Computer Engineering Department , Indus Institite of Engineering & Technology, Indus University

Program - B. Tech (Computer Science & Engineering)

SEMESTER - I

Sr. No.		Name of the subject	Credit	Teaching Scheme (per week)				Evaluation Scheme				Total	Category
								Theory		Practical			
								CIE	ESE	CIE	ESE	Marks	
				Th.	Tut.	Pr.	Tot (hr.)	Th.	Th.	Pr.	Pr.		
1	MA0111	Calculus	4	3	1	0	4	60	40	0	0	100	BS
2	CH0011	Engineering Chemistry	4	3	0	2	5	60	40	60	40	200	BS
3	EN0111	Technical Communication	2	1	0	2	3	60	40	60	40	200	HS
4		*Open Elective 1*	3	3	0	0	3	60	40	0	0	100	OE
5	ME0019	Engineering Graphics	3	1	0	4	5	60	40	60	40	200	ES
6	CV0004	Environmental Science	2	2	0	0	2	60	40	0	0	100	ES
7		*Open Elective 2*	3	3	0	0	3	60	40	0	0	100	OE
8		Indian Knowledge System	3	3	0	0	3	100	0	0	0	100	VA
		Total	24	19	1	8	28	520	280	180	120	1100	

SEMESTER - II

Sr. No.		Name of the subject	Credit	Teaching Scheme (per week)				Evaluation Scheme				Total	Segment
								Theory		Practical			
								CIE	ESE	CIE	ESE	Marks	
				Th.	Tut.	Pr.	Tot (hr.)	Th.	Th.	Pr.	Pr.		
1	MA0211	Differential Equations & Linear Algebra	4	3	1	0	4	60	40	0	0	100	BS
2	PH0011	Engineering Physics	4	3	0	2	5	60	40	60	40	200	BS
3	EN0211	Business Communication & Presentation Skills	2	1	0	2	3	60	40	60	40	200	HS
4		*Open Elective 3*	3	3	0	0	3	60	40	0	0	100	OE
5	ME0117	Workshop Practice	2	0	0	4	4	0	0	60	40	100	ES
		Indian Science Technology	1	1	0	0	0	100	0	0	0	100	VA
6	CE0216	Programming for Problem Solving	4	3	0	2	5	60	40	60	40	200	ES
		Total	20	14	1	10	24	400	200	240	160	1000	

SEMESTER - III

Sr. No.		Name of the subject	Credit	Teaching Scheme (per week)				Evaluation Scheme					Segment
				Th.	Tut.	Pr.	Total (hr.)	Theory		Practical		Total	
								CIE Th.	ESE Th.	CIE Pr.	ESE Pr.	Marks	
1	MA0311	Probability, Statistics & Numerical Methods	4	3	1	0	4	60	40	0	0	100	BS
2	CE0320	Computer Organization & Architecture	3	3	0	0	3	60	40	0	0	100	ES
3	EC0319	Digital Electronics	4	3	0	2	5	60	40	60	40	200	ES
4	CE0316	Object Oriented concepts with UML	4	3	0	2	5	60	40	60	40	200	Core
5	CE0317	Database Management System	4	3	0	2	5	60	40	60	40	200	Core
6	SS0301	Human Values and Professional Ethics	2	2	0	0	2	100	0	0	0	100	HS
7	CE0318	Internship Credit /Online courses/ MOOC	2	0	0	0	0	0	0	100	0	100	IC
		TOTAL	23	17	1	6	24	400	200	280	120	1000	

Sr. No.		Name of the subject	Credit	Teaching Scheme (per week)				Evaluation Scheme				Total Marks	Segment
								Theory		Practical			
								CIE	ESE	CIE	ESE		
				Th.	Tut.	Pr.	Tot. (hr.)	Th.	Th.	Pr.	Pr.		
SEMESTER - IV													
1	CE0425	ICT Tools and Technology	2	0	1	2	3	0	0	100	0	100	ES
2	CE0417	Data Structure & Algorithms	4	3	0	2	5	60	40	60	40	200	Core
3	CE0418	Operating System	4	3	0	2	5	60	40	60	40	200	Core
4	BB0311	Management for Engineers	2	2	0	0	2	60	40	0	0	100	HS
5	CE0421	Core Java Programming	4	3	0	2	5	60	40	60	40	200	Core
6		*Open Elective 4*	3	3	0	0	3	60	40	0	0	100	OE
7		*Open Elective 5*	3	3	0	0	3	60	40	0	0	100	OE
		TOTAL	22	17	1	8	26	360	240	280	120	1000	

SEMESTER - V

Sr. No.		Name of the subject	Credit	Teaching Scheme (per week)				Evaluation Scheme				Total	Segment
								Theory		Practical			
								CIE	ESE	CIE	ESE	Marks	
				Th.	Tut.	Pr.	Tot (hr.)	Th.	Th.	Pr.	Pr.		
1	CE0516	Design and Analysis of Algorithms	4	3	0	2	5	60	40	60	40	200	Core
2	CS0501	Advance Microprocessor	4	3	0	2	5	60	40	60	40	200	ES
3	CE0518	Computer Networks	4	3	0	2	5	60	40	60	40	200	Core
4		*Open Elective 6*	3	3	0	0	3	60	40	0	0	100	OE
5	CE0525	Programming for Scientific Computing (Python)	4	3	0	2	5	60	40	60	40	200	Core
6	CE0522	Web Technology	4	3	0	2	5	60	40	60	40	200	Core
7	CE0523	Internship Credit /Online courses/ MOOC	2	0	0	0	0	0	0	100	0	100	IC
		Total	25	18	0	10	28	360	240	400	200	1200	

Sr. No.		Name of the subject	Credit	Th.	Tut.	Pr.	Total (hr.)	CIE Th.	ESE Th.	CIE Pr.	ESE Pr.	Total Marks	Segment
		SEMESTER - VI											
1	CS0601	CS0601 - Software Engineering & Project Management	4	3	0	2	5	60	40	60	40	200	Core
2	CS0602	CS0602 - Data Preparation & Analysis	4	3	0	2	5	60	40	60	40	200	Core
3	CE0630	Data Science	4	3	0	2	5	60	40	60	40	200	PE
	CE0631	Information Retrieval											
	CE0632	Web Data Management											
5	CE0618	Advanced Java Technology	4	3	0	2	5	60	40	60	40	200	PE
	CE0619	Advance .Net Framework											
	CE0628	Mobile Application Development (Android & iOS)											
6	CE0633	Distributed Systems	4	3	0	2	5	60	40	60	40	200	PE
	CE0634	Cryptography & Network Security											
	CE0629	Data Compression											
		Open Elective 7	3	3	0	0	3	60	40	0	0	100	OE
		Research Guided Seminar	2	0	2	0	2	100	0	0	0	0	HS
7	CE0622	Internet of Things	4	3	0	2	5	60	40	60	40	200	ES
		TOTAL	29	21	2	12	35	520	280	360	240	1300	

Column headers (spanning):
- Teaching Scheme (per week): Th., Tut., Pr., Total (hr.)
- Evaluation Scheme — Theory: CIE Th., ESE Th.; Practical: CIE Pr., ESE Pr.; Total Marks

SEMESTER - VII

Sr. No.		Name of the subject	Credit	Teaching Scheme (per week)				Evaluation Scheme				Total	Segment
								Theory		Practical			
								CIE	ESE	CIE	ESE	Marks	
				Th.	Tut.	Pr.	Total (hr.)	Th.	Th.	Pr.	Pr.		
1	CS0701	Machine Learning	4	3	0	2	5	60	40	60	40	200	PE
	CE0718	Advance Computer Architecture											
	CE0721	Advance Operating System											
2	CS0702	Formal Language & Automata Theory	4	3	1	0	4	60	40	0	0	100	Core
3		*Open Elective 8*	3	3	0	2	5	60	40	60	40	200	OE
		Cyber Security											
		Block Chaining											
		Soft Computing											
		Embedded System											
4	CE0728	* Natural Language Processing (4+0+0)	4	3	0	2	5	60	40	60	40	200	PE
	CE0730	Human Computer Interface											
	CE0732	Computer Vision and Applications											
	CE0723	Cloud Computing											
5	CE0727	Software Group Project-I	2	0	1	2	3	0	0	100	0	0	PRJ
		Open Elective 9	3	3	0	0	3	60	40	0	0	100	OE
6	CE0726	Internship Credit /Online courses/ MOOC	2	0	0	0	0	0	0	100	0	100	IC
7	IT0501	Computer Graphics											Extra Credit PE
	IT0701	Artificial Intelligence											
	IT0602	Big Data Analytics											
	CS0602	Data Preparation & Analysis											
	CS0501	Advance Microprocessor											
	CS0701	Machine Learning											
	CE0716	Data Warehouse & Mining											
	CE0617	Theory of Computation											
	CE0717	Compiler Design											
	CE0517	Microprocessing and Interfacing											
		Total	22	15	2	8	25	300	200	380	120	900	

SEMESTER - VIII

Sr. No.		Name of the subject	Credit	Teaching Scheme (per week)				Evaluation Scheme				Total	Segment
								Theory		Practical		Total	
								CIE	ESE	CIE	ESE	Marks	
				Th.	Tut.	Pr.	Total (hr.)	Th.	Th.	Pr.	Pr.		
1	CE0816	Project	14	0	0	28	28	0	0	60	40	100	PRJ
		Total	14	0	0	28	28	0	0	60	40	100	

Computer Engineering Department , Indus Institute of Engineering & Technology, Indus University
Program - B. Tech (Computer Engineering/Computer Science & Engineering/Information Technology)

				Teaching Scheme				Evaluation Scheme					
				(per week)				Theory		Practical		Total	
Sr. No.		Name of the subject	Credit					CIE	ESE	CIE	ESE	Marks	Category
				Th.	Tut.	Pr.	Tot (hr.)	Th.	Th.	Pr.	Pr.		
1	MA0111	Calculus	4	3	1	0	4	60	40	0	0	100	BS
2	CH0011	Engineering Chemistry	4	3	0	2	5	60	40	60	40	200	BS
3	EN0111	Technical Communication	2	1	0	2	3	60	40	60	40	200	HS
4		*Open Elective 1*	3	3	0	0	3	60	40	0	0	100	OE
5	ME0019	Engineering Graphics	3	1	0	4	5	60	40	60	40	200	ES
6	CV0004	Environmental Science	2	2	0	0	2	60	40	0	0	100	ES
8		Indian Knowledge System	3	3	0	0	3	100	0	0	0	100	VA
7		*Open Elective 2*	3	3	0	0	3	60	40	0	0	100	OE
		Total	24	19	1	8	28	520	280	180	120	1100	

SEMESTER - I

Subject: Calculus								
Program: B. Tech. CE/CSE/IT				**Subject Code:MA0111**			**Semester: I**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	1	0	4	40	0	60	0	100

	CONTENT	
U 1	**Partial derivatives and its applications** Function of several variables: Limits, continuity, Partial Differentiation-variable treated as constant, total derivative, partial differentiation of composite functions, and differentiation of an Implicit Function. Applications of partial derivatives: Euler's Theorem, Jacobian, Maxima and Minima of Functions of two Variables- with and without constraints, Lagrange's Method of Undetermined Multipliers	**11 hours**
U 2	**Multiple Integral** Reduction formula, Curve tracing - Cartesian and polar, Double Integral, Change of order, Change of variables, Triple integral	**11 hours**
U 3	**Vector Differential Calculus** Vector Differentiation, Directional Derivative, Gradient of a Scalar Function and Conservative Field, Divergence and Curl, Related Properties of Gradient, Sums of Divergence and Curl Curvilinear coordinate system, Cartesian, Spherical and Cylindrical coordinate system	**12 hours**
U 4	**Vector Integral Calculus** Vector Integration: Integration of a Vector Function of a Scalar Argument Line Integrals: application to find work done, Potential, Conservative Field and Area Introduction to Surface Integrals, Volume Integrals, Green's Theorem in Plane, Stokes' Theorem, Gauss Divergence Theorem	**11 hours**

Text Book: B. V. Ramana, "Higher Engineering Mathematics", Tata McGraw Hill.

Reference Books:
1. Erwin Kreyszig, "Advanced Engineering Mathematics" (8th Edition), Wiley Eastern Ltd., New Delhi.
2. Dr. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, New Delhi
3. Murray Spiegel , "Advanced Mathematics for Engineering & Science: Schaum's Outline Series", Tata McGraw Hill Publication
4. Merel C Potter, J.L. Goldberg, "Advanced Engineering Mathematics" (3rd Edition), Oxford India Publication.

Subject: Engineering Chemistry								
Program: B. Tech CE/CSE/IT				Subject Code: CH0011			Semester : I	
Teaching Scheme				Examination Evaluation Scheme				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)-Theory	Continuous Internal Evaluation (CIE)-Practical	Total
3	0	2	4	40	40	60	60	200

Course Objectives:

1. To describe the various basic concepts of chemistry and green chemistry with direct application to the built environment.
2. To describe the basics of energy system, electrochemistry, surface chemistry and their practical applications.
3. To discuss the understanding of various smart materials, cement, ceramics materials and their applications in different engineering fields.
4. To apply consciousness about the quality of water for industrial process, problems and troubleshooting techniques
5. To apply knowledge about the corrosion for industrial process, problems and its prevention techniques

CONTENTS

UNIT-I

[12 hours]

General Chemistry

Introduction to Chemical Sciences, Basics includes: Periodicity, Types of reactions, various acid base concepts, Electrochemistry, Electrochemical Cell, Galvanic Cell, Electrolytic Cell, Types of electrodes, Single electrode potentials, Reference Electrodes, Standard Hydrogen Electrode (SHE), Standard Calomel Electrode (SCE), Glass Electrode, Quinhydrone Electrode, Nernst equation, Conductance, Cell constant and its determination, Conductometric titrations, Numerical

Green Chemistry

Introduction, Principles & Concepts of Green Chemistry, Importance of green synthesis, methods for green synthesis, application of green synthesis, Greenhouse concepts

UNIT-II

[12 hours]

Energy System

Introduction, classification of fuel, characteristics of good fuel, determination of calorific value of solid/liquid fuel using bomb calorimeter, numerical problems. Power alcohol, unleaded petrol and biodiesel, Introduction, classification - primary, secondary and reserve batteries. Construction, working and applications of Li-ion batteries , Overview of Oil and lubricants

Catalyst and Surface Chemistry

Catalysis: Types of catalysis, Positive & Negative catalysis, Homogeneous and Heterogeneous catalysis, Characteristics of Catalytic action, Poisoning of catalysis, Promoters, Auto Catalysis, Acid-Base Catalysis, Theories of Catalysis process, Catalysis of metal salts Criteria for choosing the catalyst for industrial process, Industrial Applications of Catalysts.

Adsorption: Introduction, Terminology, Factors affecting the adsorption of Gases by Solids, Types of adsorption, adsorption isotherm: Freundlich adsorption isotherm, Langmuir adsorption Isotherm, Determination of surface area by BET method, Application of adsorption.

UNIT-III

[11 hours]

Advance Engineering Materials and its Applications

Liquid Crystals: Introduction, classification and applications, Organic Electronic Materials: Introduction, types and applications, Chemical Sensors: Introduction, types and applications, Ionic Liquids: Introduction and applications, Chromic Materials: Introduction, types and applications, Synthesis and application of Nano materials.

Cement & Ceramic Materials

Cement: Introduction, Cement and its classification, Manufacture, chemical composition ,setting and hardening , I.S.I specification , physical properties of Portland cement, Lime and Plaster of Paris.

Ceramics and Refractories: Introduction, Refractories, Properties of Refractories, Some important high refractory materials, Glass, Porcelain.

UNIT-IV

[13 hours]

Water Chemistry:

Sources of water, Soft Water & Hard Water, Types of hardness, Units of hardness measurement, specification of drinking water, Impurities in water, Disadvantages of hard water, Determination of water hardness by EDTA method, Alkalinity of water and its significance, Significance and determination of COD and BOD. Boiler feed water, Scale and sludge formation in boilers and pipes etc , Boiler Corrosion, Water softening through Soda lime process, Zeolite Process & Ion-exchange Process, Characteristics of Potable water, Sources and quality of drinking water, Treatment of water for domestic use: Filtration, Coagulation, Sedimentation and Disinfection, Desalination through Electro Dialysis & Reverse Osmosis, Numerical problems.

Corrosion and its prevention

Definition and types of corrosion water line, pitting, stress, erosion and soil corrosion, Caustic embrittlement, Factors affecting on corrosion (Metallic and Environmental), Pourbaix diagram, Protective measures to control Corrosion, Sacrificial anode and Cathode process for corrosion control., Dry (chemical corrosion), Wet (Electrochemical corrosion) and its mechanisms; Types of electrochemical corrosion, (differential aeration, galvanic, concentration cell.

Text Books:

1. P.C. Jain, M. Jain, Engineering Chemistry 15th edition, Dhanpat Rai Publishing Company, New Delhi, 2005.ISBN8187433175
2. Shashi Chawla, Textbook of Engineering Chemistry, Dhanpat Rai Publishing Co.2004.ISBN9788126519880

Reference Books:

1.   Dara, S.S., Umare S.S.; A Text Book of Engineering Chemistry (Twelfthedition); S. Chand. Co. 2014, ISBN:8121903599.
2. P. Atkins, J.D. Paula, Physical Chemistry, Oxford University Press,2017, ISBN:9780198769866.
3. A. J. Mee, Physical Chemistry, 6th Ed. English Language Book Society and Heinemann Educational Books Ltd. London, 1962.ISBN: 0435665766
4. Douglas A. Skoog, Donald M. West, Fundamentals of AnalyticalChemistry, Cengage Learning, Ninth Edition, 2014.ISBN:9780495558347
5. Puri B. R., Sharma L. R., Pathania M.S; Principles of Physica Chemistry;Vishal Publishing Co. (46nd Edition), 2013.ISBN:9789382956013.
6. Arthur E. Morris, Gordon Geiger and H. Alan Fine, Handbook on Material & Energy Balance Calculations in Material Processing, Third Edition, 2011. ISBN:9781118065655

Web Resources:

1.   **General chemistry Electrochemistry**
(http://www.cdeep.iitb.ac.in/webpage_data/nptel/Core%20Science/

Engineering% 20Chemistry%201/Course_home_Lec22.html,
http://www.cdeep.iitb.ac.in/webpage_data/nptel/Core%20Science/Engineering%
20Che mistry%201/Course_home_Lec24.html)

2. **Green Chemistry** (https://www.epa.gov/greenchemistry)

3. **Energy System** (https://www.toppr.com/guides/chemistry/combustion-and-fuel/introduction- to-fuel-and-fuel-efficiency/,https://nptel.ac.in/courses/121106014/31)

4. **Catalyst and Surface Chemistry**
(http://www.cdeep.iitb.ac.in/webpage_data/nptel/Core%20Science/Engineering%2
0Chemistry%201/Course_home_Lec6.html)

5.**Advance Engineering Materials and its Applications**
(https://www.youtube.com/watch?v=dm0bUBy-Utk,
https://www.youtube.com/watch?v=qUEbxTkPIWI)

 6**. Cement & Ceramic Materials**
(https://www.youtube.com/watch?v=qk9P3e0l2lE)

7**. Water Treatment** (https://www.youtube.com/watch?v=O-MRC0dskHg,https://www.youtube.com/watch?v=SvCIfcovf9k)

8**. Corrosion**
(http://www.cdeep.iitb.ac.in/webpage_data/nptel/Core%20Science/Engineering%2
0Chemistry%201/Course_home_Lec25.html)

Subject: Technical Communication								
Program: B. Tech CE/CSE/IT				Subject Code: EN0111			Semester: I	
Teaching Scheme				Examination Evaluation Scheme				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)- Theory	Continuous Internal Evaluation (CIE)- Practical	Total
1	2	0	3	40	0	60	0	100

Course Objectives:

1. To help students develop comprehension and soft skills

2. To increase student's ability to improve and utilize the technical skills necessary for reading and writing.

3. To improve students' communication skills in both technical and professional contexts.

CONTENT

Unit 1: Listening:

- Diagnostic Test(Stratification)
- Icebreaking - Switch Introduction
- Icebreaking - Past, Present and Future
- Listening/ Cloze Test 1
- Listening/ Ted Talk
- Listening/ Josh Talk
- Listening/Celebrity Interviews
- Listening/ News Hour debates

Unit 2: Speaking

- Introduction and Polite Conversations
- Situational Dialogues
- Role Play
- Body Language

- Group Discussion
- JAM Sessions

Unit 3: Language Focus

- Teaching Remedial Grammar through Poem
- Vocabulary Building/Describing Words
- Movie Viewing and Discussion
- Book and Movie Adaptation
- Match Commentary and Review

Unit 4: Reading Skills

- Reading/Reading with Vocalic
- Read and Tweet
- Skimming/Scanning the Newspapers
- Reading/Play Enactment
- Reading/Short Stories
-

Reference Books:

1. English for Engineers and Technologists, Volumes 1 and 2, Department of Humanities and Social Sciences, Anna University, Chennai, Orient Longmans Publication, 2008.
2. Balasubramanyam, M and Anbalagan, G., Perform in English, Anuradha Publications, Kumbakonam, 2010.
3. Meenakshi Raman and Sangeetha Sharma, Technical Communication: Principles and Practice, Oxford University Press, New Delhi, 2004.
4. KiranmaiDutt, P. et al., A Course on Communication Skills, Edition Foundation Books, New Delhi, 2007.
5. Ashraf Rizvi, M., Effective Technical Communication, Tata McGraw Hill Publication, New Delhi, 2008.
6. Geoffrey Leech, Jan Swartvik, 'A Communicative Grammar of English', ELBS – Longman.
7. Norman and Lewis, 'English Made Easy', Oxford Publication.
8. E- Writing: 21st –Century Tools for Effective Communication, Dianna Booher, Macmillan India Ltd., 2007, ISBN – 1403-93202-6
9. R. K Bansal, spoken English for India (Orient Longman, Madras, 1972.

Web resources/ MOOCs:

1. **Grammar Clauses**:
https://www.khanacademy.org/humanities/grammar/syntax-sentences-and-clauses

2. **Parts of Speech Conjunctions & Prepositions:**
https://www.khanacademy.org/humanities/grammar/parts-of-speech-the-preposition-and-the-conjunction

3. **Nouns:** https://www.khanacademy.org/humanities/grammar/parts-of-speech-the-noun

4. **Verbs:** https://www.khanacademy.org/humanities/grammar/parts-of-speech-the-verb

5. **Pronouns:** https://www.khanacademy.org/humanities/grammar/parts-of-speech-the-pronoun

6. **Adjectives & Adverbs:**
https://www.khanacademy.org/humanities/grammar/parts-of-speech-the-modifier

7. **Syntax:** Conventions of Standard English:
https://www.khanacademy.org/humanities/grammar/syntax-conventions-of-standard-english

Subject: Engineering Graphics (ES)								
Program: B. Tech. CE/CSE/IT				**Subject Code: ME0019**			**Semester: I**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE) Theory**	**Continuous Internal Evaluation (CIE) Practical**	**Total Marks**
1	0	4	3	40	40	60	60	200

Course Objectives:

1. The course is aimed at developing basic graphic skills.

2. Develop skills in preparation of basic drawings.

3. Skills in reading and interpretation of engineering drawings

CONTENT

UNIT-I

[04]

Introduction to Engineering Graphics

Principles of Engineering Graphics and their Significance – Drawing Instruments and their Use – Conventions in Drawing – Lettering – BIS Conventions- Dimensioning systems – polygons-types of lines

Engineering Curves

Classification and application of Engineering Curves, Construction of different methods of Ellipse, parabola and Hyperbola, construction of Conics, Cycloid Curves – Cycloid, Hypocycloid, Epicycloids, Involutes and Spirals.

Projections of Points and Lines

Introduction to principal planes of projections, Projections of the points located in same quadrant and different quadrants, Projections of line with its inclination to one reference plane and with two reference planes. True length and inclination with the reference planes.

<div align="center">**UNIT-II**</div> [04]

Projections of Planes

Projections of planes (polygons, circle, and ellipse) with its inclination to one reference plane and with two reference planes, Concept of auxiliary plane method for projections of the plane.

Projections of Solids

Classification of solids. Projections of solids (Cylinder, Cone, Pyramid, Prism) along with frustum of cone and pyramid with their inclinations to one reference plane and with two reference planes.

<div align="center">**UNIT-III**</div>

[04]

Orthographic and Sectional Orthographic Projections

Fundamental of projection along with classification, Projections from the pictorial view of the object on the principal planes for view from front, top and sides using first angle projection method and third angle projection method, introduction of section of objects, full sectional view.

<div align="center">**UNIT-IV**</div> [04]

Isometric Projections

Isometric Scale, Conversion of orthographic views into isometric projection, isometric view or drawing.

Course Outcomes:

After learning the course, the students should be able to:

1. Understand the conventions and the methods of engineering drawing.
2. Interpret engineering drawings using fundamental technical mathematics.
3. Construct basic and intermediate geometry. Improve their visualization skills so that they can apply these skills in developing new products.

Text Books:

1. P. J. Shah, "A Text Book of Engineering Graphics" Publication: S. Chand.
2. A Text Book of Machine Drawing by P. J. Shah S. Chand & Company Ltd., New Delhi

Reference Books:

1. N. D. Bhatt, "Elementary Engineering Drawing", Charotar Publishing House, Anand
2. P. D. Patel, "Engineering Graphics" Publication: Mahajan
3. A text book of Engineering Drawing by R. K. Dhawan, S. Chand & Company Ltd., New Delhi
4. A text book of Engineering Drawing by P. S. Gill, S. K. Kataria & sons, Delhi

Web Resources & MOOCs:

1. http://nptel.ac.in/courses/112103019/
2. https://onlinecourses.nptel.ac.in

LIST OFPRACTICAL/DRAWING SHEETS

1. Practice sheet (which includes dimensioning methods, different types of line, preparation of title block, Polygon)

2. Engineering curves – I (Ellipse, parabola and Hyperbola)

3. Engineering curves – II (Cycloid, Hypocycloid, Epicycloids, Involutes, Spirals)

4. Projections of Points and Line

5. Projections of Line

6. Projections of Planes

7. Projections of Solids

8. Orthographic projection

9. Section Orthographic projection

10. Isometric projection

Subject: Environmental Science								
Program: B. Tech. CE/CSE/IT				Subject Code: CV0004			Semester: I	
Teaching Scheme				Examination Evaluation Scheme				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)- Theory	Continuous Internal Evaluation (CIE)- Practical	Total
2	0	0	2	40	-	60	-	100

Course Objective:

1. To get the real sense of environmental conservation aspects and making aware about the current trends towards environmental stability.

CONTENT

UNIT I

[7]

Concepts of Environmental Sciences:
Environment: Levels of organizations in environment, Structure and functions in an ecosystem;
Biosphere: Its Origin and distribution on land, in water and in air, Ecosystem and functioning of Ecosystem.
Natural Resources (Anubha Kaushik book): Renewable and Non-renewable Resources, Forests, water, minerals, Food and land (with example of one case study); Energy, Growing energy needs, energy sources (conventional and alternatives), State of Indian Environment.
Biodiversity and its conservation (Anubha Kaushik book): Biodiversity at global, national and local levels; India as a mega-diversity nation; Threats to biodiversity (biotic, abiotic stresses), and strategies for conservation

UNIT-II

[7]

Environmental Pollution: Types of pollution- Air, water (including urban, rural, marine), soil, noise, thermal, nuclear, Solid Waste (Organic and Inorganic), Concept of clean Environment; Case Studies of

Indian Studies.
Introduction to man-made disasters (Urban Flooding, Heatwave)

UNIT-III

[8]

Pollution prevention: Management of pollution- Rural/Urban/Industrial waste management [with case study of any one type, e.g., power (thermal/nuclear), fertilizer, tannin, leather, chemical, sugar], Solid/Liquid waste management, disaster management.
Environmental Monitoring: Monitoring- Identification of environmental problem, tools for monitoring (remote sensing, GIS); Sampling strategies- Air, water, soil sampling techniques
Technologies for Pollution Control: Bio-remediation, phytoremediation, bio-pesticides, bio-fertilizers;
Legal issues: Environmental legislation (Acts and issues involved), Environmental Protection Acts : (Swacch Bharat Abhiyan, state Action Plans)
Research and Policies relating to environmental Protection

UNIT-IV

[8]

Social Issues and the Environment:
Concept of sustainability and Sustainable Development, environmental Sustainability Index, Environmental Ethics, Public awareness and people's participation, Green Business (Profitability in managing Environment)

Course Outcomes:

1. Understand and realize the multi-disciplinary nature of the environment, its components, and inter-relationship between man and environment.

2. Understand the relevance and importance of the natural resources in the sustenance of life on earth and living standard.

3. Comprehend the importance of ecosystem, biodiversity and natural bio geo chemical cycle.

4. To correlate the human population growth and its trend to the environmental degradation and develop the awareness about his/her role towards environmental protection and prevention.

5. Identify different types of environmental pollution and control measures.

6. To correlate the exploitation and utilization of conventional and non conventional resources.

Self-study:

The self-study components will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Reference Books:

1. Basics of Environmental Studies by Prof Dr N S Varandani ,2013 Publisher: LAP - Lambert Academic Publishing , Germany
2. Environmental Studies by Anindita Basak ,2009 Publisher: Drling Kindersley(India)Pvt. Ltd., Pearson
3. Textbook of Environmental Studies by Deeksha Dave & S S Kateva , Cengage Publishers.
4. Environmental Sciences by Daniel B Botkin & Edward A Keller Publisher: John Wiley & Sons.
5. Environmental Studies by R. Rajagopalan, Oxford University Press
6. Environmental Studies by Benny Joseph, TMH publishers
7. Environmental Studies by Dr. Suresh K Dhameja, 2007 Published by : S K Kataria & Sons, New Delhi
8. Basics of Environmental Studies by U K Khare, 2011 Published by Tata McGraw Hill

Text Books:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha Second edition,2013 Publisher: Universities Press (India) Private Ltd, Hyderabad

Computer Engineering Department, Indus Institute of Engineering & Technology, Indus University

Program - B. Tech (Computer Engineering/Computer Science & Engineering/Information Technology)

SEMESTER - II

Sr. No.		Name of the subject	Credit	Teaching Scheme (per week)				Evaluation Scheme					Segment
								Theory		Practical		Total	
								CIE	ESE	CIE	ESE	Marks	
				Th.	Tut.	Pr.	Tot (hr.)	Th.	Th.	Pr.	Pr.		
1	MA0211	Differential Equations & Linear Algebra	4	3	1	0	4	60	40	0	0	100	BS
2	PH0011	Engineering Physics	4	3	0	2	5	60	40	60	40	200	BS
3	EN0211	Business Communication & Presentation Skills	2	1	0	2	3	60	40	60	40	200	HS
4		*Open Elective 3*	3	3	0	0	3	60	40	0	0	100	OE
5	ME0117	Workshop Practice	2	0	0	4	4	0	0	60	40	100	ES
		Indian Science Technology	1	1	0	0	0	100	0	0	0	100	VA
6	CE0216	Programming for Problem Solving	4	3	0	2	5	60	40	60	40	200	ES
		Total	20	14	1	10	24	400	200	240	160	1000	

Subject: Differential Equations and Linear Algebra								
Program: B. Tech CE/CSE/IT				Subject Code: MA0211			Semester: II	
Teaching Scheme				Examination Evaluation Scheme				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)- Theory	Continuous Internal Evaluation (CIE)- Practical	Total
3	1	0	4	40	0	60	0	100

Course Objectives:

1. To provide mathematical knowledge and skills needed to support their concurrent and subsequent engineering studies.

2. To provide an ability to apply knowledge of basic science and engineering fundamentals.

3. To provide an ability to undertake problem identification, formulation and solution.

4. To provide an ability to analyze different mathematical models within science and technology and work creatively, systematically and critically.

5. To provide an ability to find strategies for the solution of different types of mathematical models using knowledge about the possibilities and limitations of the different methods and tools.

6. To provide an ability to develop abstract, logical and critical thinking and the ability to reflect critically upon their work and work of others.

7. To provide an ability to insight their strengths and weakness as learners and to appreciate the value of errors or mistakes as powerful motivators to enhance learning and understanding.

Unit 1	**First order ordinary Differential Equations with applications**	11 hours
	Revision of ordinary differential equation: Introduction of Mathematical Modeling, Basic Definitions, First Order First Degree Differential Equations, Variable Separable equation, Homogeneous Equation, Exact Differential Equations, Reduction of Non-Exact Differential Equations to exact form using Integrating Factors, First Order Linear Differential Equation, Bernoulli Equation Applications: Orthogonal Trajectories, Simple Electric Circuits.	
Unit 2	**Higher order ordinary differential equations with applications**	12 hours
	Solution of Linear differential equations of higher order with constant coefficients, complimentary function and particular integral, Method of variation of parameters, Method of undetermined coefficient Application of Linear differential equation - Application of Deflection of Beams, Electric circuits	
Unit 3	**Partial differential equations with applications**	11 hours
	Formation of Partial differential equations, Lagrange's method, Directly Integrable equations, Method of separation of variables, solution of one dimensional wave equation, heat equation and Laplace equation.	
Unit 4	**Linear Algebra**	11 hours
	Concepts of Determinants and Matrices, Types of Matrices Row Echelon and Reduced Row Echelon form Inverse of a Matrix, Rank of a Matrix, Normal Form System of Linear Homogeneous Equations System of Non-Homogeneous Equations, Gaussian Elimination Method Eigen Values and Eigen Vectors - Properties of Eigen Values and Eigen Vectors, Caley Hamilton theorem	

Text Book: B. V. Ramana, "Higher Engineering Mathematics", Tata McGraw Hill.

Reference Books:

1. Erwin Kreyszig, "Advanced Engineering Mathematics" (8th Edition), Wiley Eastern Ltd., New Delhi.
2. Dr. B.S. Grewal , "Higher Engineering Mathematics", Khanna Publishers, New Delhi
3. Murray Spiegel , "Advanced Mathematics for Engineering & Science: Schaum's Outline Series", Tata McGraw Hill Publication
4. Merel C Potter, J.L. Goldberg, "Advanced Engineering Mathematics" (3rd Edition), Oxford India Publication.

