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NEHRU INSTITUTE OF TECHNOLOGY

AUTONOMOUS

CURRICULUM AND SYLLABI

Regulation 2023

B.TECH INFORMATION TECHNOLOGY

(Applicable for 2024 Admitted Students)

To be leading Institution in Academic excellence, Multidisciplinary Research, Innovation, Entrepreneurship and Industry relation in order to mould true citizens of the country

- To create innovative and vibrant young leaders in Engineering and Technology field for building India as a knowledge power by improving the teaching-learning process
- To enhance employability, entrepreneurship and to improve the research competence to address Societal needs.
- To generate engineering graduates who use knowledge as a powerful tool to drive societal transformation and inculcate in them ethical and moral values.

DEPARTMENT OF INFORMATION TECHNOLOGY

- To emerge as a center of Information Technology knowledge by providing quality education, promoting research and innovation.

Mission

To improve holistic education through curriculum updates, stimulating and experiential learning.

- To create research and innovation in collaboration with industry and academic professional associations to transform knowledge to build the nation through technology development.
- Transform students into responsible professionals to compete with emerging global challenges.

Program Educational Objectives

The Information Technology graduate can

PEO 1: Graduates will have core competencies in fundamental engineering and information technology for solving hardware and software engineering problems.

PEO 2: Graduates will be ready for successful professional practice in industry, academia, and innovation.

PEO 3: Graduates will continue to advance in their careers through life-long learning in research with a social and ethical concern.

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

PO2 : Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 : Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 : Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 :Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

PO6 : The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 : Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 : Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one‘s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

PSO 1: Develop an appropriate IT infrastructure with the help of basic skills and knowledge acquired in various fields related to information management and networks.

PSO 2: Use various tools and methods to design and develop software products

PSO3: Create enthusiasm for an innovative career with value-based software development courses and entrepreneurial skills leading to qualified IT solution providers.

B.TECH INFORMATION TECHNOLOGY
REGULATIONS 2023
SEMESTER I

SEMESTER-I								
S.No.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PERIODS PER WEEK**			**TOTAL CONTACT PERIODS**	**CREDITS**
				L	**T**	**P**		
	U23IP101	Induction Program	MC	-	-	-	-	0
THEORY								
1	U23EN101	English for Engineers	HSMC	3	0	0	3	3
2	U23MA101	Calculus And Differential Equations	BSC	3	1	0	4	4
3	U23PH101	Engineering Physics	BSC	3	0	0	3	3
4	U23CY101	Engineering Chemistry	BSC	3	0	0	3	3
5	U23HS101	Heritage of Tamils	HSMC	1	0	0	1	1
6	U23CS101	C- Programming	ESC	3	0	0	3	3
PRACTICAL								
7	U23BS111	Basic Science Laboratory	BSC	0	0	4	4	2
8	U23EN111	Communicative English Laboratory	HSMC	0	0	2	2	1
9	U23CS111	C- Programming Laboratory	ESC	0	0	4	4	2
10	U23VECx1	Vocational Enhancement Training-1*	VEC	0	0	2	2	1
EMPLOYABILITY ENHANCEMENT								
11	U23EE111	Career Enhancement Training- I	EEC	0	0	3	3	1
TOTAL				**16**	**1**	**15**	**32**	**23**

SEMESTER-II								
S.No.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	U23PH203	Physics for Information Science	BSC	3	0	0	3	3
2	U23HS202	Tamils & Technology	HSMC	1	0	0	1	1
3	U23CS201	Python Programming and Practices	ESC	3	0	0	3	3
THEORY WITH LAB COMPONENT								
4	U23EN202	Proficiency in English	HSMC	2	0	2	4	3
5	U23IT201	Basics of Digital Design	ESC	3	0	2	5	4
6	U23MA202	Advanced Calculus and Statistics	BSC	3	0	2	5	4
PRACTICAL								
7	U23CS211	Python Programming Lab	ESC	0	0	2	2	1
8	U23GE212	Engineering Practices Lab	ESC	0	0	2	2	1
9	U23GE213	Engineering Graphics Lab	ESC	0	0	2	2	1
EMPLOYABILITY ENHANCEMENT								
10	U23EE212	Career Enhancement Training- II	EEC	0	0	3	3	1
11	U23VECx2	Vocational Enhancement Training-II*	VEC	0	0	2	2	1
TOTAL				**15**	**0**	**17**	**32**	**22**

SEMESTER-III								
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**CATE-GORY**	**PERIODS PER WEEK**			**TOTAL CONTACT PERIODS**	**CREDITS**
				L	**T**	**P**		
THEORY COURSE								
1.	U23MA309	Discrete Mathematics for Computing	BSC	3	1	0	4	4
2.	U23IT301	Object Oriented Programming Using JAVA	PCC	3	0	0	3	3
3.	U23IT302	Fundamentals of Operating Systems	PCC	3	0	0	3	3
THEORY COURSE WITH LABORATORY COMPONENT								
4.	U23IT303	Data Structures and Algorithms	PCC	3	0	2	5	4
5.	U23IT304	Microprocessor and Microcontroller	ESC	3	0	2	5	4
LABORATORY COURSE								
6.	U23IT311	Object Oriented Programming Using JAVA Laboratory	PCC	0	0	4	4	2
7.	U23IT312	Operating System Laboratory	PCC	0	0	4	4	2
EMPLOYABILITY ENHANCEMENT								
8.	U23EE313	Aptitude and Communication for Engineers - I	EEC	0	0	2	2	1
9.	U23VECx3	Vocational Enhancement Training-III*	VEC	0	0	2	2	1
MANDATORY NON CREDIT COURSE								
10.	U23MC301	Life Skills and Ethics (Mandatory Course I)	MC	2	0	0	2	0
TOTAL				**17**	**1**	**16**	**34**	**23**

SEMESTER-IV								
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**CATE-GORY**	**PERIODS PER WEEK**			**TOTAL CONTACT PERIODS**	**CREDITS**
				L	**T**	**P**		
THEORY COURSE								
1.	U23MA410	Linear Algebra and Number Theory	BSC	3	1	0	4	4
2.	U23IT601	Compiler Design	PCC	3	1	0	4	4
3	U23IT402	Computer Architecture	PCC	3	0	0	3	3
4.	U23IT403	Database design and Management	PCC	3	0	0	3	3
THEORY COURSE WITH LABORATORY COMPONENT								
5.	U23IT404	Computer Networks	PCC	3	0	2	5	4
6.	U23IT405	Foundations of Data Science	PCC	3	0	2	5	4
LABORATORY COURSE								
7.	U23IT411	Database design and Management Laboratory	PCC	0	0	4	4	2
8.	U23IT611	Compiler DesignLaboratory	PCC	0	0	4	4	2
EMPLOYABILITY ENHANCEMENT								
9.	U23EE414	Aptitude and Communication for Engineers - II	EEC	0	0	3	3	1
10.	U23VECx4	Vocational Enhancement Training-IV*	VEC	0	0	2	2	1
MANDATORY NON CREDIT COURSE								
11.	U23MC402	Environmental Ecosystem and Sustainability	MC	2	0	0	2	0
			TOTAL	**20**	**2**	**17**	**39**	**27**

SEMESTER V								
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**CATE - GORY**	**PERIODS PER WEEK**			**TOTAL CONTACT PERIODS**	**CREDITS**
				L	**T**	**P**		
THEORY COURSE								
1.	U23IT501	Theory of Computation	PCC	3	1	0	4	4
2.	U23IT502	Distributed Computing	PCC	3	0	0	3	3
3.	U23ITP1X	Professional Elective I	PE	2	0	2	4	3
4.	U23ITO1X	Open Elective I	OE	3	0	0	3	3
THEORY COURSE WITH LABORATORY COMPONENT								
5.	U23IT503	Embedded System and IoT	PCC	3	0	2	5	4
6.	U23IT504	Object Oriented Software Engineering	PCC	3	0	2	5	4
EMPLOYABILITY ENHANCEMENT								
7.	U23EE517	Campus to Corporate- I	EEC	0	0	3	3	1
MANDATORY NON CREDIT COURSE								
8.	U23MC504	Entrepreneurship and Innovation	MC	2	0	0	2	0
TOTAL				**19**	**1**	**9**	**29**	**22**

