. Leo Jones; Let's Talk 3 (second edition); Cambridge University Press.
9. Nutall J. C.; Reading Comprehension; Orient Blackswan.
10. www.cambridgeenglish.org/in/
11. https://learnenglish.britishcouncil.org/en/english-grammar
12. https://www.rong-chang.com/

Mode of Evaluation: Continuous Internal Evaluation, Practical Examination.

Skill Oriented Course – III

20CSO603 AI TOOLS, TECHNIQUES AND APPLICATIONS

L	T	P	C
1	0	2	2

Pre-requisite

Course Description:

Performing data labeling, building custom models, object recognition, speech recognition, building chatbot, configuring neural network, building virtual assistant, and building convolutional neural network.

Course Objectives:

1. Perform data labelling
2. Develop custom models for object recognition
3. Build chatbot.
4. Configure neural network.
5. Smart Applications

List of Programs:

UNIT I: MACHINE LEARNING **6 Hours**

Supervised Learning - Linear Regression, Logistic Regression, Unsupervised Learning – K-means clustering, Anomaly Detection.

a) Implement simple linear regression to predict profits for a food truck based on the population of the city that the truck would be placed in.
b) Build a classification model that estimates the probability of admission based on the exam scores using logistic regression.
c) Implement the unsupervised learning algorithm using K-means clustering
d) Implement an anomaly detection algorithm using a Gaussian model and apply it to detect failing servers on a network.

UNIT II: NLP AND BOT TECHNOLOGIES **6 Hours**

Speech Recognition, Text-to-Speech, Chatbots: Chatbot definition, Build a Chatbot, How has chatbot transformed user experience, Designing elements, best practices for chatbot development, Virtual Assistants: What is a Virtual Assistant?

a) Liv.ai - App for Speech recognition and Synthesis through APIs
b) Building a Chatbot
d) Build a virtual assistant

UNIT III IMAGE PROCESSING &APPLICATIONS **6 Hours**

Feature detection and matching, Segmentation, Object detection, Face recognition, Recognition Databases and test sets

a) Perform Data Labelling for various images using object recognition

UNIT IV NEURAL NETWORKS **6 Hours**

Neural Networks, Deep Learning, Different types of Deep Neural Networks - CNN, RNN.

a) Implement un-regularized and regularized versions of the neural network cost function and compute gradients via the backpropagation algorithm.

b) Build a Convolutional Neural Network for Cat vs Dog Image Classification

UNIT V SMART APPLICATIONS **6 Hours**

Smart Agriculture, Smart Transportation &Autonomous Vehicles, Smart Homes, Smart cities

a) Mini project on Smart Application

Course Outcomes:

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

1. Understand the basic concepts and applications of Artificial Intelligence.
2. Design Chatbots based on the user requirements
3. Identify the features of digital images for analysis.
4. Implement the deep learning techniques using software tools.
5. Develop smart applications for various domains

Text Book(s)

1. Tom Markiewicz& Josh Zheng,Getting started with Artificial Intelligence,Published by O'Reilly Media,2017.

2. Programming collective Intelligence: Building Smart Web 2.0 Applications-Toby Segaran

Reference Books

1. AurélienGéron,Hands on Machine Learning with Scikit-Learn and TensorFlow [Concepts, Tools, and Techniques to Build Intelligent Systems], Published by O'Reilly Media,2017

2. Machine Learning with Python, Abhishek Vijayvargia, BPB publications

Mode of Evaluation: Continuous Internal Evaluation and End Semester Examination

Skill Oriented Course – III

20CSO604 SOFTWARE ENGINEERING

L	T	P	C
1	0	2	2

Pre-requisite NIL

Course Description:

This course will give an overview of UML and how to use their diagrams and views to support requirements, architectural diagram and systems design.

Course Objectives:

1. Understand the basic concepts of object-oriented techniques
2. Build the Model of the software system using UML diagrams
3. Elucidate design patterns as templates for good design
4. Learn the object-oriented methodology in software design
5. Explore testing techniques for object-oriented software.

UNIT- I BASIC OF OOAD 6 Hours

Basic concepts: objects, classes, abstract classes, data types, ADT, encapsulation and information hiding, inheritance, association, aggregation, composition, polymorphism, dynamic binding, object-oriented principles.

a) Recognize basic issues of any problem and write problem statement.
b) Identify class relations from problem statements.
c) Construct basic principles of object-orientation.