Subject: Engineering Physics								
Program: B. Tech CE/CSE/IT				Subject Code: PH0011			Semester: II	
Teaching Scheme				Examination Evaluation Scheme				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)- Theory	Continuous Internal Evaluation (CIE)- Practical	Total
3	0	2	4	40	40	60	60	200

Course Objectives:

1. To describe the basic laws of Physics, mathematical foundations and Engineering theory and to apply the knowledge in modeling and designing a real-world problem **(fundamental engineering analysis skills).**

2. To analyze a problem, identify and formulate using the concept of physics and to solve engineering problem **(engineering problem solving skills).**

3. To analyze and interpret experimental data using concepts of Physics **(information retrieval skills).**

4. To analyze and use current techniques, skills and tools necessary for Physics and engineering practice **(practical engineering analysis skills).**

CONTENT

UNIT-I : Introduction to Electromagnetic

[12 hours]

Module1: Electrostatics & Dielectrics:

Coulomb's law for distribution of charges, Gauss's law and applications, Electric field intensity, Electric flux, Electric dipole moment, Electric field due to dipole, Introduction to dielectrics, Polarizability, Types of polarization – electronic, ionic, orientational, Polarization of dielectrics, Gauss's law in presence of dielectric, Dielectric constant, Electric susceptibility and Permittivity, Internal (Local) field in dielectric, Clausius Mossotti equation (with derivation)

Module 2: Magnetism

Magnetic field, Steady current, Ampere's law, Biot-Savart law and its applications, Faradays law of Induction, Lenz's Law; Effect of magnetic field on current carrying conductor, Lorentz force.

Basic important terms and units in Magnetism, Concept and origin of magnetic moment, magnetic susceptibility, Total angular momentum, Diamagnetism, Paramagnetism, Ferromangnetism, Ferrimagnetism, Antiferromagnetism, Domain theory of Ferromagnetism, Curie temperature and hysteresis loss

UNIT-II : Superconductivity and Sound

[12 hours]

Module 1: Superconductivity
Superconductivity: Zero resistance, Critical temperature, Meissner effect, Critical field, General properties of superconductors, Type-I and Type-II superconductors, BCS theory of Superconductor, High temperature superconductors, Applications of Superconductors: SQUID, Maglev etc.

Module 2: Sound
Introduction to sound waves, Characteristics and Properties of Sound, Absorption co-efficient, Reverberation time, Sabine's formula (without derivation), Factors affecting architectural acoustics,

Introduction of Ultrasonic waves, Generation of ultrasonic waves, Detection of ultrasonic waves, Applications of Ultrasonic waves: NDT, SONAR & others.

UNIT-III : Introduction to Quantum and Semiconductor Physics

[12 hours]

Module 1: Quantum Mechanics
Black body radiation: Planck's law; Wave nature of Particles: De-Broglie theorem, Uncertainty principle; Schrodinger's wave equation – Time independent and time dependent equations; Born interpretation, probability current; Solution of stationary-state Schrodinger equation for one dimensional problems– particle in a box

Module 2 : Introduction to solids and Semiconductor Physics

Kronig-Penny model (to introduce origin of band gap), Energy bands in solids, E-k diagram; Types of electronic materials: metals, semiconductors, and insulators, Density of states, Occupation probability, Fermi level, Effective mass.

Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction diode.

UNIT-IV : Wave Optics & Laser

[12 hours]

Module 1: Wave optics

Huygens' principle, superposition of waves and interference of light by wave front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Farunhofer diffraction from a single slit, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power, Michelson interferometer

Module 2: Laser

Einstein's theory of matter radiation interaction and A and B coefficients; Amplification of light by population inversion, Properties of laser beams: mono-chromaticity, coherence, directionality and brightness; Different types of lasers: gas lasers (He-Ne), solid-state lasers (Neodymium); Applications of lasers in science, engineering and medicine.

Course Outcomes:

1. To apply the concepts of Physics in various branches of Engineering.
2. To apply the knowledge of Physics to formulate and solve Engineering problems through numerical analysis & laboratory methods.
3. To apply the techniques, skills and modern tools of Physics necessary for Engineering applications.
4. To apply the basic idea of Physics to design and conduct experiments, analyze and interpret data.
5. To apply the concepts of Physics to design a system, a component, a process or a measurement technique to meet specific criteria
6. To apply the knowledge of contemporary issues and to function on multidisciplinary teams

Text Books

1. Engineering Physics by H K Malik, A K Singh, Tata Mc Graw-Hill Education Pvt. Ltd., 2nd edition, 2018, ISBN: 978-93-5260-695-5

2. Engineering Physics by D.K. Bhattacharya, Poonam Tandon, Oxford University Press, first published, 2015, ISBN-13:978-0-19-945281-1

Reference Books

1. Engineering Physics;Fundamentals and Modern applications by P. Khare & A. Swarup, Jones & Bartlett Learning, 2009, ISBN-13: 978-0763773748

2. A textbook of Engineering Physics by S.O. Pillai and Sivakami, New Age International, Third edition, 2011, ISBN:978-81-224-3162-9

3. David Griffiths, Introduction to Electrodynamics

4. An introduction to Electrodynamics by David Griffiths, Pearson Education, 3th edition, 1999,ISBN:9780138053260

5. Optics by A. Ghatak, McGraw-Hill Education India Private Limited, 6th edition, 2017, ISBN-13:978-9339220907

6. Engineering Electromagnetics by W H Hayt & J A Buck, McGraw-Hill Education, 8th edition, 2017, ISBN-13:978-9339203276

7. Engineering Physics by K. Rajagopal,Prentice Hall of India Pvt. Ltd., 2007, ISBN: 9788120332867

8. A Textbook of Engineering Physics by M. N. Avadhanulu, P. G. Khirsagar, S.Chand Pub., Revised edition, 1992, ISBN: 9788121908177

9. University Physics, Sears and Zemansky, Pearson Education India, 13th edition, 2013, ISBN-13:978-8131790274

Web resources:

1. Acoustics & Optics: http://www.nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Guwahati/engg_physics/index_cont.htm

2. Engineering Physics: http://www.nptelvideos.in/search?q=engineering+physics

3. Laser: http://science.howstuffworks.com/laser1.htm

4. Optics: http://www.pitt.edu/~poole/physics.html#light

5. Magnetism: https://www.khanacademy.org/science/physics/magnetic-forces-and-magnetic-fields

6. Interference: https://www.khanacademy.org/science/physics/light-waves

7. Quantum Mechanics: https://ocw.mit.edu/courses/physics/8-04-quantum-physics-i-spring-2016/index.htm

LIST OF EXPERIMENTS

Experiment no.	Title	Learning Outcomes
1	**Dielectric constant: T**o determine the dielectric constant of a dielectric substance.	1. To understand the properties of dielectric material 2. To study the dielectric constant with respect to capacitance of variable and test capacitor 3. To understand the difference between variable and test capacitor
2	To determine the **magnetic field at the center of a coil and its variation with distance and radius of the coil.**	1. To see the effect of magnetic field with different radius of coil 2. To verify Biot-Savart law 3. To study the use of tangent galvanometer
3	To verify the **Faraday's law of electromagnetic induction.**	1. To study the Faraday's law 2. To understand the variation of magnetic field
4	**Hysteresis loss:** To determine the Hysteresis loss in a Ferromagnetic material.	1. To study hysteresis loss for ferromagnetic material 2. To understand the hysteresis curve for ferromagnetic material 3. To understand the use of CRO
5	**Ultrasonic Interferometer:** To determine the wavelength and velocity of ultrasonic wave through ultrasonic interferometer.	1. To calculate wavelength and velocity of ultrasound in liquid medium 2. To understand the properties of Ultrasonic wave
6	**Planck's Constant:** To determine the Planck's Constant using LED	1. To study V-I characteristics of different LED 2. To find the variation of current with temperature 3. To see the relation between band gap and Planck's constant & calculating the value of it
7	To study the **V-I characteristics of p-n junction diode**	1. To understand the working of a p-n junction diode.
8	To verify the Inverse Square Law using Photocell	1. To understand the relation between current and intensity of radiation.

9	To determine the **refractive index of prism** using Spectrometer	1. To understand the phenomena of refraction and dispersion of light rays. 2. To familiarize with the instrument spectrometer.
10	**Resolving power of grating**: To determine resolving power of a diffraction grating.	1. To understand the diffraction phenomena of light 2. To understand the use of diffraction grating
11	**Newton's Ring:** To determine the wavelength of monochromatic light	1. To familiarize with travelling microscope 2. To understand the phenomena of monochromatic light & calculating wavelength of it 3. To understand the use of optical lenses
12.	**Determination of Wavelength of Laser:** To determine the wavelength of LASER using diffraction grating.	1. To understand the properties of Laser 2. To understand the diffraction phenomena of light 3. To study the use of diffraction grating 4. To calculate the wavelength of laser 5. To study the use of single slit

Subject: Business Communication & Presentation Skills								
Program: B. Tech CE/CSE/IT				Subject Code: EN0211			Semester: II	
Teaching Scheme				Examination Evaluation Scheme				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)- Theory	Continuous Internal Evaluation (CIE)- Practical	Total
1	2	0	3	40	0	60	0	100

Course Objectives:

1. To orient students about the varied uses of business communication.

2. Under the importance of personality and its reflection in communication.

3. Train students to develop business correspondence in writing and presentation skills.

CONTENT

Unit 1: Business Communication

- Business Communication- Importance

- Information Age and Communication/Social Media

- Organizational Communication for Engineers

- Common Barriers in Professional Communication/Role Play

- Organizational Etiquettes

Unit 2: Presentation Skills

- Planning, Preparing and Practice

- Audience Interaction

- Importance of AV Aids

- Best Presentation Videos

- Group Presentations/Pair Presentations/Teacher Review

- Group Presentations/Pair Presentations/ Peer Review

Unit 3: Writing Skills

- Mind-mapping and Planning

- Paragraph Development with 7 c's

- Picture Elicitation

- Contrastive and Comparative Essays

- Completing a Story and Describing Situations

Unit 4: Writing Skills II

- Composing Drafts

- Letters / Good, Bad & Neutral Messages

- Emails/ Sample Analysis

- Creating a Blog

Reference Books:

1. Fred Luthans, Organizational Behaviour, McGraw Hill
2. Lesikar and petit, Report writing for Business
3. M. Ashraf Rizvi, Effective Technical Communication, McGraw Hill
4. Wallace and masters, Personal Development for Life and Work, Thomson Learning
5. Hartman Lemay, Presentation Success, Thomson Learning
6. Malcolm Goodale, Professional Presentations
7. Farhathullah, T. M. Communication skills for Technical Students
8. Michael Muckian, John Woods, The Business letters Handbook
9. Herta A. Murphy, Effective Business Communication
10. Lehman, Dufrene, Sinha BCOM, Cengage Learning

Web resources/ MOOCs:

1. Business Conversation Rule 1:
https://www.youtube.com/watch?v=wB8mr4iViy0

2. Business English Conversations Rule 2:
https://www.youtube.com/watch?v=wB8mr4iViy0

3. Business English Conversations 3:
https://www.youtube.com/watch?v=wB8mr4iViy0

4. Business English Conversations Rule 4:
https://www.youtube.com/watch?v=wB8mr4iViy0

5. Business English Conversations Rule 5:
https://www.youtube.com/watch?v=wB8mr4iViy0

6. English Presentation Video:
https://www.youtube.com/watch?v=wB8mr4iViy0

7. Powerful Presentation Skills: Body Language:
https://www.youtube.com/watch?v=wB8mr4iViy0

8. Make Body Language Your Superpower:
https://www.youtube.com/watch?v=wB8mr4iViy0

Make a Presentation Like Steve Jobs:
https://www.youtube.com/watch?v=wB8mr4iViy0

Subject: Workshop Practice (ES)		
Program: B. Tech CE/CSE/IT	**Subject Code: ME0117**	**Semester: II**

Teaching Scheme				Examination Evaluation Scheme				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE) Theory**	**Continuous Internal Evaluation (CIE) Practical**	**Total Marks**
0	**0**	**4**	**2**	*******	**40**	*******	**60**	**100**

Course Objective:

1. Recognize the importance of Workshop in today's technology and its impacts on market competition.

2. Understand the basics of various methodologies to manufacture components/structure.

3. Understand different tools and equipment used in mechanical, electrical, electronics and computer workshops.

4. Analyze the engineering and economical aspects of workshop practices.

	COURSE CONTENT	
1	**Introduction to Workshop and Layout** Introduction, Safety rules in Mechanical workshop, Safety slogans, Tools and Equipment used for safety in Mechanical workshop. Types of layouts, Rules and regulations for Workshop layouts and Preparation of actual layout.	**[02]**
2	**Mechanical Fitting, Carpentry, Shop Shop** Introduction, Classification and characteristics of Engineering Materials, Tools and Equipment for Fitting shop, Different operations, preparation of job in Fitting shop, Wooden Materials, Tools and Equipment for Carpentry shop, Different operations, preparation of job in Carpentry shop. Sheet Materials, Different operations, Tools and Equipment for Tin Smithy shop, preparation of job in Tin Smithy shop.	**[10]**
3	**Electronics workshop** Passive components and Active components, Voltage Sources, Measuring Instruments, Electronic Workshop Tools, Electronic circuit Drawing, Electronic circuit on breadboard, Soldering/ desoldering, electronic circuit on general purpose PCB, Manually Prepare PCB layout, Fabrication of PCB, component mounting,	**[06]**

		Soldering, testing & troubleshooting of circuits on PCB.	
4		**Electrical Workshop** SWITCHES Toggle switch- SPDT, DPDT, TPDT, Rotary switch types depending on their poles and positions Rocker switch, Push button latch and non-latch, General specifications of cables- characteristic impedance, current carrying capacity, flexibility. Types of cables , Different types of wiring system, FUSES Glass ,Ceramic fuse, Resettable fuse, HRC fuse, RELAYS construction, working and application of General purpose relay, Difference between switch & relay , Construction working and applications MCB , Construction working and applications Energy meter, Electric Shock, First aid for electric shock, importance of grounding.	**[06]**
5		**Introduction of Computer Component** Introduction of hardware peripherals components, Block Diagram of Computer and Computer Generation, Processor and its generations, Motherboards Chipset and its external and internal components, BIOS and the Boot Process, Computer Memory types, working of SMPS, storage device (Hard Disk Drive, SSD, CD/DVDs Drives), Printers types (Dot-Matrix Printer, Inkjet Printer, Laser Printer) Network Components: Introduction of Network Cable like UTP, STP, Fiber Optics, Hub, Unmanageable Switch, Manageable Switch, Router, Modem, Wi-Fi, Access Point, PCI Wireless Card, USB Wireless Device, Print Server, prepare network cable using climbing tools and connectors, understanding basic Network topologies, cramping of LAN, Setting up connection between PCs, File Transferring and Sharing. Operating System AND Software installation: Introduction to OS, Types of Operating systems, System files FAT and NTFS, installing process of different OS,	**[06]**

Course Outcome:

After learning the course, the students should be able to:

1. Prepare edges for better joints for fitting, welding, carpentry.

2. Prepare various shapes and objects by using Carpentry, Fitting, and Welding.
3. Identify a particular component from the given group of passive and active electronic components
4. Build/test and troubleshoot electronic circuits on breadboard and general purpose PCB
5. Recognize importance of electrical energy and its day to day applications
6. Use of Electrical Protective devices –fuses, relay and MCB

LIST OF EXPERIMENTS

1. To study safety rules, Workshop layout and preparation of actual layout of Mechanical Workshop.

2. To study about Fitting shops and preparing for a job.

3. To study about Carpentry shops and job preparation.

4. To study about the Tin Smithy shop and prepare for a job.
5. Draw the circuit diagrams of various (Simple to Complex) electronic circuits on drawing sheets
6. Identify and measure the terminals components using measuring instruments
7. Demonstrate external controls of CRO & function Generator.
8. Electronics Mini Project
9. Performance of Staircase Wiring & Godown Wiring
10. Demonstration of Different Types of Circuit Breakers.
11. Demonstration of Earthing Principle.
12. Demonstration of Energy Meter.

13. Demonstrate different types of computer hardware and prepare summary reports.

14. Demonstrate different components of Motherboard and its external connection port.

15. To study about different network devices and network topology.

16. To study the preparation of network cable using climbing tools and connectors.

17. To study the installation process of different OS.

Subject: Programming for Problem Solving								
Program: B. Tech CE/CSE/IT				Subject Code: CE0216			Semester: II	
Teaching Scheme (Hours per week)				Examination Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)- Theory	Continuous Internal Evaluation (CIE)- Practical	Total
3	0	2	4	60	60	40	40	200

Course Outcomes:

1) To familiarize the student with basic concepts of computer programming and developer tools.
2) To describe the parts of the computer system.
3) To describe functioning of computer components.
4) To describe the process of problem-solving using computer.
5) To describe the design an algorithmic solution for a given problem.
6) To describe writing method for maintainable 'C' program for a given algorithm.
7) To describe the importance of 'C' program for simple applications of real-life using structures and files.
8) The students will be able to enhance their analyzing and problem-solving skills and use the same for writing programs in 'C'

CONTENTS

UNIT-I

[12 hours]

Introduction to Programming:

What is programming? Problem solving methods with Examples-Algorithm and Flowchart, Types of Programming languages, Characteristics of higher level language, Some Programming languages

Introduction to 'C':

Introduction, Importance of C, Sample C programs, Basic structure of C programs, Programming style, executing a C program.

Introduction, Character Set, C tokens, Keywords and Identifiers, Constants, Variables, Data types, Declaration of Variables, Defining symbolic constants

Operators and Expression:

Introduction, Arithmetic of Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Bitwise Operators, Special Operators, Arithmetic Expressions, Evaluation of expressions, Precedence of arithmetic operators, Type conversions in expressions, Mathematical function

UNIT-II

[12 hours]

Decision Making Statements

Introduction, Decision making with IF statement, Simple IF statement, the IF ELSE statement, Nesting of IF … ELSE statements, The ELSE IF ladder, The switch statement, the turnery (? :) Operator, the GOTO statement

Looping

WHILE statement, the DO statement, The FOR statement, Jumps in loops Break and continue

Array & Handling of Character strings:

Introduction, One-dimensional arrays, Two-dimensional arrays, Initialization of two dimensional arrays, Concept of Multidimensional arrays

UNIT-III

[12 hours]

Handling of Character strings:

Introduction, Declaring and initializing string variables, reading string from terminal, writing string to screen, Arithmetic operations on characters, Putting string together, String Operations: String Copy, String Compare, String Concatenation and String Length, String Handling functions, Table of strings

User-Defined Functions:

Introduction, need for user-defined functions, return values and their types, calling a function, category of functions, no arguments and no return values, Arguments with return values, Handling of non-integer functions, Nesting of functions, Recursion, Functions with arrays, The scope and Lifetime of variables in functions

UNIT-IV

[12 hours]

Pointers:

Introduction, understanding pointers, Accessing the address of variable, Declaring and initializing pointers, Accessing a variable through its pointer, Pointer expressions, Pointer increments and scale factor, Pointers and arrays, Pointers and character strings, Pointers and Functions, Pointers and structures

Structures and Unions:

Introduction, Structure definition, Giving values to members, Structure initialization, Comparison of structures, Arrays of structures, Arrays within structures, Structures within Structures, Structures and functions, Unions

File Handling:

Introduction, Defining and opening File, Closing File, Input/output operations on Files

Course Outcomes:

By participating in and understanding all facets of this course a student will be able to:

1) Gain a broad perspective about the usage of computers in engineering industry.
2) Develop basic understanding of computer programs, concept of algorithm and algorithmic thinking.
3) Develop the ability to analyze a problem and write an algorithm and program to solve it.
4) Develop logical thinking ability and applying basic programming principles using 'C' language.
5) Development of different 'C' programming features and structures in order to solve different problems considering as an initial step towards software development.
6) Apply fundamental principles of problem solving in software engineering through various programming languages.

Text Books:

1. Programming in ANSI C, by Balagurusamy, Publisher - Tata McGraw Hill.

Reference Books:

1. Introduction to 'C' by Reema Thareja, Publisher-Oxford
2. Programming with ANSI and Turbo C, by Ashok N Kamthane, Publisher – Pearson Education.
3. Let us C, by Yashwant Kanetkar, Publisher – BPB Publication

Web Resources

1. http://nptel.ac.in/courses/106105085/2
2. https://onlinecourses.nptel.ac.in/iitk_cs_101/preview
3. https://onlinecourses.nptel.ac.in/noc15_cs15/preview

LIST OF EXPERIMENTS

Experiment. No.	Title	Learning Outcomes
1.1	Write a program to print the address of INDUS.	Understanding basic input output functions
1.2	Write a program to perform basic arithmetic operators on given two numbers.	Understanding basic input output functions and operators
1.3	Find the area and perimeter of square and rectangle and circle. Input the side(s) through the keyboard. (use PI as symbolic constant)	Understanding basic input output functions and operators
1.4	Write a program to swap values of 2 variables (i) with extra variable and (ii) without using an extra variable.	Swapping of Two Values
1.5	Write a program to print the ASCII value of a given character.	Understanding the ASCII value and Print ASCII Value of character
1.6	Write a program to enter the integer number and convert it into Rs and Paisa.	Understanding basic input output functions and operators
1.7	Write a program to enter two numbers. Make the comparison between them with conditional operator. If the first number is greater than second perform multiplication otherwise division operation.	Understanding basic input output functions and operators
1.8	Write a program to enter the temperature in Fahrenheit and convert it to Celsius.[C = ((F-32)*5)/9]	Understanding basic input output functions and operators
1.9	Write a program to calculate simple interest.	Understanding basic input output functions and operators
1.10	Write a program to enter marks of five subject of a student and calculate its average, percentage.	Understanding basic input output functions and operators
2.	**Using conditional statements**	
2.1	Write a program to find the maximum of (i) two integer values and (ii) three integer values.	Knowledge of conditional statements

2.2	Write a program to check whether the given character is a vowel or not.	Knowledge of conditional statements
2.3.	Write a program that reads a number from 1 to 7 and accordingly it should display MONDAY to SUNDAY (if- else if).	Knowledge of conditional statements
2.4	Write a menu driven program to perform the arithmetic operations.	Knowledge of conditional statements
2.5	Write a program to print number of days in a given month using switch statement. The program requires month number (between 1to 12) as an input and then displays number of days in that month.	Knowledge of conditional statements
2.6	Write a program to check whether a given value is even or odd.	Knowledge of conditional statements
2.7	Write a program to calculate total salary of an employee. total salary = basic + da + hra + ta. da = 50% of basic. **Basic** **hra** **ta** <6000 400 100 6001>= &<10000 1400 300 >=10000 2400 700	Knowledge of conditional statements
3.	**Using control statements**	
3.1	Write a program to print 1 to 10 numbers using while loop.	Knowledge of control & looping statements
3.2	Write a program to read any 7 numbers and print the average value using for loop.	Knowledge of control & looping statements
3.3	Write a program to reverse a given integer number.	Knowledge of control & looping statements
3.4	Write a program to print Fibonacci series of given number.	Knowledge of control & looping statements
3.5	Write a program to find factorial of a number.	Knowledge of control & looping statements

3.6	Write a program to check whether a number is a Krishnamurthy number or not. Krishnamurthy number is one whose sum of factorial of digits equals the number. ----$5! = 1 + 24 + 120 = 145$	Knowledge of control & looping statements
3.7	Write a program to check whether the number is Armstrong or not. Example:153----$1^3 + 5^3 + 3^3 = 1 + 125 + 27$ 153	Knowledge of control & looping statements
3.8	Write a program to list all prime numbers within given range.	

3.9	Write a program to draw following patterns:	
	*	
	**	
	***	
	****	
	*****	
	1	
	a b	
	123	
	a b c d	
	1 2 3 4 5	
	5 4 3 2 1	
	4 3 2 1	
	3 2 1	
	2 1	
	1	
	A	
	AB	
	ABC	
	ABCD	
	ABCDE	
	1	
	121	
	12321	
	1234321	
	1	
	01	
	101	
	0101	
	10101	

4	**Arrays & Strings**	
4.1	Write a program to read 10 integers in an array. Find the addition of all elements.	To Understand and Implement 1 D Array
4.2	Write a program to find number of odd and even elements from the 1- D array.	To Understand and Implement 1 D Array
4.3	Write a program to reverse the elements of array and store it in another array.	To Understand and Implement 1 D Array
4.4	Write a program to sort elements of array.	To Understand and Implement 1 D Array
4.5	Write a Program to print Addition of two matrices.	To Understand and Implement 2 D Array
4.6	Program to remove duplicate numbers from a list of numbers and print the list without duplicate numbers.	To Understand and Implement 1 D Array
4.7	Write a Program to print Multiplication of two matrices.	To Understand and Implement 2 D Array
4.8	Read the marks of five subjects obtained by five students in an examination. Display the top two student's codes and their marks.	To Display Top Student Codes and Marks
4.9	Write a program to insert an element in an array at specified position.	To Understand and Implement 1 D Array
4.10	Write a program to find the length of a string. .(without inbuilt Function)	To Understand and Implement String
4.11	Write a program to reverse the string.(without inbuilt Function)	To Understand and Implement String
4.12	Write a program to convert a string in to lower case and upper case.	To Understand and Implement String
4.13	Write a menu driven program for the implementation of all build-in string functions.	To Understand and Implement String Functions
4.14	Program to extract n characters starting from m in a given string. (String, n and m should be provided as inputs).	To Understand and Implement String Functions
4.15	Find out occurrence of each character in a given string.	To Understand and Implement String
5.	**Structure & Union**	

5.1	Write a program to define structure with tag state with fields state name, number of districts and total population. Read and display the data.	Knowledge of structure and union
5.2	Write a program to create a structure of 5 student's roll_no and name and display the records. Use array of structure	Knowledge of structure and union
5.3	Write a program to create structure of bank with accno, holder_name and balance and display them for n holders whose balance is less than 5000.	Knowledge of structure and union
5.4	Write a program to create union of student's roll_no and name and display the records.	Knowledge of structure and union
6.	**Pointers & Functions**	
6.1	Write a program that demonstrates the use of address of (&) and pointer (*) operator.	Use of pointers & Functions
6.2	Write a program to read and display values of an integer array. Allocate space dynamically for the array.	Use of pointers & Functions
6.3	Write a program to display the content of 1-D array using pointer.	Use of pointers & Functions
6.4	Write a program to sum given two integer numbers using function.	Use of pointers & Functions
6.5	Write a program using function to count the area of circle, triangle, rectangle and square.	Use of pointers & Functions
6.6	Write a program using user defined function even _odd. With argument and check whether the no is even or odd.	Use of pointers & Functions
6.7	Write a program using function with array, takes input of five subject's marks and count the percentage and display result.	Use of pointers & Functions
6.8	Write a function which accepts a character array as argument from the user. The function should convert all the lowercase characters into uppercase case	Use of pointers & Functions
6.9	Write a function using pointer parameter that calculate maximum element from given array of integer number.	Use of Pointers & Functions
6.10	Write a program that demonstrates call by value and call by reference concept in function argument.	Use of pointers & Functions

Subject: Indian Science and Technology								
Program: **B.Tech. – All Branches**				Subject Code:IST0001			Semester: **1st Year**	
Teaching Scheme				**Examination Evaluation Scheme**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)-Theory**	**Continuous Internal Evaluation (CIE)-Practical**	**Total**
01	00	00	01	00	00	100	00	100

Module No.	Topic No.	Topic Name	Allotted Lectures
1		**Fundamentals**	**2**
	1.1	An overview of Indian contributions to technology	
	1.2	Technological Innovations	
2		**Metallurgy, Textile and Chemistry**	**3**
	2.1	Copper/Bronze/Zinc	
	2.2	Iron and Steel Technology in India	
	2.3	Textile and dyeing – Indian Specialities	
	2.4	Chemistry	
3		**Water Management**	**3**
	3.1	Overview	
	3.2	Harappan water management	
	3.3	Other case studies	
	3.4	Medieval Water structures	
4		**Transportation**	**1**
	4.1	Modes of transportation and its reforms	
	4.2	Development of trading activities	
5		**Mathematics**	**3**
	5.1	An overview of the development of mathematics in India	
	5.2	Mathematics contained in *Sulbasutras*	
	5.3	Weaving mathematics into beautiful poetry: Bhaskaracarya	
	5.4	The evolution of sine function in India	
	5.5	The discovery of calculus by Kerala astronomers	
6		**Astronomy**	**2**
	6.2	Vedanga Jyotish	
	6.1	Measuring Time and Calendar	
7		**India's Contribution to World**	**1**
	7.1	Indian Foundation of Modern Science	

Text Books:
1. R.M. Pujari, Pradeep Kolhe, N. R. Kumar, 'Pride of India: A Glimpse into India's Scientific Heritage', Samskrita Bharati Publication.
2. 'Indian Contribution to science', compiled by vijnana bharati.
3. 'Knowledge traditions and practices of India',Kapil Kapoor, Michel Danino, CBSE, India.

Reference Books:
1. Dr. Subhash Kak Computation in Ancient India,Mount, Meru Publishing (2016)

Computer Engineering Department, Indus Institute of Engineering & Technology, Indus University

Program - B. Tech (Computer Engineering/Computer Science & Engineering/Information Technology)

SEMESTER - III

Sr. No.		Name of the subject	Credit	Teaching Scheme (per week)				Evaluation Scheme				Total	Segment
								Theory		Practical		Total	
								CIE	ESE	CIE	ESE	Marks	
				Th.	Tut.	Pr.	Total (hr.)	Th.	Th.	Pr.	Pr.		
1	MA0311	Probability, Statistics & Numerical Methods	4	3	1	0	4	60	40	0	0	100	BS
2	CE0320	Computer Organization & Architecture	3	3	0	0	3	60	40	0	0	100	ES
3	EC0319	Digital Electronics	4	3	0	2	5	60	40	60	40	200	ES
4	CE0316	Object Oriented concepts with UML	4	3	0	2	5	60	40	60	40	200	Core
5	CE0317	Database Management System	4	3	0	2	5	60	40	60	40	200	Core
6	SS0301	Human Values and Professional Ethics	2	2	0	0	2	100	0	0	0	100	HS
7	CE0318	Internship Credit /Online courses/ MOOC	2	0	0	0	0	0	0	100	0	100	IC
		TOTAL	23	17	1	6	24	400	200	280	120	1000	

	INDUS INSTITUTE OF TECHNOLOGY& ENGINEERING
ज्ञानेन प्रकाशते जगत् INDUS UNIVERSITY	**INDUS INSTITUTE OF TECHNOLOGY& ENGINEERING** **Constituent Institute of Indus University**

Subject: Probability, Statistics & Numerical Methods

Program: B. Tech CE/CSE/IT				Subject Code: MA0311			Semester: III	
Teaching Scheme (Hours per week)				**Examination Evaluation Scheme (Marks)**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)-Theory**	**Continuous Internal Evaluation (CIE)-Practical**	**Total**
3	1	0	4	40	0	60	0	100

Unit 1	**Basics of Probability:** Introduction to Probability, Characteristics of random variable, Probability mass function, cumulative distribution function, probability density function. **Probability distributions:** Discrete distributions: Binomial distribution, Poisson distribution, Continuous distributions: Normal distribution	10 hours
Unit 2	**Statistics:** Introduction and application of statistics, types of statistics, testing of hypothesis**,** Mean, standard deviation, coefficient of variation, F-test , t-test , Chi Square test, Correlation and regression.	10 hours
Unit 3	**Interpolation** Finite differences and Interpolation: Finite differences Forward, Backward & Central difference operators and difference tables. Interpolation, Interpolation Formulae with equal intervals: Newton's forward, Newton's backward, Central difference interpolation by Stirling's formulae Interpolation Formulae with unequal intervals: Lagrange's & Newton's divided difference interpolation Numerical Integration: Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule. Numerical differentiation: Using Newton's forward and backward interpolation formula	12 hours
Unit 4	**Numerical Methods** Basic Errors. Solution of Algebraic and Transcendental Equations: Bisection method, Regula-Falsi method, Newton-Raphson method., Convergence condition for these methods, Numerical methods in Linear Algebra: Gauss-Jacobi, Gauss-seidel method Largest Eigen values and corresponding Eigen vectors: By power method Numerical Solutions of ordinary differential equations: Taylor's Method, Euler's Method, Improved Euler Method (Heun's Method), Runge-Kutta method of order four	13 hours

Text Book: B. V. Ramana, "Higher Engineering Mathematics", Tata McGraw Hill.

Reference Books:

1. Erwin Kreyszig, "Advanced Engineering Mathematics" (8th Edition), Wiley Eastern Ltd., New Delhi.
2. Dr. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, New Delhi
3. Murray Spiegel , "Advanced Mathematics for Engineering & Science: Schaum's Outline Series", Tata McGraw Hill Publication
4. Merel C Potter, J.L. Goldberg, "Advanced Engineering Mathematics" (3rd Edition), Oxford India Publication.

		INDUS INSTITUTE OF TECHNOLOGY& ENGINEERING
		Constituent Institute of Indus University

Subject: Computer Organization and Architecture							
Program: B.Tech Computer Engineering				**Subject Code: CE0320**			**Semester: III**
Teaching Scheme (Hours per week)				**Examination Evaluation Scheme (Marks)**			
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	0	3	40	0	60	0	100

Course Objectives

1. To conceptualize the basics of organizational and architectural issues of a digital computer.
2. To analyze performance issues in processor and memory design of a digital computer.
3. To understand various data transfer techniques in digital computer.
4. To analyze processor performance improvement using parallelism.

CONTENTS

UNIT-I

Basic Computer Organization and Data Representation   [12 hours]

Overview of computer organization, CPU organization components classification of computerarchitecture, Register, types of register, Bus, types of bus, quantitative techniques in computer design,measuring and reporting performance, Amdahl's Law, number system, fixedpointrepresentation, floating point representation.

UNIT-II

Instruction Set Architecture   [12 hours]

Instruction, instruction format, instruction execution cycle, instruction timing cycles, ISA, ISA design issue, types of ISA, Accumulator organization, stack organization, memory-memory organization, register memory organization, register-register organization, addressing mode, RISC, CISC,8085 microprocessors, Architecture, Operations of 8085, Instruction Set for 8085, Addressing Modes of 8085.

UNIT-III

Pipeline   [12Hours]

What is pipeline, Flynn's taxonomy for Parallel Processing, types of pipeline, Arithmetic Pipeline, Instruction Pipeline, measuring performance of pipeline, types of hazard, structural hazard, data hazard, control hazard, method for avoiding hazard, Vector Processing, Array Processors, Parallel Processing

UNIT-IV

Memory Organization   [12 Hours]

Memory Hierarchy, types of memory, Main Memory, Auxiliary Memory, Inclusion, Coherence and locality properties, Cache Memory, Organization of cache memory, performance of cache memory with examples, cache memory mapping algorithms, cache optimization techniques, Virtual Memory, demand paging, page replacement algorithms.