SEMESTER VI								
SL. NO.	COURSE CODE	COURSETITLE	CATEGORY	PERIODS PERWEEK			TOTALCONTACTPERIODS	CREDITS
				L	T	P		
THEORY COURSE								
1.	U23IT401	AI Fundamentals and Machine Learning	PCC	3	0	0	3	3
2.	U23ITP2X	Professional Elective-II	PE	2	0	2	4	3
3.	U23ITP3X	Professional Elective-III	PE	2	0	2	4	3
4.	U23ITP4X	Professional Elective-IV	PE	2	0	2	4	3
5.	U23ITO2X	Open Elective-II	OE	3	0	0	3	3
THEORY COURSE WITH LABORATORY COMPONENT								
6.	U23IT602	Cryptography and Network security	PCC	3	0	2	5	4
LABORATORY COURSE								
8.	U23IT612	Mini Project	PCC	0	0	4	4	2
EMPLOYABILITY ENHANCEMENT								
9.	U23EE618	Campus to Corporate-II	EEC	1	0	0	1	1
MANDATORY NON CREDIT COURSE								
10	U23MC604	Intellectual Property Rights	MC	2	0	0	2	0
			TOTAL	**18**	**0**	**12**	**30**	**22**

SEMESTER VI I								
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**CATE - GORY**	**PERIODS PER WEEK**			**TOTAL CONTACT PERIODS**	**CREDITS**
				L	**T**	**P**		
THEORY COURSE								
1.	U23HS701	Human Resource Management	HSMC	3	0	0	3	3
2.	U23ITP5X	Professional Elective-V	PE	2	0	2	4	3
3.	U23ITP6X	Professional Elective-VI	PE	2	0	2	4	3
4.	U23ITO3X	Open Elective-III	OE	3	0	0	3	3
5.	U23ITO4X	Open Elective-IV	OE	3	0	0	3	3
LABORATORY COURSE								
6.	U23IT711	Project Work Phase -I	PCC	0	0	4	4	2
			TOTAL	**13**	**0**	**8**	**21**	**17**

SEMESTER VIII								
SL. NO.	**COURSE CODE**	**COURSE TITLE**	**CATE - GORY**	**PERIODS PER WEEK**			**TOTAL CONTACT PERIODS**	**CREDITS**
				L	**T**	**P**		
THEORY COURSE								
1.	U23IT811	Project Work -II / Internship	EEC	0	0	20	20	10
			TOTAL	**0**	**0**	**20**	**20**	**10**

SCHEME OF CREDIT DISTRIBUTION- SUMMARY

S.No.	Stream	I	II	III	IV	V	VI	VII	VIII	NIT	AICTE Norms	Anna University
1.	Humanities and Management Courses(HSMC)	5	4					3		12	12	12
2.	Basic Science Course (BSC)	12	7	4	4					27	24	25
3.	Engineering Science Course(ESC)	5	10	4						19	29	18
4.	Professional Core Course(PCC)			14	22	15	9			60	49	61
5.	Professional Elective Course(PEC)					3	9	6		18	18	18
6.	Open Elective Course(OEC)					3	3	6		12	12	12
7.	Employability Enhancement Course	1	1	1	1	1	1	2	10	18	15	16
8.	Vocational Enhancement Course	1	1	1	1							
9.	Mandatory Course(MC)										Non Credit	
NIT		23	22	23	27	22	22	17	10	166		
AICTE		17.5	20.5	24	22	21	22	18	15		159	
Anna University		22	26	23.5	22	22	20.5	16	10			162

PROFESSIONAL ELECTIVE COURSES: VERTICALS

VERTICAL 1: DATA SCIENCE

S.NO.	COURSE TITLE	CATEGORY	PERIODSPER WEEK			TOTAL CONTACT PERIODS	CREDITS
			L	T	P		
1.	Big Data Analytics	PE	2	0	2	4	3
2.	Business Analytics	PE	2	0	2	4	3
3.	Computer Vision	PE	2	0	2	4	3
4.	Exploratory Data Analysis	PE	2	0	2	4	3
5.	Image And Video Analytics	PE	2	0	2	4	3
6.	Neural Networks And Deep Learning	PE	2	0	2	4	3
7.	Text And Speech Analysis	PE	2	0	2	4	3

VERTICAL 2: FULL STACK DEVELOPMENT

S.NO.	COURSE TITLE	CATEGORY	PERIODSPER WEEK			TOTAL CONTACT PERIODS	CREDITS
			L	T	P		
1.	App Development	PE	2	0	2	4	3
2.	Web Application Security	PE	2	0	2	4	3
3.	Knowledge Engineering	PE	2	0	2	4	3
4.	Principles Of Programming Languages	PE	2	0	2	4	3
5.	Ui And Ux Design	PE	2	0	2	4	3
6.	Software Testing And Automation	PE	2	0	2	4	3
7.	Virtualization	PE	2	0	2	4	3

VERTICAL 3: CLOUD COMPUTING AND DATA CENTER TECHNOLOGIES

S.NO	COURSE TITLE	CATEGORY	PERIODSPER WEEK			TOTAL CONTACT PERIODS	CREDITS
			L	T	P		
1.	Security And Privacy In Cloud	PE	2	0	2	4	3
2.	Software Defined Networks	PE	2	0	2	4	3
3.	Soft Computing	PE	2	0	2	4	3
4.	Stream Processing	PE	2	0	2	4	3
5.	Data Warehousing	PE	2	0	2	4	3
6.	Cloud Computing	PE	2	0	2	4	3
7.	Cloud Services Management	PE	2	0	2	4	3

VERTICAL 4: CYBER SECURITY AND DATA PRIVACY

S.NO.	COURSE TITLE	CATEGORY	PERIODSPER WEEK			TOTAL CONTACT PERIODS	CREDITS
			L	T	P		
1.	Cryptocurrency and Blockchain Technologies	PE	2	0	2	4	3
2.	Digital and Mobile Forensics	PE	2	0	2	4	3
3.	Social Network Security	PE	2	0	2	4	3
4.	Ethical Hacking	PE	2	0	2	4	3
5.	Network Security	PE	2	0	2	4	3
6.	Security and Privacy in Cloud	PE	2	0	2	4	3
7.	Engineering Secure Software Systems	PE	2	0	2	4	3

VERTICAL 5: CREATIVE MEDIA

S.NO	COURSE TITLE	CATEGORY	PERIODSPER WEEK			TOTAL CONTACT PERIODS	CREDITS
			L	T	P		
1.	Augmented Reality/Virtual Reality	PE	2	0	2	4	3
2.	Multimedia and Animation	PE	2	0	2	4	3
3.	Video Creation and Editing	PE	2	0	2	4	3
4.	Multimedia Data Compression and Storage	PE	2	0	2	4	3
5.	Digital Marketing	PE	2	0	2	4	3
6.	Visual Effects	PE	2	0	2	4	3
7.	Game Development	PE	2	0	2	4	3

VERTICAL 6: EMERGING TECHNOLOGIES

S.NO	COURSE TITLE	CATEGORY	PERIODSPER WEEK			TOTAL CONTACT PERIODS	CREDITS
			L	T	P		
1.	3D Printing and Design	PE	2	0	2	4	3
2.	Cognitive Science	PE	2	0	2	4	3
3.	DevOps	PE	2	0	2	4	3
4.	Quantum Computing	PE	2	0	2	4	3
5.	Modern Cryptography	PE	2	0	2	4	3
6.	Cyber Security	PE	2	0	2	4	3
7.	Ethics and AI	PE	2	0	2	4	3

OPEN ELECTIVES

OPEN ELECTIVE 1

S.NO	COURSE TITLE	CATEGORY	PERIODSPER WEEK			TOTAL CONTACT PERIODS	CREDITS
			L	T	P		
1.	PHP and My SQL	OE	3	0	0	3	3
2.	Blockchain Essentials	OE	3	0	0	3	3
3.	Fog and Edge Computing	OE	3	0	0	3	3

SEMESTER I

U23EN101	**ENGLISH FOR ENGINEERS**	**Category : HSMC**
SDG: 4	**(Common to all Branches)**	**L T P C**
		3 0 0 3

COURSE OBJECTIVE:

1. To enable learners of engineering and technology to develop their basic communication skills in English.
2. To acquire, command in both the respective skills (listening and reading) and the productive skills (writing and speaking) of the English language.
3. To understand the key concepts of values, life skills and business communication and motivate students to look within and create a better version of themselves.
4. To focus on the development of basic fluency in English, usage of vocabulary in the technical field, and strengthening reading and official written communication skills. 5.To use language efficiently in expressing their opinions via various media.