UNIT- II MODELLING USING UML-I 6 Hours

UML Diagrams: Use case diagrams, class diagrams, various relationships among classes: generalization, association, aggregation, composition, inheritance, dependency etc., object diagram, UML 2 diagrams.

a) Describe the basic syntax and semantics of UML.
b) Develop modeling of the user's view using use case diagrams.

UNIT-III MODELLING USING UML- II 6 Hours

UML packages, activity diagram, state machine diagram, sequence diagram, communication diagram, interaction overview diagram, component diagram, deployment diagram.

a) Design class diagram and Activity diagram
b) Summarize behavioral modeling of any problem using sequence diagram collaboration diagram, and state chart diagram
c) Summarize behavioral modeling of any problem using collaboration diagram, and state chart diagram

UNIT IV: DESIGNING USING UML **6 Hours**

Overview of OOAD methodology, Use case model development, Domain modelling, Identification of entity objects, Brooch's object identification method, Interaction modelling, CRC cards, Applications of the analysis and design process, object-oriented design principles. OOD goodness criteria, CK Metrics, LK Metrics, MOOD Metrics, Code Refactoring.

a) Interpret domain modeling.
b) Develop sequence diagram for any given use case.
c) Design class diagram for a given problem.

UNIT-V TESTING OBJECT ORIENTED SOFTWARE **6 Hours**

Features in testing object-oriented software, Importance of grey-box testing of object-oriented software, Coverage analysis, State-based testing, Class testing, Fault-Based Testing, Scenario-Based Test Design, Integration Testing: Thread-based integration Strategies, Use-based integration Strategies, Cluster Testing, Validation Testing, System Testing, Testing tools.

a) Design unit test cases for a project
b) Design integration test cases for a project

Course Outcomes:

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

1. Analyze the problem from object oriented perspective.
2. Model complex systems using UML Diagrams.
3. Choose the suitable design patterns in software design.
4. Adapt Object-Oriented Design Principles.
5. Identify the challenges in testing object-oriented software.

Text Book(s)

1. Rajib Mall, "Fundamentals of Software Engineering", 5th Edition, PHI, 2018
2. Applying UML and patterns: An introduction to Object-Oriented Analysis and Design and Iterative Development by Craig Larman, Prentice Hall; 3rd Edition (October 30, 2004). ISBN-10: 0131489062

Reference Books

1. Rumbaugh and Blaha, Object-oriented Modeling and design with UML, Pearson, 2007
2. Bernd Bruegge and, Allen H. Dutoit, Object-Oriented Software Engineering Using UML,Patterns, and Java, Pearson, 2009

Mode of Evaluation: Continuous Internal Evaluation and End Semester Examination.

Dept. of Computer Science & Engineering (IoT)

Skill Oriented Course – IV

20CSO605 MULTIMEDIA COMPUTING

L	T	P	C
1	0	2	2

Pre-requisite: **Nil**

Course Description:
This course provides interactive, computer-based applications that allow students to communicate ideas and information with digital and print elements. It helps to develop and manage online graphics and content. It provides an interaction between users and digital information.

Course Objectives:

1. This course aims to develop student's competency in producing dynamic and creative graphic solutions for multimedia productions.
2. It introduces students with the advanced scripting skills necessary for implementing highly interactive, rich internet applications using multimedia technologies and authoring tools.
3. Students will develop aesthetic value and competencies in multimedia authoring.
4. Artistic visual style and layout design are stressed, as well as the editing and integration of graphic video, audio, images and animation, files.
5. The course allows students to master industry-wide software and technologies to create highly interactive, rich internet applications.

UNIT I INTRODUCTION TO EDITING AND MULTIMEDIA TECHNOLOGIES — 6 hours

Video editing is used to structure and present all video information, including films and television shows, video advertisements and video essays. Non-linear editing systems (NLE) allow video to be edited on computers with specialized software. Offline editing is the process by which raw footage is copied from an original source, without affecting the original film stock or video tape. Online editing is the process of reassembling the edit to full resolution video after an offline edit has been performed.

(a) Video Editing
(b) Audio Editing
(c) Image Editing

UNIT II PRINCIPLES OF ANIMATION — 6 hours

The term 2D means 2 dimensional which means that an image for the animation can be moved in two-dimensional space that is X-axis and Y-axis. 3D animation is an animation that is created in three-dimensional space which makes the characters and objects appear realistic and lively. Thus, a 3D animation has height, width as well as depth.