Course Outcomes

At the end of this subject, students should be able to:
After successful completion of the course, student will able:

1. To understand and describe the basics of various architectural units of the Computer System
2. To apply the knowledge of combinational and sequential logical circuits to mimic a simple computer architecture
3. To demonstrate the simulations for basic computer operations
4. To recognize the importance of parallelism in computer architecture
5. To understand the basic working of various memory system.
6. This course is the bridge between digital electronics and microprocessor.

Text Books:
1. Computer system Architecture Mano, M. Morris Pearson publication
2. Computer Architecture and Organization Ghoshal, Subrata Pearson publication

Reference Books:
1. Carl Hamacher -Computer Organization, Fifth Edition, Tata McGraw Hill.
2. John P Hayes -Computer Architecture & Organization–McGraw Hill
3. William Stallings-Computer Organization and Architecture, Seventh Edition, Pearson Education

Web Resources

1. https://nptel.ac.in/courses/106/105/106105163

2. https://www.youtube.com/channel/UC2GUBG_WsP0OO5tXXocwp3Q/videos

	INDUS INSTITUTE OF TECHNOLOGY & ENGINEERING
INDUS UNIVERSITY ज्ञानेन प्रकाशते जगत्	**Constituent Institute of Indus University**

Subject: Digital Electronics

Program: B. Tech CE/CSE/IT			Subject Code: EC0319			Semester: III		

Teaching Scheme (Hours per week)				Examination Evaluation Scheme (Marks)				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	40	40	60	60	200

Course Objectives:

By participating in and understanding all facets of this course a student will:

1. Understand number representation and conversion between different representations in digital electronic circuits.
2. Perform the analysis and design of various digital electronic circuits.
3. Understand concept of Optimization of logic circuits using Karnaugh maps.
4. Analyze logic processes and implement logical operations using combinational logic circuits
5. Analyze logic processes and implement logical operations using sequential logic circuits.
6. Analyze sequential systems in terms of state machines.

CONTENTS

UNIT-I

[12 hours]

Number System:
Decimal, Binary, Octal, Hexadecimal number system, Conversion of numbers from one number system to other, complement method of addition ,subtraction using 9's and 10's compliment method & 1's and 2's complement method.

Binary Codes:
Weighted and Non-weighted code, 8421 BCD code, XS-3 code, Gray code, Binary to Gray conversion, Gray to Binary conversion

Logic Gates & Boolean Algebra: AND, OR, NOT, NAND, NOR, X-OR, X-NOR, BUFFER, Axioms and laws of Boolean algebra, D'morgans theorem, Duality, Reduction of Boolean expression

UNIT-II

[12 hours]

Boolean Algebra - II & Simplification of Boolean Functions: Converting AND/OR/INVERT logic to NAND/NOR logic , POS and SOP expressions, Simplification of Boolean expression using Karnaugh Map for 2 to 5 variables, Don't care conditions and Tabulation method

Combinational Logic: Introduction, Design Procedure, Code Conversion, Multilevel NAND and NOR circuit

UNIT-III

[12hours]

Combinational Circuits   with MSI & LSI

The Half-adder, The Full-adder, The Half-subtractor, The Full-Subtractor, Parallel Binary Adders, Binary Subtractor, Adder- Subtractor, BCD adder, Code converters, Parity bit Generators/Checkers, Comparators, Decoders, BCD to 7-Segment Decoders, Encoders, , Multiplexers, Applications of Multiplexer, Demultiplexers , Circuit implementation using PLDs (PLA, PAL)

Flip Flop :
S-R Flip-flop, JK Flip-flop, D Flip-flop, T Flip-flop, Master-slave Flip-flop, Conversion of Flip flop

UNIT-IV

[12hours]

Shift Registers, Counters & FSM Design

Shift Registers: Serial-in Serial-out Shift register, Serial-in Parallel-out Shift register, Parallel-in Serial-out Shift register, Parallel-in Parallel-out Shift register

Counters: Asynchronous counter, Design of Asynchronous counter, Synchronous counters, Design of Synchronous counter

FSM Design: State Diagram, State Table, State Assignment, Moore and Mealy Model

Course Outcomes:

At the end of this subject, students should be able to:

1. Understand number representation and able to perform conversion between different representation in digital electronic circuits.
2. Familiar with basic logic gates and independently or work in team to create logiccircuits using logic gates.
3. Remember Boolean algebra and apply basic properties of Boolean algebra to simplifyBoolean functions by using the basic Boolean properties.
4. Optimize logic circuits using Karnaugh maps.
5. Analyze logic processes and implement logical operations using combinational logiccircuits.
6. Understand concepts of sequential circuits and to analyze sequential systems in terms ofstate machines.

Text Books:

1) Morris Mano, "Digital Logic and Computer Design", Pearson , ISBN 13: 9788177584097

Reference Books:

1) Ronald J. Tocci, Gregory L. Moss, "Digital Systems", 10 Ed, Pearson, ISBN 9780135103821
2) D.C.Green, "Digital Electronics"5th Ed., Pearson, 2005, ISBN-9788177580686

Web Resources:

1) Digital Circuits & Systems
   http://nptel.ac.in/courses/117106086/1
2) Circuits and Electronics
   https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-002-circuits-and-electronics-spring-2007/index.htm

LIST OF EXPERIMENTS

Experiment. No.	Title	Learning Outcomes
1.	To Verify the behavior of Logic Gates using Truth Table and Familiarization with Digital Integrated Circuits	Upon successful completion of this course students should be able to:
2.	Familiarization with the Different Portions of the Datasheet for a Digital IC and Using the Datasheet to Gather Relevant Information to Utilize the IC as a Component in another Digital Logic Circuit	1. Implementation for basic logic gates & digital Circuits using ICs.
3.	Realization of basic gates using Universal Gates.	2. Implementation & analyze the operation of medium & high complexity standard combinational circuits like the encoder, decoder, multiplexer, demultiplexer, adder ,subtractor
4.	Verification of Demorgans Theorem.	
5.	Implementation of Half Adder & Full Adder Circuits.	
6.	Implementation of Half Subtractor & Full Subtractor Circuits	
7.	Implementation of Multiplexes (4-1 MUX/8-1 MUX)	
8.	Implementation of Decoders (3-8 Decoder/4-16 decoder)	
9.	Realization of Flip-Flop using Gates.	3. Implementation & analyze the operation of a flip-flop and examine relevant timing diagrams
10.	Implementation of Shift Registers using Flip Flop. (Serial-in Serial-out Shift register, Serial-in Parallel-out Shift register, Parallel-in Serial-out Shift register, Parallel-in Parallel-out Shift register)	
11.	Implementation of Asynchronous Counters (4 bit Up/down)	4. Implementation & analyze the operation of counters and shift registers
12.	Implementation of Synchronous Counters (4 bit Up/down)	Design and operate practical digital logic circuits

	ज्ञानेन प्रकाशते जगत् **INDUS UNIVERSITY**			**INDUS INSTITUTE OF TECHNOLOGY& ENGINEERING** **Constituent Institute of Indus University**				

Subject: Object Oriented Concepts with UML

Program: B. Tech CE/CSE/IT				Subject Code: CE0316			Semester: III	
Teaching Scheme (Hours per week)				**Examination Evaluation Scheme (Marks)**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	40	40	60	60	200

Course Objectives:

1. To learn the fundamental programming concepts and methodologies which are essential to building good C/C++ programs.
2. To write reusable modules, functions and classes as per Object Oriented Concepts.
3. To enhance employment of students, making good use of the object-oriented programming paradigm to simplify the design and implementation process
4. To encourage the practical problem solving skills.
5. To code, document, test, and implement a well-structured, robust computer program using the C/C++ programming language.

CONTENTS

UNIT-I

[12 hours]

Introduction to C++:

Concepts of OOP: Introduction OOP, Procedural Vs. Object Oriented Programming, Principles of OOP, Benefits and applications of OOP C++Basics: Overview, Program structure, namespace, identifiers, variables, constants, enum, operators, typecasting, control structures C++ Functions: Simple functions, Call and Return by reference, Inline functions, Macro Vs. Inline functions, Overloading of functions, default arguments, friend functions

UNIT-II

Objects and classes:

Basics of object and class in C++, Private, protected and public Members, static data and static function, Constructors and their types, Destructors, Arrays & Strings: A standard C++ string class. Operator Overloading: Overloading unary and binary operators, Operator Overloading with friend function, Data Conversion, type conversion, class to class, basic to class, class to basic.

UNIT-III

[12 hours]

Inheritance:

Concept of Inheritance, types of inheritance: single, multiple, multilevel, hierarchical, hybrid, protected members, overriding, virtual base class, constructor in derived classes

Polymorphism:

Pointers in C++, Pointes and Objects, this pointer, virtual and pure virtual functions, implementing polymorphism I/O management: Concept of streams, cin and cout objects, C++ stream classes, Unformatted and formatted I/O, manipulators

UNIT-IV

[12 hours]

File management:

File stream, C++ File stream classes, File management functions, File modes, Binary and random files

Object-oriented Design:

Object modeling using UML, Three models, Class Model (Object and Class Diagram), State model (state Diagram) and Interaction model (Use case diagrams, Activity diagrams, Interaction diagrams).

Course Outcomes:

At the end of this subject, students should be able to:

1. Understand the difference between the top-down and bottom-up approach.
2. Describe the object-oriented programming approach in connection with C++.
3. Illustrate the process of data file manipulations using C++.
4. Apply the concepts of object-oriented programming.
5. Apply virtual and pure virtual function & complex programming situations.
6. Design and implement C++ programs for complex problems, making good use of the features of the language such as classes, inheritance and templates.

Text Books:

1. Object oriented Programming with C++, Tata Mc Graw Hill Publication Co. Ltd, Fourth Edition, 2000, ISBN: 97800746203802)

2. Object oriented programming in turbo C++, Robert Lefore, Galgotia Publication Pvt. Ltd. First Edition, 1994, ISBN9788185623221

Reference Books:

1. The Complete Reference C++, Herbert Schildt, Tata Mcgraw Hill Publication, Fourth Edition,ISBN-10:00704118322)

2. The C++ programming language, Bjarne Stroustrup, Addison, Fourth Edition, ISBN-10: 0321563840

Web Resources

1. https://www.youtube.com/watch?v=tFYRTWFXSgY
2. https://www.youtube.com/watch?v=8fDao3MBbwk
3. https://www.youtube.com/watch?v=zagx5hdXBLw

LIST OF EXPERIMENTS

Experiment. No.	Title	Learning Outcomes
1	Basics of programming	To understand how C++ improves C with object-oriented features.
2	2.1 Write a program to calculate the area of circle, rectangle and square using function overloading. 2.2 Write a program to demonstrate the use of default arguments in function overloading.	To learn how to overload functions and operators in C++.

	2.3 Write a program to demonstrate the use of returning a reference variable.	
3	3.1 Create a class student which stores the detail about roll no, name, marks of 5 subjects, i.e. science, Mathematics, English, C++. The class must have the following:• Get function to accept value of the data members.• Display function to display values of data members.• Total function to add marks of all 5 subjects and store it in the data members named total. 3.2 Create a function power() to raise a number m to power n. the function takes a double value for m and int value for n, and returns the result correctly. Use the default value of 2 for n to make the function calculate squares when this argument is omitted. Write a main that gets the values of m and n from the user to test the function. 3.3 Write a basic program which shows the use of scope resolution operator. 3.4 Write a C++ program to swap the value of private data members from 2 different classes.	To learn how to design C++ classes for code reuse.
4	4.1 Write a program to illustrate the use of this pointer. 4.2 An election is contested by five candidates. The candidates are numbered 1 to 5 and the voting is done by marking the candidate number on the ballot paper. Write a program to read the ballots and count the votes cast for each candidate using an array variable count. In case a number is read outside the range of 1 to 5, the ballot should be considered as a 'spoilt ballot' and the program should also count the number of spoilt ballots. 4.3 Write a program to call member functions of class in the main function using pointer to object and pointer to member function.	To learn how to design C++ pointers
5	5.1 Using friend function find the maximum number from given two numbers from two different classes. Write all necessary functions and constructors for the program. 5.2 Using a friend function, find the average of three numbers from	To learn how to implement constructors and class member functions.

	three different classes. Write all necessary member functions and constructor for the classes. 5.3 Define currency class which contains rupees and paisa as data members. Write a friend function named AddCurrency ( ) which add 2 different Currency objects and returns a Currency object. Write parameterized constructor to initialize the values and use appropriate functions to get the details from the user and display it. 5.4 Create Calendar class with day, month and year as data members. Include default and parameterized constructors to initialize a Calendar object with a valid date value. Define a function AddDays to add days to the Calendar object. Define a display function to show data in "dd/mm/yyyy" format.	
6	6.1 Create a class named 'String' with one data member of type char *, which stores a string. Include default, parameterized and copy constructor to initialize the data member. Write a program to test this class. 6.2 Write a base class named Employee and derive classes Male employee and Female Employee from it. Every employee has an id, name and a scale of salary. Make a function ComputePay (in hours) to compute the weekly payment of every employee. A male employee is paid on the number of days and hours he works. The female employee gets paid the wages for 40 hours a week, no matter what the actual hours are. Test this program to calculate the pay of employee. 6.3 Create a class called scheme with scheme_id, scheme_name, outgoing_rate, and message charge. Derive customer class form scheme and include cust_id, name and mobile_no data.Define necessary functions to read and display data. Create a menu driven program to read call and message information for a customer and display the detail bill.	To learn how to implement copy constructors and class member functions.
7	7.1 Write a program with use of inheritance: Define a class publisher that stores the name of the title. Derive twoclasses book and tape, which inherit publisher. Book class contains member data called	To learn how containment and inheritance promote code reuse in C++.

	page no and tape class contain time for playing. Define functions in the appropriate classes to get and print the details. 7.2 Create a class account that stores customer name, account no, types of account. From this derive classes cur_acc and sav_acc to include necessary member function to do the following:• Accepts deposit from customer and update balance• Compute and Deposit interest• Permit withdrawal and Update balance. 7.3 Write a base class named Employee and derive classes Male employee and Female Employee from it. Every employee has an id, name and a scale of salary. Make a function ComputePay (in hours) to compute the weekly payment of every employee. A male employee is paid on the number of days and hours he works. The female employee gets paid the wages for 40 hours a week, no matter what the actual hours are. Test this program to calculate the pay of employee.	
8	8.1 Create a class vehicle which stores the vehicleno and chassisno as a member. Define another class for scooter, which inherits the data members of the class vehicle and has a data member for a storing wheels and company. Define another class for which inherits the data member of the class vehicle and hasa data member for storing price and company. Display the data from derived class. Use virtual function. 8.2 Create a base class shape. Use this class to store two double type values that could be used to compute the area of figures. Derive two specific classes called triangle and rectangle from the base shape. Add to the base class, a member function get_data() to initialize the base class data members and another member function display_area() to compute and display the area of figures. Make display_area() as a virtual function and redefine this function in the derived class to suit their requirements. 8.3 Write a program to demonstrate the use of pure virtual function. 8.4 For multiple inheritance, write a program to show the invocation of constructor and destructor. 8.5 Create a class string with character array as a data member and write a program to add two strings with use of operator overloading	To learn how inheritance and virtual functions implement dynamic binding with polymorphism.

	concept.	
	8.6 Create a class distance which contains feet and inch as a data member. Overhead = =, <and> operator for the same class. Create necessary functions and constructors too.	
9	9.1 Create a class MARIX of size mxn. Overload + and –operators for addition and subtraction of the MATRIX. 9.2 Define a class Coord, which has x and y coordinates as its data members. Overload ++and –operators for the Coord class. Create both its prefix and postfix forms. 9.3 Create one class called Rupees, which has one member data to store amount in rupee and create another class called Paise which has member data to store amount in paise. Write a program to convert one amount to another amount with use of type conversion. 9.4 Create two classes Celsius and Fahrenheit to store temperature in terms of Celsius and Fahrenheit respectively. Include necessary functions to read and display the values. Define conversion mechanism to convert Celsius object to Fahrenheit object and vice versa. Show both types of conversions in main function.	To learn how to overload functions and operators in C++.
10	10.1 Write a program to create a function template for finding maximum value contained in an array. 10.2 Write a program to create a class template for the 'Array' class. 10.3 Create a template for the bubble sort function. 10.4 Write a program to illustrate the use of insertion and extraction operators for Text mode Input/Output.	To learn how to design and implement generic classes with C++ templates.
11	11.1 Write a program to illustrate the use of put(), get() and getline() functions for Text mode Input/Output. 11.2 Write a program to illustrate the use of read() and write()	To learn how to design and implement files with C++.

functions for Binary mode Input/Output.

11.3 Write a program to illustrate the use of manipulators in file handling.8.Write a program to illustrate the use of file pointer manipulation functions.

11.4 Write down a program to Copy source file 'source.txt' to destination file.

11.5 A file contains a list of telephone numbers in the following format:

a) Ram 47890

b) Krishna 878787

c) --------------------

d) -------------------

The names contain only one word and the names and telephone numbers are separated by white space. Write a Program to read the tel.dat file and display the content. The names should be left justified and the number right-justified.

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ज्ञानेन प्रकाशते जगत् INDUS UNIVERSITY				Constituent Institute of Indus University				
Subject: Database Management System								
Program: B. Tech CE/CS/IT				**Subject Code: CE0317**			**Semester: III**	
Teaching Scheme (Hours per week)				**Examination Evaluation Scheme (Marks)**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)-Theory**	**Continuous Internal Evaluation (CIE)-Practical**	**Total**
3	**0**	**2**	**4**	**40**	**40**	**60**	**60**	**200**

Course Objectives:

1. Transform an information model into a relational database schema and to use a data definition language and/or utilities to implement the schema using a DBMS.

2. Design and implement a database schema for a given problem-domain.

3. Understand Functional Dependency and Functional Decomposition and Normalize a database

4. Formulate query, using SQL, solutions to a broad range of query and data update problems.

5. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMSfor skill enhancement.

<u>**CONTENTS**</u>

<u>**UNIT-I**</u>

[12 hours]

Introductory concepts of DBMS: Introduction and applications of DBMS, Purpose of data base, Data, Independence, Database System architecture- levels, Mappings, Database, users and DBA

Entity-Relationship model : Basic concepts, Design process, constraints, Keys, Design issues, E-R diagrams, weak entity sets, extended E-R features – generalization, specialization, aggregation, reduction to E-R database schema

UNIT-II

[12 hours]

Relational Model: Structure of relational databases, Domains, Relations, Relational algebra – fundamental operators and syntax, relational algebra queries, tuple relational calculus

Relation Database Design: Functional Dependency – definition, trivial and non-trivial FD, closure of FDset, closure of attributes, irreducible set of FD, Normalization – 1Nf, 2NF,3NF, composition using FD- dependency preservation, BCNF, Multivalued dependency, 4NF, Join dependency and 5NF

UNIT-III

[12 hours]

Transaction Management and Security:

Transaction concepts, properties of transactions, serializability of transactions, testing for serializability, System recovery, Two- Phase Commit protocol, Recovery and Atomicity, Log-based recovery, concurrent executions of transactions and related problems, Locking mechanism, solution to concurrency related problems, deadlock, , two-phase locking protocol, Isolation, Intent locking

Security: Introduction, Discretionary access control, Mandatory Access Control, Data Encryption

UNIT-IV

[12 hours]

SQL & PL/SQL Concepts:

SQL: Basics of SQL, DDL,DML,DCL, structure – creation, alteration, defining constraints – Primary key, foreign key, unique, not null, check, IN operator, aggregate functions, Built-in functions –numeric, date, string functions, set operations, sub-queries, correlated sub-queries, join, Exist, Any, All , view and its types., transaction control commands.

PL/SQL: Cursors, Stored Procedures, Stored Function, Database Triggers

Course Outcomes:

At the end of this subject, students should be able to:

1. Identify the basic concepts and various data model used in database design ER modeling concepts and architecture used.

2. Apply relational database theory and be able to describe relational algebra expression, tuple and domain relation expression fro queries

3. Recognize and identify the use of normalization and functional dependency, indexing and hashing technique used in database design.

4. Apply and relate the concepts of Ttransaction, Concurrency and Recovery techniques in database.

5. Utilize the knowledge of basics of SQL and construct queries using SQL. Perform PL/SQL programming using concept of Cursor Management, Error Handling, Package and Triggers.

6. Justify database solution to an information technology problem. Working on existing database systems, designing of database, creating relational database, analysis of table design.

Text Books:

1. Database System Concepts, Abraham Silberschatz, Henry F. Korth & S.Sudarshan, McGraw Hill.
2. SQL- PL/SQL by Ivan Bayross.

Reference Books:

1) An Introduction to Database Systemsby C. J. Date.
2) Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems (3/e), McGraw Hill, 2003.
3) Peter Rob and Carlos Coronel, Database Systesm- Design, Implementation and Management (7/e), Cengage Learning, 2007.
4) Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems (5/e), Pearson Education, 2008.
5) Understanding SQL by Martin Gruber, BPB.

Web Resources

1. https://beginnersbook.com/2015/04/dbms-tutorial/

2. https://www.jbiet.edu.in/coursefiles/cse/HO/cse2/DBMSI-III.pdf

3. https://www.geeksforgeeks.org/dbms/

4. https://mrcet.com/downloads/digital_notes/IT/Database%20Management%20Systems.pdf

5. https://lecturenotes.in/subject/38/database-management-system-dbms

LIST OF PRACTICALS

Practical No.	Title	Learning Outcomes
1	Introduction to SQL. Data Definition in SQL (CREATE, ALTER and DROP), Data Types.	CO5
2	Draw E-R diagram and convert entities and relationships to relation table for a given scenario. A. Two assignments shall be carried out i.e. consider two different scenarios (eg. bank, college) B. Write relational algebra queries for a given set of relations.	CO1,CO2
3	Design a Database and create required tables. For e.g. Bank, College Database.	CO5,CO6
4	Perform the following: a. Viewing all databases, Creating a Database, Viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback)	CO5,CO6
5	Apply the constraints like Primary Key , Foreign key, NOT NULL to the tables.	CO5
6	Perform the following: a. Altering a Table, Dropping/Truncating/Renaming Tables, Backing up / Restoring a Database.	CO5

7	For a given set of relation schemes, create tables and perform the following Simple Queries, Simple Queries with Aggregate functions, Queries with Aggregate functions (group by and having clause), Queries involving- Date Functions, String Functions , Math Functions	CO5
8	Join Queries- Inner Join, Outer Join Subqueries- With IN clause, With EXISTS clause	CO5
9	For a given set of relation tables perform the following: Creating views (with and without check option), Dropping views, Selecting from a view	CO5
10	Perform the following operation for demonstrating the insertion , updation and deletion using the referential integrity constraints.	CO5
11	Write a PL/SQL block to insert record into emp2table. Accept value at runtime.	CO5
12	Write a PL/SQL block to reserve a given number.	CO5
13	Write a PL/SQL block to check given num is odd or even.	CO5
14	Write a PL/SQL block to accept id of employee (emp2 table) from user and fetch a record of that employee. Check the salary and update the salary Column as follows: a. If salary >10000and salary<=20000, then salary = salary+30% of salary. b. If salary>20000 and salary<=30000, then salary =salary+ 40% of salary.	CO5
15	Write a PL/SQL block that will display the information of the first 5 employee holding the highest salary of emp2 table	CO5
16	Write a PL/SQL block that merge ft_work and pt_work. Fetch name of emp from pt_work, check if it is in ft_work. If it is not there then insert that record in ft_work, otherwise display appropriate message.	CO5
17	Create trigger on supplier table which allow access between 9 AM to 5 PM only.	CO5

18	Create trigger on Supplier Detail on update or insert of Sname to convert Sname into capital letter.	CO5
19	Create a stored procedure which accept CNUM from the user and print that order is placed by that customer or not. Also write a PL/SQL block for using this procedure.	CO5
20	Create a database.	CO5,CO6

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ज्ञानेन प्रकाशते जगत् **INDUS UNIVERSITY**	**Constituent Institute of Indus University**

Subject: Human Values and Professional Ethics								
Program: B. Tech CE/CS/IT				**Subject Code: SS0301**			**Semester: III**	
Teaching Scheme (Hours per week)				**Examination Evaluation Scheme (Marks)**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
2	0	0	2	0	0	100	0	100

Course Objectives:

1. To Facilitates arriving at correct decisions because, correct decisions formbasis for success anywhere and in any venture.
2. To decode Success.
3. To achieve Emotional stability through righteous earning of wealth.
4. To understand and discriminate between ethical and unethical practices.
5. To study moral issues and critical decision making.
6. To understand the role of ethics in promoting sustainable

Course Contents:

Music with invocation of thought process, Decoding success: Skill or a trait or both?, Decoding self to decode success, Understanding Self-Confidence, Self- respect, Self-esteem, False prestige towards removal of Identity crisis, Components of self (mind, body, spirit), Idea of self (Which of the three am I?), Mind and conscience, Psychosomatic (mind over matter) effect and disease, Effect of ethics and values on well being, Handling insecurity, anxiety and pressure, Handling failures, guilt, Status and success, Success redefined., Happiness being the key to success and not vice-versa, From self to society to global-sustainability.

Course Outcomes:

CO1: Identify the ways to decode success and redefining it for global sustainability [BT-1]

CO2: Understand the Difference between the ethical and unethical practices in surrounding and explore the reasons behind them.[BT-2]

CO3: Apply correct decisions to form basis for success in all ventures of life[BT-3]

CO4: Analyse various components of self (mind, body, soul) [BT-4]

CO5: Estimate the Emotional stability through righteous earning of wealth[BT5]

CO6: Develop the thought process for promoting sustainable practices in multiple domains of life and society. [BT6]

Books:

1) The Mahabharata box set - Bibek Debroy, ISBN-13: 978-0143424789

2) The Valmiki Ramayana, Set of 3 Vols - Bibek Debroy, ISBN-13: 978-0143441144

3) Honest truth of dishonesty Dan Ariely, Harper (2012), ISBN: 0062183591 / 9780062183590

4) "Seven Spiritual Laws of Success", Deepak Chopra, Amber-Allen Publisher, ISBN: 9782290339954

5) "The Vedas and Upanishads for Children", Roopa pai,Hachette India, ISBN:9789351952961

6) The Gita : for Children - Roopa Pai, Hachette India Local; Latest edition, ISBN: 9789351950127

7) Go for Growth, Narsinhbhai K Patel, Ahmedabad Management Association

8) Be a Winner, Narsinhbhai K Patel, Ahmedabad Management Association

9) Swadharma: Puranic stories for childrena

10) Pearls of Wisdom from Hinduism – Nicholas Sutton and Hanuman Dass

11) The Power of Dharma: The Universal Moral Principle - Nicholas Sutton andHanuman Dass

10) Two Vedic Tales: Stories from The Mahabharata and the Puranas

11) Inside Job (documentary) - Matt Damon (Actor), Gylfi Zoega (Actor), & 1More Rated: U/A (Parental Guidance) Format: Blu-ray

12) Ethical and Spiritual Values in Indian Scriptures - Ved Prakash Bhatia

13) The Upanishads Demystified : Ethical values - Ved Prakash Bhatia

14) Lying - Sam Harris

15) Free Will - Sam Harris

16) Deep Work: Rules for Focused Success in a Distracted World Paperback –Cal Newport

17) The Elephant in the Brain: Hidden Motives in Everyday Life - Kevin Simlerand Robin Hanson

18) Trust Me I'm Lying: Confessions of a Media Manipulator - Ryan Holiday

19) Who's in Charge?: Free Will and the Science of the Brain - Michael S.Gazzaniga

20) The Ethical Brain: The Science of Our Moral Dilemmas - Michael S.Gazzaniga

21) Misbehaving Paperback – by Richard H Thaler

Computer Engineering Department, Indus Institute of Engineering & Technology, Indus University

Program - B. Tech (Computer Engineering/Computer Science & Engineering/Information Technology)

SEMESTER - IV
Sr. No.		**Name of the subject**	**Credit**	colspan="4"	**Teaching Scheme**				colspan="4"	**Evaluation Scheme**		**Segment**
				(per week)				**Theory**		**Practical**		**Total**	
								CIE	**ESE**	**CIE**	**ESE**	**Marks**	
				Th.	**Tut.**	**Pr.**	**Tot. (hr.)**	**Th.**	**Th.**	**Pr.**	**Pr.**		
1	CE0425	ICT Tools and Technology	2	0	1	2	3	0	0	100	0	100	ES
2	CE0417	Data Structure & Algorithms	4	3	0	2	5	60	40	60	40	200	Core
3	CE0418	Operating System	4	3	0	2	5	60	40	60	40	200	Core
4	BB0311	Management for Engineers	2	2	0	0	2	60	40	0	0	100	HS
5	CE0421	Core Java Programming	4	3	0	2	5	60	40	60	40	200	Core
6		*Open Elective 4*	3	3	0	0	3	60	40	0	0	100	OE
7		*Open Elective 5*	3	3	0	0	3	60	40	0	0	100	OE
		TOTAL	22	17	1	8	26	360	240	280	120	1000	

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Subject: ICT Tools and Technology

Program: B. Tech CE/CS/IT			Subject Code: CE0425				Semester: IV

Teaching Scheme (Hours per week)				Examination Evaluation Scheme (Marks)				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
0	1	2	2	0	0	0	100	100

Course Objectives:

1. To understand, learn and implement ICT tools for Quizzing, Creative creations-animations, presentations that enhance the employability skills of students.

2. To familiarize the concept of Office Automation Tools and Technologies

3. To explore open source software, freeware, application software that helps in skill development.

4. To gain knowledge of Virtual labs and Virtual Reality in Learning.

5. Exposure of various educational Resources in learning and Online Certification Courses that enhances entrepreneurship skills in students.

CONTENTS

Information and Communication Technology(ICT)- Introduction, models of access to ICT, advantages and Disadvantages of ICT tools, Key issues to remember concerning to the importance of ICT in education, ICT tools for developing literacy, ICT tools for Quizzing/Testing/Gaming-Google forms, BookWidgets, Classmarker, Educaplay, ICT tool for presentation-Prezi, ICT tools for creative creations-Wordle, Canva, ICT tools for online collaboration-Google spreadsheets, Google docs, ICT tools for Brainstorm/Organizing-Xmind, Timeglinder, other important tools for ICT-Diiigo, iRubric, PDF-splitter, merger, converter.

Office Automation Tools and Technologies- Document Editor - Mail merge with E-mail address lists /Databases Spreadsheet – Referencing, Relative, Absolute and Mixed, Various charts in detail, VLOOKUP, HLOOKUP, Pivot Table Use of E-mail clients – MS Outlook, Mozilla Thunderbird- Installation and Configuration.

Open Source Software-The philosophy of OSS, commercial software vs OSS, free software vs freeware,**OSI-approved Open Source License:** Introduction to Python, Installation and Working with Python, Writing and executing python programs, comments, keywords, identifiers, built - in data types, variables, literals, sequences, sets, operators, precedence and associativity , type conversion, expression evaluation, simple input - output statements**.**Control Statements, Strings: creating, indexing, slicing, manipulating, operations, testing methods, Lists, Tuples and Dictionaries: creating, indexing, slicing, manipulating, operations, methods.

Pedagogical integration of emerging ICT strategy in Learning-Techniques for various learning Mode, Integration of Open Educational Resources, Virtual Labs, Video Tutorial & Interactive Video Tutorial, Virtual Reality in Teaching and Learning, Integration of Open Educational Resources for Research Blended and Flipped Learning, Online Certification Courses- MOOC, Udemy, Coursera, NPTEL- Swayam portal.

Course Outcomes:

At the end of this subject, students should be able to:

1. Demonstrate their ability to use the state of the art technologies and tools including Free and Open Source Software (FOSS) tools in developing software.
2. Apply current techniques, skills and modern engineering tools necessary for computing practice.
3. Analyze the factors for designing new system software.
4. Identify and apply for certification courses on various online platforms that enhance employability skills of students.
5. Foster innovation in design of products, processes or systems by using different tools and technologies.
6. Distinguish different software into different categories.

Reference Books:

1. Information and Communication Technologies and Real-Life Learning 2005 Edition Springer Publication by Tom van Weert Arthur Tatnall.
2. Towards Engineering Free/Libre Open Source Software (FLOSS) Ecosystems for Impact and Sustainability by Fitzgerald, Brian, Mockus, Audris, Zhou, Minghui.
3. Open Sources: Voices from the Open Source Revolution 1st Edition January 1999.

4. Advances in Information and Communication Technologies by Editors: Ilchenko, Mykhailo, Uryvsky, Leonid, Globa, Larysa (Eds.)

5. John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India

Web Resources:

1. https://onlinecourses.swayam2.ac.in/ntr20_ed04/preview

2.https://www.researchgate.net/publication/309740093_Blended_learning_pedagogy_learning_styles_and_assessment_activities_in_the_classroom

LIST OF EXPERIMENTS

Experiment No.	Title	Learning Outcomes
1	Prepare a MCQ based questionnaire on health and fitness using Google Forms.	CO -1,3
2	Make a presentation using Prezi tool on any given topic	CO-2,5
3	Prepare a memory game / crossword puzzles/ word search using Educaplay	CO -1,3
4	Make a photo collage and an animated video with transition effects using Canva.	CO-1,3
5	Install and configure Mozilla Thunderbird.	CO-2,5
6	Prepare an assignment using Mail Merge. You are required to write a cover letter that describes your professional qualifications for a job as Assistant Engineer. Please limit your cover letter to one page, and your number of addresses in the data source file to 15.	CO-5
7	Write a Python program to print the calendar of a given month and year.	CO-1,6

8	Write a Python program to check whether a specified value is contained in a group of values. Test Data : 3 -> [1, 5, 8, 3] : True -1 -> [1, 5, 8, 3] : False	CO-2,3
9	Write a Python program which accepts a sequence of comma-separated numbers from user and generate a list and a tuple with those numbers.	CO-2,6
10	Write a Python program to display the first and last colors from the following list.[orange, purple, red, yellow, blue]	CO-1,3
11	Explore V labs-IIT Bombay and IIT-KGP	CO-4
12	One Online certification course on Udemy/ Coursera/ NPTEL.	CO-4

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		Constituent Institute of Indus University		

Subject: Data Structure & Algorithms

Program: B. Tech CE/CS/IT				Subject Code: CE0417			Semester: IV	
Teaching Scheme (Hours per week)				**Examination Evaluation Scheme (Marks)**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	40	40	60	60	200

Course Objectives:

1. To enable an efficient storage of data for an easy access.
2. To understand concepts about searching and sorting techniques
3. To empower the student in writing algorithms to solve problems using step by step approach with the help of fundamental data structures.
4. To develop skills in data protection and management.
5. To enhance skills to pick out the underlying algorithms in real-world problems and solve them efficiently.