UNIT 1 **INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION** **9**

Listening– listening to Audio/video(formal & informal);Telephonic conversation (Activity) Speaking-Self Introduction; Introducing a friend (Activity);Conversation-politeness strategies; Reading - Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts-Writing-Writing on self, Writing Definition; Jumbled sentence Grammar – Simple present tense, Present continuous, Present perfect, Present perfect continuous; Question types: Wh/ Yes or No/ and Tags; Word formation, One-word substitution.

UNIT 2 **NARRATION AND SUMMATION** **9**

Listening- Listening to the podcast, anecdotes/stories/event narration; documentaries and interviews with celebrities (Activity). Speaking-Narrating personal experiences/events; interviewing a celebrity (Activity). Reading- Reading biographies, travelogues, newspaper reports,
Writing- Guided Writing-Paragraph writing, Short Report on an event (field trip etc.) - Grammar– Simple past tense, Past continuous, Past perfect, Past perfect continuous; Subject- Verb Agreement; Prepositions, Word forms (prefixes & suffixes); Error Correction.

UNIT 3 **DESCRIPTION OF PROCESS/PRODUCT** **9**

Listening – Listening to specific audio tracks (Activity) Speaking – Picture description; giving instruction to use the product; presenting a product; Role play (Activity) -Reading – Reading advertisements, gadget reviews; finding key information from a given text- Writing - Instructions; Process description; Grammar - Simple future tense, Future continuous, Future perfect, Future perfect continuous; Imperatives; Adjectives; Degrees of comparison; Compound Words.

UNIT 4 CLASSIFICATION AND RECOMMENDATIONS 9

Listening – watching videos/ documentaries and responding to the questions based on them, Scientific lectures; and educational videos. Speaking – Small Talk; Mini presentations (Activity) - Reading – Journal reports, predicting content of reading habits, Reading articles (Activity)- Writing –Memos to colleagues or friends; Opinion Blogs; Grammar – Articles; Pronouns - Possessive & Relative pronouns, Cause and Effect.

UNIT 5 EXPRESSION 9

Listening – Listening to different accent, Listening to speeches or presentation- Speaking – Debates and Expressing opinions through Simulations, exchanging personal information - (Activity)- Reading – Reading editorials; Poster making (Activity)- Writing – Creative Writing, Checklist- Grammar – Punctuation; Compound Nouns, Homonyms; and Homophones, Simple, Compound & Complex Sentences.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Listen and comprehend complex academic texts.

CO2: Understand the denotative and connotative meanings of technical texts.

CO3: Identify definitions, descriptions, narrations and essays on various topics.

CO4: Apply different methods of integration in solving practical problems.

CO5: Express their opinions effectively in both oral and written medium of communication.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University (2020 edition).
2. English for Science & Technology Cambridge University Press, 2021. Authored by Dr.VeenaSelvam, Dr.Sujatha Priyadarshini, Dr.Deepa Mary Francis, Dr.KN.Shoba and Dr.Lourdes Joevani, Department of English, Anna University.

REFERENCES:

1. Technical Communication – Principles and Practices By Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.
2. A Course Book on Technical English by Lakshmi Narayanan, Scitech Publications (India) Pvt.Ltd.
3. English for Technical Communication (with CD) by Aysha Viswamohan, Mc-graw Hill Education, ISBN:0070264244
4. Effective Communication Skill, KulbhusanKumar, RS Salaria, Khanna Publishing House.
5. Learning to Communicate–Dr.V.Chellammal, Allied Publishing House, NewDelhi, 2003.

CO's-PO's & PSO's MAPPING															
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO3**
CO1	-	-	-	-	-	1	1	-	3	1	-	2	-	-	-
CO2	-	-	-	-	-	1	1	-	3	-	-	2	-	-	-
CO3	-	-	-	-	-	1	1	-	3	2	-	3	-	-	-
CO4	-	-	-	-	-	1	2	-	3	1	-	2	-	-	-
CO5	-	-	-	-	-	1	2	-	3	2	-	3	-	-	-
Correlation levels:			**1 – low**				**2 – medium**				**3 – high**			**"-"- no correlation**	

COURSE DESIGNED BY	**APPROVED BY**
Prof. J.Brindha Devi- AP/ English	Dr.M.Kumaresan – Professor & Head/ S&H
Name and Department	**Name and Department of BoS Chairman**

SEMESTER I

Category : BSC

U23MA101 CALCULUS AND DIFFERENTIAL EQUATIONS

L	T	P	C
3	1	0	4

SDG: 4 **(Common to all Branches)**

COURSE OBJECTIVE:

1. To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
2. To familiarize the students with differential calculus.
3. To enlighten the students with functions of several variables. This is needed in many branches of engineering.
4. To make the students acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
5. To acquaint the students with mathematical tools needed in evaluating multiple integrals and their applications.

UNIT 1 MATRICES 9+3

Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values and Eigen vectors (without proof) – Cayley – Hamilton theorem (Statement and applications only) - Orthogonal matrices – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic form – Nature of Quadratic forms - Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT 2 DIFFERENTIAL CALCULUS 9 + 3

Representation of functions - Limit of a function - Continuity - Derivatives -Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation - Applications: Maxima and Minima of functions of one variable.

UNIT 3 MULTIVARIABLE CALCULUS 9 + 3

Functions of two variables – Partial derivatives – Total differential – Taylor's series for functions of two variables – Jacobian's – Constrained maxima and minima – Lagrange's multiplier and its applications

UNIT 4 ORDINARY DIFFERENTIAL EQUATIONS OF SECOND ORDER 9 + 3

Linear differential equations of second order with constant coefficients. Linear differential Equations of second order with variable coefficients: Cauchy's linear differential equation - Method of variation of parameters for second order differential equations

UNIT 5 MULTIPLE INTEGRALS 9 + 3

Double integration with constant and variable limits - Region of integration - Area as double integral in Cartesian coordinates. Triple integral in Cartesian coordinates. Application of integration – Volume of Solids

COURSE OUTCOMES:

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

CO1: Comprehend the concepts of Eigen values, Eigen vectors, limits, continuity, functions of several variables, double integration and region of integration for solving complex problems.
CO2: Use rules of differentiation to solve maxima and minima problems.
CO3: Apply various techniques in solving ordinary and partial differential equations for practical applications.
CO4: Apply differential and integral calculus tools in modeling problems.
CO5: Evaluate integrals to compute area, volume and other practical problems.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Grewal.B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition 2018.
2. James Stewart, "Calculus : Early Transcendentals", Cengage Learning, 8th Edition, New Delhi,2015.
3. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New delhi,2016.

REFERENCES:

1. Bali. N., Goyal. M. and Watkins. C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009
2. Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New delhi,2016
3. Anton. H, Bivens. I and Davis. S, " Calculus ", Wiley, 10th Edition, 2016
4. Narayanan. S. and Manicavachagom Pillai. T. K., "Calculus" Volume I and II, S.Viswanathan Publishers Pvt. Ltd., Chennai, 2009.
5. Jain. R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2016.
6. Srimantha Pal and Bhunia. S.C, " Engineering Mathematics " Oxford University Press, 2015

CO's-PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	3	1	1	3	-	-	-	-	-	-	-	-	-
CO2	3	3	1	-	-	3	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	1	3	-	-	-	-	-	-	-	-	-
CO4	3	3	3	-	-	3	-	-	-	-	-	-	-	-	-
CO5	3	3	2	1	-	3	-	-	-	-	-	-	-	-	-

Correlation levels:	**1 – low**	**2 – medium**	**3 – high**	**“-“- no correlation**

COURSE DESIGNED BY	**APPROVED BY**
Prof.Amali Therasa AP/Mathematics	Dr.M.Kumaresan – Professor & Head/ S&H
Name and Department	**Name and Department of BoS Chairman**

SEMESTER I

U23PH101	**ENGINEERING PHYSICS**	**Category : BSC**
SDG: 4	**(Common to CSE & IT)**	**L T P C** **3 0 0 3**

COURSE OBJECTIVE:

1. Understand the basics of Properties of Matter and apply them to Engineering.
2. Explore the applications of Lasers and Fiber optics in engineering contexts.
3. Apply principles of Ultrasonics and Thermal Physics to Engineering challenges.
4. Grasp foundational Quantum Physics concepts and their modern applications.
5. Analyze Crystal systems and their structures in Engineering and Technology.