(a) 2D Animation
(b) 3D Animation

UNIT III MULTIMEDIA TECHNOLOGIES 6 hours

Multimedia combines different media for text, sound, and images into one presentation to create a more enriched and entertaining message. Multimedia technologies include the machines and systems used to create and transmit these messages. You experience multimedia when you go to the movies, watch television, play video games, or explore Web sites on the Internet.

(a) Write a Program to create an animated e-card using adobe flash
(b) Write a Program to create an animation to indicate a ball bouncing on steps
(c) Write a Program to simulate a ball hitting another ball

UNIT IV MULTIMEDIA TECHNOLOGIES USING FLASH 6 hours

For computer-drawn animation, the beginning and ending images in a sequence are drawn first. The artist then saves the images to the animation program's memory. The computer fills in the images in between the beginning and the ending images. Feature-length animated films contain hundreds of thousands of separate digital images. Without the aid of computers, these films would take years to draw.

(a) Write a Program to change a circle into a square using flash
(b) Write a Program to perform motion tweening operation using flash

UNIT V VIDEO MOTION ANALYSIS 6 hours

In video and computer games, the graphics on the screen are always changing. Game software has many animation sequences and sounds stored in its memory. Each move you make with the controller tells the computer which sequence to run. As you play, you create a story.

(a) Write a Program to change and object shape using a shape tweening concept
(b) Write a Program to create a 24 spokes on a wheel using flash

Course Outcomes:

At the end of the course, learners will be able to—

1. Describe different realizations of multimedia tools and the way in which they are used.
2. Compare various data compression schemes.
3. Analyse user interface for a given application
4. Ability to apply different multimedia development tools to produce web based and standalone user interfaces
5. Demonstrate 2D and 3D animations using animation software.

Text Books:

1. Fundamentals of Multimedia by Ze-Nian Li and Mark S. Drew PHI Learning, 2004.

2. AJAX, Rich Internet Applications, and Web Development for Programmers, Paul J Deitel and Harvey M Deitel, Deitel Developer Series, Pearson Education, 2008. (UNITS 4,5)

Reference:

1. Professional Adobe Flex 3, Joseph Balderson, Peter Ent, et al, Wrox Publications,Wiley India, 2009

2. Multimedia Communications: Applications, Networks, Protocols and Standards, FredHalsall, Pearson Education, 2001, RP 2005

Mode of Evaluation: Continuous Internal Evaluation, Practical Examination.

Dept. of Computer Science & Engineering (IoT)

Skill Oriented Course - IV

20CSO606 FULL STACK DEVELOPMENT

L	T	P	C
1	0	2	2

Pre-requisite:

Course Description:

Full Stack Web Development course will make students to become master in front-end technology. It provides basic information and experiments to grow to be a Full-Stack web developer. With fast growing technologies, the students can update their knowledge on technologies. This will help the students to learn the complete set of process like designing, development and deployment.

Course Objectives:

1. To build web applications using HTML, Javascript, CSS and PHP with client side validations.
2. To create and integrating Plug-ins with JQuery (Events, Animation).
3. To build XML documents with DTD, Schemas and style sheets.
4. To develop a web application with database interaction using Node JavaScript and Angular JavaScript
5. To implement MongoDBModels.

LIST OF PROGRAMS:

UNIT – I: HTML & CSS **6 Hours**

History of HTML/XHTML/HTML5, HTML5 New Features, HTML5 vs HTML4 vs XHTML, Structural, Content, Application-focused tags, Deprecated elements. History of CSS, The Power of CSS, Selectors and Pseudo Classes, Fonts and Text Effects, Colors.

a. Develop static pages (using only HTML) of an online ticket reservation.
b. Design a website using style sheets so that the pages have uniform style.

UNIT – II: INTRODUCTION TO JAVASCRIPT **6 Hours**

Introduction to JavaScript, Comments, Variables, Exploring JavaScript Data Types, Popup Boxes, Objects, Functions, Conditions, Loops, JavaScript Break and Continue, Error handling, Form Validation, RegExp Object, String Object, Date Object

a. Write a JavaScript to design a simple calculator to perform the following operations: sum, product, difference and quotient.
b. Design a form and validate all the controls placed on the form using Java Script.
c. Write a JavaScript code that displays text “TEXT-GROWING” with increasing font size in the interval of 100ms in RED COLOR, when the font size reaches 50pt it displays “TEXTSHRINKING” in BLUE color. Then the font size decreases to 5pt.