CONTENTS

UNIT-I

[12 Hours]

INTRODUCTION TO DATA STRUCTURE:
Definition, classification of data structure, Examples of data structure. Searching and Sorting: Various sorting techniques: Selection sort -bubble sort -Quick sort, Merge sorting. Sequential searching, Binary searching.

UNIT-II

[12 Hours]

LINEAR DATA STRUCTURE:
Representation of arrays, Applications of arrays, Stack: Stack-Definitions & Concepts, Operations On Stacks, Applications of Stacks, Polish Expression, Reverse Polish Expression And Their Compilation, Recursion, Tower of Hanoi, Queue: Representation Of Queue, Operations On Queue, Circular Queue, Priority Queue, Array, Double Ended Queue, Applications of Queue, Linked List: Singly Linked List, Doubly Linked list, Circular linked list ,Linked

implementation of Stack, Linked implementation of Queue, Applications of linked list.

UNIT-III

[12 Hours]

NONLINEAR DATA STRUCTURE:

Tree-Definitions and Concepts, Representation of binary tree, Binary tree traversal (In order, post order, preorder), Threaded binary tree, Binary search trees, Applications of Trees-Some balanced tree mechanism, e.g., AVL trees, 2-3 trees, Height Balanced, Weight Balance, Graph-MatrixRepresentation of Graphs, Elementary Graph operations, (Breadth First Search, Depth First Search, Spanning Trees, Shortest path, Minimal spanning tree)

UNIT-IV

[12 Hours]

HASHING AND FILE STRUCTURES:

Hashing: The symbol table, Hashing Functions, Collision-Resolution Techniques, File Structure: Concepts of fields, records and files, Sequential, Indexed and Relative/Random File Organization, Indexing structure for index files, hashing for direct files, Multi-Key file organization and access methods

Course Outcomes:

At the end of this subject, students should be able to:

1. Explain the significance of arrays, stacks, queues, linked lists, trees, heaps, graphs and Hash Tables are represented in the main memory and manipulated or used by different operations
2. Construct algorithms for performing operations on a datastructure, with an understanding of the trade-off between the time and space complexity.
3. Compare alternate implementations of an Abstract Data Type withrespect to their performance.
4. Illustrate various concepts like arrays, stacks, queues, linked lists, trees, heaps,Graphs and Hash Tables are used in various applications.
5. Analyze the computational efficiency of key searching, sorting and hashing algorithms
6. Choose appropriate data structures to solve realworld problems efficiently.

Text Books:

1. An Introduction to Data Structures with Applications. by Jean-Paul Tremblay & Paul G. Sorenson Publisher-Tata McGraw Hill.

Reference Books:

1. Data Structures using C & C++ -By Ten Baum Publisher Prentice-Hall International.
2. Fundamentals of Data Structures in C++-By Sartaj Sahani.
3. Classical Data Structure by D. Samantha. Pearson publication

Web Resources:

1. https://nptel.ac.in/courses/106102064/
2. https://www.edx.org/course/algorithms-and-data-structures-3

LIST OF EXPERIMENTS

Experiment. No.	Title	Learning Outcomes
1.1	Write a program to implement following searching algorithms. (1)Linear (2) Binary	To understand Searching Concept
1.2	Write a program to implement following sorting algorithms.(1)Bubble (2) Selection (3) Quick (4) Merge	To understand Sorting Concept
1.3	Write a program to implement following STACK operations. (1)PUSH (2) POP (3) PEEP (4) CHANGE (5) DISPLAY	To understand Searching Concept
1.4	Write a program to convert infix expression to postfix expression	Application of stack
1.5	Write a program to implement following QUEUE operations.(1)INSERT (2) DELETE (3) DISPLAY	To understand Queue Concept

1.6	Write a program to implement following CQUEUE operations. (1)INSERT (2) DELETE (3) DISPLAY	Application of Queue concept
1.7	Write a program to implement following operations of the singly linked list (SLL). (1) Insert a node at the front of the linked list. (2) Insert a node at the end of the linked list. (3) Insert a node such that linked list is in ascending order. (According to Info field)	Linked list concept
2.	**Practical 2**	
2.1	Write a program to implement following operations of the singly linked list (SLL). (1) Delete a first node of the linked list. (2) Delete a node before specified position. (3) Delete a node after specified position.	Linked list Implementation
2.2	Write a program to implement following operations of the doubly linked list (DLL). (1) Insert a node at the front of the linked list. (2) Insert a node at the end of the linked list.	Linked list Implementation
2.3.	Write a program to implement following operations of the doubly linked list (DLL). (1) Delete a last node of the linked list. (2) Delete a node before specified position	Linked list Implementation
2.4	Write a program to implement stack using linked list.	Implementation of stack using Linked list
2.5	Write a program to implement queue using linked list.	Implementation of Queue using Linked list
2.6	Write a program to implement binary tree traversals	Understanding of Tree Data structure

Subject: Operating System

Program: CE/CSE/IT				Subject Code:CE0418				Semester: IV

Teaching Scheme (Hours per week)				Examination Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)-Theory	Continuous Internal Evaluation (CIE)-Practical	Total
3	0	2	4	40	40	60	60	200

Course Objectives:

1. To understand the services provided by and the design of an operating system.
2. To understand the structure and organization of the file system.
3. To understand what a process is and how processes are synchronized and scheduled.
4. To understand different approaches to memory management.
5. Students should be able to use system calls for managing processes, memory and the file system.
6. Students should understand the data structures and algorithms used to implement an Operating System.

CONTENTS

UNIT-I

[**12 hours**]

Introduction to Operating System

Architecture of OS (Ex. Monolithic, Microkernel, Layered , Exo kernel), Operating system objectives and functions, Virtual Computers, Interaction of O. S. & hardware architecture, Evolution of operating systems, Batch, multiprogramming. Multitasking, Multiuser, parallel, distributed & real –time O.S., System calls, O. S. Shell, Linux Shell commands, Shell programming. Examples of O. S.: Linux, MS-Windows, Handheld OS.

Process Management

Process, Process description, Process states, Process control, Threads, Processes and Threads, Uniprocessor Scheduling: Types of scheduling, Scheduling algorithms: FCFS, SJF, Priority, Round Robin, UNIX Multi-level feedback queue scheduling, Thread Scheduling, Multiprocessor Scheduling concept, Real Time Scheduling concept

UNIT-II

[12 hours]

Concurrency

Principles of Concurrency, Critical Section problem, Mutual Exclusion H/W Support, software approaches, Semaphores and Mutex, Message Passing, Monitors, Classical Problems of Synchronization: Readers-Writers Problem, Producer Consumer Problem, Dining Philosopher problem

Deadlock:

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

UNIT-III

[12 hours]

Memory Management

Memory Management requirements, Memory partitioning: Fixed ,dynamic, partitioning, Contiguous memory allocation, Buddy System Memory allocation Strategies (First Fit, Best Fit, Worst Fit, Next Fit), Fragmentation, Swapping, Segmentation , Paging, Virtual Memory, Demand paging, Page Replacement Policies (FIFO, LRU, Optimal, clock) ,Thrashing.

I/O Management and Disk Scheduling

I/O Devices, Organization of I/O functions, Operating System Design issues, I/O Buffering, Disk Scheduling (FCFS, SCAN, C-SCAN, SSTF), Disk Caches.

UNIT-IV

[12 hours]

File Management

Overview, File Organization and access, File Directories, File Sharing, Security issues, Record Blocking, Secondary Storage Management.

Computer security & protection:

Security Threats, Attacks and assets, Intruders, Malicious software, Protection: Protection Policy and mechanisms, Authentications: Internal Access Authorizations, Implementations.

Course Outcomes:

At the end of this subject, students should be able to:

CO 1: Describe the general architecture of computers. [BT-2]

CO 2: Describe, contrast and compare differing structures for operating systems. [BT-4]

CO3: Understand and analyze theory and implementation of processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files. [BT-2,4]

CO 4: Run Linux commands. [BT-6]

CO 5: Understand background control command. [BT-2]

CO 6: Understand process scheduling in program. [BT-3]

Text Books:

1. Silberschatz, Galvin, and Gagne, "Operating System Concepts", By, Wiley India Pvt Ltd.
2. William Stallings, "Operating Systems Internals and Design Principles", By, Pearson Education.

Reference Books:

1. Andrew S. Tanenbaum, "Modern Operating Systems", By, Pearson Education.
2. Gary Nutt, "Operating Systems", By, Pearson Education.
3. Harvey M. Deital, "Operating Systems", By, Pearson Education.
4. Das Sumitabha," Unix Concepts and Applications", Tata McGraw Hill.

Web Resources:

1. https://whatis.techtarget.com/definition/operating-system-OS
2. https://www.tutorialspoint.com/operating_system/os_overview.htm
3. https://www.geeksforgeeks.org/introduction-of-operating-system-set-1/

LIST OF EXPERIMENTS

Experiment. No.	Basic Commands of Unix commands	Learning Outcomes
1.1	Explain UNIX Architecture. What are the features of UNIX?	Knowledge of Unix basics

1.2	$who $who am i $mkdir $cd $rmdir $touch $cat $cp $rm $pwd $mv $ls $lc $lf $chmod $expr $factor $units $bc $logname $id $uname $tty	Knowledge of basic Commands
1.3	$date $cmchk $dfspace $df $du $ulimit $passwd $banner $cal $file $wc $sort $grep $cut $dd $head $pg $lp $more $lpstat $cancel lp	Knowledge of basic Commands
1.4	$compress $man $uncompress $ps $nohup $kill $time $nice $at $mail $batch	Knowledge of basic Commands
2.	**Loops and Conditional statements in Shell programming**	Knowledge of Loops and Conditional statements
2.1	Write a shell script to input two no's from the user and perform addition, subtraction, multiplication, and division.	Knowledge of Loops and Conditional statements
2.2	The distance between two cities (in km.) is input through the keyboard. Write a shell script to convert and print distance in meters, feet, inches and centimetres.	Knowledge of Loops and Conditional statements
2.3.	Any integer is input through the keyboard. Write a shell script to find out whether it is an odd number or even number.	Knowledge of Loops and Conditional statements
2.4	Write a shell script which receives any year form the keyboard and determines whether the year is a leap year or not. If no argument is supplied the current year should be assumed.	Knowledge of Loops and Conditional statements
2.5	Write a shell script to find the factorial of any no entered through keyboard.	Knowledge of Loops and Conditional statements
3.	**Loops and Conditional statements in Shell programming**	

3.1	Write a shell script which will accept a number band display first n prime numbers as output.	Knowledge of Loops and Conditional statements
3.2	Write a shell script which will generate first nFibonacci numbers like: 1, 1, 2, 3, 5, 13,...	Knowledge of Loops and Conditional statements
3.3	Write a shell script to read n numbers as command arguments and sort them in descending order.	Knowledge of Loops and Conditional statements
3.4	Write a shell script to display all executable files, directories and zero sized files.	Knowledge of Loops and Conditional statements
3.5	Write a shell script to fetch data from a file and display data into another file in reverse order.	Knowledge of Loops and Conditional statements
3.6	Display calendar of current month Display today's date and time Display usernames those are currently logged in the system Display your name at given x, y position.	Knowledge of Loops and Conditional statements
3.7	Write a shell script to print the series 1, 3, 5, 7, 9, ……., N. Write a program to print all prime no's from 1 to 300. (Hint – Use Nested Loops, break and continue) Write a shell script which deletes all lines containing the word unix in the files as arguments to this shell script.	Knowledge of Loops and Conditional statements
4	**ARRAY in Shell programming**	

4.1	Given the number N which represents the number of rows and columns, print the different following patterns.	Knowledge of Array in Shell programming
4.2	1 1 2 1 2 3 1 2 3 4 1 2 3 4 5	Knowledge of Array in Shell programming
4.3	# ### ##### ####### ######### ########### #############	Knowledge of Array in Shell programming
4.4	1 2 2 3 3 3 4 4 4 4 5 5 5 5 5	Knowledge of Array in Shell programming
5.	**String in Shell programming**	
5.1	Write a menu driven shell script to perform the following string operations. Compare Two Strings Join Two Strings Find The Length of a Given String Occurrence of Character and Words Reverse the string.	Knowledge of String in Shell programming

5.2	Write a shell script to validate the entered date. (eg. Date format is : dd-mm-yyyy) Write an awk program using function, which convert each word in a given text into capital.Write a program for process creation using C. (Use of gcc compiler).	Knowledge of String in Shell programming
5.3	Write a shell script to check entered string is palindrome or not.. Shell programming using filters (including grep, egrep, fgrep)Study of Unix Shell and Environment Variables.	Knowledge of String in Shell programming
6.	**File in Shell programming**	
6.1	Write a shell script which receives two file names as arguments. It should check whether the two file's contents are same or not. If same then the second file should be deleted	Knowledge of File in Shell programming

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Subject: Management for Engineers								
Program: B. Tech CE/CSE/IT				**Subject Code: BB0311**			**Semester: IV**	
Teaching Scheme (Hours per week)				**Examination Evaluation Scheme (Marks)**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
2	0	0	2	40	0	60	0	100

Course Objectives:

1. Techniques relating to managing engineering activities, engineer's transition into management, engineering managerial functions, motivation of individual and group behavior.
2. Productivity assessment/improvement.
3. Managing the quality function and communications.

CONTENTS

UNIT-I

[7 hours]

Meaning, importance, skills and roles of manager, different levels of management. Functions of management, planning: nature, importance, steps, Organizing: Meaning, process, principles of organizing, staffing:-manpower planning, recruitment, selection, placement.

UNIT-II

[7 hours]

Leadership and Organizations Management, Strategic Planning, Budgeting, Project Planning - Risk Identification, Assessment and Response Planning

UNIT-III

[7 hours]

Management of Technology, Product Development and Innovation, Technical Entrepreneurship, Global Trade and International Operations, Operations Management

UNIT-IV

[7 hours]

Marketing Management:-the 4 p's of marketing, demand forecasting (concepts only), market segmentation. Financial management:-meaning, scope, functions, objectives, role of financial manager. Lean Systems, Intellectual Property, Legal Issues in Engineering Management, Principles of Ethics for Engineering Managers

Course Outcomes:

1. Able to know, comprehend, apply, analyze, synthesize and evaluate the basic principles of the fundamentals of managing technical organizations.

2. Prepare for further study in the area of engineering technology management.

3. Able to identify and apply appropriate management techniques for managing contemporary organizations.

4. Have an understanding of the skills, abilities, and tools needed to obtain a job on a management track in an organization of their choice.

Text Books:

1. Principles of Management by PC Tripathi & Reddy.
2. Management –I by Stephen P. Robbins& Stoner.
3. Management-II BY Kotler,Stoner

Reference Books:

1. L. M. Prasad; Principles of Management; Sultan Chand and Sons
2. Karminder Ghuman and K. Aswathapa; Management – Concept

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Subject: Core Java Programming

Program: B. Tech CE/CS/IT			Subject Code: CE0421				Semester: IV

Teaching Scheme (Hours per week)				Examination Evaluation Scheme (Marks)				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	40	40	60	60	200

Course Objectives:

1. To understand object oriented programming concepts and implement in java.
2. Comprehend building blocks of OOPs language, inheritance, package and interfaces.
3. Identify exception handling methods.
4. Implement multithreading in object oriented programs.
5. Prepare UML diagrams for software system
6. To enhance the programming skills of students into field of Java Programming and to create their interest in the same field.

CONTENTS

UNIT-I

[12 Hours]

Basics of Java:
Features of Java, Byte Code and Java Virtual Machine, JDK, Data types, Operator, Control Statements – If , else, nested if, if-else ladders, Switch, while, do-while, for, for-each, break, continue.

Array and String: Single and Multidimensional Array, String class, StringBuffer class, Operations on string, Command line argument, Use of Wrapper Class.

Classes, Objects and Methods: Class, Object, Object reference, Constructor, Constructor Overloading, Method Overloading, Recursion, Passing and Returning object form Method, new operator, this and static keyword, finalize() method, Access control, modifiers, Nested class, Inner class, Anonymous inner class, Abstract class.

UNIT-II

[12 Hours]

Inheritance and Interfaces:
Use of Inheritance, Inheriting Data members and Methods, constructor in inheritance, Multilevel Inheritance – method overriding Handle multilevel constructors – super keyword, Stop Inheritance - Final keywords, Creation and Implementation of an interface, Interface reference, instanceof operator, Interface inheritance, Dynamic method dispatch ,Understanding of Java Object Class, Comparison between Abstract Class and interface, Understanding of System.out.println –statement **Package:** Use of Package, CLASSPATH, Import statement, Static import, Access control.
Exception Handling: Exception and Error, Use of try, catch, throw, throws and finally, Built in Exception, Custom exception, Throwable Class.

UNIT-III

[12 Hours]

Networking with java.net:
InetAddress class, Socket class, DatagramSocket class, DatagramPacket class.

IO Programming: Introduction to Stream, Byte Stream, Character stream, Readers and Writers, File Class, File InputStream, File Output Stream, InputStreamReader, OutputStreamWriter, FileReader, FileWriter, Buffered Reader.

Collection Classes: List, AbstractList, ArrayList, LinkedList, Enumeration, Vector, Properties, Introuduction to Java.util package.

UNIT-IV

[12 Hours]

Multithreaded Programming:
Use of Multithread programming, Thread class and Runnable interface, Thread priority, Thread synchronization, Thread communication, Deadlock.

Generics: Generics Fundamentals, Bounded Types, Using wildcard arguments & bounded wildcards, Generic methods, constructors, class hierarchies & Interfaces.

Applets: Applet basics, complete skeleton, initialization & termination, repainting, Using status window & passing parameters to applets.

Course Outcome:

After successful completion of the course, student will able to:

1. Apply the object oriented concepts for the given problem and   able to do work in OOP Concept technology.
2. Use and create packages in a java program and manage project web classes in

proper order.

3. Create applet application as per customer requirement and develop skill in desktop application development.

4. Use exceptions, threads, collections, logs of Java for the given problem. So they can able design user friendly application.

5. Use graphical user interface using applet in Java programs and able to work in GUI design requirement in industry.

6. Understand and know about basic knowledge of different java framework and able to select future way of interested framework.

Text Books:

l) Java Fundamentals, A comprehensive introduction by Herbert Schildt, Dale Skrien, McGraw Hill Education, First Edition, 2013, ISBN 13:978125900659

Reference Books:

1) Programming with Java A Primer – E.Balaguruswamy, McGrawhill, 4th Edition, 2009,ISBN

 - 9780070141698

2) The Complete Reference, Java 2 Herbert Schildt, TMH, 7th Edition, 2007, ISBN: 978-0-07- 163177-8

3) Core Java Volume-I Fundamentals Horstmann & Cornell, - Pearson Education, 8th Edition, 2008, ISBN -9780132354769

4) Object Oriented Modeling and Design with UML Michael Blaha and James Rambaugh – Pearson Publication, 2nd Edition, 2005, ISBN -9780131968592

5) UML Distilled: A Brief Guide to the Standard Object Modeling Language by Martin Fowle, 3rd Edition, 2004, ISBN -0321193687

Web Resources:

1. OOP, Basic of Java:

  http://www.nptelvideos.com/java/java_video_lectures_tutorials.php

2. Exceptions and Functions:

  http://www.nptelvideos.com/java/java_video_lectures_tutorials.php?pn=1

3. Multithreading:

  http://www.learnerstv.com/Free-Computers-Video-lectures-ltv006-Page1.htm

 4. Networking Basics:

  http://nptel.ac.in/courses/106105084/

LIST OF EXPERIMENTS

Experiment No.	Title	Learning Outcomes
1	Steps to compile and run JAVA program, program to print "Hello" on the console (Command Prompt). object oriented concepts	Basic concept of JAVA programming
2	User input as command line argument	Concept of command line
3	Programs on Objects and classes	Concept of object and class
4	String operations using Java, difference between String and String Buffer	Concept of string
5	Constructor overloading and variable overriding	Concept of overloading
6	Static keyword in java, Access Modifiers in Java	Concept of access specifier
7	Programs on Inheritance	Inheritance
8	Programs on Interface	Interface
9	Package based application and need of package	Package
10	Exception Handling and Exception generation in Java	Exception handling
11	Programs on Multithreading	Threading
12	Buffered Reader, Buffered Writer, Random Access File, Object I/O, Applications of File I/O	Concept of I/O
13	Programs on Collection classes	Collection class
14	Generics	Generics
15	Applet Life Cycle, Graphics and Shapes in Applet using java.awt.* package classes	Applet

Computer Engineering Department, Indus Institute of Engineering & Technology, Indus University

Program - B. Tech (Information Technology)

SEMESTER - V													
Sr. No.		Name of the subject	Credit	**Teaching Scheme**				**Evaluation Scheme**					Segment
				(per week)				**Theory**		**Practical**		**Total**	
								CIE	ESE	CIE	ESE	**Marks**	
				Th.	Tut.	Pr.	Tot (hr.)	Th.	Th.	Pr.	Pr.		
1	CE0516	Design and Analysis of Algorithms	4	3	0	2	5	60	40	60	40	200	Core
2	IT0501	Computer Graphics	4	3	0	2	5	60	40	60	40	200	Core
3	CE0518	Computer Networks	4	3	0	2	5	60	40	60	40	200	Core
4		*Open Elective 6*	3	3	0	0	3	60	40	0	0	100	OE
5	CE0525	Programming for Scientific Computing (Python)	4	3	0	2	5	60	40	60	40	200	Core
6	CE0522	Web Technology	4	3	0	2	5	60	40	60	40	200	Core
7	CE0523	Internship Credit /Online courses/ MOOC	2	0	0	0	0	0	0	100	0	100	IC
		Total	25	18	0	10	28	360	240	400	200	1200	

	INDUS INSTITUTE OF TECHNOLOGY& ENGINEERING
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Subject: Design and Analysis of Algorithms							
Program: B. Tech CE/CS/IT				Subject Code: CE0516			Semester: V
Teaching Scheme (Hours per week)				Examination Evaluation Scheme (Marks)			
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)-Theory	Continuous Internal Evaluation (CIE)-Practical	Total
3	-	2	4	40	40	60	60	200

Course Objectives:

1. To be able to analyze algorithms by working out complexity of algorithms.
2. To understand alternate methods of writing algorithms under various categories, such as Divide-and-Conquer, Dynamic Programming, Greedy Methods, Backtracking, Branch & Bound, etc.
3. To understand the basics of P, NP, and NP Complete problems
4. To develop skills in problem solving and programming.

CONTENTS

UNIT-I

[12 hours]

Basics of Algorithms and Mathematics:
What is an algorithm? Mathematics for Algorithmic Sets, Functions and Relations,Vectors and Matrices, Linear Inequalities and Linear Equations.

Analysis of Algorithm:
The efficient algorithm, Best, Average and Worst case analysis, Elementary operation,Asymptotic Notation, Analyzing control statement, Amortized analysis, Sorting Algorithm, Binary Tree Search.

Divide and Conquer Algorithm:
Introduction, Multiplying large Integers Problem, Problem Solving using divide and conquer algorithm - Binary Search, Sorting (Merge Sort, Quick Sort), Matrix Multiplication, Exponential.

Greedy Algorithm:
General Characteristics of greedy algorithms, Problem solving using Greedy Algorithm - Activity selection problem, Elements of Greedy Strategy, Minimum Spanning trees (Kruskal's algorithm, Prim's algorithm), Graphs: Shortest paths, The Knapsack Problem, Job Scheduling Problem.

UNIT-III

[12 hours]

Dynamic Programming:
Introduction, The Principle of Optimality, Problem Solving using Dynamic Programming – Calculating the Binomial Coefficient, Making Change Problem, Assembly Line-Scheduling, Knapsack problem, Shortest path, Matrix chain multiplication, Longest Common Subsequence.

Exploring Graphs:
An introduction using graphs and games, Undirected Graph, Directed Graph, Depth First Search, Breath First Search, Backtracking and Branch & Bound– The Knapsack Problem, The Eight Queens problem.

UNIT-IV

[12 hours]

String Matching:
Introduction, The naive string matching algorithm, The Rabin-Karp algorithm, String Matching with finite automata.

Introduction to NP-Completeness:
The class P and NP, Polynomial reduction, NP- Completeness Problem, NP-Hard Problems.

Course Outcomes

At the end of this course, students should be able to:
1. Analyze the asymptotic performance of algorithms.
2. Derive and solve recurrences describing the performance of divide-and-conquer
   algorithms.

3. Find optimal solution by applying various methods.
4. Apply pattern matching algorithms to find particular pattern.
5. Differentiate polynomial and non polynomial problems.
6. Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate.

Text Books:

1. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivestand Clifford Stein, PHI., Third edition,2009, ISBN-13:9780262033848
2. Fundamental of Algorithms by Gills Brassard, Paul Bratley. First Edition,1995, ISBN-13: 978-0133350685

Reference Books:

1. Introduction to Design and Analysis of Algorithms, Anany Levitin, Pearson publication, 2nd Edition, 2009, ISBN - 9788131718377

Web Resources:

1. https://onlinecourses.nptel.ac.in/noc17_cs20/preview
2. http://freevideolectures.com/Course/2281/Design-and-Analysis-of-Algorithms/6
3. http://www.nptelvideos.in/2012/11/design-analysis-of-algorithms.html
4. http://www.nptelvideos.com/video.php?id=1444

LIST OF EXPERIMENTS

Experiment No.	Title	Learning Outcomes
1	Implementation and Time analysis of linear and binary search algorithm.	Efficient searching method
2	Implementation and Time analysis of sorting algorithms : Bubble sort, Selection sort and Quicksort	Efficient Sorting Method
3	Implementation and Time analysis of factorial program using iterative and recursive method.	Time Analysis of iterative and recursive method
4	Implement Prim's algorithm	Greedy Approach
5	Implement Kruskal's algorithm.	Greedy Approach
6	Implementation of a knapsack problem using dynamic programming.	Dynamic Programming

7	Implementation of matrix chain multiplication using dynamic programming.	Dynamic Programming
8	Implementation of making a change problem using dynamic programming	Dynamic Programming
9	Implementation of Graph and Searching (DFS and BFS).	Graph Traversal
10	Implement LCS problem.	Dynamic programming

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Subject: Computer Graphics			

Program: B. Tech IT			**Subject Code: IT0501**			**Semester: V**

Teaching Scheme (Hours per week)				**Examination Evaluation Scheme (Marks)**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	40	40	60	60	200

Course Objectives:

1. To understand various aspects of computer graphics for the student skill development.
2. To apply the working of basic drawing and rendering algorithms in 2D & 3D
3. To design and create various components in 2D and 3D.
4. To understand various aspects of computer visualization.
5. To understand and apply fundamental concepts within information visualization.
6. To understand and apply current trends of computer graphics in real scenarios for employability and entrepreneurship.

CONTENTS

UNIT-I

[12 hours]

Basic of Computer Graphics
Basic of Computer Graphics, Applications of computer graphics, Display devices, Random and Raster scan systems, Graphics input devices, Graphics software and standards.

UNIT-II

[12 hours]

Graphics Primitives
Points, lines, circles and ellipses as primitives, scan conversion algorithms for primitives, Fill area primitives including scan-line polygon filling, inside-outside test, boundary and flood-fill, character generation, line attributes, area-fill attributes, character attributes.

2D transformation and viewing

Transformations (translation, rotation, scaling), matrix representation, homogeneous coordinates, composite transformations, reflection and shearing, viewing pipeline and coordinates system, window-to-viewport transformation, clipping including Point clipping, Line clipping (Cohen-Sutherland, Liang- Barsky, NLN), Polygon clipping.

UNIT-III

[12 hours]

3D transformation and viewing
3D scaling, rotation and translation, composite transformation, viewing pipeline and coordinates, parallel and perspective transformation, view volume and general (parallel and perspective) projection transformations.

3D concepts and object representation
3D display methods, polygon surfaces, tables, equations, meshes, curved lies and surfaces, quadric surfaces, spline representation, cubic spline interpolation methods, Bazier curves and surfaces, B-spline curves and surfaces

UNIT-IV

[12 hours]

Advance topics
Visible surface detection concepts, back-face detection, depth buffer method, illumination, light sources, illumination methods (ambient, diffuse reflection, specular reflection), Color models: properties of light, XYZ, RGB, YIQ and CMY color models.

OpenGL:
The OpenGL API, Primitives and attributes

Course Outcomes:

At the end of this subject, students should be able to:

1. List the basic concepts used in computer graphics.
2. Implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.
3. Describe the importance of viewing and projections
4. Learn about basic animations in computer graphics.

5. Learn about how to render and create 2D and 3D objects.
6. Apply knowledge of computer graphics in real time scenarios.

Text Books:

1. Computer Graphics by D.Hearn And P.Baker , Pearson Eduction - C Version
2. Computer Graphics, with OpenGL by Hearn and Baker, Pearson

Reference Books:

1. Computer Graphics by Sinha & Udai, Tata Macgraw Hill
2. Computer Graphics by Foley and Van Dam by Person Education.

Web Resources:

1. https://www.tutorialspoint.com/computer_graphics/

LIST OF EXPERIMENTS

Experiment. No.	Title	Learning Outcomes
1.1	To study the various graphics commands in C language.	Basic knowledge of graphics
1.2	Develop a drawing using various graphics commands in C language	Usage of basic commands
1.3	Develop the DDA Line drawing algorithm using C language	Learn to draw line using algorithm
1.4	Develop the Bresenham's Line drawing algorithm using C language	Learn to draw line using algorithm
1.5	Develop the Bresenham's Circle drawing algorithm using C language	Learn to draw circle using algorithm
2.	**2D transformation and viewing**	

2.1	Implement Boundary-Fill algorithm to fill a polygon.	Learn to fill polygon
2.2	Implement Flood-Fill algorithm to fill a polygon.	Learn to fill polygon
2.3.	Implement algorithm for Character generation	Learn to generate character
2.4	Implement Cohen-Sutherland line clipping algorithm.	Learn to implement clipping algorithm
3.	**OpenGL**	
3.1	Introduction to OpenGL	Intro to Open GL
3.2	Basics of OpenGL	Basics of OpenGL
3.3	Generate a small graphical application based program in C Language.	Application based

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Subject: Computer Networks						
Program: B. Tech Computer Engineering				**Subject Code: CE0518**		**Semester: V**
Teaching Scheme (Hours per week)				**Examination Evaluation Scheme (Marks)**		

Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	40	40	60	60	200

Course Objectives:

1. To understands the significance and concepts of the layered model for computer networking.
2. Provides knowledge about computer network related hardware and software using a layered architecture.
3. Identify basic protocols and design issues for layered model.
4. Seeking employment that will allow use of troubleshooting and analysis skills.
5. The emphasis of the course will be developing skills in the concepts and the engineering trade-offs involved in the working of the network protocols.

CONTENTS

UNIT-I

[12 hours]

Introduction to Computer Networks:

Basics of Data Communication System and its components, Computer network and its goals, Types of computer networks: LAN, MAN, WAN, Wireless networks, Transmission media, Network software: concept of layers, protocols, interfaces and services, ISO-OSI reference model, TCP/IP reference model.

Data Link Layer:

Design issues, Framing, Types of Errors, Error detection and correction codes: checksum, CRC, hamming code, Data link protocols for noisy and noiseless channels, Sliding Window Protocols: Stop & Wait ARQ, Go-back-N ARQ, Selective repeat ARQ. Data link protocols: HDLC and PPP.

UNIT-II

[12 hours]

Medium Access Sub-Layer:
Static and dynamic channel allocation, Random Access: ALOHA, CSMA protocols, Controlled Access: Polling, Token Passing, IEEE 802.3 frame format, Ethernet cabling, Manchester encoding, collision detection in 802.3, Binary exponential back off algorithm.

UNIT-III

[12 hours]

Network Layer:
Design issues, IPv4 classful and classless addressing, subnetting, Protocols: IP, ARP, RARP, ICMP, Routing algorithms: distance vector and link state routing, shortest path algorithm, Routing protocols: IGMP, OSPF, RIP, BGP, flooding, Congestion control: Principles of Congestion Control, Congestionprevention policies, Leaky bucket and token bucket algorithms.

UNIT-IV

[12 hours]

Transport Layer:
Elements of transport protocols, introduction to TCP/UDP protocols and their comparison. The TCP Service Model, The TCP Segment Header, The Connection Establishment, The TCP Connection Release, The TCP Connection Management Modeling, The TCP Sliding Window.

Application Layer:
Hyper Text Transfer Protocol (HTTP), Domain Name System (DNS), File Transfer Protocol (FTP), Dynamic Host Configure Protocol (DHCP)

Course Outcomes:

At the end of this subject, students should be able to:

1. Independently understand basic computer network technology.
2. Understand and explain Data Communications System and its components.
3. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
4. Identify the different types of network devices and their functions within a network
5. Understand and building the skills of subnetting and routing mechanisms.
6. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

Text Books:

1. Data Communications and Networking, Fourth Edition by Behrouza A. Forouzan, TMH.
2. Computer Networks, A.S. Tanenbaum, 4th edition, Pearson education.

Reference Books:

1. Computer Network, Natalia Olifer, Victor Olifer, Wiley-India edition.
2. Data and computer communication, William Stallings, Pearson
3. Local area Networks by Peter Hudson

Web Resources:

1. https://www.youtube.com/watch?v=UXMIxCYZu8o
2. https://youtu.be/pVl1L1jrbFE
3. https://youtu.be/AmlOSGYkKXc

LIST OF EXPERIMENTS

Experiment. No.	Title	Learning Outcomes
1	To study different types of topologies.	Know the various topologies
2	To study different category of networks.	Know different category of networks
3	To compare OSI and TCP/IP protocol model	Study OSI and TCP/IP model
4	To demonstrate Networking and Internetworking devices.(NIC, Switch, Hub, Router, Gateway, Repeater, Bridge, Cables)	Learn regarding various devices
5	Write a program which demonstrates the concept of bit stuffing.	To study the concept of bit stuffing
6	Write a program which demonstrates the concept of byte stuffing.	To study the concept of byte stuffing

7	Write a program which demonstrates the concept of Error Detection Methods like VRC, LRC.	To study the concept of LRC/VRC
8	Configuration of router in packet tracer.	To study the configuration of router
9	Simulation of RIP protocol in packet tracer.	To study the configuration of RIP protocol.
10	Simulation of OSPF protocol in packet tracer.	To study the configuration of OSPF protocol.
11	Simulation of BGP protocol in packet tracer.	To study the configuration of BGP protocol.
12	Write a program which demonstrates the concept of Parity Checking.	To study the configuration of error configuration.
13	Study of packet sniffing tools. (Wireshark, tcpdump)	To study concept of wireshark, tcpdump
14	To study RS-232 standard.	To learn RS 232 concepts.
15	Write a program which demonstrates the concept of Error Detection Method CRC.	To study the configuration of error detection.