UNIT 1 PROPERTIES OF MATTER 9

Elasticity – Stress-strain diagram and its uses - Factors affecting elastic modulus – Torsional stress and deformations –Torsion pendulum: theory and experiment - Bending of beams - Bending moment – Cantilever: theory and experiment – Uniform and non-uniform bending: theory and experiment - I-shaped girders - Applications. – Basic Solved Problems.

UNIT 2 LASER AND FIBER OPTICS 9

Introduction – Principle of Spontaneous emission and stimulated emission. Population inversion, pumping- Einstein's A and B coefficients: derivation. Types of lasers – Nd-YAG, CO_2- Industrial Applications of Lasers –Fiber Optics: Principle and propagation of light – Numerical aperture and Acceptance angle - Types of optical fibres (material, refractive index, mode) – Temperature and displacement sensors.

UNIT 3 ULTRASONICS AND THERMAL PHYSICS 9

Introduction – Piezoelectric effect - piezoelectric generator - Velocity measurement – Acoustic grating – Ultrasonic Medical applications - Introduction to heat - Transfer of heat energy :Thermal conduction, convection and radiation –Thermal conductivity - Forbe's and Lee's disc method: theory and experiment – Applications: heat exchangers, refrigerators, ovens and solar water heaters.

UNIT 4 QUANTUM PHYSICS 9

Black body radiation – Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh-Jeans' Law from Planck's theory – Compton effect :Theory and experimental verification – Matter waves – Schrödinger's wave equation: Time independent and time dependent equations – Physical significance of wave function – Particle in a one-dimensional box - Microscope: Scanning Tunnelling microscope.

UNIT 5 CRYSTAL PHYSICS 9

Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – 'd' spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – Diamond and graphite structures – Polymorphism and allotropy - Crystal defects – Point, line and surface defects- Burger vector.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Realize the fundamental engineering ideas of matter, optics, heat, sound, and quantum theory.
CO2: Demonstrate a solid understanding of fundamental matter properties, Laser and Fiber optics classification, Quantum concepts and apply them successfully to solve practical engineering problems.
CO3: Apply the elastic modulus theory, Fiber Optic Sensors, Ultrasonics and thermal applications to integrate knowledge and problem solve at an advanced level.
CO4: Categorize the Elastic moduli concepts, Fiber optic lasers and Crystal structures to implement in Engineer problems in Material Science and electronics.
CO5: Analyze the foundational Quantum and Crystal Physics concepts to implement solutions for modern engineering problems.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Bhattacharya, D.K. & Poonam, T. "Engineering Physics". Oxford University Press, 2015.
2. Gaur, R.K. & Gupta, S.L. "Engineering Physics". Dhanpat Rai Publishers, 2012.
3. Pandey, B.K. &Chaturvedi, S. "Engineering Physics". Cengage Learning India, 2012

REFERENCES:

1. Halliday, D., Resnick, R. & Walker, J. "Principles of Physics". Wiley, 2015.
2. Serway, R.A. & Jewett, J.W. "Physics for Scientists and Engineers". Cengage Learning, 2010.
3. Palanisamy P.K. Engineering Physics. SCITECH Publications, 2011.
4. Kittle,C,: Introduction to solid state Physics:, Wiley, 2005.
5. Mani P. Engineering Physics I. Dhanam Publications, 2011.
6. Senthilkumar G. Engineering Physics I. VRB Publishers, 2011.

CO's-PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3
CO1	3	3	1	-	1	-	1	-	-	1	-	1	-	-	-
CO2	3	3	1	-	1	-	1	-	1	-	-	1	-	-	-
CO3	3	3	1	-	1	-	1	-	1	-	-	1	-	-	-
CO4	3	2	1	-	1	-	-	-	-	1	-	1	-	-	-
CO5	3	3	1	-	-	-	1	-	1	-	-	1	-	-	-

Correlation levels : 1 – low 2 – medium 3 – high "-"- no correlation

COURSE DESIGNED BY	APPROVED BY
Dr.G.Satheesh Kumar –Assistant Professor/Physics	Dr.M.Kumaresan – Professor & Head/ S&H
Name and Department	**Name and Department of BoS Chairman**

SEMESTER I

Category : BSC

U23CY101 **ENGINEERING CHEMISTRY**

L	T	P	C
3	0	0	3

SDG: 9 **(Common to all Branches)**

COURSE OBJECTIVE:

1. Learn boiler feed water requirements, and water treatment techniques.
2. To acquire knowledge about the preparation, properties and applications of polymers.
3. Understand the basic concepts of electrochemistry and its applications.
4. Learn corrosion control and protective techniques.
5. Acquire the knowledge about the fuels and properties of energy storage devices.

UNIT 1 **WATER TECHNOLOGY** **9**

Introduction - Sources of water - Impurities in water - Types of water –Hardness of water - Expression of hardness - Units of hardness - Estimation of hardness of water by EDTA method - Disadvantages of using hard water - Boiler troubles - Scale and sludge - Softening of water - External treatment method - Demineralization process - Internal treatment process – Carbonate, Phosphate and Calgon conditioning - Desalination by reverse osmosis method.

UNIT 2 **POLYMERS** **9**

Introduction: Classification of polymers – Natural and synthetic; Thermoplastic and Thermosetting. Functionality – Degree of polymerization. Types: Addition, condensation and copolymerization and mechanism of Addition polymerization (Free Radical); Techniques of polymerization: Bulk, emulsion, solution and suspension. Preparation, properties and uses of Nylon (6,6 and 11) and Epoxy resin. Engineering application of plastics- PVC, PTFE and Bakelite. Types of compounding of plastics- Moulding, injection moulding.

UNIT 3 **ELECTRO CHEMISTRY** **9**

Electrochemistry**:** Introduction - Cells - Representation of a galvanic cell - Reversible and irreversible cells - Electrode potential - Nernst equation - Reference electrode (Calomel electrode) - Standard hydrogen electrode - Glass electrode - Electrochemical series and its applications –
Battery: Introduction, Types of batteries- alkaline battery- lead storage battery - H_2 -O_2 fuel cell- applications. Construction of solar cells and E-Vehicle.

UNIT 4 **CORROSION AND ITS CONTROL** **9**

Introduction - Chemical corrosion and Wet corrosion - Galvanic and differential aeration (Pitting, Crevice and Pipeline) - Factors influencing rate of corrosion - Corrosion- causes- factors- corrosion control - material selection and design aspects - electrochemical protection – sacrificial anode method and impressed current cathodic method- Cathodic protection method.

UNIT 5 FUELS AND COMBUSTION 9

Introduction - Classification of fuels - Requirements of a good fuel – Combustion: Principle of combustion - Calorific value - Gross and net calorific values - Explosive range - Spontaneous ignition temperature. Fuels: Solid fuels - Coal and its varieties - Proximate analysis - Significance - Metallurgical coke - Otto-Hoffman byproduct method - Liquid fuel: Manufacture of synthetic petrol - Bergius method - Knocking - Octane number - Cetane number - Gaseous fuel: Liquefied petroleum gas (LPG), Compressed natural gas (CNG).

COURSE OUTCOMES:

At the end of the course, students would

CO1: Recall the concept about water technology, engineering polymers, electrodes, corrosion and combustion of fuels.

CO2: Understand the boiler problems and categorize the polymers.

CO3: Classify plastics, batteries, corrosion, and the calorific value of fuels.

CO4: Apply enough knowledge of contemporary water softening, polymerization, fuel cell, electrochemical protection, and fuel manufacturing procedures.

CO5: Analyze the hardness of water using the EDTA technique and characterization of coal.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Jain P C and Monica Jain, “Engineering Chemistry”, 17th Edition, Dhanpat Rai Publishing Co., 2018.
2. Sivasankar B., “Engineering Chemistry”, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2017.