UNIT – III: PHP **6 Hours**

Overview of PHP Data types and Concepts: Variables and data types, Operators, Expressions and Statements. Advanced Concepts: Using Sessions, authenticating users. PHP and Database

Access: Basic Database Concepts, connecting to a MYSQL database, Retrieving and Displaying results, Modifying, Updating and Deleting data.

a. 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.
b. Design Webpage for Data collection, store, retrieve and manipulate data using SQL database using PHP

UNIT – IV: jQuery, NodeJS and Angular JS **6 Hours**

Introduction to jQuery, Installation, Selectors, Events, Effects, Callbacks, jQuery and HTML, jQuery. Introduction to Node JS, Advantage of Node JS, File System: Using file operation (open, read, write and delete). Introduction to AngularJS: What is Angular JS? Why Angular JS? Features of Angular JS. Working with Angular JS forms.

(a) Working on Blink text using jQuery.
(b) Using jQuery right click to toggle background color.
(c) Develop a Form and validate using Angular JS
(d) Working on file write, read and delete using Node.js

UNIT – V: XML & MongoDB **6 Hours**

Introduction to XML, Creating ML Documents, Creating XML DTDs, XMLSchemas, XSL. Introduction to MongoDB – Data Modelling, Data Types.

(a) Design an XML document to store information about a students. The information must include Rollno, Name, and Name of the College, Branch, Year of Joining, and email id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.
(b) Implement MongoDB data models.

Course Outcomes:

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

1. Design pages with HTML and CSS attributes.
2. Design and develop web applications with the support of client side validations.
3. Use well-formed XML documents and develop PHP scripts with may support of object oriented features.
4. Manage the session in web browser through Sessions and able to communicate with other web pages through form GET and POST methods.
5. Design and develop web applications with the database interactions (thorough MongoDB) and apply Node JavaScript and Angular JavaScript for faster performance.

Text Book(s)

1. PHP 5 Recipes A problem Solution Approach Lee Babin, Nathan A Good, Frank M.Kromann andJon Stephens.
2. HTML & CSS:The Complete Reference ,Thomas.A Powel “Fifth Edition”Kindle Edition,2017.
3. Professional Angular JS, Valeri Karpov and Diego Netto, John Willey Edition.
4. Beginning Node.JS by Basarat Syed, 2014.

5. MongoDB Basics 1st ed. Edition by Peter Membrey (Author), David Hows (Author), Eelco Plugge (Author)

Reference Books

1. Web Coding Bible, An Accelerated Course, Chong Lip Phang, 2015
2. Java Script for ProgrammersPaul J. Deitel, Deitel & Associates, Inc.Harvey M. Deitel, Deitel& Associates, Inc.

Mode of Evaluation: Continuous Internal Evaluation and End Semester Examination

HONORS

Dept. of Computer Science & Engineering (IoT)

Honors

20HDCSO101 GO PROGRAMMING

L	T	P	C
3	0	0	3

Pre-requisite NIL

Course Description:
This course aims to introduce Go Programming Language. Go Programming Language has the features of procedural programming and parallel programming. This course will help the students to write programs using the GO language interfaces, concurrent routines and packages.

Course Objectives:
1. To understand the data types and constructs of GO Language.
2. To write GO Programs using basic programming constructs
3. To write GO programs using functions and arrays
4. To write GO programs using structures and interfaces
5. To write GO programs using concurrent routines
6. To do packaging and file handling in Go

UNIT I INTRODUCTION AND CONSTRUCTS 9 hours

Go Runtime and Compilations, Keywords and Identifiers, Constants and Variables, Operators and Expressions , Local Assignments, Booleans, Numerics, Characters, Pointers and Addresses, Strings, if-else and switch, for Statements, Counter-controlled Iterations, Condition-controlled Iterations, Range Loops, Using break and continue

UNIT II FUNCTIONS AND ARRAYS 9 hours

Parameters and Return Values, Call by Value and Reference, Named Return Variables, Blank Identifiers, Variable Argument Parameters, Using defer statements, Recursive Functions, Functions as Parameters, Closures

Array Literals, Multidimensional Arrays, Array Parameters, Slices and Slice Parameters, Multidimensional Slices, Reslicing, Maps and Map Parameters, Map Slices