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Subject: Programming for Scientific Computing (Python)								
Program: B. Tech CE/CS/IT				**Subject Code: CE0525**			**Semester: V**	
Teaching Scheme (Hours per week)				**Examination Evaluation Scheme (Marks)**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	40	40	60	60	200

Course Objectives:

1. Importance of Python as scientific computing tool which directly leads to employability.
2. To learn how to design and develop Python applications.
3. Skill development to apply mutable and immutable types.
4. To learn how to design object-oriented concepts in python.
5. Development of GUI based applications for entrepreneurship.
6. To learn how to build and package Python modules for reusability.

CONTENTS

UNIT-I

[12 hours]

Basic elements of Python, Branching, looping, Strings and Input, Iteration, Functions, Recursion, Global variables, Modules, Files, Structured Objects, Mutability: Strings, Tuples, Lists, Sets, Dictionaries, Functions as Objects, Mutability and Higher-Order Functions.

UNIT-II

[12 hours]

Object-Oriented Programming, Abstract Data Types and Classes, Encapsulation and Information Hiding, Simple Algorithms and Data structures, Regular Expressions – REs, Networking, Multithreading in Python.

UNIT-III

[12 hours]

Array computing and curve plotting, vectors and higher-dimensional arrays, matrices, numPy, sciPy and Matplotlib, Plotting using PyLab, Chat Application, Graphics and GUI Programming – Drawing using Turtle, Tkinter.

UNIT-IV

[12 hours]

Python Pandas - Data alignment, aggregation, summarization, computation and analysis with Pandas. Scientific computation using Python - Statistical data analysis, image processing, Basics of web development (Introduction to frameworks flask, Tensorflow).

Course Outcomes:

At the end of this subject, students should be able to:

1. Work with the Python standard libraries.
2. Implement mutability for various elements of Python.
3. Develop GUI based projects.
4. Design Networking configuration for chatting applications.
5. Implement Scientific Computing.
6. Solve real world problems using Python programming.

Text Books:

1. John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India
2. Hans Petter Langtangen, A Primer on Scientific Programming with Python

Reference Books:
1. Claus Fuhrer, Jan Erik Solem, Olivier Verdier, Scientific Computing with Python 3,Packt Publishing Limited
2. Martin C. Brown, Python: The Complete Reference, McGraw Hill Education R. Nageswara Rao, "Core Python Programming", dreamtech
3. Wesley J. Chun. "Core Python Programming - Second Edition", Prentice Hall
4. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, "Data Structures and Algorithms in Python", Wiley

5. Kenneth A. Lambert, "Fundamentals of Python – First Programs", CENGAGE Publication

Web Resources:

1) http:// https://www.edx.org/course/introduction-to-computer-science-and-programming-using-python-2

2) http://www.openculture.com/2017/05/learn-python-with-a-free-online-course-from-mit.html

3) https://www.edx.org/course/introduction-to-python-absolute-beginner-3

LIST OF EXPERIMENTS

Experiment. No.	Title	Learning Outcomes
1.1	Write a Python program to print the calendar of a given month and year.	CO1
1.2	Write a Python program to calculate number of days between two dates.	CO1
1.3	Write a Python program to check whether a specified value is contained in a group of values. *Test Data* : 3 -> [1, 5, 8, 3] : True -1 -> [1, 5, 8, 3] : False	CO1
1.4	Write a Python program to get OS name, platform and release information.	CO1
2.	**Mutable and Immutable types**	
2.1	Write a Python program which accepts a sequence of comma-separated numbers from user and generate a list and a tuple with those numbers.	CO2
2.2	Write a Python program to display the first and last colors from the following list.[orange, purple, red,yellow,blue]	CO2

2.3.	Write a Python program to concatenate all elements in a list into a string and return it.	
2.4	Write a Python program to print out a set containing all the colors from color_list_1 which are not present in color_list_2. *Test Data* : color_list_1 = set(["White", "Black", "Red"]) color_list_2 = set(["Red", "Green"]) *Expected Output* : {'Black', 'White'}	CO2
2.5	Write a Python script to print a dictionary where the keys are numbers between 1 and 15 (both included) and the values are square of keys. Sample Dictionary {1: 1, 2: 4, 3: 9, 4: 16, 5: 25, 6: 36, 7: 49, 8: 64, 9: 81, 10: 100, 11: 121, 12: 144, 13: 169, 14: 196, 15: 225}	CO2
2.6	Write a Python program to print all unique values in a dictionary. Sample Data : [{"V":"S001"}, {"V": "S002"}, {"VI": "S001"}, {"VI": "S005"}, {"VII":"S005"}, {"V":"S009"},{"VIII":"S007"}] Expected Output : Unique Values: {'S005', 'S002', 'S007', 'S001', 'S009'}	CO2
3.	**Data Structures, RE and Plots**	
3.1	Develop programs for data structure algorithms using python – searching, sorting and hash tables.	CO6
3.2	Write a Python Program that searches a string to see if it starts with "The" and ends with "Indus".	CO1
3.3	Write a Python Program that returns a match where the string contains a white space character.	CO1
3.4	Write a Python program that matches a string that has an a followed by three 'b'.	CO1
3.5	Develop chat room application using multithreading.	CO4
3.6	Perform basic plotting using the randomly generated data to plot graph using series and matplotlib.	CO1
3.7	Generate different types of bar plot and Pie plot to understand behavior of given data.	CO1

4	**Tkinter, turtle, flask**	
4.1	Create (1) Registration form (2) Quiz form using tkinter.	CO3
4.2	Draw (1) Square (2) Rectangle (3) Star patterns using Turtle.	CO3
4.3	Basics of Flask.	CO3
4.4	Basics of Tensor flow.	CO3
5.	**Numpy**	
5.1	Practicals based on Numpy statistical analysis.	CO5
6.	**Pandas**	
6.1	Practicals based on Pandas	CO1

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Subject: Web Technology				
Program: B Tech CE/CS/IT		**Subject Code: CE0522**		**Semester: V**
Teaching Scheme (Hours per week)			**Examination Evaluation Scheme (Marks)**	

Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	40	40	60	60	200

Course Objectives:

1. To provide and enrich students with knowledge, skills and practical experience on client side scripting and mark up languages.
2. To introduce the concepts and techniques of problem solving through structured modular approaches.
3. To develop the ability to logically plan and develop web pages.
4. To empower members to create web applications that depends on the Model-View-Controller Architecture.
5. To enhance the skills of good programming style and discipline.

CONTENTS

UNIT-I

[12 hours]

Introduction:

Concept of WWW, Internet and WWW, URL, HTTP Protocol, Web browser and Web servers

HTML:

Basics of HTML and Tags, Introduction to HTML5, Evolution of HTML5, HTML 5: Deprecated Tags and New Tags, Events, Forms, SVG, Web Storage, Canvas, Audio and Video

UNIT-II

CSS:

Basics of CSS , Introduction to CSS 3 , CSS 3 : Borders, Background, Text Effects , Fonts , Transformation , Transitions ,Animations , Multiple Columns , User Interface, Introduction to Boot Strap with CSS.

Java Script:

Introduction of Java Script, Variables, Conditions, Looping, functions, Events, Cookies. Advance Java Script: Java Script Objects, Error Handling, Validation , Animation and Multimedia.

UNIT-III

Angular JS:

Introduction , MVC Architecture , Directives , Expression , Controllers , Filters , Tables, HTML DOM , Modules , Forms ,AJAX , Scope and Services

Node JS:

Introduction, Callback Concept, Event Driven Programming, Buffers, Streams, File System, Object, Modules and RESTFul API.

UNIT-IV

PHP :

Introduction, Basic Syntax, Variables, Constants, Decision Making, Looping, Arrays, Strings, Functions, Web Concepts, GET & POST, Cookies, Sessions. Advance Concept: Regular Expression, Exception Handling, Forms, Object Oriented Programming with PHP.

MY SQL :

Introduction to PHP MyAdmin, Connection to MySQL server from PHP, execution of MySQL queries from PHP, receiving data from database server and processing it on web server using PHP. Web Hosting.

Course Outcomes:

At the end of this subject, students should be able to:

    1. Gain the knowledge of www including browser and HTTP protocol.
    2. Create dynamic web pages using a combination of HTML, CSS, and JavaScript, apply essential programming language concepts when creating HTML forms

3. Select an appropriate web hosting service, and publish your webpages for the world to see

4. To build dynamic web pages with usage of server-side scripting PHP and MySQL

5. Apply the knowledge of JavaScript/jQueryProgramming for interactive front-end web development

6. To provide employability skills such as write, test, and debug web pages using HTML and JavaScript.

Text Books:

1. Developing Web Application, Ralph Moseley, -Wiley India
2. Black Book, HTML 5, Dreamtech Press

Reference Books:

1. Black Book, Web Technologies, Dreamtech Press
2. Beginning Node.js Apress
3. Angular: Up and Running: Learning Angular, Step by Step, O'reilly

Web Resources

1. https://www.w3schools.com/html/default.asp

2. https://nptel.ac.in/courses/106105084/

3. https://www.tutorialspoint.com/nodejs/index.htm

4. https://www.tutorialspoint.com/angularjs/index.htm

LIST OF EXPERIMENTS

Experiment. No.	Title	Learning Outcomes
1.1	Introduction to web 3.0, website, web portal, domain name, networking concepts. Introduction to internet, hosting of website, server configurations and maintenance	Learn the concepts of Web.
1.2	Create a website layout using table structure which consist of space/locations for Logo, Search, News, Events, Content area, etc.	To study implementation of tags

1.3	Make resume with the help of Basic HTML Tags	To know various HTML tags and its use.
1.4	Write HTML Code to display student registration form.	To learn HTML functionalities
2.1	Use CSS in resume which was made using only HTML tags.	Know the concepts of CSS
2.2	Write the following styles in separate CSS file and also show how to link this CSS file in HTML file. (a) The headings should have normal font style and font size should be 120%. (b) Apply a background image "abcd.jpg". Write a paragraph about it and define a class arial for paragraph which defines font family.	To study the link between CSS and HTML
3.1	Write a Javascript code to build a calculator.	To learn Javascript coding concepts and usages
3.2	Write a Javascript program to calculate area of triangle and rectangle.	To learn Javascript coding concepts and usages
3.3.	Write a Javascript to take 2 digit number and then separate this two digits then multiply first digit by itself for second digit times.(Exa: 23, Output: 2 is multiply 3 times answer is: 8)	To learn Javascript coding concepts and usages
4.1	Create a basic Book Directory Project using Nodejs and APIs.	To study concepts of Nodejs and APIs
4.2	Using Angular JS features make a shopping list/To-do list where you can add or remove items.	To study concepts of Angular JS
5.1	PHP based web application to understand data retrieval on server side	To study concepts of server side programming
5.2	Include, require, date functions in php.	To learn use of php
5.3	Develop PHP web application using session and cookie.	To learn use of php
5.4	Understand PHP MyAdmin.	To learn use of php
5.5	Implement php application to store employee records in MySQL database	To learn use of php with database

5.6	Create a login application using session and Database.	To learn use of php with database
6.1	Minor Project	To learn how to work on real world Applications and project

Sr. No.		Name of the subject	Credit	Teaching Scheme (per week)				Evaluation Scheme				Total	Segment
								Theory		Practical			
								CIE	ESE	CIE	ESE	Marks	
				Th.	Tut.	Pr.	Total (hr.)	Th.	Th.	Pr.	Pr.		

Sr. No.		Name of the subject	Credit	Th.	Tut.	Pr.	Total (hr.)	CIE Th.	ESE Th.	CIE Pr.	ESE Pr.	Total Marks	Segment
		SEMESTER - VI											
1	IT0601	Software Testing & Quality Assurance	4	3	0	2	5	60	40	60	40	200	Core
2	IT0602	Big Data Analytics	4	3	0	2	5	60	40	60	40	200	Core
3	CE0630	Data Science	4	3	0	2	5	60	40	60	40	200	PE
	CE0631	Information Retrieval											
	CE0632	Web Data Management											
5	CE0618	Advanced Java Technology	4	3	0	2	5	60	40	60	40	200	PE
	CE0619	Advance .Net Framework											
	CE0628	Mobile Application Development (Android & iOS)											
6	CE0633	Distributed Systems	4	3	0	2	5	60	40	60	40	200	PE
	CE0634	Cryptography & Network Security											
	CE0629	Data Compression											
		Open Elective 7	3	3	0	0	3	60	40	0	0	100	OE
		Research Guided Seminar	2	0	2	0	2	100	0	0	0	0	HS
7	CE0622	Internet of Things	4	3	0	2	5	60	40	60	40	200	ES
		TOTAL	29	21	2	12	35	520	280	360	240	1300	

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Subject: Software Testing & Quality Assurance

Program: B. Tech Information Technology				Subject Code: IT0601			Semester: VI	

Teaching Scheme (Hours per week)				Examination Evaluation Scheme (Marks)				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
03	**00**	**02**	**04**	**40**	**40**	**60**	**60**	**200**

Course Objectives:

1. Understand software testing and quality assurance as a fundamental component of software life cycle.
2. To gain the skill development to apply different testing strategies and inspection techniques and to know how test tools can be used in the testing life cycle.
3. Learn how to do performance testing and usability testing.
4. Understand Systematic approach to the development, operation, testing and maintenance of software which help them in employability in industries and entrepreneurship.
5. Understand and discuss the benefits, needs and techniques of software reviews, software testing and configuration management.

CONTENTS

UNIT-I

Introduction to Software and Software Engineering   **[12 hours]**

The Evolving Role of Software, Software: A Crisis on the Horizon and Software Myths, Software Engineering: A Layered Technology, Software Process Models, The Linear Sequential Model, The Prototyping Model, The RAD Model, Evolutionary Process Models, Agile Process Model, Component-Based Development, Process, Product and Process.

Introduction to Software Testing

Need of testing, Basic concepts – errors, faults, defects, failures, Testing Principles, Goals, Testing Life Cycle – Roles and activities, Test Planning – forming a test team, develop test plan review, Test Plan (IEEE format), Strategic Approach to Software Testing , Verification and

Validation, Organizing for Software Testing , Software Testing Strategy—The Big Picture, Criteria for Completion of Testing , Strategic issues ,Test Strategies for Conventional Software

UNIT-II

Testing Principles   **[12 hours]**

Unit Testing ,Integration Testing ,Test Strategies for Object-Oriented Software ,Unit Testing in the OO Context ,Integration Testing in the OO Context ,Test Strategies for Web Apps ,Validation Testing , Validation- Test Criteria ,Configuration Review, Alpha and Beta Testing ,System Testing ,Recovery Testing ,Security Testing ,Stress Testing ,Performance Testing ,Deployment Testing ,The Art of Debugging ,The Debugging Process ,Psychological Considerations, Debugging Strategies ,Correcting the Error.

UNIT-III

Testing Conventional Applications   **[12 hours]**

Software Testing Fundamentals ,Internal and External Views of Testing ,White-Box Testing ,Basis Path Testing ,Flow Graph Notation ,Independent Program Paths ,Deriving Test Cases ,Graph Matrices , Control Structure Testing ,Condition Testing ,Data Flow Testing ,Loop Testing ,Black-Box Testing Graph-Based Testing Methods ,Equivalence Partitioning ,Boundary Value Analysis ,Orthogonal Array Testing Model-Based Testing ,Testing for Specialized Environments, Architectures, and Applications, Testing GUIs ,Testing of Client-Server Architectures ,Testing Documentation and Help Facilities ,Testing for Real-Time Systems ,Patterns for Software Testing .

UNIT-IV

Software Quality Assurance   **[12 hours]**
Quality Assurance and Management Quality Concepts and Software Quality Assurance, Software Reviews (Formal Technical Reviews), Inspection, Walk through, Software Reliability, The Quality Standards: ISO 9000, CMM, Six Sigma for SE, SQA Plan.

The SCM Process, Identification of Objects in the Software Configuration, Version Control and Change Control.

Advanced Topics in Software Testing
Test Suites Design, Testing Conventional Applications, Testing Object Oriented Applications, Testing Web and Mobile Applications, Testing Tools (Win runner, Load runner). Test case design and studies based on Software Testing (for ex. 1. Design the test cases for login page. 2. Manual Testing for PAN card verification. 3. Generate test case for ATM machine.)

Course Outcomes:

At the end of this subject, students should be able to:

1. Apply modern software testing processes in relation to software development and project management.
2. Create test strategies and plans, design test cases, prioritize and execute them.
3. To gain expertise in designing, implementation and development of computer-based systems and IT processes.
4. Gain the knowledge of software management principles: quality assurance, process improvement, configuration management and software quality management.
5. Distinguish among SCM and SQA and can classify different testing strategies and tactics and compare them.
6. Investigate the reason for bugs and analyze the principles in software testing to prevent and remove bugs.

Textbooks:
1. Roger S. Pressman, Software engineering- A practitioner's Approach, McGraw-Hill International Editions.
2. Software Testing Principles and Practices 2nd Edition Naresh Chauhan oxford higher Education

Reference Books:
1. Ian Sommerville, "Software Engineering", 7th Edition, Pearson Education, 2007.
2. M G Limaye, "Software Testing – Principles, Techniques and Tools", McGraw Hill, 2011.
3. Ilene Burnstein, "Practical Software Testing", Springer International Edition, Chennai, 2003.
4. Milind Limaye, "Software Quality Assurance", McGraw Hill, 2011.

Web Resources:
1. https://www.opensourcetesting.org
2. https://www.onestoptesting.com/
3. https://opensource.com/business/14/1/top-project-management- tools-2014

LIST OF EXPERIMENTS

Experiment. No.	Title	Learning Outcomes
1	Assume that you are Software Architect or Project Manager in organization. Construct Software Requirement Specification (SRS) document for your project.	CO1

2	Identify system specification and design test cases for Inventory Management.	CO2
3	Understanding Test Automation. Using Selenium write a simple test script to validate each field of the registration page (Eg: Gmail Registration Page)	CO3
4	Design and run test cases for WordPad (MS-Windows based) using automation tool.	CO3, CO4
5	Install Selenium server and demonstrate it using a script in Java/PHP.	CO3
6	Demonstrate test cases to validate a mobile number using one time pin identification.	CO4
7	Write a program and design test cases for the following control and decision-making statement. **a)** For...Loop **b)** Switch...Case **c)** Do...While	CO5
8	Design test cases for e-commerce (Flipchart, Amazon Login Form)	CO5, CO6
9	Prepare a defect report after executing test cases for Withdrawal of amount from ATM Machine	CO6
10	Understanding the use of bug tracking and testing tool Bugzilla and Jira.	CO6

Open ended Experiment: Mini Project

Task: For below mentioned Systems prepare following software documents mentioned as from A to D

Library Information System, Villager Telephone System, Waste Management Inspection Tracking System (WMITS), Flight Control System and Ambulance Dispatching System

A. Development of Software Requirements Specification (SRS)

B. Implementation using any Language and testing

C. Test case design

D. Bug Report/Defect report

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Subject: Big Data Analytics

Program: B. Tech IT				Subject Code: IT0602			Semester: VI	
Teaching Scheme (Hours per week)				**Examination Evaluation Scheme (Marks)**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	40	40	60	60	200

Course objectives:

1. To understand big data for business intelligence.
2. To learn business case studies for big data analytics.
3. To understand Nosql big data management. Perform map-reduce analytics using Hadoop and related tools.
4. To understand about different platforms and tools available for Big Data analytics so that student can develop skills in the same field.

CONTENT

UNIT-I

[12 hours]

What is big data, why big data, convergence of key trends, unstructured data, industry examples of big data, web analytics, big data and marketing, fraud and big data, risk and big data, credit risk management, big data and algorithmic trading, big data and healthcare, big data in medicine, advertising and big data, big data technologies, introduction to Hadoop, open source technologies, cloud and big data, mobile business intelligence, Crowd sourcing analytics, inter and trans firewall analytics.

UNIT-II

[12 hours]

Introduction to NoSQL, aggregate data models, aggregates, key-value and

document data models, relationships, graph databases, schemaless databases, materialized views, distribution models, sharding, master- slave replication, peer-peer replication, sharding and replication, consistency, relaxing consistency, version stamps, map-reduce, partitioning and combining, composing map-reduce calculations.

UNIT-III

[12 hours]

Data format, analyzing data with Hadoop, scaling out, Hadoop streaming, Hadoop pipes, design of Hadoop distributed file system (HDFS), HDFS concepts, Java interface, data flow, Hadoop I/O, data integrity, compression, serialization, Avro, file-based data structures, MapReduce workflows, unit tests with MRUnit, test data and local tests, anatomy of MapReduce job run, classic Map-reduce, YARN, failures in classic Map-reduce and YARN, job scheduling, shuffle andsort, task execution, MapReduce types, input formats, output formats

UNIT-IV

[12 hours]

Hbase, data model and implementations, Hbase clients, Hbase examples, praxis. Cassandra, Cassandra data model, Cassandra examples, Cassandra clients, Hadoop integration. Pig, Grunt, pig data model, Pig Latin, developing and testing Pig Latin scripts. Hive, data types and file formats, HiveQL data definition, HiveQL data manipulation, HiveQL queries.

Introduction to Apache Spark, Features of Apache Spark, Spark Eco-System, RDD (Resilient Distributed Dataset) Architecture, Application of Spark Streaming, Introduction to Apache Kafka, Architecture of Kafka and its applications.

Course Outcomes:

The students should be able to:

1. Differentiate between traditional database limitations & need of Big Data Analytics.
2. Describe big data and use cases from selected business domains.
3. Explain NoSQL big data management.
4. Install, configure, and run Hadoop and HDFS.
5. Perform map-reduce analytics using Hadoop.
6. Use Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data analytics.

Text Books:

1. Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses by Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, Wiley 2013.
.
2. P.J Sadalage and M. Fowler,"NoSQL Distilled: A Brief Guide to the Emerging world of Polyglot Persistence.

Reference Books:

1. Patankar, S.V., "Numeric Polyglot Persistence", Addison- Wesley Professional, 2012.
2. Tom White, "Hadoop: The Definitive Guide", Third Edition,O'Reilley, 2012.
3. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.
4. E. Capriolo, D. Wampler, and J. Rutherglen, "ProgrammingHive", O'Reilley, 2012.
5. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.
6. Eben Hewitt, "Cassandra: The Definitive Guide", O'Reilley,2010.
7. Alan Gates, "Programming Pig", O'Reilley, 2011.

Web Resources:

1. https://onlinecourses.nptel.ac.in/noc19_cs33/preview
2. https://www.coursera.org/courses?query=big%20data%20analytics

LIST OF EXPERIMENTS

Ex. No.	Title	Learning Outcomes
1	Study Practical: Introduction to Hadoop and its Functionalities.	Students will be able to understand the Hadoop and its Functionalities
2	Perform Basic Hadoop shell commands to manage HDFS. (with theory)	Students will be able to understand the Hadoop Shell Commands.
3	Study Practical: Intro to NoSQLand MongoDB	Students will be able to understand NoSQL and MongoDB

4	Study Practical: MapReduce	Students will be able to understand MapReduce
5	Write a program to calculate frequency of each word using MapReduce.	Students will be able to understand how to to calculate frequency of each word using MapReduce.
6	Write a program to know the lifetime value of each customer using MapReduce Reduce Side Join.	Students will be able to understand MapReduce Reduce Side Join
7	Write a program to perform basicHBase commands.	Students will be able to understand basic HBase commands
8	Write a program to data of file inHBase table.	Students will be able to understand HBase table.
9	Write a program using Pig find the most occurred start letter.	Students will be able to understand Pig.
10	Write a program in pig script to read data from a data file and to display the required contents on the terminal as output.	Students will be able to understand Pig script.
11	Case study and demo discussion on Apache Spark Streaming.	Student will be able to understand practical usage of Apache Spark
12	Demo of any one data visualization platform (Ex. Tableau, Power BI etc.)	Students will be able to know about the concept and benefits of data visualization and its usage in data analysis

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Subject: Data Science

Program: B. Tech CE/CSE/IT				Subject Code: CE0630			Semester: VI	

Teaching Scheme (Hours per week)				Examination Evaluation Scheme (Marks)				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	**0**	**2**	**4**	40	40	60	60	200

Course Outcome:

1. Learn the fundamentals of data analytics and the data science pipeline
2. Learn how to scope the resources required for a data science project
3. Apply principles of Data Science to the analysis of business problems.
4. Skill development in data mining software to solve real-world problems.
5. Increase in employability in cutting edge tools and technologies to analyze Big Data.

CONTENTS

UNIT-I

[12 Hours]

Introduction to data science:

Defining Data Science, what do data science people do? Data Science in Business, Use Cases for Data Science, Data science and Big data, Data science and Machine learning
Data Science Process Overview – Defining goals – Retrieving data – Data preparation – Data exploration – Data modeling – Presentation.

UNIT-II

[12 Hours]

Introduction to statistics:

What is statistics, Descriptive Statistics: Introduction, Population and sample, Types of variables, Measures of central tendency, Measures of variability, Coefficient of variance, Skewness and Kurtosis

Inferential Statistics:

Normal distribution, Test hypotheses, Central limit theorem, Confidence interval, T-test, Type I and II errors

UNIT-III

[12 Hours]

Machine Learning Introduction and Concepts:

Machine learning – Modeling Process – Training model – Validating model – Predicting new observations
Important machine learning terminologies, Types of machine learning algorithms, Supervised learning algorithms: Types of supervised learning algorithms, Regression: Linear Regression, Classification algorithms
Unsupervised learning algorithms: Clustering algorithms

UNIT-IV

[12 Hours]

Introduction to data visualization – Data visualization options – Filters – Python libraries for visualization – Matplotlib- seaborn
Data Science Ethics – Doing good data science – Owners of the data - Valuing different aspects of privacy - Getting informed consent - The Five Cs – Diversity – Inclusion – Future Trends.

Course Outcome:

After completion of the course students will be able to:

1) Demonstrate knowledge of big data analytics.
2) Demonstrate the ability to think critically in making decisions based on data
3) Interpret data, extract meaningful information, and assess findings.
4) Identify and analyze social, legal, and ethical issues in data science.
5) Choose and apply tools and methodologies to solve data science tasks.
6) Explore future trends in data.

Text Books:

1. Introducing Data Science, Davy Cielen, Arno D. B. Meysman, Mohamed Ali, Manning Publications Co., 1st edition, 2016

2. An Introduction to Statistical Learning: with Applications in R, Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, Springer, 1st edition, 2013

3. Ethics and Data Science, D J Patil, Hilary Mason, Mike Loukides, O' Reilly, 1st edition, 2018

Reference Books:

1. Machine Learning: A Probabilistic Perspective. Kevin P. Murphy.

LIST OF EXPERIMENTS

Sr. No.	Title	Learning Outcome
1	Getting Started with Skills Network Labs	To know functionality and usage of Skill Network Labs environment
2	Getting Started with Jupyter Notebooks	To know functionality and usage of Jupyter Notebook platform
3	Getting Started with Apache Zeppelin Notebooks	To know functionality and usage of Apache Zeppelin Notebook
4	Getting Started with RStudio IDE	Introduction to Rstudio and its usage in Machine Learning

5	Data Analysis with Python
	    Import data sets
	    Clean and prepare data for analysis
	    Manipulate pandas Data Frame
	    Summarize data
	    Build machine learning models using scikit-learn
	    Build data pipelines
		To understand the concept of machine learning, data preparation, pandas and scikit-learn with model building.

6	Data Visualization with Python Introduction to Visualization Tools Basic Visualization Tools Specialized Visualization Tools Creating Maps and Visualizing Geospatial Data	To understand about the field of data visualization and tools used for visualization.
7	Advanced Visualization Tools	Study and understanding about functionalities of advanced visualization tools.

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Subject: Information Retrieval

Program: B. Tech CE/CSE/IT			Subject Code: CE0631				Semester: VI

Teaching Scheme (Hours per week)				Examination Evaluation Scheme (Marks)				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)-Theory**	**Continuous Internal Evaluation (CIE)-Practical**	**Total**
3	**0**	**2**	**4**	40	40	60	60	200

Course Objective:

1. To develop a model for Text Indexing and Retrieval
2. To evaluate Information Retrieval Systems
3. To analyze Textual and Semi-Structured data sets
4. To learn Text Similarity Check Measures
5. To Understand Search Engines

CONTENTS

UNIT-I

Introduction to Text Retrieval Systems   **[06 hours]**

Retrieval System, Types of Retrieval Systems, Boolean Retrieval, Term Vocabulary Lists, Posting Lists, Index Compression

UNIT-II
Information Retrieval Models   **[16 hours]**

Vector Space Model, TF-IDF Weight Model, Evaluation of an Information Retrieval System, Okapi/BM25, Language Models, KL-Divergence, Page Ranking

UNIT-III

Query Expansion and Feedback   **[06 hours]**

Query Expansion, Relevance Feedback, Pseudo Relevance Feedback, Query Reformation

UNIT-IV

Text Classification and Clustering   **[20 hours]**

Text Classification Problem, Bayesian Classification, Support Vector Machine, Feature Selection, Flat Clustering, K-Means Clustering

Course Outcomes:

At the end of this subject, students should be able to:

1) Recognize Document as Vector and perform Text Analysis over the document
2) Perform Evaluation of the Information Retrieval Systems
3) Understand Search Engines and Page Ranking Techniques
4) Perform Supervised and Unsupervised Learning Techniques
5) Understand Relevance Feedback Mechanism in Search Optimization
6) Apply Text Classification & Clustering techniques

Text Books:

1. Christopher D. Manning, Prabhakar Raghavan and Hinrich Schütze, Introduction to Information Retrieval, Cambridge University Press. 2008.

Reference Books:

1. Cheng Xiang Zhai, Statistical Language Models for Information Retrieval (Synthesis Lectures Series on Human Language Technologies), Morgan & Claypool Publishers, 2008.

Web Resources:

1) https://nlp.stanford.edu/IR-book/newslides.html

2) https://www.tutorialspoint.com/lucene/

LIST OF EXPERIMENTS

Sr. No.	Title	Learning Outcomes
1	Introduction to Lucene Software	To *develop* a model for Text Indexing and Retrieval
2	Implementation of Basic Text Processing Techniques on a Text Document	To *analyze* Textual and Semi-Structured data sets, To *learn* Text Similarity Check Measures, To *evaluate* Information Retrieval Systems
3	Query Expansion and Ranking in Lucene	To *analyze* Textual and Semi-Structured data sets, To *learn* Text Similarity Check Measures, To *evaluate* Information Retrieval Systems
4	Implementation of Language Model with Smoothing Techniques	To *analyze* Textual and Semi-Structured data sets, To *learn* Text Similarity Check Measures, To *evaluate* Information Retrieval Systems
5	Introduction to RStudio	To *develop* a model for Text Indexing and Retrieval
6	Implementation of Naïve Bayes Classifier in RStudio	To *apply* techniques for Text Classification and Clustering
7	Implementation of K-Means Algorithm in RStudio	To *apply* techniques for Text Classification and Clustering
8	Case Study: Search Engine	To *Understand* Search Engines

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Subject: Web Data Management								
Program: B. Tech CE/CSE/IT				**Subject Code: CE0632**			**Semester: VI**	
Teaching Scheme (Hours per week)				**Examination Evaluation Scheme (Marks)**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	**0**	**2**	**4**	**40**	**40**	**60**	**60**	**200**

Course Objective:

1. Understand the basic concept of web data management using XML.
2. To learn Xpath and XQuery to find appropriate data from XML.
3. To learn the current technology stack (URIs, XML, RDF/S, OWL) in web data management.
4. To understand test on an ontology and schema mappings
5. To learn different tools for semantic data management

CONTENTS

UNIT-I

[12 hours]

Data Model

Introduction to Modeling Web Data, Semistructured data, XML, Web Data Management with XML, XML Standards, XML and syntax, XML Data Model, XLink, and XPointer.

XPath and XQuery

Introduction, Basics of XPath and XQuery, XPath: Steps and path expressions, Evaluation of path expressions, Generalities on axes and node tests, Axes, Node tests and abbreviations, Predicates, XPath 2.0; FLWOR expressions in XQuery: Defining variables - the for and let clauses, Filtering - the where clause, The return clause, Advanced features of XQuery; XPath foundations.

UNIT-II

[12 hours]

Typing

Motivating Typing, Automata, Schema Languages for XML, Typing Graph Data: Graph Semi structured Data, Graph Bisimulation, Data guides.

XML Query Evaluation

XML fragmentation, XML identifiers: Region-based identifiers, Dewey-based identifiers, Structural identifiers and updates; XML evaluation techniques: Structural join, Optimizing structural join queries, Holistic twig joins

UNIT-III

[12 hours]

Ontologies, RDF, and OWL

Introduction, Ontologies by example, Web resources, URI, namespaces, RDF, RDFS: RDF Schema, OWL, Ontologies and (Description) Logics.

Querying Data through Ontologies.

Introduction, Querying RDF data: notation and semantics, Querying through RDFS ontologies, Answering queries through DL-LITE ontologies

UNIT-IV

[12 hours]

Data Integration

Introduction, Containment of conjunctive queries, Global-as-view mediation, Local-as-view mediation, Ontology-based mediators, Peer-to-Peer Data Management Systems.

Building Web scale applications

Web search, web crawlers, web information retrieval, Web graph mining and hot topics in web search, Distributed systems, failure management, required properties of a distributed system, P2P networks, Hash-based structures, distributed indexing, Distributed computing with MapReduce.

Course Outcomes:

After successful completion of this course, student will be able to

1) Learn the overall vision of the Semantic Web
2) Analyzed the current technology stack and design for future (URIs, XML, RDF/S, OWL).
3) To understand how one could use these technologies for building something useful.
4) Design test an ontology and define schema mappings.
5) Use different tools for semantic data management
6) Understand the concept of MapReduce technique in distributed computing.