REFERENCES:

1. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, “Textbook of nanoscience and nanotechnology”, Universities Press-IIM Series in Metallurgy and Materials Science, 2018.
2. O.G. Palanna, “Engineering Chemistry” McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.
3. Friedrich Emich, “Engineering Chemistry”, Scientific International Pvt, Ltd, New Delhi, 2017.
4. Shikha Agarwal, “Engineering Chemistry-Fundamentals and Applications”, Cambridge University Press, Delhi, Second Edition, 2019.
5. R.D. Madan, “Modern Inorganic Chemistry”, S. Chand, New Delhi, 2012
6. S.S. Dara, “A Textbook of Engineering Chemistry”, S. Chand Publishing, 12th Edition, 2018.

CO's-PO's & PSO's MAPPING														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	-	-	2	-	-	2	-	-	-	-	1	-	-	-
CO2	3	-	-	2	2	-	2	-	-	-	-	2	-	-	-
CO3	3	-	-	2	2	-	2	-	-	-	-	2	-	-	-
CO4	3	-	-	2	3	-	2	-	-	-	-	3	-	-	-
CO5	3	-	-	2	3	-	2	-	-	-	-	3	-	-	-
Correlation levels:				**1 – low**			**2 – medium**			**3 – high**			**"-"- no correlation**		

COURSE DESIGNED BY	**APPROVED BY**
Dr.M.Kumaresan – Professor & Head/ S&H	Dr.M.Kumaresan – Professor & Head/ S&H
Name and Department	**Name and Department of BoS Chairman**

SEMESTER I

Category : HSMC

U23HS101	**HERITAGE OF TAMILS (Common to all Branches)**	**L**	**T**	**P**	**C**
		1	**0**	**0**	**1**

COURSE OBJECTIVE:

1. To learn the extensive literature of classical tamil
2. To review the fine arts heritage of tamil culture
3. To realize the contribution in Indian freedom struggle

UNIT 1 LANGUAGE AND LITERATURE 3

Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

UNIT 2 HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE 3

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

UNIT 3 FOLK AND MARTIAL ARTS 3

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

UNIT 4 THINAI CONCEPT OF TAMILS 3

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

UNIT 5 CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE 3

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Remember the extensive literature of tamil and its classical nature, musical instruments, Folk, thinai concept, Indian Freedom Struggle& Aham, Puram and Aram Concept.

CO2: Remember the principles in Thirukural, Bakthi Literature Azhwars and Nayanmars , heritage of sculpture, painting and musical instruments of ancient people, victory of chozha dynasty.

CO3: Understand on folk and martial arts of tamil people, Justice in Sangam Literature, Development of Modern literature in Tamil, Making of musical instruments.

CO4: Understand the role of Temples in Social and Economic Life of Tamils, Ancient Cities and Ports of Sangam Age, Conquest of Cholas.

CO5: Understand the Cultural Influence of Tamils over the other parts of India, contribution of tamils self-esteem movement and siddha medicine, Print History of Tamil Books.

TOTAL: 15 PERIODS

TEXT BOOKS:

1. □'□ * – □ -□ 0□ – .□ . □ 1□□ (□450):
2. □'□ 0 □ 8□ *□ 4:□
3. □ "□ – >□ . @□ . (4□ 1□@□).
4. 3.A□B – □ C□ :□ (□ F□ G□□ (□450)

REFERENCES:

5. Social Life of Tamils (Dr. K. K. Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Historical Heritage of the Tamils (Dr .S. V. Subaramanian, Dr .K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
7. The Contributions of the Tamils to Indian Culture (Dr. M. Valarmathi) (Published by: International Institute of Tamil Studies)
8. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
9. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

CO's-PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO2	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO3	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO4	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO5	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-

Correlation levels: 1 – low 2 – medium 3 – high "-"- no correlation

COURSE DESIGNED BY	APPROVED BY
Prof. A.Prabhakaran – AP/ Tamil	Dr.M.Kumaresan - Professor & Head / S&H
Name and Department	**Name and Department of BoS Chairman**

SEMESTER I

U23CS101 **C-PROGRAMMING** **Category : ESC**

SDG : 4 **(Common to CSE & IT)**

L	T	P	C
3	0	0	3

COURSE OBJECTIVE:

1. To acquire knowledge about the concept of C programming, keywords and operators.
2. To classify the data types, structure of C program, looping statements, arrays and strings.
3. To identify the basics of functions, structures, nested structure and Union.
4. To the concept of searching, recursion and array of structure with dynamic memory allocation
5. To defund the pointers, file fundamentals of sequential, random access file and command line arguments.

UNIT 1 **BASICS OF C PROGRAMMING** **9**

Introduction to Computer and programming paradigms – Applications of C Language - Structure of C program - C programming: Data Types - Constants – Enumeration Constants - Keywords – Operators: Precedence and Associativity - Expressions - Input/Output statements, Assignment statements –Decision making statements - Switch statement - Looping statements – Preprocessor directives -Compilation process.

UNIT 2 **ARRAYS AND STRINGS** **9**

Introduction to Arrays: Declaration, Initialization – One dimensional array –Two dimensional arrays - String operations: length, compare, concatenate, copy – Selection sort, linear and binary search.

UNIT 3 **FUNCTIONS AND POINTERS** **9**

Modular programming - Function prototype, function definition, function call, Built-in functions (string functions, math functions) – Recursion, Binary Search using recursive functions –Pointers – Pointer operators – Pointer arithmetic – Arrays and pointers – Array of pointers – Parameter passing: Pass by value, Pass by reference.

UNIT 4 **STRUCTURES AND UNION** **9**

Structure - Nested structures – Pointer and Structures – Array of structures – Self-referential structures – Dynamic memory allocation - Union - Storage classes and Visibility.

UNIT 5 **FILE PROCESSING** **9**

Files – Types of file processing: Sequential access, Random access – Sequential access file - Random access file - Command line arguments.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Remember the concept of C programming to understand the functional knowledge about operators and the keywords used.

CO2: Demonstrate C program for data types, looping & array.
CO3: Illustrate the basics for functions, structures, pointers and union.
CO4: Make use of the concept to perform the operations dynamic memory allocation, searching and recursion.
CO5: Examine the file processing for sequential, random access and command line arguments.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. ReemaThareja, "Programming in C", Oxford University Press, Second Edition, 2016.
2. Kernighan, B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2015.

REFERENCES:

2. Paul Deitel and Harvey Deitel, "C How to Program with an Introduction to C++", Eighth edition, Pearson Education, 2018.
3. Yashwant Kanetkar, Let us C, 17th Edition, BPB Publications, 2020.
4. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C", McGraw-Hill Education, 1996.
5. Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", Second Edition, Oxford University Press, 2013.
6. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", 1st Edition, Pearson Education, 2013

CO's-PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3
CO1	1	2	2	-	2	-	-	-	2	-	-	2	1	2	-
CO2	2	2	2	-	2	-	-	-	2	-	-	3	2	2	-
CO3	3	3	2	-	2	-	-	-	2	-	-	2	2	2	-
CO4	2	2	2	-	3	-	-	-	2	-	-	3	2	2	-
CO5	2	3	3	-	2	-	-	-	2	-	-	2	2	3	-

Correlation levels: 1 – low 2 – medium 3 – high "-"- no correlation

COURSE DESIGNED BY	APPROVED BY
Dr.Irfan Ahamed	Dr.D.Karthikeswaran ASP/Head/IT
Name and Department	**Name and Department of BoS Chairman**

SEMESTER I

		Category : BSC			
U23BS111 SDG:4	**BASIC SCIENCE LABORATORY**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**2**

COURSE OBJECTIVE:

1. Realize the fundamental engineering ideas of matter, optics, heat, sound, and quantum theory.
2. Demonstrate a solid understanding of fundamental matter properties, Laser and Fiber optics classification, Quantum concepts and apply them successfully to solve practical engineering problems.
3. Apply the elastic modulus theory, Fiber Optic Sensors, Ultrasonics and thermal applications to integrate knowledge and problem solve at an advanced level.
4. Categorize the Elastic moduli concepts, Fiber optic lasers and Crystal structures to implement in Engineer problems in Material Science and electronics.
5. Analyse the foundational Quantum and Crystal Physics concepts to implement solutions for modern engineering problems.