UNIT III STRUCTURES AND INTERFACE 9 hours

Structures and Structure Parameters, Structure Tags and Fields, Embedded Structures Recursive Structures, Method Declarations, Functions vs. Methods, Pointer and Value Receivers, Method Values and Expressions, Interface Types and Values, Type Assertions and Type Switches, Method Sets with Interfaces, Embedded Interfaces, Empty Interfaces, Working with Interfaces

UNIT IV CONCURRENCY AND PARALLELISM 9 hours

Concurrency vs. Parallelism, Goroutine Functions and Lambdas, Wait Groups, Channels, Sending and Receiving, Unbuffered and Buffered Channels, Directional Channels, Multiplexing with select, Timers and Tickers

UNIT V 9 hours

Packages and Workspaces, Exporting Package Names, Import Paths and Named Imports, Package Initializations, Blank Imports, Unit Testing with Test Functions, Table Tests and Random Tests, Benchmarking

Files and Directories, Reading Directories , Reading Files, Writing Files, Copying Files, Error Strategies, Panic and Recover, Package Error Handling , Regular Expressions

Course Outcomes:

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

1. apply basic programming constructs of GO Programs
2. apply functions and arrays of GO Programs
3. apply structures and interfaces using GO programs
4. demonstrate concurrent routines using GO programs
5. use packaging and file handling in Go

Text Book(s)

1. Caleb Doxsey, Introducing Go: Build Reliable, Scalable Programs 1st Edition Released January 2016,Publisher(s): O'Reilly Media, Inc., ISBN: 9781491941959
2. Jay McGavren, Head First Go, April 2019, Publisher(s): O'Reilly Media, Inc., ISBN: 9781491969557

Reference Books

1. Alan A. A. Donovan · Brian W. Kernighan, The Go Programming Language, Oct 26, 2015 Addison-Wesley; 380pp; ISBN: 978-0134190440
2. Jon Bodner, Learning Go, March 2021, Publisher(s): O'Reilly Media, Inc. ISBN: 9781492077213

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Dept. of Computer Science & Engineering (IoT)

Honors

20HDCSO102 ADVANCED INFORMATION SYSTEMS SECURITY

Course Prerequisite: NIL

L	T	P	C
3	0	0	3

Course Description:

This course is designed to provide the foundation for understanding the key issues associated with protecting information assets, determining the levels of protection and response to security incidents, and designing a consistent, reasonable information security system with appropriate intrusion detection

Course Objectives:

1. Understand the concepts of information systems security as applied to an IT infrastructure.
2. Understand to describe how threats, and vulnerabilities impact an IT infrastructure.
3. Understand the role of access controls in implementing a security policy.
4. Understand the role of operations & administration in implementation of security policy.

UNIT I: INTRODUCTION, NEED FOR SECURITY 9 hours

Introduction to Information Security - The History of Information Security- Critical Characteristics of Information - NSTISSC Security Model - Components of an Information System - Securing Components - Balancing Information Security and Access - The Systems Development Life Cycle - The Security Systems Development Life Cycle. The Need for Security: Introduction - Business Needs First -Threats -Attacks.

UNIT II:RISK MANAGEMENT AND INFORMATION SECURITY 9 hours

Introduction - An Overview of Risk Management - Risk Identification -Risk Assessment - Risk Control Strategies - Selecting a Risk Control Strategy - Risk Management Discussion Points - Recommended Practices in Controlling Risk.

UNIT III: POLICIES, STANDARDS, PRACTICES AND BUSINESS CONTINUITY 9 hours

Introduction - Information Security Policy, Standards and Practices -The Information Security Blueprint: ISO 17799/BS 7799, ISO 27001and its controls, NIST Security Models, Design of Security Architecture - Security Education, Training and Awareness Program - Continuity Strategies.

UNIT IV: SECURITY TECHNOLOGY 9 hours

Introduction - Intrusion Detection and Prevention Systems: IDPS Terminology, Use of IDPS, Strengths and Limitations of IDPS - Honey Pots, Honey Nets, and Padded Cell Systems - Scanning and Analysis Tools, Access Control Devices.

UNIT V: BIOMETRIC CONTROLS **9 hours**

Biometrics - Nature of Biometrics Identification/Authentication Techniques - Biometric Techniques - Matching and Enrollment Process in Biometrics - Benefits Over Traditional Authentication Methods. Attacks on Wireless Networks: Other Security Risks in Wireless Networks, Management and Mitigations for Wireless Networks Attacks.