Text Books:

1) Bhavani Thuraisingham, "Web Data Management and Electronic Commerce", CRC Press, 2000
2) Bhavani Thuraisingham, "XML Databases and the Semantic Web", CRC Press, 2002

Reference Books:

1) Serge Abite boul, IoanaManolescu, Philippe Rigaux, Marie-Christine Rousset and Pierre Senellart, "Web Data Management", Cambridge University Press, 2011
2) Athena Vakali and George Pallis, "Web Data Management Practices: Emerging Techniques and Technologies", IGI Publishing, 2007, ISBN-10: 1599042282; ISBN-13: 978-1599042282

Web Resources

1) https://nptel.ac.in/courses/111104100/16
2) https://www.coursera.org/learn/data-management-cloud
3) https://www.classcentral.com/tag/data-management

LIST OF EXPERIMENTS

Sr. No	Title	Learning Outcome
1	Create an XML file defining an article in newspaper.	Create an XML File
2	Create an XML file containing list of students. Also create stylesheet file to display list in an HTML format.	Create Stylesheet
3	Create an XML file containing list of students. Using XPath display following information • Information of a student with ID No : 101 • All the student in the sorted order according to their CGPA	Using XPath display
4	Create an XForm to collect information from staff member regarding their publications. Details like Year of Publication, National/International, Title, Conference/Journal etc.	Using XForm to collect information
5	From the above gathered information, using XQuery find out the number of publication in a specific year.	Using XQuery
6	Demonstrate the use of AJAX.	Usage if AJAX
7	Study of XMLSPY tool.	Study of XMLSPY

8	Create an RSS for the events occurring in your institute	Create an RSS
9	Write a program to read the articles in RSS created in above practical.	Read article in RSS
10	Study of RDF (Resource Description Framework)	Study of RDF
11	Create a system which can use of Web search, web crawlers and web information retrieval.	To create a system for information retrieval
12	Analyze and implement a system with Web graph mining.	Implement system for Web graph mining
13	Implement and Subscribe RSS News feeds to get latest news in India	Implement and subscribe RSS News Feeds

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Subject: Advance Java Technology

Program: B. Tech CE/CS/IT				Subject Code: CE0618			Semester: VI

Teaching Scheme (Hours per week)				Examination Evaluation Scheme (Marks)				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	40	40	60	60	200

Course Objectives:

1. To provide and enrich students with knowledge of Enterprise Java standards and architectures.
2. To introduce the concepts and techniques of problem solving through structured Modular approaches.
3. To implement application over the web or network.
4. To cultivate good programming style and discipline. To improve the team work qualities.
5. To understand concept and application of spring and struts framework.
6. By learning the skills of Advance Java Technology students get more employable in the field of Software Development

CONTENTS

UNIT-I

[12 hours]

Introduction to J2EE and Overview of Web Development:
Concept of Java Technology, J2EE Architectures, Java EE Components and Containers, Types of Servers in J2EE Application. Concept of HTTP Protocols and API, Request Processing in Web Application, Web Application Structure, Web Containers, and Web based MVC architecture.
JDBC:
Introduction to JDBC, Architecture of JDBC, JDBC driver types, steps for connecting to JDBC, Types of Statements in JDBC (Statement Interface, Prepared Statement, Callable Statement),

Types of Result Set, Executing SQL Queries, Meta Data, JDBC Exception, Transaction Management.

UNIT-II

[12 hours]

Servlet API:
Introduction to Servlet, Life Cycle of Servlet, HTTP Methods Structure and Deployment descriptor, ServletContext and ServletConfig Object, Request and Response objects, ServletCollaboration, Servlet Annotations, Session Tracking, Filters API, Connecting Servlet API to JDBC.

JSP:
Introduction to JSP, Compare JSP with Servlet, JSP page life cycle, JSP architecture, JSP elements, JSP Implicit Objects, Expression Language, JSP Standard Tag Libraries, JSP Custom Tag, JSP Session Management, JSP Exception Handling, JSTL

UNIT-III

[12 hours]

Network Programming:
Basic of Network Programming, Introduction of Socket, Types of Socket, Socket API, TCP/IP client sockets, java.net package Socket, Datagram's, URL, TCP/IP server sockets, RMI Architecture, Client Server application using RMI.

Java Mail:
Introduction, Protocols used in Java Mail, Architecture of Java Mail, Sending and Receiving Email.

Hibernate Framework:
Introduction, Architecture, Object Relational Mapping in Hibernate, Hibernate annotations, Hibernate Query Language.

UNIT-IV

[12 hours]

Spring Framework:
Introduction, Spring Architecture, Spring MVC Module, Bean Life Cycle, Constructor Injection, Dependency Injection, Inner Beans, Aliases in Bean, Bean Scopes, Spring Annotation. Spring AOP Module, Spring DAO, Database Transaction Management, CRUD Operation using DAO and Spring API

Struts Framework:
Introduction, features, core component, Struts2 Architecture, Action, Struts2 Configuration, Interceptors, Struts2 Validation (Custom & Bundled Validation)

<u>Course Outcome:</u>

After successful completion of the course, student will able to:

1. Demonstrate the working of web applications and able to work in web development environment
2. Understanding various java frameworks and its applications, so student can able to decide future way in interested framework
3. Develop both client side and server side programming.
4. Graphical user interface in Java programs and able to work in GUI design requirement in industry.
5. Know MVC Architecture concept in practical .so they able to design secure application.
6. Different classes for database framework and OR Mapping and able to design dynamic application with database

Text Books:

1. Java 6 Programming, Black Book, Dreamtech
2. Java Server Programming, Java EE6 (J2EE 1.6), Black Book, Dreamtech
3. Java Programming Advance Topics, Joe Wigglesworth and Paula McMillan, Cengage Learning.

Reference Books:

1. Professional Java Server Programming, a Apress
2. Core Java, Volume II – Advanced Features, Eight Edition, Pearson
3. Unleashed Java 2 Platform, Sams Techmedia
4. The Complete Reference J2EE, Keogh, McGrawHill
5. Java EE 5 for beginners, Bayross and Shah, SPD
6. JDBC 3 Java Database Connectivity, Bernand Van Haecke, Wiley-dreamtech
7. Java Server Pages for Beginners, Bayross and Shah, SPD
8. Java Servlet Programming, Jason Hunter, SPD (O'Reilly)

Web Resources:

1. https://www.javatpoint.com/what-is-framework-in-java
2. https://www.javatpoint.com/java-swing
3. https://www.tutorialspoint.com/spring/index.htm
4. https://www.javatpoint.com/spring-tutorial

LIST OF EXPERIMENTS

Sr. No.	Class Activity	List of Practical	Learning Outcomes
01	Lab 1	Web server, Introduction to JSP (print hello word), Dynamic table printing using JSP (use color change)	Students know Basic Concept of JSP.
02	Lab 2	Data forwarding and manual URL building, Learning JSP page directive (any one)	Student know concept of URL building through JSP.
03	Lab 3	CRUD operation using Cookie, Cookie management tool (Cookie table with delete and update button)	Students can able store data in cookies in Java application.
04	Lab 4	Demonstrating five methods of session, Shopping cart using session	Student can able to understand practical concept of session.
05	Lab 5	Login using session (static username & password), Create Registration form using type-1 database connectivity	Student can understand login concept of any web application.
06	Lab 6	List all the records of a table using type-2 db connectivity driver, Search engine using type-2 database connectivity	Student can understand database connectivity with java application
07	Lab 7	Introduction to Servlet (folder structure-generic servlet-http servlet-lifecycle-deployment descriptor file)	Student can understand servlet life cycle by practical
08	Lab 8	Create a browser specific page hit counter using servlet, Using single HTTP Servlet create a form and insert a record into database..	Student can create servlet application.

09	Lab 9	Parameter passing in servlet, Create an application specific page hit counter in which the counter value should remain as it is even though we restart the server	Student can able to create servlet application
10	Lab 10	Demonstrate web base MVC architecture using JSP, Servlet and JavaBean, Introduction to swing (blank frame-FlowLayout-button)	Student understand concept MVC architecture
11	Lab 11	Pluggable look and feel using JButton, Swing + Database	Student can understand concept of swing and able to design GUI Application
12	Lab 12	Learning TCP connection using java, Learning UDP connection using JAVA	Student can understand concept of network programming
13	Lab 13	Demonstrating the use and architecture of RMI app	Understand concept of RMI
14	Lab 14	Implementing internationalization in JAVA, Learning hibernate configuration and architecture	Understand concept of hibernate.
15	Lab 15	Insert, delete, update n select records using hibernate, Hibernate annotations	Understand database connectivity in hibernate.

Subject: Advanced .NET Framework

Program: B. Tech CE/CS/IT				Subject Code: CE0619			Semester: VI

Teaching Scheme (Hours per week)				Examination Evaluation Scheme (Marks)				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	40	40	60	60	200

Course Objective:

1. Understand Basic architecture of ASP.NET and how to provide the connectivity.
2. Ideas for basic namespaces, Object oriented Concepts and database connection.
3. Understand concept of master pages and themes for any application.
4. Learn to use of web service for web application.
5. Identify debug issues related to the development of concurrent programs.
6. Learn the skills of web development which makes them industry ready.

CONTENTS

UNIT-I

[12 hours]

C# .Net : Namespaces, Constructor and Destructor- Using parameterized constructor in class, creating copy constructor, calling a destructor in class, Function Overloading and inheritance- Function overloading, Inheritance, Modifiers, Properties and indexers-creating read and write property, creating read only property, creating a static property, Attributes, Reflection API- Events and Delegates.

Asp.Net: Introduction to ASP.NET Framework, Difference between ASP and ASP .Net, lifecycle of an Asp.Net Web page- difference stages of asp.net page, ASP.Net page life cycle, Working with Asp.net pages, Exploring the concepts of code behind page model, Explain View state, Working with post back, Working with Controls, Working with validation control, Using Rich server control, Working in user control in asp.net.

UNIT-II

[12 hours]

Managing State and Master Pages and Themes
Managing State: Preserving state in web application, Page level state, using cookies to preserve state, ASP.Net session state, Storing objects in session state, configuring session state, storing session state in sql server, using cookie less session IDs, Application state.

Master Pages and Themes: Master Pages-Simple and Nested Master pages, Working with content Placeholder and Nested master Page-Creating simple master page, Creating nested master page.Asp.Net Themes: Working with CSS and Skin files.

UNIT-III

[12 hours]

Data Bound Controls and Repeater Controls: Overview of List Bound Controls- List box, Dropdown list, Checkbox list, Radio Buttonlist, Gridview, Listview, Creating Repeater control, Creating datalist control

Introduction to ADO.Net: Benefits of ADO.Net, ADO.Net compared to classic ADO, ADO.Net Objects and Namespaces, Managed Providers, Disconnected Data Access-Disconnected Data Access with IDE, Disconnected Data Access without IDE, Connected Data Access, Data Binding- Manual Data binding, simple data binding, complex data binding ,Types Dataset.

UNIT-IV

[12 hours]

Creating and Consuming Web and Advance .Net Concepts.

Creating and Consuming Web: The motivation of XML web services, Designing of XML Web services, Creating XML Web services with visual studio, Creating Web service consumer, Discovering web service using UDDI.

Advance .Net Concepts: Introduction of WPF, Introduction of WCF, Exploring Silverlight, and Introduction of AJAX

Course Outcome:

After learning, the course the students should be able to:

1) Use .NET framework architecture, various tools, data bound control and Validation techniques for dynamic application.
2) Use of different templates available in Visual Studio for asp.net application
3) Implementation testing strategies in real time applications.
4) Design and develop complex concurrent programs using the .NET framework
5) Use advanced concepts related to Web Services, WCF, and WPF in project development.
6) Develop a website after learning all the concepts, knowledge gained from above subject could be further implemented into advanced level projects in coming semesters.

Text Books:

1) ASP.NET 2.0, Black Book, Dreamtech
2) ASP .NET Complete Reference, TMH
3) C# the Basic by Vijay Mukhi

Reference Books:

1) Advance .Net Technology, Dreamtech Edition, Chirag Patel
2) ASP.NET Developer's Guide – Greg Buczek, McGraw Hill
3) Programming VB.Net 2005, Julia Case Bradley, Anita Millspaugh, McGraw Hill

Web Resources

1) https://www.tutorialsteacher.com/mvc/asp.net-mvc-tutorials
2) https://www.tutorialspoint.com/asp.net/
3) https://dotnet.microsoft.com/learn/dotnet/architecture-guides
4) https://www.javatpoint.com/asp-net-tutorial

LIST OF EXPERIMENTS

Experiment. No.	Title	Learning Outcome
1	Create a website to pass username and password from one page to another within a query string. and Check if its valid or invalid user	Username and Password creation
2	Create a website applying an external skin file to a given webpage.	Apply external skin file in webpage
3	Create a webpage using checkbox, checkbox list, and radio button.	Apply checkbox, checkbox list, and radio button.
4	Create a webpage performing Image upload, Adrotator as well as a Date & Time display Calender	Use Image upload, adorator and Calendar
5	Create a website showing the usage of a Menustrip within a webpage	To understand Menu strip usage
6	Create a website performing Multiview output within a webpage	To use feature of multiview output
7	Create a website performing validation within a form.	To apply concept of validation in form.
8	Create a website showing implementation of master pages	To implement master pages in website
9	Create a website in which Multiview is used.	To use the multiview feature in website

10	Create a website demonstrating State management within a webpage.	To create website for state management
11	Create a website implementing the usage of web services from external sources within a web page.	To implement usage of web services
12	Demonstrate connected-disconnected state of a database.	Demonstration of both states
13	Create a webpage demonstrating structure of MDI form.	Demonstrate structure of MDI form
14	Create a webpage demonstrating structure of Registration Page	Demonstrate structure of Registration Page
15	Creating Web services for addition of two numbers	To create web services

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Subject: Mobile Application Development (Android & IOS)

Program: B. Tech CE/CS/IT				Subject Code: CE0628				Semester: VI
Teaching Scheme (Hours per week)				Examination Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)-Theory	Continuous Internal Evaluation (CIE)-Practical	Total
3	0	2	4	40	40	60	60	200

Course Objectives:

1. Design and develop the basic application programs.
2. Describe, identify and debug issues related to the development of application.
3. Create a customized control application with different UI components which helps to develop skills in mobile application development.
4. Design and develop the database needed for the storing data of application.
5. Understand the different states of mobile application

CONTENTS

UNIT-I

[12 hours]

The Basics:

Hello World: Intro to Android, Why develop appsor Android?, Flavors of Android operating, systems, Challenges of developing for Android(multiple OS, need backwards compatibility, need to consider performance and offline capability)

Concept: Create Your First Android App: Overview of the development process - Java, Android Studio ,Project layout in Android Studio, Target and minimum SDKs, Android Virtual Device (AVD) Monitor, Viewing logs in logcat and AVD, Android manifest file , App Architecture: An app consists of one or more activities. For an activity, write Java code and layout xml, and hook them together, and register the activity in the manifest file.

Concept: Layouts, Views and Resources: Layout elements can be viewed and edited in Layout Editor and XML, Introduction to the range of UI elements, Resources (layouts, strings, styles, themes), Identifying resources with IDs, Programmatically referencing, resources using resource IDs, on Click attribute, Getting user input from a view, Programmatically changing UI elements, Layout Managers, Defining layouts for activities, inflating the layout

Concept: Scrolling Views: How to make activities scrollable: compare ScrollView, ListView, RecyclerView, Getting the resource ID for a UI element by inflating a layout (needed for RecyclerView), How to implement RecyclerView (requires layout managers and ViewHolders) , Performance implications of different kinds of scrolling UI elements

Concept: Resources to Help You Learn: Resources to help you learn: Samples that ship with the SDK, Templates for projects, developer.android.com, Android developer blog , Android developer YouTube channel, Source code and samples in github, Stack overflow, Google search!

Activities and Intents : About activities, Defining Activities , Activity Lifecycle , Activity navigation , About intents ,Explicit vs Implicit intents ,Passing info to new activity ,Returning data from activity

The Activity Lifecycle and Managing State: Activity lifecycle , Activity lifecycle callback methods , Activity instance state.

Starting Activities with Implicit Intents: Starting activities by sending implicit intents, Intent filters and enabling your activities to receive intents, ShareCompat.

Testing and Debugging, and Backwards Compatibility: Debugging your apps, Testing your app, Support libraries

UNIT-II

[12 hours]

User Interface:

User Input Controls: Getting user input , Changing keyboards , Buttons , Dialogs and pickers , Spinners, checkboxes, and radio buttons

Menus: Options menu, contextual menus (floating and action bar), and popup menu, Adding menu items. Handling on Clicks from menus.

Screen Navigation: Terminology, Different ways a user can navigate through an app, Action bar, Settings menu, Navigation drawer, Directed workflow (funnels), Best practices for navigation

Themes and Styles: Best practices for themes and styles, Performance benefits for themes, When and how to use drawables, best practices for drawables, When and how to use nine-patches, best practices for nine-patches, Tools for creating drawables.

Material Design: What is material design? Material design best practices. Material Design guidelines, Implementing Material Design look and feel, with compatibility with previous versions, Support library for Material Design , Transitions and Animations

Adapt layouts for multiple devices and orientations: Why we need to consider different screen sizes and orientations , Screen density (dip or dp), How to create adaptive layouts using resources folders , Different ways to create images that scale nicely, Images and image formats and how they affect performance (download speeds).

Accessibility: Why accessibility matters, Accessibility considerations: Color blindness, poor vision, poor hearing, physical limitations, Accessibility guidelines, testing for accessibility, Screen readers, making your app more accessible: Color and Contrast, button size Material Design guidelines, considerate layouts and navigation

Localization: How to prep your app for localization, LTR and RTL (eg Arabic) text.
Testing the User Interface: Automated testing of UIs, User testing your UI with real users, Using the Espresso and UI Automator frameworks for testing UIs

UNIT-III

[12 hours]

Background Tasks:

Connect to the Internet: Background Tasks
Synchronous versus async tasks, what is the UI thread and when should you use it? , Example of a background task - retrieving data over the internet, Creating background tasks. (Schedule, send data, etc.) , Implementing AsyncTask (doInBackground(), callbacks) , Limitations of AsyncTask , Passing info to background tasks, Initiating background tasks, Scheduling background tasks (intro only, more later).
Connecting to the Internet:
Permissions, Building URIs, Opening and closing Internet connections, Parsing JSON in Android. (Because it's common.) , Sending requests and parsing response.
AsyncTaskLoade:
Intro to AsyncTaskLoader , loadInBackground() , AsyncTaskLoader callbacks , Benefits of loaders

Broadcast Receivers:
What is a Broadcast Receiver and a Broadcast Intent? , Broadcast Receiver Security and Lifecycle
Services:

What is a service? Long running task without a UI, Difference between Activity and Service , Start and stop services, Lifecycle methods, Foreground services, IntentService class, App priority (critical, high, low), How to create a new Service.

Notifications:

What is a Notification? , Notification Design Guidelines.

Triggering, Scheduling, and Optimizing Background: AlarmManager

Storing Data in your app:

Internal versus external storage, Privacy, sharing, security, encryption of your data , Shared Preferences: Store private primitive data in key-value pairs , SQLite Databases: Store structured data in a private database , Store data on the web with your own network server, Firebase for storing and sharing data in the cloud, Concept: Preferences , What are Settings and Preferences? , Settings best practices (harder to take away settings than to add, for usability reasons, Storing and retrieving preferences as key/value pairs using SharedPreference, Different Settings types, Settings menu, Using Activity and PreferenceFragments to allow users to set preferences

Store data using SQLite database:

Overview of SQLite, OpenHelper Android class, Querying (dev) Searching (user) databases, Best practices for using databases in Android, Best practices for testing your database

Using Content Resolvers to access data: Content Providers and Content Resolvers work together, what is a content provider? , What is a content resolver? , How do they work together? , How to implement and use Content Resolvers

Content Providers: When to implement content providers , How to implement content providers (overview), Content URIs , UriMatcher, Content Provider authorities , Required methods on ContentProvider (query, insert, delete, update) , MIME types , Contracts , Making content provider data accessible to other apps by modifying manifest, and protecting data with permissions.

Using Loaders to Load and Display Data: Using loaders to asynchronously load data into an activity or fragment, Benefits of Loaders -- why use them? , Loader states (started, stopped, reset) , LoaderManager , Methods & callbacks to implement in Loaders: loadInBackground(), deliverResult() onStart/StopLoading(), onReset/Cancelled()),Registering listeners , Using CursorLoader with ContentProviders

UNIT-IV

[12 hours]

Fundamentals of iOS: Overview of MAC OS and X-CODE, Introduction to iPhone Architecture, Essential COCOA Touch Classes, Interface Builder, Nib File, COCOA and MVC Framework, Overview of features of latest iOS.

iPhone application development: Auto Layout, Views, Outlets and Actions, Different View Controller: single view Controller, Master-Detail View Controller, Navigation View Controller, Managing Application Memory, Application delegate, Handling Keyboard Input, UI Controllers: Label, Button, Text Field, Slider, Switch, Progress View, Page Control, Table View, Collection View, Image View, Text View, Web View, Map View, Date Picker, Picker View, Search Bar, Gestures, push notification, Image Picker, QR Code Scanner, Audio and Video.

Course Outcomes:

At the end of this subject, students should be able to:

1. Understand the existing state of mobile app development via researching existing apps, meeting with industry professionals, and formulating new ideas.

2. Understand the limitations and features of developing for mobile devices.

3. To be able to create mobile applications involving data storage in SQLite and other database tools.

4. Create a complete Mobile app with a significant programming component, involving the sensors and hardware features of the phone.

5. Build their ability to develop software with reasonable complexity on the android platform.

6. Design & Develop iphone and ipad application.

Text Books:

1. Android Programming (Big Nerd Ranch Guide), by Phillips, Stewart, Hardy and Marsicano.
2. Android Programming – Pushing the limits by Hellman

Reference Books:

1. Programming Android: Java Programming for the New Generation of Mobile Devices 2nd, Kindle eBook by Zigurd Mednieks (Author), G. Blake Meike (Author), Laird Dornin (Author).
2. Professional Android 4 Application Development Paperback – 2012 by Reto Meier
3. Learning Android Paperback – 2014 by Gargenta Marko

Web Resources:

1. https://www.youtube.com/watch?v=SLNTnJkg6EE
2. https://www.youtube.com/watch?v=taSwS5rhtmc
3. https://www.youtube.com/watch?v=myjSxtAk9XM
4. https://www.youtube.com/watch?v=odqACn2Vgic

LIST OF EXPERIMENTS

Experiment. No.	Title	Learning Outcomes
1.	Basic of Android Programming	
1.1	To print "hello world" using string.xml file.	Understand about basic of android IDE
1.2	Android Life Cycle - Android system initiates its program within an Activity starting with a call on onCreate() callback method. There is a sequence of callback methods that start up an activity and a sequence of callback methods that tear down an activity as shown in the below Activity life cycle program	Understand about how application work.
2.	**User Interface**	
2.1	Different ways of handling button click event. a. Specifying the function in xml file: b. MainActivity implements listener class c. Anonymous Inner Class	CO2
2.2	Arithmetic Operations (Addition, Subtraction, Division, Multiplication)	CO2,CO3
2.3.	Custom Toast & Dialog Box	CO2
2.4	UI Controls (Android AutoCompleteTextView , Android spinner , Android progress bar , Image Button, Toggle Button, Button, CheckBox, RadioGroup, Raadio Button)	CO2
3.	**Background Task**	
3.1	Implicit Intent - Messages wiring components together. The source and destination for the content transfer are not known. Only the task and the action to be performed are known.	CO3
3.2	Explicit Intent - Messages wiring components together. The source and destination are known as well as the task and actions to be performed are known.	CO3
3.3	SMS Sending – Message can be sent using 2 methods – using	CO3

	Intent, using SMS Manager.	
3.4	Plotting a location on Google Map	CO2,CO3
3.5	GPS Tracking	CO2,CO3
3.6	Implement the concept of Async Task in Android App	CO2,CO3
3.7	Implement the concept of Shared preference in Android.	CO1,CO2,CO3
3.8	Demonstrate the use of shared preference as session in Android	CO2,CO3
4	**Database**	
4.1	Create Login & Registration Form using Sqlite Database	CO2,CO3
4.2	Create an Android App to display student details in ListView (using Database helper class and Adapter class).	CO2,CO3
4.3	Create an Android App to display student details in ListView (List must contain image and textview)	CO2,CO3
4.4	Implement the concept of Insert, Update and Delete Student facilities using fragment and database helper	CO2,CO3
5.	**Multimedia**	
5.1	Playing audio files in Android App	CO3
5.2	Playing video files in Android App.	CO3
6.	**iOS Practical**	
6.1	Installation of x-code on MAC	CO4
6.2	Write an application to demonstrate the use of table control & views.	CO4
6.3	Write an i-phone application which can play audio and video files	CO4

Subject: Distributed Systems

Program: B. Tech CE/CSE/IT	Subject Code: CE0633	Semester: VI

Teaching Scheme (Hours per week)				Examination Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)-Theory	Continuous Internal Evaluation (CIE)- Practical	Total
3	0	2	4	40	40	60	60	200

Course Outcome:

1. To understand foundations of Distributed Systems.
2. To understand the concepts of Remote Communication and Interprocess Communication
3. To study about various distributed client server models
4. To create an awareness of the major technical challenges in distributed systems design and implementation.
5. Know about emerging trends in distributed computing.

CONTENTS

UNIT-I

[12 hours]

Introduction Distributed System Concepts:

Introduction, Distributed Computing Models, Software Concepts, Issues in Designing Distributed Systems ,Client-Server Model , Case Studies: WWW 1.0 , 2.0 , 3.0, Protocols for Distributed Systems, Examples of Distributed Systems–Trends in Distributed Systems

UNIT-II

Distributed computing paradigm and model:

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

UNIT-III

Peer to Peer Utilities:

Peer-to-peer Systems – Introduction – Napster and its legacy – Peer-to-peer – Middleware – Routing overlays. Overlay case studies: Pastry, Tapestry- Distributed File Systems –Introduction – File service architecture – Andrew File system. File System: Features-File model -File accessing models – File sharing semantics Naming: Identifiers, Addresses, Name Resolution – Name Space Implementation – Name Caches – LDAP

UNIT-IV

Duplication and Synchronization:

Introduction – Clocks, events and process states – Synchronizing physical clocks- Logical time and logical clocks – Global states – Coordination and Agreement – Introduction – Distributed mutual exclusion – Elections – Transactions and Concurrency Control– Transactions -Nested transactions – Locks – Optimistic concurrency control – Timestamp ordering – Atomic Commit protocols - Distributed deadlocks – Replication – Case study – Coda.

Process Management:

Process Migration: Features, Mechanism – Threads: Models, Issues, Implementation. Resource Management

Course Outcomes:

At the end of this subject, students should be able to:

1. Understand the need and requirements of Distributed System
2. Discuss trends in Distributed Systems.

3. Apply network virtualization.
4. Apply remote method invocation and objects.
5. Design process and resource management systems.
6. Understand application of Distributed Systems

Text Books:

1. Distributed Systems: Principles and Paradigms, A S Tanenbaum & Martin Stee, 2/E,PHI, 2006
2. Distributed Systems Concepts &Design,Colouris, Dollimore, Kindberg, Pearson
3. Distributed Computing, Sunita Mahajan and Seema Shah, Oxford University
4. Distributed Operating Systems by P. K. Sinha, PHI

Reference Books:

1. Distributed Systems: Principles and Paradigms, Tanenbaum
2. Distributed Computing, Fundamentals, Simulations and Advanced topics, 2nd Edition, HagitAttiya
3. .Distributed Systems: Concepts and Design, G. Coulouris, J. Dollimore, and T. Kindberg,
4. Java Network Programming & Distributed Computing by David Reilly, Michael Reill

Web Resources

1. https://nptel.ac.in/courses/Distributed System

LIST OF EXPERIMENTS

Experiment. No.	Title	Learning Outcomes
1	Write a program to implement hello world service using RMI	Students will get hands on practice about RMI .
2	Write a program to implement calculator using RMI	Students will get hands on practice about RMI .
3	Write a program to implement time service using RMI	Students will get hands on practice about RMI .

4	Write a program to implement hello world service using RPC	Students will get hands on practice about RPC .
5	Write a program to implement date service using RPC	Students will get hands on practice about RPC .
6	Write a program to implement Echo SOCKET in JAVA	Students will get hands on practice about SOCKET Programming .
7.	Write a program to implement Echo server using RPCGEN	Students will get hands on practice about RPCGEN .
8	Write a program to implement producer-consumer concept using THREAD	Understand threading.
9.	Write a program to find the length of string using THREAD	Understand threading.

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ज्ञानेन प्रकाशते जगत् **INDUS UNIVERSITY**	**Constituent Institute of Indus University**

Subject: Internet of Things							
Program: B. Tech CE/CS/IT				**Subject Code: CE0622**			**Semester: VI**
Teaching Scheme (Hours per week)				**Examination Evaluation Scheme (Marks)**			
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)-Theory**	**Continuous Internal Evaluation (CIE)-Practical**	**Total**
3	**0**	**2**	**4**	**40**	**40**	**60**	**60**	**200**

Course Objectives

1. Introduce evolution of internet technology and need for IoT.
2. Train the students to build IoT systems using sensors, single board computers and open source IoT platforms that help in skill development.
3. To identify the design, development and security challenges in IoT Systems.
4. To study IoT Applications in Different Domains and be able to measure their performance that enhances the employability skills of students.
5. To implement basic IoT Applications on Embedded Platforms to enhance entrepreneurship skills in students.

CONTENTS

UNIT-I

[12 hours]

Introduction to IoT

Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs, Machine to Machine, IoT versus Machine to Machine, Challenges in IoT: Design challenges, Development challenges, Security challenges

Application of IoT: Home automation, Industry applications, Surveillance applications

UNIT-II

[12 hours]

IoT Reference Architecture- Getting Familiar with IoT Architecture, Various architectural views of IoT such as Functional, Information, Operational and Deployment.

Constraints affecting design in IoT world- Introduction, Technical design Constraints.

Web Infrastructure for managing IoT Resources: Introduction, Open IoT Architecture for IoT/Cloud Convergence, Scheduling Process and IoT Service Lifecycle, Device/Cloud Collaboration Framework

UNIT-III

[12 hours]

Internet of Things Privacy, Security and Governance: Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities and Security.

UNIT-IV

[12 hours]

PREPARING IOT PROJECTS: Interoperability in IoT, Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino, Introduction to Python programming, Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi.

Course Outcomes

At the end of this subject, students should be able to:

1. Explain the Principles of Internet of Things
2. Design and develop IoT based sensor systems.
3. Employ IoT Solutions to Real Time Engineering Problems
4. Familiar with the Data Management Techniques, Architectures and various key enablers to enable practical IoT systems
5. Identify the Challenges and Research Scope in Communication Protocols used in IoT Applications.
6. Solve IoT security problems using light weight cryptography

Text Books:

1. Internet of Things Principles and Paradigms, Edited By Rajkumar Buyya, Amir Vahid Dastjerdi, Morgan Kaufmann, ELSEVIER
2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stamatis Karnouskos, Stefan Avesand, David Boyle, "From Machine to Machine to Internet of Things", Elsevier Publications, 2014

Reference Books:

1. Fundamentals of Wireless Sensors Networks Theory and Practice, Waltenegus Dargie and Christian Poellabauer, WILEY Series
2. Rethinking the Internet of Things A Scalable approach to connecting everything, Francis daCosta, Apress Open
3. Arduino Cookbook, Michael Margolis, O'Reilly
4. Internet of Things – From Research and Innovation to Market Deployment, Edited By Ovidiu Vermesan and Peter Friess, River Publishers

Web Resources:

1. NPTEL Lecture: https://nptel.ac.in/courses/106105166/

LIST OF EXPERIMENTS

Experiment. No.	Title	Learning Outcomes
1	Familiarization with Arduino/Raspberry Pi and perform necessary software installation.	CO-1
2	To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.	CO-2,3
3	Interface analog sensor (PIR Sensor, temperature sensor LM35, Ultrasonic Sensor) with - Arduino	CO-2
4	To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when '1'/'0' is received from a smart phone using Bluetooth.	CO-2,3
5	To install MySQL database on Raspberry Pi and perform basic SQL queries.	CO-3,4
6	Write a program on Arduino/Raspberry Pi to publish temperature data to MQTT broker.	CO-1,3

7	Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from thingspeak cloud.	CO-3,4
8	Write a program to create a TCP server on Arduino/Raspberry Pi and respond with humidity data to the TCP client when requested.	CO-4,5
9	Creating a webpage and display the values available through Arduino	CO-4,5
10	Open Ended Experiment-Mini Project: Working on any IOT Application	CO-5,6

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Subject: Data Compression

Program: CE/CS/IT			Subject Code: CE0629			Semester: VI	

Teaching Scheme (Hours per week)				Examination Evaluation Scheme (Marks)				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	40	40	60	60	200

Course Objectives:

1. To make known to students to basic applications, concepts, and techniques of Data compression.
2. To develop skills for using recent data compression software to solve practical problems in a variety of disciplines.
3. To gain experience doing independent study and research.
4. Improve fundamental understanding of data compression methods for text, images, and video and related issues in the storage, access, and use of large data sets.
5. Select and give reasons that are sensitive to the specific application and particular circumstance, most appropriate compression techniques for text, audio, image and video information

CONTENTS

UNIT-I

[**12 hours**]

Compression Techniques

Lossless Compression, Lossy Compression ,Measures of Performance Mathematical Preliminaries for Lossless Compression Models : Physical Models, Probability Models, Markov Models, Composite Source Model Coding, Uniquely Decodable Codes, Prefix Codes, Algorithmic Information Theory, Minimum Description Length Principle, Huffman Coding ,The Huffman Coding Algorithm, Minimum

Variance Huffman Codes, Adaptive Huffman Coding, Applications of Huffman Coding, Lossless Image Compression, Text Compression and Audio Compression

UNIT-II

[**12 hours**]

Arithmetic Coding Introduction

Coding a Sequence, Generating a Tag, Deciphering the Tag, Generating a Binary Code, Uniqueness and Efficiency of the Arithmetic Code, Algorithm Implementation, Integer Implementation, Comparison of Huffman and Arithmetic Coding, Adaptive Arithmetic Coding

UNIT-III

[**12 hours**]

Dictionary Techniques

Static Dictionary Diagram, Coding Adaptive Dictionary the LZ77 Approach the LZ78 Approach Applications File Compression —UNIX compress Image Compression—The Graphics Interchange Format (GIF) Image Compression—Portable Network Graphics (PNG) Compression over Modems — V.42 bis

UNIT-IV

[**12 hours**]

Lossless Compression

Standards zip, gzip, bzip, unix compress, GIF, JBIG. Image & Video compression Basis functions and transforms from an intuitive point, JPEG, MPEG, Vector Quantization, case study of WinZip, WinRar Wavelet based compression Fundamentals of wavelets, various standard wavelet bases, Multi resolution analysis and scaling function and JPEG 2000.