PHYSICS - LIST OF EXPERIMENTS (Any 5 Experiments)

1. Determination of rigidity modulus – Torsion pendulum
2. Determination of Young's modulus - Non uniform bending method.
3. Determination of Young's modulus - Uniform bending method.
4. Determination of thickness of a thin wire – Air wedge method.
5. Determination of the wavelength of the laser using grating .
6. Determination of Numerical Aperture and acceptance angle using Optical fibre.
7. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
8. Determination of thermal conductivity of a bad conductor – Lee's Disc method.
9. Melde's string experiment.
10. Determination of Band gap of a semiconductor.

CHEMISTRY- LIST OF EXPERIMENTS (Any 5 Experiments)

1. Estimation of total, temporary and permanent hardness of water by EDTA method.
2. Estimation of alkalinity of the given water sample.
3. Determination of chloride content of water sample by Argentometric method.
   4.Determination of strength of given hydrochloride acid using pH meter
5. Determination of DO content of water sample by Winkler's method.
6. Conduct metric titration strong acid Vs Strong Base.
7. Estimation of BOD of the given water sample.
8. Estimation of iron content of the given solution using potentiometer.
9. Estimation of Iron content by spectrophotometer.
10. Estimation of sodium present in water using flame photometer.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Apply Physics principles of elasticity to evaluate engineering properties of materials.

CO2: Analyze the physical principle involved in various instruments in acoustics, optics and thermal physics.

CO3: Characterize the quality of water samples with respect to their acidity, alkalinity and hardness.

CO4: Apply chemistry principles to evaluate DO, BOD, Iron content of the given samples.

CO5: Analyze the strength and amount of acids using pH, potentiometer, conductivity meter and the amount of chloride, sodium iron using Argentometric method and flame photometer for the given solution.

TOTAL: 60 PERIODS

CO's-PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	1	1	-	-	1	-	1	-	-	-			
CO2	3	2	1	1	-	-	1	-	1	-	-	1			
CO3	3	2	1	1	-	-	1	-	1	-	-	-			
CO4	3	2	1	1	-	-	1	-	1	-	-	1			
CO5	3	2	-	1	-	-	1	-	1	-	-	1			

Correlation levels: 1 – low 2 – medium correlation 3 – high "-"- no

COURSE DESIGNED BY	APPROVED BY
Dr.M.Kumaresan – Professor & Head/ S&H & Dr.T.Jayaprakash - Professor / Physics	Dr.M.Kumaresan – Professor & Head / S&H
Name and Department	**Name and Department of BoS Chairman**

SEMESTER I

Category : HSMC

U23EN111 COMMUNICATIVE ENGLISH LABORATORY L T P C

SDG : 4 (Common to all Branches) 0 0 2 1

COURSE OBJECTIVE:

1. To enable learners of engineering and technology to develop their basic communication skills in English.
2. To acquire, command in both the respective skills (listening and reading) and the productive skills (writing and speaking) of the English language.
3. To understand the key concepts of values, life skills and business communication and motivate students to look within and create a better version of themselves.
4. To focus on the development of basic fluency in English, usage of vocabulary in the technical field, and strengthening reading and official written communication skills. 5.To use language efficiently in expressing their opinions via various media.

LIST OF EXPERIMENTS

1. Conversation: Introduction to Classmates-Audio/Video (formal & informal)
2. Self-Introduction
3. Telephone Conversation
4. Listening to voicemail & messages
5. Listening and filling a form
6. Debate
7. Group Discussion
8. Exchanging personal Information
9. Introducing a friend politeness strategy
10. Essay Writing

COURSE OUTCOMES:

At the end of the course, students would

CO1 : To improve the communicative competence of learners

CO2 :To help learners use language effectively in academic /work contexts

CO3 : To develop various listening strategies to comprehend various types of audio materials like lectures, discussions, videos etc.

CO4 : To build on students' English language skills by engaging them in listening, speaking and grammar learning activities that are relevant to authentic contexts.

CO5 : To use language efficiently in expressing their opinions via various media.

30 Periods

CO's-PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	3	1	1	1	-	-	2	-	2	2	2	2	-
CO2	3	2	2	2	1	1	-	-	2	-	2	2	3	3	-
CO3	3	2	3	2	1	2	-	-	2	-	2	2	2	2	-
CO4	3	2	2	2	1	2	-	-	3	-	2	3	3	3	-
CO5	3	2	3	1	1	2	-	-	3	-	2	3	2	3	-

Correlation levels: 1 – low 2 – medium 3 – high "-"- no correlation

COURSE DESIGNED BY	APPROVED BY
Prof. J.Brindha Devi- AP/ English	Dr.M.Kumaresan – Professor & Head/ S&H
Name and Department	**Name and Department of BoS Chairman**

SEMESTER I

Category : ESC

U23CS111	**C -PROGRAMMING LABORATORY**	**L**	**T**	**P**	**C**
SDG: 4	**(Common to CSE & IT)**	**0**	**0**	**4**	**2**

COURSE OBJECTIVE:

1. To familiarize with C programming constructs.
2. To develop programs in C using basic constructs.
3. To develop programs in C using arrays.
4. To develop applications in C using strings, pointers, functions.
5. To develop applications in C using structures.
6. To develop applications in C using file processing.

LIST OF EXPERIMENTS

1. Writing algorithms, flow charts and pseudo codes for simple problems.
2. Programs on expressions and conversions.
3. Programs using if, if-else, switch and nested if statements.
4. Programs using while, do-while, for loops.
5. Programs on one dimensional array, passing arrays to functions and array operations.
6. Programs using two dimensional arrays, passing 2D arrays to functions.
7. Programs using String functions.
8. Programs using function calls, recursion, call by value.
9. Programs on pointer operators, call by reference, pointers with arrays
10. Programs using structures and unions.
11. Programs on file operations and modes.
12. Working with text files, random files and binary files.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Demonstrate knowledge on C programming constructs.
CO2: Develop programs in C using arrays.
CO3: Develop applications in C using strings, pointers, functions.
CO4: Develop applications in C using structures.
CO5: Develop applications in C using file processing.

CO's-PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	3	1	1	1	-	-	2	-	2	2	2	2	-
CO2	3	2	2	2	1	1	-	-	2	-	2	2	3	3	-
CO3	3	2	3	2	1	2	-	-	2	-	2	2	2	2	-
CO4	3	2	2	2	1	2	-	-	3	-	2	3	3	3	-
CO5	3	2	3	1	1	2	-	-	3	-	2	3	2	3	-

Correlation levels: 1 – low 2 – medium 3 – high "-"- no correlation

COURSE DESIGNED BY	APPROVED BY
Dr. Irfan Ahamed	Dr.D.Karthikeswaran ASP/Head/IT
Name and Department	**Name and Department of BoS Chairman**

SEMESTER I

Version 1.0

Category : EEC

U23EE111 CAREER ENHANCEMENT TRAINING I L T P C

SDG: 17 (Common to all Branches) 0 **0 3 1**

COURSE OBJECTIVE:

1. To improve mathematical and analytical abilities of students, particularly in the context of comprehending engineering concepts and making data-driven decision.
2. To develop critical thinking skills including problem solving, logic, patterns, and reasoning. 3.To Comprehend and appreciate mathematical terminologies and concepts in order to understand, interpret, and represent science and technology.

UNIT 1 FUNDAMENTALS 6

Divisibility Test - Square root and Cube roots – HCF & LCM - problems on Numbers

UNIT 2 ALGEBRA 5

Simplification – Surds & Indices – Linear & Quadratic Equations

UNIT 3 BANKING ESSENTIALS 8

Average – Percentage – Profit & Loss – Simple Interest – Compound Interest

UNIT 4 TIME AND EFFICIENCY 8

Time Speed Distance – Problems on Trains – Boats & Streams – Time & Work – Pipes & Cisterns

UNIT 5 LOGICAL REASONING 3

Number & letter series – Analogy– Pattern classification – Coding & Decoding

COURSE OUTCOMES:

At the end of the course, students would

CO1: Exhibit a clear understanding of fundamental concepts of aptitude for engineering. **CO2:** Demonstrate problem-solving skills and critical thinking abilities in the context of recruitment aptitude tests.

CO3: To use appropriate strategies and shortcuts to improve speed and accuracy in solving aptitude problems during recruitment processes.

CO4: Evaluate and interpret aptitude test results to identify areas of improvement and develop a personalized study plan for further enhancement.