COURSE OUTCOMES

1. Identify and analyze the security threats and attacks and apply device suitable security policies and standards.
2. Assess the risks and apply suitable risk control strategies.
3. Employ appropriate intrusion detection and prevention systems to ensure information security.
4. Discuss various national and international laws of information security and its framework

TEXT BOOKS

1. Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Course Technology, New Delhi, Fourth Edition, 2012 Reprint.
2. Nina Godbole, "Information Systems Security-Security Management, Metrics, Frameworks and Best Practices", Wiley India Pvt. Ltd., New Delhi, First Edition, 2009.(Biometric Controls, Security of Wireless Networks, Laws and Legal Framework)

REFERENCE BOOKS

1. Thomas R.Peltier, "Information Security Fundamentals", Auerbach Publications, Second Edition, 2013.
2. Micki Krause and Harold F.Tipton, "Information Security Management Handbook", Auerbach Publications, Sixth Edition,2008.
3. Mark Merkow and Jim Breithaupt," Information Security - Principles & Practices", Second Edition, Pearson Education, 2014.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Dept. of Computer Science & Engineering (IoT)

Honors

20HDCSO103 DATA COMMUNICATION

L	T	P	C
3	0	0	3

Pre-requisite NIL

Course Description:

To develop an understanding of the various aspects of data communications and computer networking systems. Topics include: data transmission, multiplexing, switching, error detection and few use cases.

Course Objectives:

1. To understand the fundamental concepts of encoding techniques
2. To familiarize with various multiplexing techniques
3. To understand the importance of error correcting codes in data transmission

UNIT I WAVEFORM ENCODING 9 hours

Introduction to Waveform Encoding- Pulse Code Modulation: Sampling, Quantization, Transmission, Reception, Error, SNR, Differential Pulse Code Modulation, Delta Modulation, Adaptive Delta Modulation, Sigma Delta Modulation, Linear Predictive Coder (LPC)

UNIT II ANALOG AND DIGITAL TRANSMISSION 9 hours

Physical Layer- Digital and Analog Signals, Periodic Analog Signals, Signal Transmission, Limitations of Data Rate, Digital Data Transmission, Performance Measures, Line Coding, Digital Modulation, Media and Digital Transmission System

UNIT III MULTIPLEXING 9 hours

Multiplexing- Multiplexing Techniques: FDM, TDM, STDM, Transmission Media: Classification and Selection of Media, Switching Networks: Packet, Circuit, Massage, Telephone Networks: Packet and Circuit Switching in telephone networks

UNIT IV ERROR DETECTION AND CORRECTION 9 hours

Error Detection and Correction- Types of Errors, Two dimensional parity check, Detection verses correction, Block Coding, Linear Block Coding, Cyclic Codes, Checksum, Standardized Polynomial Code, Error Correction Methods, Forward Error Correction

UNIT V APPLICATIONS 9 hours

Case Study- Wireless Data Transfer, Remote Weather Monitoring System, Energy Management in Wireless System, Emission Monitoring System, Railway Information and Surveillance System, Central Distribution Hub

Course Outcomes:

On completion of the course students will be able to

1. explain waveform encoding
2. describe the analog and digital transmission
3. discuss the multiplexing techniques
4. implement error correction and detection codes for correct transmission of data
5. apply data communication concepts in practical areas

Text Book(s)

1. Behrouz A. Forouzan, Sophia Chung Fegan, "Data Communications and Networking", 5th edition, Science Engineering & Math Publications, 2012
2. William Stallings, "Data and Computer Communications", 8th edition, Pearson Education India, 2007

Reference Books

1. Behrouz A. Forouzan, Data Communications and Networking, 5th Edition Paperback – 1 July 2017, McGraw Hill
2. Simon Haykin, Data Communications, 4th Edition, 2001, John Wiley & Sons

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Honors

20HDCSO104 MINING MASSIVE DATA SETS

L	T	P	C
3	0	0	3

Pre-requisite 20CSE112

Course Description:

This course aims to provide comprehensive knowledge on developing and applying machine learning algorithms for massive datasets. The emphasis is on techniques that are efficient and scale well.