Course Outcomes

At the end of this subject, students should be able to:

1. Understand importance of data compression.
2. Develop a reasonably sophisticated data compression application.
3. Select methods and techniques appropriate for the task.
4. Develop the methods and tools for the given task.
5. Illustrate the concept of various algorithms for compressing text, audio, image and video information.
6. To develop a research oriented thinking in the area of Data Compression.

Text Books:

1. Introduction to Data Compression, Khalid Sayood, Morgan Kaufmann
2. The Data Compression book, Mark Nelson, Jean Loup Gaily

Reference Books:

1. Data Compression: "The Complete Reference", David Saloman, Springer.
2. An Introduction to Information Retrieval, Christopher D. Manning, Prabhakar Raghavan, Hinrich Schütze, Cambridge University Press, Cambridge, England.

Web Resources:

1. https://www.barracuda.com/glossary/data-compression
2. https://developer.mozilla.org/en-US/docs/Web/HTTP/Compression
3. http://www.data-compression.info/

LIST OF EXPERIMENTS

Experiment. No.	Title	Learning Outcomes
1.1	Write a program that compresses and displays uncompressed windows BMP image file.	Basic Knowledge of compression
1.2	Write a program to generate binary code in case of arithmetic coding.	Basic Knowledge of compression
1.3	Write a program to count the occurrences of different letters by reading the given text file and also find the probability of each letter with number of bits required for them using the formula: No. of bits=1/log2 prob.	Basic Knowledge of compression
1.4	Write a Program to check whether the given code is prefix or not.	Basic Knowledge of compression
1.5	Write a program to determine whether the set of given codes is uniquely decodable or not.	Basic Knowledge of compression

2.	**Arithmetic and Huffman Coding**	
	Write a program to generate binary code in case of arithmetic coding.	Knowledge of Arithmetic compression
2.1	Implement Huffman Code (HC) to generate binary code when symbol and probabilities are given	Knowledge of Huffman compression
3.	**Arithmetic and Huffman Coding**	
3.1	Implement Huffman code which can compress given file and decompress compressed file	Knowledge of Huffman compression
3.2	Implement adaptive Huffman program to compress decompressed file.	Knowledge of Huffman compression
4	**Text Compression Techniques**	
4.1	Write a program to Implement LZ77 algorithm.	Knowledge of Text Compression Techniques
4.2	Write a program to Implement LZ55 algorithm.	Knowledge of Text Compression Techniques
5.	**Text Compression Techniques**	
5.1	Write a program to Implement LZ78 algorithm	Knowledge of Text Compression Techniques
6.	**Image Compression Techniques**	
6.1	Write a program which performs JPEG compression, process step by step for given 8x8 block and decompression also	Knowledge of Image Compression Techniques

6.2	Study of Speech Compression Techniques.	Knowledge of Speech Compression Techniques

Subject: Cryptography & Network Security								
Program: B. Tech CE/CSE/IT				Subject Code: CE0634			Semester: VI	
Teaching Scheme (Hours per week)				Examination Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)-Theory	Continuous Internal Evaluation (CIE)-Practical	Total
3	0	2	4	40	40	60	60	200

Course Objectives

1. To understand various Cryptographic Techniques.

2. Acquire background on hash functions; authentication; firewalls; intrusion detection techniques.

3. To understand the various Security Applications.

4. To understand various protocols for network security to protect against the threats in the networks.

5. Identify and mitigate software security vulnerabilities in existing systems.

CONTENTS

UNIT-I

[12 hours]

Fundamentals: Basic objectives of cryptography, Security mechanisms, OSI Security Architecture, Classical Encryption techniques, Cipher principles, cryptanalysis, Attack models.

Block ciphers: Block cipher design principles and modes of operation, Fiestel cipher structure, Data Encryption standard (DES), International Data Encryption Algorithm, Blowfish, variants of DES, AES with structure, its transformation functions, key expansion.

UNIT-II

[12 hours]

Public Key Cryptography: Overview of Asymmetric Key Cryptography, RSA algorithm, its computational aspects and security, Elliptic Curve Cryptography, Knapsack Algorithm, Diffie-Hellman key Exchange,Man-in-Middle attack.

Key management: Key management and distribution, symmetric key distribution using symmetric and asymmetric encryptions, distribution of public keys.

UNIT-III

[12 hours]

Hash Function: Message Authentication Codes, its requirements and security, MACs based on Hash Functions, Security of Hash Functions,Secure Hash Algorithm, HMAC, Digital Signature, its properties, requirements and security, various digital signature schemes (Elgamal and Schnorr), NIST digital Signature algorithm.

Network Security: Authentication Applications like Kerberos, X.509 Authentication Service, PGP.

UNIT-IV

[12 hours]

 IP& Web Security: IPSec architecture, Applications of IPSec, Benefits of IPSec, and IPSec protocols, Web Security threats, Secure Socket Layer, Secure Electronic Transaction.

System Level Security: Intrusion detection, Viruses and related Threats - Virus Counter measures, Firewall Design Principles, Trusted Systems.

Course Outcomes

At the end of this subject, students should be able to:

1. To understand the fundamental principles of access control models and techniques, authentication and secure system design.
2. To understand and apply the various symmetric key algorithms and asymmetric key algorithms.
3. To understand the concepts of hashing with algorithms,digital signature and apply them.
4. To understand and use the message authentication and its requirement.
5. Analyze and design network security protocols.

6. To acquire the hands-on skills and the knowledge required for job competency.

Text Books:

William Stallings,"Cryptography and Network Security - Principles and Practices", Prentice Hall of India, Third Edition, 2003.

Reference Books:

1) Cryptography & Network Security, Forouzan, Mukhopadhyay, McGrawHill
2) Cryptography and Network Security (2nd Ed.), Atul Kahate, TMH
3) Information Systems Security, Godbole, Wiley-India
4) Information Security Principles and Practice, Deven Shah, Wiley-India
5) Bruce Schneier, "Applied Cryptography", John Wiley & Sons Inc, 2001.
6) A. Das and C. E. Veni Madhavan, Public-Key Cryptography: Theory and Practice, Pearson Education Asia.

Web Resources

1. Software: cryptool (www.cryptool.org)
2. Software: Wireshark (www.wireshark.org)
3. http://www.cryptix.org/
4. williamstallings.com/Extras/Security-Notes/
5. www.cs.bilkent.edu.tr/~selcuk/teaching/cs519/
6. http://freevideolectures.com/Course/3027/Cryptography-and-Network-Security
7. http://cs.brown.edu/courses/csci1510/2013_lectures.html

LIST OF PRACTICALS

Sr. No.	Title	Learning Outcomes
1.	To implement Caesar Cipher Encryption - Decryption.	CO1
2.	To implement Mono-alphabetic Cipher Encryption – Decryption.	CO1
3.	To implement Hill Cipher Encryption	CO1
4.	To implement Poly-alphabetic Cipher (Vigener Cipher) Technique	CO1

5.	To implement Play-Fair Cipher Technique.	CO1
6.	Write a program to implement Rail-Fence, Simple columnar Encryption Technique.	CO1
7.	To implement S-DES algorithm for data encryption.	CO2
8.	Write a program to implement RSA asymmetric (public key and private key)-Encryption.	CO2
9.	Implement Diffi-Hellmen Key exchange Method.	CO2
10.	Implement a digital signature algorithm.	CO3
11.	Perform various encryption-decryption techniques with cryptool.	CO4
12.	Study and use the Wireshark for the various network protocols.	CO4

Computer Engineering Department, Indus Institute of Engineering & Technology, Indus University

Program - B. Tech (Information Technology

Sr. No.		Name of the subject	Credit	Teaching Scheme (per week)				Evaluation Scheme				Total	Segment
								Theory		Practical			
								CIE	ESE	CIE	ESE	Marks	
				Th.	Tut.	Pr.	Total (hr.)	Th.	Th.	Pr.	Pr.		
1	IT0701	Artificial Intelligence	4	3	0	2	5	60	40	60	40	200	PE
	CE0718	Advance Computer Architecture											
	CE0721	Advance Operating System											
2	IT0702	Enterprise Resource Planning	4	3	1	0	4	60	40	0	0	100	Core
3		Open Elective 8	3	3	0	2	5	60	40	60	40	200	OE
		Cyber Security											
		Soft Computing											
		Embedded System											
		Block Chaining											
4	CE0732	Computer Vision and Applications	4	3	0	2	5	60	40	60	40	200	PE
	CE0728	* Natural Language Processing (4+0+0)											
	CE0730	Human Computer Interface											
	CE0723	Cloud Computing											
5	CE0727	Software Group Project-I	2	0	1	2	3	0	0	100	0	0	ES
		Open Elective 9	3	3	0	0	3	60	40	0	0	100	OE
6	CE0726	Internship Credit /Online courses/ MOOC	2	0	0	0	0	0	0	100	0	100	IC
7	IT0501	Computer Graphics											Extra Credit PE
	IT0701	Artificial Intelligence											
	IT0602	Big Data Analytics											
	CS0602	Data Preparation & Analysis											
	CS0501	Advance Microprocessor											
	CS0701	Machine Learning											
	CE0716	Data Warehouse & Mining											
	CE0617	Theory of Computation											
	CE0717	Compiler Design											
	CE0517	Microprocessing and Interfacing											
		Total	22	15	2	8	25	300	200	380	120	900	

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				Constituent Institute of Indus University				
Subject: Artificial Intelligence								
Program: B. Tech IT				**Subject Code: IT0701**			**Semester: VII**	
Teaching Scheme (Hours per week)				**Examination Evaluation Scheme (Marks)**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)-Theory**	**Continuous Internal Evaluation (CIE)-Practical**	**Total**
3	0	2	4	40	40	60	60	200

Course Objectives:

1. Understand AI Problems and Apply Various Techniques for Engineering Problem Solving and skill development.
2. Solve Game Playing Problems
3. Understand how Expert System is designed and how Knowledge Engineering works to provide employability.
4. Apply Fuzzy Logic for Problem Solving.
5. Apply Semantic Rules for reasoning and inference.
6. Apply Various Algorithms like Breadth First Search, Depth First Search, A* and Heuristic Search for various Applications

CONTENTS

UNIT-I

[12 hours]

Artificial Intelligence: Its Roots and Scope
Introduction, history/early work in AI, Overview of AI Application Areas , Turing Test.AI Problems, The Underlying Assumption, What Is An AI Techniques, The Level Of The Model, Criteria For Success,
Problem Solving by Searching
Defining the problems as a state space search, production systems, production characteristics, production system characteristics, Issues in designing search programs.
Uninformed and Informed Search Strategies, Searching with Partial Information, Heuristic Functions,

UNIT-II

[12 hours]

Search Techniques:
Generate and test, Hill climbing, Breadth first search, Depth first search, Hill climbing, Best first search, A* algorithm, AO* Algorithm, Iterative Deepening Search, IDA*, Recursive Best First Search, Constraint Satisfaction and Heuristic Repair, Applications, Problem Solving Agents, Searching for Solutions, Real World Problems, Constraint Satisfaction Search, Local Search Algorithms and Optimization Problems, Online Search Agents and Unknown Environments

UNIT-III

[12 hours]

Knowledge Representation Issues: Representations and Mappings, Approaches to Knowledge Representation
Using Predicate Logic: Representation Simple Facts in Logic, Representing Instance and ISA Relationships, Computable Functions and Predicates and Resolution.
Representing Knowledge Using Rules: Procedural versus Declarative Knowledge, Logic Programming, Forward Versus Backward Reasoning.
Symbolic Reasoning Under Uncertainty: Introduction to Non monotonic Reasoning, Logics for Non-monotonic Reasoning.
Statistical Reasoning: Probability and Bays' Theorem, Certainty Factors and Rule-Base Systems, Bayesian Networks, Dempster Shafer Theory, Fuzzy Logic. Semantic Nets, Frames.

UNIT-IV

[12 hours]

Game Playing : Games, Optimal Decisions in Games, Min max method , Perfect and imperfect decisions, Overview, Min Max, Alpha-Beta Cut-off, Refinements, Iterative deepening, The Blocks World, Components Of A Planning System, Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical Planning, Reactive Systems, Other Planning Techniques.
Learning: Overview of different forms of learning, Learning Decision Trees, Neural Networks.

Course Outcomes:

After learning the course the students should be able to:

1. Understand AI Problems and Apply Various Techniques for Engineering Problem Solving.
2. Solve Game Playing Problems.
3. Understand how Expert System is designed and how Knowledge Engineering works.
4. Apply Fuzzy Logic for Problem Solving.
5. Apply Semantic Rules for reasoning and inference.

6. Apply Various Algorithms like Breadth First Search, Depth First Search, A*, Heuristic Search for various Applications

Text Books:

1. "Artificial Intelligence" -By Elaine Rich And Kevin Knight (2nd Edition) Tata Mcgraw-Hill
2. N. J. Nilsson, "Artificial Intelligence: A New Synthesis", Harcourt Publishers.

Reference Books:

1. "Artificial Intelligence: A Modern Approach", Stuart Russel, Peter Norvig, PHI
2. "Introduction to Prolog Programming " by Carl Townsend.
3. "PROLOG Programming For Artificial Intelligence" -by Ivan Bratko(Addison-Wesley)
4. "Programming with PROLOG" –by Klocksin and Mellish.

Web Resources:

1) www.nptel.ac.in
2) http://www.inf.ed.ac.uk/teaching/courses/aipp/material/aipp_coursenotes.pdf

LAB PLAN

LIST OF EXPERIMENTS

Experiment. No.	Title	Learning Outcomes
1	A) Write a PROLOG program that list four addresses in a label form, each address should list a name, one-line address, city, state &ZIP code. B) WAP to Create Database for Hobbies of Different Person	Basic knowledge of PROLOG
2	A) Write a PROLOG program for diagnosis the childhood diseases. B) Write a PROLOG program for Family Relationship.	Basic knowledge of PROLOG
3	A) Write a PROLOG program To implement Breadth first search (BFS) B) Write a PROLOG program To implement Depth first search (DFS)	Basic knowledge of BFS & DFS

	Write a PROLOG program Checking for Password.	Basic knowledge of PROLOG
4	A) Give an opportunity to user to re-enter the password 'n' no. Of Times, on entering wrong password. B) Give an opportunity to user to re-enter the password three (03) Times, on entering wrong password.	
5	Write a PROLOG program to implement Tower Of Hanoi Problem.	Basic knowledge of Tower Of Hanoi Problem.
6	Write a PROLOG program to calculate the roots of quadratic equation Consider all possibilities real, equal, imaginary.	Basic knowledge of PROLOG operators.
7	Write a PROLOG program for finding the average salary of an employee and for adding and deleting employees from the database.	Basic knowledge of PROLOG operators
8	Write a PROLOG program to solve Water-Jug Problem.	Basic knowledge of Water-Jug Problem
9	Write a PROLOG program to demonstrate the effective use of Cut and Fail.	Basic knowledge of cut & fail in prolog.
10	Write a PROLOG program for Traveling Salesman Problem.	Basic knowledge of Traveling Salesman Problem.
11	Write a PROLOG program for Monkey Banana Problem.	Basic knowledge of Monkey Banana Problem
12	Write a PROLOG program N-QUEEN problem	Basic knowledge of N-QUEEN problem.
13	Write a PROLOG program based on list:- A) To find the length of a list. B) To find whether given element is a member of a list. C) To Append the list. D) To Reverse the list. E) To find the last element of a list. F) To delete the first occurrence of an element from a list.	Basic knowledge of list in PROLOG.

| 14 | 17. Write a PROLOG program for Arithmetic Operations.
  C) To add the member of a given list.
  D) To check if a given year is a Leap Year or not.
  E) To find the Greatest Common Divisor.
  F) To find the Least Common Divisor.
  G) To find the factorial of a given number.
  H) To generate the Fibonacci series of a given number.
  I) To convert an integer number into a string of equivalents binary | Basic knowledge of Arithmetic Operations. |

Subject: Enterprise Resource Planning								
Program: B. Tech IT				**Subject Code: IT0702**			**Semester: VII**	
Teaching Scheme (Hours per week)				**Examination Evaluation Scheme (Marks)**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	0	3	40	0	60	0	100

Course Outcome:

1. Understand the concept and importance of ERP
2. Analyze the various case studies on ERP.
3. Understand the relationship of ERP and SCM.
4. Analyze ERP market and vendors.
5. Implement ERP modules.
6. To understand various features of ERP software, so that student can build their skills to identify and classify a good ERP system.

CONTENTS

UNIT-I

[12 hours]

Introduction to ERP:
Definition of ERP, Significance of ERP, Evolution of ERP, Advantages of ERP, Characteristics of ERP, Process integration with ERP system, Implementation costs, Roadmap for successful ERP implementation.
ERP Market and Vendors:ERP market, ERP vendors, Service oriented architecture, ERP package features.
Extended ERP Services: Defining Extended ERP, Supply chain Management (SCM) and ERP, ERP and Business Intelligence (BI), ERP and E-commerce.

UNIT-II

[12 hours]

Business Process Re-engineering (BPR) and ERP:
Defining BPR, Pros and Cons of BPR, BPR Vs TQM, BPR and change management, approaches in BPR implementation, Methodologies for BPR implementation

Planning for ERP: Planning for ERP implementation, understanding organizational requirement, Economic and strategic justification, Project scope, determining resources, organizational commitment to change, budget for ERP, select right ERP package.

UNIT-III

[12 hours]

Implementation of ERP: ERP life Cycle, Methodologies for Implementation, Cost of ERP Implementation, Selection of consulting partner.
The ERP Packages: ERP package Selection ERP Marketplace, SAP Modules, Oracle Modules, PeopleSoft Modules
Managing ERP projects: ERP Project Team and Project Organization Structure, Project scope, Managing the Requirements Risk Management, Case Studies of ERP Failures.
ERP: Going Live and post implementation: Preparing to go live, Strategies for migration to new ERP system, Managing ERP after Go Live, Maintenance of ERP system.

UNIT-IV

[12 hours]

ERP Case Studies, Internet and WWW – ERP II: The internet explosion, ERP, Internet 4 9 and WWW, ERP to ERP II, Best practices of ERP II.
Future directions and Trends in ERP: New markets, New channels, Easier communication tools, Business models, need based applications, Expenditures, Reduction in implementation time, Market snap shots, Shifting revenue models.

Course Outcomes:

At the end of this subject, students should be able to:

1. Understand the significance and advantages of using ERP.
2. Differentiate and comparison between systems with ERP and without ERP
3. Tradeoff between ERP packages.
4. Analyze the management aspect of ERP implementation.
5. Analyze the Impact of ERP and observe Trends in ERP
6. Classify between a good and bad characteristics of any ERP software

Text Books:

1. Alexis Leon, "Enterprise Resource Planning*",* Tata Mc Graw Hill Education Pvt. Ltd., New Delhi, 2008.

Reference Books:
1. Ashim Raj Singla, "Enterprise Resource Planning", Cengage Learning India Pvt. Ltd., New Delhi, 2008.
2**.** V.K. Garg ,"Enterprise Resource Planning: Concepts and Practice".

Web Resources

1. https://nptel.ac.in/courses/110105083/10https://

2. https://nptel.ac.in/courses/112107238/60

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Subject: Advanced Computer Architecture

Program: B. Tech CE/CSE/IT				Subject Code: CE0718			Semester: VII	

Teaching Scheme (Hours per week)				Examination Evaluation Scheme (Marks)				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)-Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	**0**	**2**	**4**	40	40	60	60	200

Course Outcome:

1. Understand the micro-architectural design of processors.
2. Learn about the various techniques used to obtain performance improvement and power savings in current processors.
3. Understanding about the architecture of advanced processors and memory will improve their skills and knowledge into the hardware side of the computers.

CONTENTS

UNIT-I

[12 hours]

INSTRUCTION LEVEL PARALLELISM

Overview of the current state of computer architecture and computer architecture trends, Measuring, reporting and summarizing Performance; Quantitative Principles of computer design, overview of pipelined architecture. Performance evaluation of pipelined architecture. Limitations of scalar pipelines, ILP concepts Compiler Techniques for Exposing ILP – Dynamic Branch Prediction – Dynamic Scheduling – Multiple instruction Issue – Hardware Based Speculation – Static scheduling - Multi-threading - Limitations of ILP

UNIT-II

[12 hours]

THREAD LEVEL PARALLELISM

Symmetric and Distributed Shared Memory Architectures – Performance Issues – Synchronization – Models of Memory Consistency – Case studies: Intel i7 Processor, SMT & CMP Processors

UNIT-III

[12 hours]

DATA-LEVEL PARALLELISM

Vector architecture – SIMD extensions – Graphics Processing units – Loop level parallelism.

UNIT-IV

[12 hours]

MEMORY AND I/O

Cache memory, virtual memory, Cache Performance – Reducing Cache Miss Penalty and Miss Rate – Reducing Hit Time – Main Memory and Performance – Memory Technology. Types of Storage Devices – Buses – RAID – Reliability, Availability and Dependability – I/O Performance Measures.

Course Outcomes

At the end of this subject, students should be able to:

1. Evaluate performance of different architectures with respect to various parameters
2. Analyze performance of different ILP techniques
3. Understand thread level and data level parallelism.
4. Understand about advanced level processors
5. Identify cache and memory related issues in multi-processors
6. Understand about type of storage devices

Text Books:

1. John L Hennessey and David A Patterson, "Computer Architecture A Quantitative Approach", Morgan Kaufmann/ Elsevier, Fifth Edition, 2012

Reference Books:

1. Kai Hwang and Faye Briggs, "Computer Architecture and Parallel Processing", Mc Graw-Hill International Edition, 2000.
2. Sima D, Fountain T and Kacsuk P, "Advanced Computer Architectures: A Design Space Approach", Addison Wesley, 2000.

Web Resources

1. https://nptel.ac.in/courses/106105033/1

LIST OF EXPERIMENTS

Experiment. No.	Title	Learning Outcomes
1	Write the working of 8085 simulator GNUsim8085 and basic architecture of 8085 along with small introduction.	Students will get know basic computer architecture.
2	Study the complete instruction set of 8085 and write the instructions in the instruction set of 8085 along with examples	Students will get hands on practice about instruction execution.
3	Write an assembly language code in GNUsim8085 to implement data transfer instruction	Students will get hands on practice about data transfer.
4	Write an assembly language code in GNUsim8085 to implement arithmetic instruction	Students will get hands on practice about arithmetic instruction
5	Write a assembly language code for simple instruction pipeline implementation	Students will get hands on practice about instruction pipeline implementation
6	Write a assembly language code for simple Arithmetic pipeline implementation	Students will get hands on practice about Arithmetic pipeline implementation

7.	Evaluate the performance of intel I7 Processor	Students will get to know about intel i7 processor
8	Write assembly language code for simulation of vector architecture.	Students will get hands on practice about vector architecture.
9.	Simulate the performance of various memory organization	Students will get to know about performance of various memory device.

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Subject: Natural Language Processing

Program: B. Tech CE/CS/IT				Subject Code: CE0728				Semester: VII
Teaching Scheme (Hours per week)				**Examination Evaluation Scheme (Marks)**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	40	40	60	60	200

Course Objectives:

      1. To identify linear and non-linear text classification.

      2. Learn about the various language models.

      3. Discuss sequence labeling and its various applications

      4. Identify various applications for natural language processing.

CONTENTS

UNIT-I

[12 hours]

Introduction: What is NLP, Why NLP is Difficult, History of NLP, Advantages of NLP, Disadvantages of NLP, Components of NLP, Applications of NLP, Knowledge in speech and language processing, Ambiguity, Models and algorithms, Language, Thought, and Understanding, State-of-the-art, History

UNIT-II

[12 hours]

Language Modeling and Part of Speech Tagging: Unigram Language Model, Bigram, Trigram, N-gram, Advanced smoothing for language modeling, Empirical Comparison of Smoothing Techniques, Applications of Language Modeling, Natural Language Generation, Parts of Speech Tagging, Morphology, Named Entity Recognition

Words and word forms: Regular expressions and automata, Morphology and Finite-State Transducers, Computational Phonology and Text-to-Speech, Probabilistic Models of Pronunciation and Spelling, HMMs and Speech Recognition

UNIT-III

[12 hours]

Syntax: Word classes and Part-of-speech tagging, Context-free grammars for English, Parsing with context-free grammars, Features and unification, Lexicalized and probabilistic parsing
Semantics: Representing meaning, Semantic analysis, Lexical semantics, Word Sense Disambiguation and NLP in Information Retrieval

UNIT-IV

[12 hours]

Pragmatics: Discourse, Dialogue and Conversational Agents, Generation, Machine Translation
Natural Language Processing: Application of Deep learning in NLP, Text classification, Word generation

Course Outcomes:

At the end of this subject, students should be able to:

1. Comprehend the key concepts of NLP which are used to describe and analysis language
2. Perform POS tagging and generate context free grammar for English language
3. Realize semantics and pragmatics of English language for processing
4. Formulate the parser for context-free grammars.
5. Understand the applications for real-life problems of natural language processing.
6. Understand and use of natural language processing tasks.

Text Books:

1. Speech and Language processing an introduction to Natural Language Processing, Computational Linguistics and speech Recognition by Daniel Jurafsky and James H. Martin (ISBN13: 978-0131873216)
2. James A. Natural language Understanding 2e, Pearson Education, 1994.

Reference Books:

1. Handbook of Natural Language Processing, Second Edition-NitinIndurkhya, Fred J. Damerau, Fred J. Damerau (ISBN13: 978-1420085921)
2. Bharati A., Sangal R., Chaitanya V. Natural language processing: a Paninian perspective, PHI, 2000.
3. Siddiqui T., Tiwary U. S. Natural language processing and Information retrieval, OUP, 2008.

Web Resources:

1. https://github.com/keon/awesome-nlp
2. https://nlp.stanford.edu/blog/
3. https://courses.analyticsvidhya.com/courses/Intro-to-NLP

Subject: Soft Computing								
Program: B. Tech CE/CSE/IT				Subject Code: CE0719			Semester: VII	
Teaching Scheme (Hours per week)				Examination Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)- Theory	Continuous Internal Evaluation (CIE)- Practical	Total
3	0	2	4	40	40	60	60	200

Course Objectives:

1. Soft computing refers to principal components like fuzzy logic, neural networks and genetic algorithm, which have their roots in Artificial Intelligence.

2. Healthy integrations of all these techniques have resulted in extending the capabilities of the technologies to more effective and efficient problem-solving methodologies

3. To know basic idea of modern engineering techniques which are useful for solving non-linear andcomplex functions that may come across dissertation/research work which further helps in employability and entrepreneurship.

4. To solve various optimization problems and to implement algorithms based on soft computing.

5. To understand different soft computing techniques like Genetic Algorithms, Fuzzy Logic, NeuralNetworks and their combination.

6. To apply soft computing techniques to solve engineering or real-life problems for skill development.

CONTENTS

UNIT-I

[12 hours]

Introduction to Neural Network: Biological Neuron, Fundamental concept of Artificial Neural Network & Biological Neural Network , Evolution of Neural Networks, Basic Models of Artificial Neural Networks ,Types of Learning, Important Terminologies of ANNs ,Idea of computational units & Activation Functions, McCulloch–Pitts unit and Thresholding logic, Linear separability, Hebb network

UNIT-II

[12 hours]

Supervised Learning Networks: Perceptron, Perceptron Learning Algorithm, Convergence theorem for Perceptron Learning Algorithm, Adaline ,Multiple Adaptive Linear Neurons , Multi-layered Networks, Generalized delta rule, Gradient Descent, Backpropagation Network, Radial basis function network, Adaptive Learning rate, Feedback Networks, Back-propagation through time, real-time recurrent learning
Unsupervised Learning Networks: Competitive Learning, Fixed weight Competitive Nets, Kohonen Self-organizing Feature Maps, Extended Kohonen SOM.

UNIT-III

[12 hours]

Fuzzy Logic: Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion. Fuzzy Logic –II (Fuzzy Membership, Rules) Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfication & Defuzzificataion, Fuzzy Controller, Industrial applications

UNIT-IV

[12 hours]

Genetic Algorithm(GA) :Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Selection techniques, Crossover Techniques, ,Genetic operators, Mutation, Mutation techniques ,Problem Solving using GA, applications.

Course Outcomes:

At the end of this subject, students should be able to:

1. Identify and describe soft computing techniques and their roles in building intelligent machines.
2. Recognize the feasibility of applying a soft computing methodology for a particular problem.
3. Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
4. Apply genetic algorithms to combinatorial optimization problems.

5. Apply neural networks to pattern classification and regression problems.
6. Effectively use existing software tools to solve real problems using a soft computing approach.

Text Books:

1. S.N. Sivanandan and S.N. Deepa, Principles of Soft Computing, Wiley India, 2007. ISBN: 10: 81-265-1075-7.
2. S. Rajsekaran & G.A. Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm:Synthesis and Applications" Prentice Hall of India.

Reference Books:

1. Simon Haykin,"NeuralNetowrks", Prentice Hall of India
2. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India.
3. Kumar Satish, "Neural Networks" Tata Mc Graw Hill

Web Resources

1. https://www.youtube.com/watch?v=aYf3MKzExzI
2. https://www.youtube.com/watch?v=0kgEjAAjxM8
3. https://www.youtube.com/watch?v=HfdZE1dogfA
4. https://www.youtube.com/watch?v=Z_8MpZeMdD4

LIST OF EXPERIMENTS

Experiment. No.	Title	Learning Outcomes
1	W.A.P to implement simple AND & OR function with neuron.(take w1=w2=1, find appropriate threshold(threshold)	Basic knowledge of neuron model.
2	Write a program to generate XOR function using McCulloch-Pitts neuron and appropriate values for weights, bias and threshold.	Basic knowledge of neuron model.
3	Write a program for perceptron net for an AND function with bipolar inputs and targets.	Basic knowledge of perceptron learning algorithm.

4	Write a program to Implement Hebb Algorithm.	Basic knowledge of hebb algorithm in In neural network.
5	Write a program to Implement ADALINE Algorithm.	Basic knowledge of ADALINE algorithm in In neural network.
6	Write a program to Implement MADALINE Algorithm.	Basic knowledge of MADALINE algorithm in In neural network.
7	Write a program to Implement BPN(Back Propagation Network) Algorithm.	Basic knowledge of back propogation algorithm in In neural network.
8	W.A.P to implement fuzzy set properties & operations.	Basic knowledge of fuzzy logic.
9	Solve a given problem-1(Operatons) using Fuzzy Logic in MATLAB.	Basic knowledge of fuzzy logic.
10	Solve a given problem (Max-Min Composition) using Fuzzy Logic in MATLAB.	Basic knowledge of fuzzy logic.
11	Solve a given problem using fuzzy inference in MATLB GUI	Basic knowledge of fuzzy logic.
12	W.A.P to maximize the function f(x) $=x^2$ using Genetic algorithm, where x ranges from (0-31),perform 5 iterations.	Basic knowledge of Genetic Algorithm.
13	W.A.P to find the minimum of the quadratic equation f(x)=x2+5x+2, within the range -6<=x<=0	Basic knowledge of Genetic Algorithm.
14	Study GA tool in MATLAB.	Basic knowledge of Genetic Algorithm.
15	Study Neural Network tool in MATLAB.	Basic knowledge of neuron network.

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Subject: Embedded System			

Program: B. Tech CE/CSE/IT		Subject Code: CE0731		Semester: VII

Teaching Scheme (Hours per week)				Examination Evaluation Scheme (Marks)				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)-Theory**	**Continuous Internal Evaluation (CIE)-Practical**	**Total**
3	**0**	**2**	**4**	40	40	60	60	200

Course Objective:

To impart knowledge on

1. 8051 Microcontroller based system design.
2. Microchip PIC 8 bit microcontroller based system design

CONTENTS

UNIT-I

[12 Hours]

Background and Motivation-INTRODUCTION TO EMBEDDED SYSTEMS

Introduction to an embedded systems design & RTOS: Introduction to Embedded system, Processor in the System, Microcontroller, Memory Devices, Embedded System Project Management, ESD and Co-design issues in System development Process, Design cycle in the development phase for an embedded system, Use of target system or its emulator and In-circuit emulator, Use of software tools for development of an ES. Inter-process Communication and Synchronization of Processes, Tasks and Threads, Problem of Sharing Data by Multiple Tasks, Real Time Operating Systems: OS Services, I/O Subsystems, Interrupt Routines in RTOS Environment, RTOS Task Scheduling model, Interrupt Latency and Response times of the tasks.

UNIT-2

[12 Hours]

Overview of Microcontroller: Microcontroller and Embedded Processors, Overview of 8051 Microcontroller family: Architecture, basic assembly language programming concepts, The program Counter and ROM Spaces in the 8051, Data types, 8051 Flag Bits ad PSW Register, 8051 Register Banks and Stack Instruction set, Loop and Jump Instructions, Call Instructions, Time delay generations and calculations, I/O port programming Addressing Modes, accessing memory using various addressing modes, Arithmetic instructions and programs, Logical instructions, BCD and ASCII application programs, Single-bit instruction programming, Reading input pins vs. port Latch, Programming of 8051 Timers, Counter Programming

UNIT-3

[12 Hours]

Communication with 8051: Basics of Communication, Overview of RS-232, I2C Bus, UART, USB, 8051 connections to RS-232, 8051 serial communication programming, 8051 interrupts, Programming of timer interrupts, Programming of External hardware interrupts, Programming of the serial communication interrupts, Interrupt priority in the 8051

UNIT-4

[12 Hours]

Interfacing with 8051: Interfacing an LCD to the 8051, 8051 interfacing to ADC, Sensors, Interfacing a Stepper Motor, 8051 interfacing to the keyboard, Interfacing a DAC to the 8051, 8255 Interfacing with 8031/51, 8051/31 interfacing to external memory

Course Outcomes:

1. Explain various embedded system applications and design requirements
2. Construct embedded system hardware
3. Develop software programs to control embedded system

Text Book:

1. Raj Kamal, "Embedded Systems", TMH, 2004.
2. M.A. Mazidi and J. G. Mazidi, "The 8051 Microcontroller and Embedded Systems", PHI, 2004.

Reference Book:

1. David E. Simon, "An Embedded Software Primer", Pearson Education, 1999.
2. K.J. Ayala, "The 8051 Microcontroller", Penram International, 1991.
3. Dr. Rajiv Kapadia, "8051 Microcontroller & Embedded Systems", Jaico Press
4. Shibu K V "Introduction to Embedded Systems", TMH, 2011.
5. Dr. Prasad, "Embedded Real Time System", Wiley Dreamtech, 2004.

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Subject: Human Computer Interface

Program: B. Tech CE				Subject Code: CE0730			Semester: VII
Teaching Scheme (Hours per week)				**Examination Evaluation Scheme (Marks)**			
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	40	40	60	60	200

Course Objectives:

1. To learn the basic physiological, perceptual, and cognitive components of human learning and memory.

2. To gain theoretical knowledge of and practical experience in the fundamental aspects of designing and implementing user interfaces.