TOTAL: 30 PERIODS

TEXT BOOKS:

1. The Pearson Guide to Quantitative Aptitude For Competitive Examinations, Dinesh Khattar. Pearson

2. Quantitative Aptitude Dr. R.S. Aggarwal S. Chand Publication.
3. A modern Approach to Verbal and Non-Verbal Reasoning R.s. Aggarwal.

REFERENCES:

1. Quantitative Aptitude for CAT, Arun Sharma.
2. Fast Track Objective Arithmetic, Rajesh Verma, Arihant Publication.
3. Quantitative Aptitude Quantum CAT Common Admission Tests for Admission into IIMs, Sarvesh K. Verma.
4. Effective Communication Skill,Kulbhusan Kumar,R S Salaria,Khanna Publishing House.
5. Wiley's Exam Expert Quantitative Ability for CAT, 2ed, Ashu Jain.

CO's-PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	-	-			
CO2	3	2	1	3	-	-	-	-	-	-	-	-			
CO3	3	1	1	2	-	-	-	-	-	-	-	-			
CO4	1	1	1	1	-	-	-	-	-	-	-	-			
CO5	-	-	-	-	-	-	-	-	-	-	-	-			

Correlation levels: 1 – low 2 – medium 3 – high "-"- no correlation

COURSE DESIGNED BY	APPROVED BY
Prof. Ramesh Raja – Head/ NCPIR	Dr.M.Kumaresan – Professor & Head/ S&H
Name and Department	**Name and Department of BoS Chairman**

SEMESTER II

Category: BSC

		L	T	P	C
U23PH203	PHYSICS FOR INFORMATION SCIENCE	3	0	0	3

1. Make the students understand the importance in studying electrical properties of materials..
2. Enable the students to gain knowledge in semiconductor physics.
3. Make the students to learn the origin of magnetism in magnetic materials and their classifications; to learn the physics of superconductivity and various properties exhibited by superconductors.
4. Make the students to learn the mechanisms of polarization in dielectric materials, and about classification and properties of dielectric materials; familiarize with the optical properties of materials.
5. Inculcate an idea of significance of Nano structures, quantum confinement, ensuing Nano materials preparation and applications.

UNIT 1 ELECTRICAL PROPERTIES OF MATERIALS 9

Introduction - Classical free electron theory - Expressions for Electrical and Thermal conductivity - Wiedemann-Franz law – Lorentz Number - Quantum free electron theory – Fermi distribution function – Effect of temperature on fermi function-Density of energy states – Carrier concentration in metals - Electron effective mass- Concept of hole.

UNIT 2 SEMICONDUCTOR PHYSICS 9

Elemental and Compound semiconductors - Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – Extrinsic semiconductor - Derivation of carrier concentration in n-type and p-type semiconductor – variation of Fermi level with temperature and impurity concentration — Hall effect – Determination of Hall coefficient – Applications.

UNIT 3 MAGNETISM AND SUPERCONDUCTIVITY 9

Origin of magnetic moment – Bohr magneton – Comparison of Dia, Para and Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – antiferromagnetic materials – Ferrites and its applications. Superconductivity: properties – Type I and Type II superconductors – High Tc superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation.

UNIT 4 DIELECTRIC AND OPTICAL PROPERTIES OF MATERIALS 9

Electrical susceptibility – Dielectric constant – Electronic, ionic, orientational and space charge polarization – Frequency and temperature dependence of polarisation – Internal field – Claussius – Mosotti relation (derivation) – Dielectric loss - Light absorption - Luminescence, Phosphors and white LEDs -Birefringence, Dichroism - Electro-optic effect and amplitude modulators.

UNIT 5 IMAGE PROCESSING & NETWORKING WITH PYTHON AND APPLICATIONS **9**

Basics of Image processing- Image File Formats – Introduction to Classic Image Processing Algorithm- Image Processing Tools-Fundamentals of Networking- Introduction to Python Sockets- Simple Client/Server Programming-Python Applications.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Grasp the fundamental principles of classical and quantum mechanics, semiconductor physics, magnetic properties of materials, dielectric materials, superconducting materials, optical and nano materials and acquire insights into the essentials of emerging engineering materials.

CO2: Demonstrate a comprehensive understanding of classical and quantum mechanics, semiconductor physics, magnetic properties of materials, dielectric materials, and superconducting materials optical and nano materials, enabling the adept resolution of practical engineering challenges.

CO3: Apply the foundational theories of classical and quantum mechanics, semiconductor physics, and the properties of magnetic, dielectric, superconducting materials, optical and nano materials to seamlessly integrate knowledge into diverse engineering applications.

CO4: Classify the semiconductor, magnetic, dielectric, and superconducting properties of materials, utilizing this systematic categorization to effectively address engineering problems in Material Science.

CO5: Analyze the foundational knowledge of conductors, semiconductors, magnetic, dielectric, superconducting materials, optical and nano materials to formulate and implement solutions for contemporary engineering issues.

TEXT BOOKS:

1. Arumugam M., Materials Science. Anuradha publishers, 2010
2. S.O. Kasap. Principles of Electronic Materials and Devices, McGraw Hill Education (Indian Edition), 2020.
3. The Physics and Chemistry of NanoSolids by Frank J. Owens and Charles P. Poole Jr, WileyInterscience, 2008.

REFERENCES:

1. Palanisamy P.K. Materials Science. SCITECH Publishers, 2011.
2. Senthilkumar G. Engineering Physics II. VRB Publishers, 2011
3. Handbook of nanoscience, Eng. & Technology by W. Gaddand, D. Bernner, S.L. Solnki & G.J. Infrate (Eds) , CRC press 2002.
4. Charles Kittel, Introduction to Solid State Physics, Wiley India Edition, 2019.
5. Amnon Yariv and P.Yeh, Photonics: Optical Electronics in Modern Communications, Oxford Univ.Press, 2007

6. Nanostructure and Nanomaterials: Synthesis , Properties and Application by G. Cao, Imperial College Press, 2004.

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CO's-PO's & PSO's MAPPING

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PSO 3
CO 1	3	2	1	-	-	-	1	-	-	-	-	1	-	-	-
CO 2	3	2	-	-	1	-	1	-	-	-	-	-	-	-	-
CO 3	3	2	1	-	1	-	1	-	-	1	-	1	-	-	-
CO 4	3	2	1	-	1	-	1	-	-	1	-	1	-	-	-
CO 5	3	2	1	-	1	-	1	-	-	1	-	1	-	-	-

Correlation levels: 1 – low 2 – medium 3 – high "-"- no correlation

COURSE DESIGNED BY	APPROVED BY
Dr. G. Shatheeshkumar AP/Physics	Dr.M.Kumaresan – Professor & Head/ S&H
Name and Department	**Name and Department of BoS Chairman**

SEMESTER II

Category: HSMC

U23HS202	**Tamils & Technology**	**L**	**T**	**P**	**C**
		1	**0**	**0**	**1**

1.To learn the extensive literature of classical Tamil.

2 To review the fine arts heritage of Tamil culture.

3 To realize the contribution in Indian freedom struggle.

UNIT 1 TAMILS AND TECHNOLOGY 3

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

UNIT 2 DESIGN AND CONSTRUCTION TECHNOLOGY 3

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

UNIT 3 MANUFACTURING TECHNOLOGY 3

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold-Coins as
source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads - Terracotta beads -
Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.

UNIT 4 AGRICULTURE AND IRRIGATION TECHNOLOGY 3

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells
designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

UNIT 5 SCIENTIFIC TAMIL & TAMIL COMPUTING 3 Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Understand the extensive literature of Tamil and its classical nature (understand).

CO2: Understand the heritage of sculpture, painting and musical instruments of ancient people (understand).

CO3: Review on folk and martial arts of Tamil people (understand).
CO4: Realization of thinai concepts, trade and victory of chozha dynasty (understand).
CO5: Understand the contribution of Tamils in Indian freedom struggle, self-esteem movement and siddha medicine (understand).

TEXT BOOKS:

1. த"ழகவரலா* – மக்க-ம்பண் பா0ம் – . கக. கக1ள்ைள (வை450): த"ழ்நா0 பாட8ல்மற்*ம்கல்4:யல்பணிகள்கழகம்.
2. கணினித்த"ழ் – >ளனவர்இல. @ந்தரம் . (4கடன்1ர@ரம்).
3. AழB – ளவளகநCக்களர:ல்சங்ககாலநகரநாகரிகம் (வதால்Fயல்ைள (வை450).