Course Objectives:

1. To appreciate the need of map reduce functions
2. To understand the methods used for finding similar items
3. To understand the mining techniques used in data streams
4. To extend the use of machine learning methods to massive data set
5. To use the deep learning methods

UNIT I MAP REDUCE **9 hours**

Distributed File Systems, MapReduce,Algorithms Using MapReduce, Frequent Itemsets Mining - Handling Larger Datasets in Main Memory

UNIT II FINDING SIMILAR ITEMS **9 hours**

Applications of Near-Neighbor Search, Shingling of Documents, Similarity-Preserving Summaries of Sets, Locality-Sensitive Hashing for Documents, Applications of Locality-Sensitive Hashing

UNIT III MINING DATA STREAMS **9 hours**

The Stream Data Model, Sampling Data in a Stream, Filtering Streams, Counting Distinct Elements in a Stream, Estimating Moments, Counting Ones in a Window, Decaying Windows

UNIT IV LARGE-SCALE MACHINE LEARNING **9 hours**

The Machine-Learning Model, Perceptron, Parallel Implementation of Perceptrons,The Mechanics of an SVM, Parallel Implementation of SVM, The Framework for Nearest-Neighbor Calculations, Dealing with High-Dimensional Euclidean Data, Dealing with Non-Euclidean Distances, Using a Decision Tree, Parallel Design of Decision Trees

UNIT V NEURAL NETS AND DEEP LEARNING **9 hours**

Introduction to Neural Nets, Dense Feedforward Networks - Activation Functions, Convolutional Neural Networks, Recurrent Neural Networks, Regularization

Course Outcomes:

Upon completion of the course the students will be able to

1. Describe the use of map reduce functions
2. Apply the methods used for finding similar items
3. Apply the mining techniques used in data streams
4. Explain how massive data set can be modeled using machine learning algorithms
5. Elaborate the working of deep learning methods

Text Book(s)

1. Jure Leskovec, Anand Rajaraman, Jeffrey Ullman, "Mining of Massive Datasets", Standford Press,2011.

Reference Books

1. Nick Pentreath, "Machine Learning with Spark", Packt Publishing
2. Ron Bekkerman, Mikhail Bilenko, John Langford "Scaling Up Machine Learning: Parallel and Distributed Approaches", Cambridge University Press, 2012.

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Honors

20HDCSO105 GP - GPU COMPUTING

L	T	P	C
3	0	0	3

Pre-requisite 20CSE103, 20CSE107

Course Description:

This course teaches the basics of parallel processing model, GPU programming using CUDA and applications of parallel processing.

Course Objectives:

1. To learn the architecture of GPU and basics of parallelism
2. To learn about the evolution of GPU computing
3. To learn GPU programming using CUDA
4. To study the methods of performance improvement in GPU

UNIT I INTRODUCTION 9 hours

Graphics Processing Units (GPU) as Parallel Computers - Architecture of a modern GPU - Why more speed or parallelism? - Parallel Programming Languages and Models - Overarching Goals - History of GPU computing - Evolution of Graphics Pipelines - GPU Computing.

UNIT II PARALLEL PROGRAMMING 9 hours

Goals of Parallel Programming - Problem Decomposition - Algorithm Selection - Computational Thinking - Introduction to OPENCL: Background - Data Parallelism Model - Device Architecture - Kernel Functions - Device Management & Kernel Launch.

UNIT III INTRODUCTION TO CUDA 9 hours

Data Parallelism - CUDA Program Structure - AMatrix - Matrix Multiplication Example - Device Memories and Data Transfer - Kernel Functions and Threading - Function declarations - Kernel launch - Predefined variables - Runtime API - CUDA Threads: CUDA Thread Organization - Using blockIdx and threadIdx - Synchronization and Transparent Scalability - Thread Assignment - Thread Scheduling and Latency Tolerance - CUDA Memories: Importance of Memory Access Efficiency - CUDA Device Memory Types - A Strategy for Reducing Global Memory Traffic - Memory as a Limiting Factor to Parallelism.

UNIT IV PERFORMANCE CONSIDERATIONS 9 hours

Thread execution - Global memory bandwidth - Dynamic partitioning of SM resources - Data prefetching - Instruction mix - Thread Granularity - Floating Point considerations: FP format -

Representable numbers - Special bit patterns and precision - Arithmetic accuracy and rounding - Algorithm considerations - Debugging and Profiling: Debugging CUDA programs - Profiling CUDA programs - CUDA and MPI.