3. To analyze interaction problems from a technical, cognitive, and functional perspective for employability and entrepreneurship.

4. To develop an awareness of the range of general human-computer interaction issues that must be considered when designing information systems.

5. To learn about multimodal displays for conveying and presenting information.

6. To design and evaluate the quality of user interfaces and spatial displays for user skill development

CONTENTS

UNIT-I

[12 hours]

Introduction:

The human, The computer, The interaction, Paradigms, Usability of Interactive Systems, Guidelines, Principles, and Theories
Design Process- Interaction design basics, HCI in the software process, Design rules, Implementation support, Evaluation techniques, Universal design and User support.

UNIT-II

[12 hours]

Models and Theories:
Cognitive models, Socio-organizational issues and stakeholder requirements, Communication and collaboration models, Task analysis, Dialogue notations and design, Models of the system, Modeling rich interaction.

UNIT-III

[12 hours]

Interaction Styles:
Direct Manipulation and Virtual Environments, Menu Selection, Form Filling and Dialog Boxes, Command and Natural Languages, Interaction Devices, Collaboration and Social Media Participation.

UNIT-IV

[12 hours]

Design Issues:
Quality of Service, Balancing Function and Fashion, User Documentation and Online Help, Information Search and Information Visualization.

Outside the Box:
Group ware, Ubiquitous computing and augmented realities, Hypertext, multimedia, and the world wide web (www).

Course Outcomes:

At the end of this subject, students should be able to:

1. Students will learn the basic physiological, perceptual, and cognitive components of human learning and memory.
2. Students will gain theoretical knowledge of and practical experience in the fundamental aspects of designing and implementing user interfaces.
3. Students will learn to analyze interaction problems from a technical, cognitive, and functional perspective.
4. Students will develop an awareness of the range of general human-computer interaction issues that must be considered when designing information systems.
5. Students will learn about multimodal displays for conveying and presenting information.
6. Students will know and have practiced a variety of simple methods for designing and evaluating the quality of user interfaces and spatial displays.

Text Books:

1. "Human Computer Interaction" by Alan Dix, Janet Finlay, ISBN: 9788131717035, Pearson Education (2004)
2. "Designing the User Interface - Strategies for Effective Human Computer Interaction", by Ben Shneiderman ISBN: 9788131732557, Pearson Education (2010).

Reference Books:

1. Usability Engineering: Scenario-Based Development of Human-Computer Interaction, by Rosson, M. and Carroll, J. (2002)
2. The Essentials of Interaction Design, by Cooper, et al. , Wiley Publishing(2007)
3. Usability Engineering, by Nielsen, J. Morgan Kaufmann, San Francisco, 1993. ISBN 0-12-518406-9
4. The Resonant Interface: HCI Foundations for Interaction Design, by Heim, S. , Addison-Wesley. (2007)

LIST OF EXPERIMENTS

Experiment. No.	Title	Learning Outcomes
1.1	Design an User Interface for a)　　Welcome screen b)　　Multiplication and Addition of any two numbers	To learn about user interface
1.2	Design an user interface for assigning a grade to students based on the subjects marks Design an User interface for printing the numbers in a)　　Ascending order b)　　Descending order c)　　Subtraction	To learn about user interface
1.3	Design an user interface for calculator Design a user interface for registration of a student for admissions.	To learn about user interface with human interaction

1.4	Design an user interface for semester registration Design an user interface for displaying and changing of picture on the form Design an user interface for To count the number of digits in a given number	To learn about user interface with human interaction
1.5	Design an user interface for simple sort program Design an User interface User interest form, Making suggestion form Design an user interface to check whether the year is leap year or not Design an user interface for menu based Program	To learn about user interface with human interaction

1.6	List of Projects	
	1) Design an User Interfaces for ATM Machine 2) Design an User Interfaces for Socio E-commerce shop 3) Design an User Interfaces for Smart Phone 4) Design an User Interfaces for Railway Reservation System 5) Design an User Interfaces for Online Examination 6) Design an User Interfaces for Hospital management 7) Design an User Interfaces for library management 8) Design an User Interfaces for Hotel Booking 9) Design an User Interfaces for Online Banking System 10) Design an User Interfaces for On line auction 11) Design an User Interfaces for Booking of Movie Tickets 12) Design an User Interfaces for University admissions process 13) Design an User Interfaces for Online Job Search 14) Design an User Interfaces for Tourism system 15) Design an User Interfaces for Stock Market 16) Design an User Interfaces for Windows 8 on Laptop 17) Design an User Interfaces for driver of a modern car 18) Design an User Interfaces for flight simulation system 19) Design an User Interfaces for Social Network sites 20) Design an User Interfaces for Passport Tracking system 21) Design an user Interfaces for project management system 22) Design an user Interfaces for credit card processing system 23) Design an user Interfaces for Bus Reservation System 24) Design an user Interfaces for Flight Reservation System 25) Design an user Interfaces for Foreign Trading System 26) Design an user Interfaces for Super Market Management System 27) Design an user Interfaces for Computer Institute Management System 28) Design an user Interfaces for Paint Brush application 29) Design an user Interfaces for Insurance Management System 30) Design an user Interfaces for College Management System 31) Design an user Interfaces for Courier Management System	To learn about user interface with human interaction

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Subject: Computer Vision & Applications			

Program: B. Tech CE/CSE/IT		Subject Code: CE0732		Semester: VII

Teaching Scheme (Hours per week) | **Examination Evaluation Scheme (Marks)**

Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)-Theory	Continuous Internal Evaluation (CIE)-Practical	Total
3	0	2	4	40	40	60	60	200

Course Objectives:

1. To understand basic principles and concepts related to Computer Vision.

2. To study about various research subareas related to Computer Vision i.e. image formation, image processing and feature extraction

3. Introduction to the concept of object recognition and image understanding.

4. Usage of Deep Learning concepts in computer vision.

5. To improvise the skills in the field of Computer Vision.

6. To apply knowledge gained in the subject into the projects to solve various technical problems of industry.

CONTENTS

UNIT-I

[12 Hours]

Introduction to Computer Vision: Image Processing, Computer Vision and Computer Graphics, What is Computer Vision-Low Level, Mid-Level, High-Level, Application areas related to Computer Vision: Document Image Analysis, Biometrics, Object Recognition, Tracking, Medical Image Analysis, Content Based Image Retrieval, Video Data Processing, Multimedia, Virtual Reality and Augmented Reality. Three R's of Computer Vision-Reconstruction, Recognition and (re) Organization, 3D from images, Special Effects.

Image Formation & Filtering: Camera Projection and image filtering, Light, color and sensors, Convolution, Image pyramids, Image filtering & hybrid images, thinking in frequency.

UNIT-II

[12 Hours]

Image Processing, Feature Detection & Matching: Image preprocessing, Image representations, (continuous & discrete), Edge Detection, Interest Points and Corners, Local Image Features, Feature Matching, Model Fitting and RANSAC

Multiple Views & Motion: Stereo Introduction, Camera Calibration, Epipolar Geometry and Structure from motion, Dense Stereo correspondence, Feature Tracking & Optical Flow.

UNIT-III

[12 Hours]

Recognition: Recognition Overview and Bag of Features, Large-scale, Instance Recognition, Large-scale Category Recognition and Advanced Feature Encoding, Detection with Sliding Windows: Viola Jones and Dalal Triggs, Pascal VOC and Big Data, Human Computation and Crowdsourcing, Modern Boundary Detection and Sketches, Context, Spatial Layout, and Scene Parsing

Motion Estimation: Regularization Theory, Optical Communication, Stereo Vision, Motion Estimation, Structure from Motion

UNIT IV

[12 Hours]

Machine Learning & Deep Learning: Neural Networks, Introduction to Machine Learning & Deep Learning concepts, Convolutional Networks for Recognition, Object Detectors Emerge in Deep Scene CNNs, Deep Geolocalization, MS COCO and Deeper Deep Architectures, Structured Output from Deep Learning, Unsupervised Learning and Style Transfer, Generative Networks Colorization

Course Outcomes:

At the end of this subject, students should be able to:

1. Understand about the field of Computer Vision and its applications.
2. Implement about fundamental image processing techniques as a component of Computer Vision.
3. Understand about concept of features detection and matching
4. Know about Machine Learning and Deep Learning concepts used in Computer Vision.

5. Geometric relationships between 2D images and the 3D world.
6. Understand to image formation, measurement, analysis and concepts of motion.

Text Books:

1. Foundations of Computer Vision, James F. Peters, Springer.
2. Computer Vision, Models, Learning & Inference, Simon J.D. Prince, Cambridge University Press.

Reference Books:

1. Computer Vision and Image Processing Fundamentals and Applications, Manas Kamal Bhuyan, CRC Press.
2. Learn Computer Vision using OpenCV with Deep Learning CNN and RNN's, Sunila Gollapudi, Appress.

Web Resources

1. NPTEL Lecture: https://nptel.ac.in/courses/106/105/106105216
2. NPTEL Lecture: https://nptel.ac.in/courses/106/106/106106224

LIST OF EXPERIMENTS

No.	Title	Learning Outcomes
1	Introduction to CVIP (Computer Vision & Image Processing) Lab/ OpenCV.	To understand about the CVIP and OpenCV library and its utility in Computer Vision
2	Two-dimensional fast transforms: Fourier (FFT), cosine (DCT), Haar, Walsh, Hadamard, wavelet transforms.	To know about different types of transforms

3	Feature extraction - binary, RST-invariant, histogram, spectral and texture object features.	To learn about feature extraction
4	Pattern classification - nearest neighbor, K-nearest neighbor and nearest centroid	To implement and understand different pattern classification algorithms.
5	Edge/Line detection and edge linking - Kirsch, pyramid, Sobel, Prewitt, Roberts, Laplacian, Frei-Chen, Hough transform	To understand the concept of detection and transformations
6	Histogram Thresholding Segmentation	To know about Histogram Thresholding segmentation
7	Image segmentation: fuzzy c mean, histogram thresholding, median-cut, principal components transform/median cut, spherical coordinate transform/center split, gray level quantization, split and merge	To apply the image segmentation techniques
8	Histogram-based image enhancement - histogram equalization, histogram slide, histogram shrink/stretch, local equalization, histogram hyperbolization, histogram specification, adaptive contrast filters (standard, logarithmic, exponential), gray-scale piecewise linear modification	To apply and learn about Histogram based techniques

9	Morphological filters - binary iterative morphology, gray-scale and color erosion, dilation, opening, and closing.	To apply the morphological filters
10	Case Study /Open Experiment: (Student have to identify the simple problem and try to implement it-if possible) [Research papers from reputed Journals & Conferences.]	Identify the real life/industry/ research based problem and study it. Student will be allowed to either make a case study or implementation of the problem under consideration.

				INDUS INSTITUTE OF TECHNOLOGY& ENGINEERING		
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Subject: Advance Operating System							
Program: B. Tech CE/CSE/IT				**Subject Code: CE0721**		**Semester: VII**
Teaching Scheme (Hours per week)				**Examination Evaluation Scheme (Marks)**			
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	**0**	**2**	**4**	40	40	60	60	200

Course Outcome:

After learning the course the students should be able to

1. Understand general architecture of computers
2. Understand and analyze theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files.
3. Understand and use advanced concepts in operating systems
4. Understand the high-level structure of the Linux kernel both in concept

CONTENTS

UNIT-I

[12 hours]

Operating System Introduction, Structures:
Simple Batch, Multi programmed, time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating-System services, System Calls, Virtual Machines, System Design and Implementation. Process and CPU Scheduling - Process concepts and scheduling, Operation on processes, Cooperating Processes, Threads, and Interposes Communication Scheduling Criteria, Scheduling Algorithm, Multiple -Processor Scheduling, Real-Time Scheduling.

Memory Management and Virtual Memory:
Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging. Demand Paging, Performance of Demanding Paging, Page Replacement, Page Replacement Algorithm, Allocation of Frames, Thrashing.

UNIT-II

[12 hours]

File System Interface and Implementation:
Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management, Directory Management, Directory Implementation, Efficiency and Performance.

Deadlocks:
 System Model, Dead locks Characterization, Methods for Handling Dead locks Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock.
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UNIT-III

[12 hours]

Operating System Security Issues:
Introduction to the topic of Security in Operating Systems, Principles of Information Security, Access Control Fundamentals, Generalized Security Architectures.

Introduction to Distributed systems:
 Goals of distributed system, hardware and software Concepts, design issues. Elementary introduction to the terminologies within Modern Oss: Parallel, Distributed, Embedded & Real Time, Mobile, Cloud and Other Operating System Models.

UNIT-IV

[12 hours]

Clock Synchronization:
 Logical Clocks, Mutual Exclusion, Global Positioning Of Nodes, Data-Centric Consistency Models, Client-Centric Consistency Models, Consistency Protocols.

Introduction to Fault Tolerance: Process Resilience, Reliable Client-Server Communication, Reliable Group Communication, Distributed Commit, Recovery, Secure Channels, Access Control, Security Management

Course Outcomes:

At the end of this subject, students should be able to:

1. Understand about general architecture of computers
2. Understand and analyze theory and implementation of: processes, resource control (concurrency etc.).
3. Understand about physical and virtual memory, scheduling, I/O and files.
4. Understand and use advanced concepts in operating systems
5. Understand the high-level structure of the Linux kernel both in concept
6. Understand the about the concept of clock synchronization and fault tolerance.

Text Books:

1. Modern Operating System by Andrew S Tanenbaum PHI Publication
2. OS Principal by Peter B Galvin7th Edition John Willey

Reference Books:

1. Operating System by Dhamdhere TMH Publication
2. Distributed Operating System by Andrew S Tanenbaum PHI Publication

Web Resources:

1. https://www.dos.org/
2. https://www.tutorialpoint.com/os/

LIST OF EXPERIMENTS

No.	Title	Learning Outcomes
1.1	Uses an exploration of POSIX file I/O to motivate learning about DTrace, user-kernel interactions, and performance analysis.	Basic Knowledge of POSIX Thread Analysis

2.1	Uses DTrace to understand the dynamics of local Inter Process Communication: kernel memory allocation, copying, locking, scheduling, and message-based IPC. Of particular concern will be building an understanding of basic IPC functionality, but also of how it interacts with buffering and the scheduler to affect IPC latency and throughput	Basic Knowledge of IPC Functionality.
3.1	Introducesa new performance analysis mechanism, hardware performance counters that allow direct monitoring of low level architectural and micro-architectural details of performance. Using this tool, we will revisit existing benchmarks to explain the use of CPU time by the application and kernel.	Basic Knowledge of micro kernel.
4.1	To explore the TCP state machine in practice: how it is triggered by both API and network-level events. An early measurement of the impacts of network latency on TCP is performed.	Basic Knowledge of TCP state machine
5.1	Continues our investigation of the effects of network latency on TCP performance, and especially its interactions with congestion-control slow start and steady state. We also explore how socket buffer configuration affects flow control, and the combined end effects on available bandwidth.	Basic Knowledge of TCP Latency

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Subject: Cyber Security			

Program: B. Tech CE/CS/IT		Subject Code: CE0729		Semester: VII

Teaching Scheme (Hours per week)				Examination Evaluation Scheme (Marks)				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	40	40	60	60	200

Course Objectives:

1. To understand cyber-attack, types of cybercrimes, cyber laws and also how to protect them self and ultimately society from such attacks.
2. Generalize the knowledge on Digital Forensics.
3. Understand the legal and social issues at play in developing solutions.
4. Appreciate the vulnerabilities and threats posed by criminals, terrorist and nation states to national infrastructure.
5. To enhance employability skills in the field of Cyber Security and Forensics.

CONTENTS

UNIT-I

[12 hours]

Introduction to Cyber Security

Overview of Cyber Security, Importance and challenges in Cyber Security, Cyberspace, Cyber threats, Cyberwarfare, CIA Triad, Cyber Terrorism, Cyber Security of Critical Infrastructure, Cyber Security - Organizational Implications.

UNIT-II

[12 hours]

Systems Vulnerability Scanning

Overview of vulnerability scanning, Open Port / Service Identification, Banner / Version Check, Traffic Probe, Vulnerability Probe, Vulnerability Examples, OpenVAS, Metasploit. Networks Vulnerability Scanning - Netcat, Socat, understanding Port and Services tools - Datapipe, Fpipe, WinRelay, Network Reconnaissance – Nmap, THC-Amap and System tools. Network Sniffers and Injection tools – Tcpdump and Windump, Wireshark, Ettercap, Hping Kismet

UNIT-III

[12 hours]

Network Defense Tools

Firewalls and Packet Filters: Firewall Basics, Packet Filter Vs Firewall, How a Firewall Protects a Network, Packet Characteristic to Filter, Stateless Vs Stateful Firewalls, Network Address Translation (NAT) and Port Forwarding, the basic of Virtual Private Networks, Linux Firewall, Windows Firewall, Snort: Introduction Detection System.

Web Application Tools

Scanning for web vulnerabilities tools: Nikto, W3af, HTTP utilities - Curl, OpenSSL and Stunnel, Application Inspection tools – Zed Attack Proxy, Sqlmap. DVWA, Webgoat, Password Cracking and Brute-Force Tools – John the Ripper, L0htcrack, Pwdump, HTC-Hydra

UNIT-IV

[12 hours]

Cyber Laws and Forensics

Introduction, Cyber Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards. The Indian Cyberspace, National Cyber Security Policy 2013.

Introduction to Cyber Forensics, Need of Cyber Forensics, Cyber Evidence, Documentation and Management of Crime Sense, Image Capturing and its importance, Partial Volume Image, Web Attack Investigations, Denial of Service Investigations, Internet Crime Investigations, Internet Forensics, Steps for Investigating Internet Crime, Email Crime Investigations.

Course Outcomes:

At the end of this subject, students should be able to:

1. To understand importance and challenges in Cyber Security.
2. Understand, appreciate, employ, design and implement appropriate security technologies and policies to protect computers and digital information.
3. Identify & Evaluate Information Security threats and vulnerabilities in Information Systems and apply security measures to real time scenarios.
4. To use Network Defense tools and Web Application Tools.
5. Demonstrate the use of standards and cyber laws to enhance information security in the development process and infrastructure protection.
6. To acquire the hands-on skills and the knowledge required for job competency.

Text Books:

1) Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole and Sunit Belpure, Publication Wiley

Reference Books:

1) Anti-Hacker Tool Kit (Indian Edition) by Mike Shema, Publication Mc Graw Hill.

2) Charles P. Pfleeger, Shari Lawerance Pfleeger, "Analysing Computer Security", Pearson Education India.
3) V.K. Pachghare, "Cryptography and information Security", PHI Learning Private Limited, Delhi India.
4) Dr. Surya Prakash Tripathi, Ritendra Goyal, Praveen Kumar Shukla ,"Introduction to Information Security and
5) Cyber Law" Willey Dreamtech Press. Schou, Shoemaker, "Information Assurance for the Enterprise", Tata McGraw Hill.
6) Chander, Harish," Cyber Laws And It Protection " , PHI Learning Private Limited ,Delhi ,India
7) Donaldson, S., Siegel, S., Williams, C.K., Aslam, A., Enterprise Cybersecurity-How to Build a Successful Cyberdefense Program Against AdvancedThreats, A-press

Web Resources:

1. https://www.cisco.com/c/en_in/products/security/what-is-cybersecurity.html

2. https://www.paloaltonetworks.com/cyberpedia/what-is-cyber-security

LIST OF EXPERIMENTS

Experiment. No.	Title	Learning Outcomes
1	TCP scanning using NMAP.	CO4
2	Port scanning using NMAP.	CO4
3	TCP / UDP connectivity using Netcat.	CO4
4	Network vulnerability using OpenVAS.	CO2
5	Web application testing using DVWA.	CO4
6	Install VM Workstation in Ubuntu and set up Windows and Kali.	CO6
7	Write a program to sniff packet sent over the local network.	CO4
8	Create virus with python script and implement attack and analyze the effect of various viruses.	CO2
9	Sniffing Website Credentials using Social Engineering Toolkit.	CO4
10	Study and Audit Indus University IT Infrastructure.	CO6

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Subject: Block Chaining								
Program: B. Tech CE/CSE/IT				**Subject Code: CE0722**			**Semester: VII**	
Teaching Scheme (Hours per week)				**Examination Evaluation Scheme (Marks)**				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	**0**	**2**	**5**	**40**	**40**	**60**	**60**	**200**

Course Objectives:

1. Understand Block chain technology.
2. Develop block chain based solutions and write smart contracts using Hyperledger Fabric and Ethereum frameworks.
3. Build and deploy block chain application for on premise and cloud based architecture.

CONTENTS

UNIT-I

[12 hours]

Introduction:
Overview of Block chain, Public Ledgers, Bitcoin, Smart Contracts, Block in a block chain, Transactions, Distributed Consensus, Public vs Private Block chain, Understanding Crypto currency to Block chain, Permissioned model of Block chain.

Basic Crypto Primitives:
Cryptographic Hash Function and its properties, Hash pointer and Merkle tree, Digital Signature, Public key cryptography.

UNIT-II

[12 hours]

Understanding Block chain with Cryptocurrency:

Bitcoin and Block chain: Creation of coins, payments and Double spending, Bitcoin Scripts, Bitcoin B2B Network, Transaction in Bitcoin network, Block mining, Block propagation and block relay.

Working with Consensus in Bitcoin:
Distributed consensus in open environments, Consensus in Bitcoin network, Proof of Work(PoW)-basic introduction, Hash cash PoW, Attacks on PoW and the monopoly problem, Proof of Stake, Proof of Burn, Proof of Elapsed Time, The life of Bitcoin Miner, Mining difficulty, Mining pool.

UNIT-III

[12 hours]

Understanding Block chain for Enterprise:
Permissioned model and Use cases, Design issues for permissioned block chain, Execute Contracts, Overview of Consensus models for permissioned block chain,- Distributed Consensus in closed environment, Paxos, RAFT, Byzantine general problem, Byzantine fault tolerant, Pease BFT algorithm, BFT over asynchronous system.

Enterprise application of Block chain:
Cross border payments, Know Your Customer(KYC), Food security, Mortage over Block chain, Block chain enabled trade, Supply chain Financing, Identity on Block chain.

UNIT-IV

[12 hours]

Block chain application development:
Hyperledger Fabric – Architecture, Identities and policies, Membership and Access Control, Channels, Transactions validation, Writing Smart Contracts using Hyperledgers, Overview of Ripple and Corda.

Course Outcomes:

At the end of this subject, students should be able to:

1. Understand what and why of Blockchain and also its major components.
2. Learn about Bitcoin, Cryptocurrency, Ethereum
3. To provide conceptual understanding of how block chain technology can be used to innovate and improve business process.
4. Learn about Hyperledger fabric model and its architecture.
5. Covers the technological underpinning of block chain operations in both theoretical and practical implementation of solutions using block chain technology.
6. Build and deploy block chain application for on premise and cloud based architecture for better employability.

Text Books:

1. Blockchain: Blueprint for a New Economy by Melanie Swan 1ˢᵗ edition, O'Reilly, 2015, Kindle Edition.

Reference Books:

1. Blockchain Revolution: How the Technology Behind Bitcoin Is Changing Money, Business, and the World by Don Tapscott and Alex Tapscott
2. The Age of Cryptocurrency: How Bitcoin and Digital Money Are Challenging the Global Economic Order by Paul Vigna and Michael J. Casey
3. Mastering Blockchain: Distributed ledger technology, decentralization, and smart contracts explained, 2nd Edition by Imran Bashir
4. Blockchain Basics: A Non-Technical Introduction in 25 Steps | by Daniel Drescher
5. Mastering Bitcoin: Programming the Open Blockchain | by Andreas M. Antonopoulos
6. The Complete Guide to Understanding Blockchain | by Miles Price

Web Resources:

1. https://blockgeeks.com/guides/what-is-blockchain-technology/
2. https://www.edureka.co/blog/blockchain-tutorial/
3. https://www.guru99.com/blockchain-tutorial.html
4. https://blockchaintutorial.net/

LIST OF EXPERIMENTS

Experiment No.	Title	Learning Outcomes
1	Install and understand Docker container, Node.js, Hyper ledger fabric and perform necessary software installation.	Installation
2	Create and deploy a block chain network.	Deployment
3	Interact with block chain network. Execute transactions and requests against a block chain network.	Understand the architecture
4	Use block chain to track fitness club rewards.	Hands on

5	Car auction network.	practice
6	Deploy an asset transfer app using blockchain.	
7	Develop an IoT asset tracking app using blockchain.	
8	Digital Certificates	
9	Implement secure Hash Algorithm.	Implementation of SHA
10	Case Study.1	Case Study
11	Case Study 2	Case Study

Subject: Cloud Computing

Program: B. Tech CE/CS/IT			Subject Code: :CE0723			Semester: VII	

Teaching Scheme (Hours per week)				Examination Evaluation Scheme (Marks)				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
3	0	2	4	40	40	60	60	200

Course Objectives:

1. Identify the technical foundations of Cloud systems architecture.

2. Analyze the problems and solutions to cloud application problemssoftware that helps in skill development.

3. Identify the research scope in cloud computingthat enhances entrepreneurship skills in students.

4. Describe various service delivery models of cloud computing architecture, and the ways in which clouds can be deployed as public, private, hybrid, and community clouds.

5. Comprehend the technical capabilities and business benefits of virtualization and cloud computingthat enhance the employability skills of students.

6. Describe the landscape of different types of virtualization and understand the different types of clouds.

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CONTENTS

UNIT-I

[12 hours]

Introduction to Cloud Computing Cloud Computing: Overview, History of Cloud Computing, Layers and Types of Cloud, Offerings of a cloud, Software-as-a-Service, Platform-as-a-Service, Infrastructure-as-a-Service, Challenges and Risks.

Cloud Computing Architecture and Vitalization: Cloud Computing Architecture, Deployment Models, Virtualization, XML Basics, web Services, Service Oriented Architecture**.**

UNIT-II

[12 hours]

Managing Cloud and SLA: Managing cloud data, Introduction to MapReduce, OpenStack, Cloud Economics, Service Level Agreement (SLA), Resource Management, Case Studies Commercial Cloud and Google Cloud Platform.

Virtualization of the resource provisioning: Virtual machine technology, virtualization applications in enterprises, Drawbacks of virtualization.

Multitenancy on offering: Multi-entity support, Multi-schema approach, Multitenancy using cloud data stores, Data access control for enterprise applications.

UNIT-III

[12 hours]

Cloud Security Aspects:

Cloud security fundamentals Vulnerability assessment tool for cloud, Privacy and Security in cloud

Cloud computing security Structure Architectural Considerations- General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro- architectures; Identity Management and Access control Identity management, Access control, Autonomic Security, Virtualization security management virtual threats, VM Security Recommendations, VM-Specific Security techniques.

Cloud computing security Issues: Cloud Computing: Security Issues in Collaborative SaaS, Cloud Computing: Broker for Cloud Marketplace

UNIT-IV

[12 hours]

Recent trends and Research scope in cloudcomputing: Mobile cloud Computing, Fog Computing, Geo-Spatial cloud, Green Cloud Computing, IoT Cloud, Big Data and Cloud Computing, Introduction to Docket Container, Research Scope of the Cloud Computing, Open Source and Commercial Clouds, Cloud Simulator

Course Outcomes

At the end of this subject, students should be able to:

1. Articulate the main concepts, key technologies, strengths and limitations of cloud computing.
2. Implement the virtual cloud.
3. Security perusal of data in cloud environment.
4. Compare various cloud service provider architecture.
5. Illustrate and choose the appropriate technologies, algorithms and approaches for implementation and use of cloud.
6. Explore the research scope of cloud computing

Text Books:

1. Rajkumar Buyya, Cloud Computing: Principles and Paradigms, John Wiley & Sons, First Edition
2. Gautam Shroff, Enterprise Cloud Computing: Technology, Architecture, Applications, Cambridge University Press, First Edition Judith Hurwitz, R Bloor, M.Kanfman, F.Halper, Cloud Computing for Dummies, Wiley India Edition, First Edition

Reference Books:

1. Anthony T Velte, Cloud Computing : A Practical Approach, McGraw- Hill Osborne, First Edition
2. Barrie Sosinsky, Cloud Computing Bible, Wiley India, First Edition
3. Ronald Krutz and Russell Dean Vines, Cloud Security, Wiley-India, First Edition
4. Tim Malhar, S. Kumaraswammy, S.Latif, Cloud Security & Privacy, O'Really Publications, First Edition
5. Scott Granneman, Google Apps, Pearson, First Edition

Web Resources

1. http://cloudbus.orgH
2. Http://www.salesforce.com/in/cloudcomputing/
3. http://www.ibm.com/cloud-computing/in/en/what-is-cloud- computing.html
4. http://www.rackspace.com/cloud/what_is_cloud_computing
5. http://aws.amazon.com/
6. http://www.microsoft.com/en-in/server-cloud/cloud-os/
7. http://azure.microsoft.com/en-in/
8. https://cloud.google.com/

9. https://cloud.google.com/products/

LIST OF EXPERIMENTS

Experiment. No.	Title	Learning Outcomes
1	Sketch out and analyze architecture of Cloudsim and identify different entities to understand the structure of cloudsim	Usage of CLoudSim and Architecture of the same.
2	Create a scenario in cloudsim to create a datacenter along with one host. Also create one virtual machine with static configuration to run one cloudlet on it.	Working of the data centers in cloud environment.
3	Illustrate a scenario in cloudsim to create one datacenter and one host. Also implement required virtual machines to run two cloudlets on it. Assume that cloudlets run in VMs with the same MIPS requirements. The cloudlets will take the same time to complete the execution.	Understanding the cloudlets request in a cloud scenario
4	Implement a datacenter with two hosts and run two cloudlets on it in cloudsim. Consider the cloudlets run in VMs with different MIPS requirements. The cloudlets will take different time to complete the execution depending on the requested VM performance.	Analyzing the cloud performance in the distinct scenario.
5	Design a program in cloudsim to create two data centers with one host and run two cloudlets on it.	Multiple cloudlet execution in the cloud.
6	Construct a case in cloudsim to create two datacenters with one host each and run cloudlets of two users on them.	Multiple data center approach and its performance on the cloud.

7	Make and perform scenario to pause and resume the simulation in cloudsim, and create simulation entities (a Datacenter Broker) dynamically	Understanding the Broker concept with example
8	Organize a case in cloudsim for simulation entities (a Datacenter Broker) in run-time using a global manager entity (Global Broker).	Understanding the global manager in cloud.
9	Sketch out and analyze architecture of Microsoft Azure.	Working of AZURE cloud.
10	Implement a web application using Microsoft Azure account as a cloud service by creating a web page and database. Also provide database connectivity with implemented webpage.	Utilizing the cloud services.

	INDUS INSTITUTE OF TECHNOLOGY& ENGINEERING		
ज्ञानेन प्रकाशते जगत् **INDUS UNIVERSITY**	**Constituent Institute of Indus University**		

Subject: Software Group Project-I								
Program: CE/CS/IT				Subject Code: CE0727			Semester: VII	
Teaching Scheme (Hours per week)				Examination Evaluation Scheme (Marks)				
Lecture	**Tutorial**	**Practical**	**Credits**	**University Theory Examination**	**University Practical Examination**	**Continuous Internal Evaluation (CIE)- Theory**	**Continuous Internal Evaluation (CIE)- Practical**	**Total**
0	1	2	2	0	0	0	100	100

Contents

Introduction

(A) Project Category:

- **Industry Defined Project (IDP):** IDP is a category of the project in which individual student or groups works for their industry defined problem definition within the industry premises.
- **User Defined Project (UDP):** UDP is the category of project in which a group or individual student decides to make their own project under the mentorship of internal guide.

(B) Selection of Group, Definition, Tutorial:

- **Selection of Group:** The number of students per group for a project has to be decided with prior approval of Project/ Subject Coordinator.
- **Project Definition: S**tudent is expected to search the Project Definition.
- **Tutorial:** It should be used for discussion on project types, technologies and design of the project.

(C) Learning and Progress:

- **Literature survey/Analysis:** The student is advised to do some case study in form of Literature Review/Analysis related to the Previous Projects/Problems.
- **Methodology/Software tools:** Student is expected to figure out specifications, methodology, resources required, critical issues involved in software design and for project development.

(D) Submission of the Case Study Report:

- **Case study report:** Copies of the Case Study report should be submitted to the Course Coordinator.

(E) Evaluation:

- **Case study and Project Evaluation:**At end of the semester, studentis required to submit a Case study report and Present their Project through a power point presentation about 20-25 minutes.

(F) Evaluation criteria:

- Technical Content of Analysis and Case study report
- Quality of Technical Case Study Report
- Presentation (20-25 minutes)
- Regularity and sincerity related to the Work.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand project problems using analysis/literature survey.
2. Understand project characteristics and various types and stages of a project.
3. Demonstrate knowledge of contemporary issues in their chosen field of Project.
4. Designand test the prototype/algorithm in order to solve the problem.
5. Understand the fundamentals of project work in end semester project.
6. Work in a group project, it increases the learning potential by experiential and collaborative learning.

Computer Engineering Department, Indus Institute of Engineering & Technology, Indus University

Program - B. Tech (Computer Engineering/Computer Science & Engineering/Information Technology)

SEMESTER VIII

Sr. No.		Name of the subject	Credit	Teaching Scheme (per week)				Evaluation Scheme					Segment
								Theory		Practical		Total	
								CIE	ESE	CIE	ESE	Marks	
				Th.	Tut.	Pr.	Total (hr.)	Th.	Th.	Pr.	Pr.		
1	CE0816	Project	14	0	0	28	28	0	0	60	40	100	PRJ
		Total	14	0	0	28	28	0	0	60	40	100	

Semester wise Credit Breakup

Semester	HS	BS	ES	Core	PE	OE	PRJ	IC	PC	Total Credits
1	3	8	5	0	0	6	0	0	0	22
2	3	8	6	0	0	3	0	0	0	20
3	2	4	7	8	0	0	0	2	0	23
4	2	0	2	12	0	3	0	0	2	21
5	0	4	0	16	0	3	0	2	0	25
6	0	0	4	8	12	0	0	0	2	26
7	0	0	2	7	8	0	0	2	0	19
8	0	0	0	0	0	0	15	0	0	15
Total Credits as per IU	10	24	26	51	20	15	15	6	4	171
% credit	5.8%	14.0%	15.2%	29.8%	11.7%	8.8%	8.8%	3.5%	2.3%	100.0%