UNIT V CASE STUDIES 9 hours

Advanced MRI Reconstruction, Molecular Visualization and Analysis, Image Processing, Graph algorithms, Simulations, Deep Learning

Course Outcomes:

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

1. Explain the basics of GPUs and GPU architecture
2. Discuss the parallel programming concepts and OpenCL
3. Write programs for GPUs using CUDA
4. Explain the methods for performance improvisation
5. Apply parallel applications targeting GPUs

Text Book(s)

1. David Kirk, Wen-mei Hwu, “Programming Massively Parallel Processors: A Hands-on Approach”, Third Edition, Morgan Kaufmann, 2017.
2. Shane Cook, CUDA Programming: A Developer's Guide to Parallel Computing with GPUs, Morgan Kaufman; 2012 (ISBN: 978-0124159334)

Reference Books

1. Wilkinson, M.Allen, Parallel Programming Techniques and Applications using networked workstations and parallel computers, Prentice Hall, 1999
2. David Kirk and Wen-mei Hwu, Programming Massively Parallel Processors: A Hands-On Approach, 2nd Edition, Publisher: Morgan Kaufman, 2012, ISBN: 9780124159921

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.

Honors

20HDCSO106 CLOUD DESIGN - PERFORMANCE, SCALABILITY AND SECURITY

L	T	P	C
3	0	0	3

Pre-requisite None

Course Description:

Course Objectives:

1. To learn the basic elements of cloud computing system design.
2. To know the performance of cloud management.
3. To know the major cloud service providers and the web services offered by them.
4. To learn the common standards in cloud application development.
5. To compare the modern cloud security concepts as they are applied to cloud computing.

UNIT I INTRODUCTORY CONCEPTS AND OVERVIEW 9 hours

Cloud Design overview, private, public and hybrid cloud. Cloud types; IaaS, PaaS, SaaS. Benefits and challenges of cloud computing, public vs private clouds, role of virtualization in enabling the cloud; Business Agility: Benefits and challenges to Cloud architecture. Application availability, performance, security and disaster recovery; next generation Cloud Applications

UNIT II PERFORMANCE MANAGEMENT 9 hours

Management techniques, methodology and key performance metrics used to identifying CPU, memory, network, virtual machine and application performance bottlenecks in a virtualized environment. Configuration and change management goals and guidelines, tools and technologies in virtualized environments.

UNIT III MANAGEMENT OF CLOUD SERVICES 9 hours

Reliability, availability and security of services deployed from the cloud. Performance and scalability of services, tools and technologies used to manage cloud services deployment; Cloud Economics : Cloud Computing infrastructures available for implementing cloud based services. Economics of choosing a Cloud platform for an organization, based on application requirements, economic constraints and business needs (e.g Amazon, Microsoft and Google, Salesforce.com, Ubuntu and Redhat).

UNIT IV APPLICATION DEVELOPMENT 9 hours

Service creation environments to develop cloud based applications. Development environments for service development; Amazon, Azure, Google App. Technologies and the processes required when

deploying web services; Deploying a web service from inside and outside a cloud architecture, advantages and disadvantages.

UNIT V SECURITY CONCEPTS 9 hours

Confidentiality, privacy, integrity, authentication, non-repudiation, availability, access control, defence in depth, least privilege, how these concepts apply in the cloud, what these concepts mean and their importance in PaaS, IaaS and SaaS. e.g. User authentication in the cloud; Cryptographic Systems- Symmetric cryptography, stream ciphers, block ciphers, modes of operation, public-key cryptography, hashing, digital signatures, public-key infrastructures, key management, X.509 certificates, OpenSSL.

Course Outcomes:

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

1. Articulate the concepts, technologies and challenges of cloud computing designs.
2. Analyse the various cloud performance management delivered from the cloud.
3. Apply the cloud service features in cloud ntworks.
4. Design cloud services and applications.
5. Apply security features in cloud networks.

Text Book(s)

1. Cloud Computing implementation, management and security by John W. Rittinghouse, James F.Ransome, CRC Press, Taylor & Francis group, 2010.

2. Cloud Computing: A practical approach by Anthony T.velte, Toby J.velte Robert Elsenpeter, Tata Mc Graw Hill edition, 2010.

Reference Books

1. Cloud Application Architectures by George Reese, Oreilly publishers.

2. Cloud Computing and SOA convergence in your enterprise, by David S. Linthicum, Addison-Wesley.
3. Gautam Shroff, "Enterprise Cloud Computing Technology Architecture Applications*"*,

Mode of Evaluation: Assignments, Mid Term Tests, End Semester Examination.