REFERENCES:

1. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print) Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
2. National The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: Interl
3. Institute of Tamil Studies)
4. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu
5. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
6. sJourney of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

CO's-PO's & PSO's MAPPING

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PSO 3
CO 1	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO 2	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO 3	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO 4	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-
CO 5	-	-	-	-	-	-	3	3	-	2	-	3	-	-	-

Correlation levels: 1 – low 2 – medium 3 – high "-"- no correlation

COURSE DESIGNED BY	APPROVED BY
A.Prabakaran AP/Tamil	Dr.M.Kumaresan – Professor & Head/ S&H
Name and Department	**Name and Department of BoS Chairman**

SEMESTER II

Category: ESC

PYTHON PROGRAMMING AND PRACTICES

U23CS201 **L T P C**

(Common to CSE and IT)

3 0 0 3

1. To understand and develop programs using Python.
2. To use the concepts of strings, control flow, data types in python programs.
3. To create programs using list, tuples, dictionaries, and files concept in Python.
4. To analyze image processing, networking and object-oriented programming in Python.
5. To create new ideas for problems in real world application using python.

UNIT 1 INTRODUCTION TO PYTHON PROGRAMMING 6

Introduction to Python Programming- Python Interpreter and Interactive Mode -Variables- Numerical types- Arithmetic operators and Expressions- Psuedo Code - Values and types: int, float, Boolean - Variables, Expressions, Statements -Illustrative Problems.

UNIT 2 DATA TYPES, CONTROL FLOW, STRINGS 8

Control Flow -conditional (if), Alternative (if-else), Chained conditional (if-elif-else)- Iteration: state, while, for, break, continue, pass - Strings: string slices, immutability, string functions and methods, string module, Regular expression, Pattern matching . - Illustrative Problems.

UNIT 3 LISTS, TUPLES DICTIONARIES AND FUNCTIONS 10

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters- Tuples: tuple assignment, tuple as return value- Dictionaries: operations and methods, advanced list processing – list comprehension. Functions and User Defined Functions: Simple and Mathematical Built–in Functions, Recursion -Illustrative Problems

UNIT 4 FILES AND OOPS CONCEPT IN PYTHON 11

Files, Text files, reading and writing files-format operator; Files and exception handling -Introduction to Object Oriented Programming – Basic principles of Object Oriented Programming in Python – Class definition-Object Creation - Inheritance, Composition, Operator Overloading.

UNIT 5 IMAGE PROCESSING & NETWORKING WITH PYTHON AND APPLICATIONS 11

Basics of Image processing- Image File Formats – Introduction to Classic Image Processing Algorithm-Image Processing Tools-Fundamentals of Networking- Introduction to Python Sockets- Simple Client/Server Programming-Python Applications.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Explain the concepts of Python.
CO2: Use appropriate constructs to represent data.
CO3: Write programs using different constructs in Python.
CO4: Develop real world applications in image processing and networking.
CO5: Develop various simple programs for real world application using python.

TEXT BOOKS:

1. Python Programming for Beginners: Skyrocket Your Code and Master Python in Less than a Week. Discover the Foolproof, Practical Route to Uncover Insider Hacks, Unlock New Opportunities, and Revolution Kindle Edition by Kit Jackson (Author), 31 May 2023
2. Introducing Python, 2nd Edition, by Bill Lubanovic, O'Reilly Media, Inc., 2019

S.NO	**LIST OF EXPERIMENTS**
1	Simple programs to execute the concept of python for editing, saving and handling error message.
2	Python program using Statements and Expressions (exchange the values of two variables, circulate the values of n
3	variables, distance between two points).
4	Scientific problems using Conditionals and Iterative loops (Number series, Number patterns, pyramid pattern).
5	Programs for functions using python (Factorial, larger number in a list).
6	Implementing programs using regular expressions.
7	Program for implementing strings (reverse, palindrome).
8	Implementingreal time application using List, Tuples (Items present in library, operations of list and tuples).
9	Python programs for real time using file handling (Coping from one file to another, word count, longest word)
10	Python program using image processing, networking.
11	Python program using Oops concept.
12	Mini Project

CO's-PO's & PSO's MAPPING															
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**	**PSO 3**
CO 1	2	-	1	-	-	-	-	-	1	1	-	3	1	1	-
CO 2	2	-	1	-	-	-	-	-	1	1	-	3	1	1	-
CO 3	2	-	1	-	-	-	-	-	1	1	-	3	1	1	-
CO 4	2	3	1	-	3	-	-	1	1	1	3	3	1	1	-
CO 5	2	3	1	1	3	-	-	1	3	1	3	3	1	1	-
Correlation levels:			**1 – low**			**2 – medium**				**3 – high**			**"-"- no correlation**		

REFERENCES:

1. Python Programming for Beginners,ISBN-13-979-8870875248, Narry Prince, 2023
2. Python Programming, West McKinney,ISBN-13-979-8870534817,2023
3. Python Quick Start Guide: The Simplified Beginner's Guide to Python Programming Using Hands-On Projects and Real-World Applications, by Robert Oliver,ISBN-13-978163610037, 2023.
4. Mastering Python Networking:Utilize Python packages and frameworks for network automation, monitoring, cloud, and management by Eric Chou,2023

COURSE DESIGNED BY	**APPROVED BY**
P. Jason AP/IT	Dr.D.Karthikeswaran ASP/Head/IT
Name and Department	**Name and Department of BoS Chairman**

Category: HSMC

U23EN202 **PROFICIENCY IN ENGLISH**

(Common to CSE and IT)

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

1.To engage learners in meaningful language activities to improve their LSRW skills. 2
To identify personality traits and evolve as a better team player.
3.To develop analytical thinking skills for problem solving in communicative contexts
4To demonstrate a understanding of job applications and interviews for internship and placements.
5.To create new ideas for problems in real world application using python.

UNIT 1 **MAKING COMPARISONS** **9**

Listening – Listening to informal conversations (Activity) Speaking – Role Play - talking about experiences- talking about events in life- discussing past events Reading - Reading advertisements, Extensive Reading (Activity) Writing – Reading Comprehension, Writing a review/ summary of story/article.

Grammar – Active voice & Passive voice, Prepositional phrases

UNIT 2 **EXPRESSING CASUAL RELATIONS IN SPEAKING AND WRITING** **9**

Listening - Listening to longer technical speech, Listening to situation based dialogues Speaking – discussing news stories -talking about travel problems and procedures Reading - Reading longer technical texts, Reading a short story Writing - Personal letter (Inviting your friend), Congratulating letter, Writing responses to complaints and adjustment letter Grammar - Infinitive and Gerunds, Modals

UNIT 3 **PROBLEM SOLVING** **9**

Listening – Listening to movie scenes/ documentaries depicting a technical problem and suggesting solutions (Activity). Speaking – Conversation skills with a sense of stress, intonation, pronunciation, Welcome address - vote of thanks Reading - Case Studies, news reports, reading passages with time limit

Writing – Letter to the Editor, Short report on an event (field trip) Grammar -– If conditional sentence, Phrasal Verbs

UNIT 4 **REPORTING OF EVENTS AND RESEARCH** **9**

Listening – Listening Comprehension based on news reports Speaking – Presenting an oral report, Talking about past, present and the future (Activity) Reading – Newspaper articles; Reading the job advertisements and the profile of the company Writing – Essay writing and its types (Compare & Contrast, Cause & Effect, Problem & Solution) Grammar – Reported Speech, Conjunctions

UNIT 5 **THE ABILITY TO PUT IDEAS OR INFORMATION TO COGENTLY** **9**

Listening – Listening to Presentations Speaking – Participating in a Role, Talking about environmental issues, Talking about everyday services (Activity) Reading – Note making skills – making notes from books Writing – Email Writing, Biographical sketches of famous personalities Grammar – Relative Clauses, Collocation, Fixed & Semi-fixed expressions

COURSE OUTCOMES:

At the end of the course, students would

CO1: Identify cause and effects in events, industrial processes through technical text
CO2: Understand and use tools of structured written communication
CO3: Identify individual personality types and role in a team

CO4: Understand the basics concepts of morality and diversity
CO5: Present their opinion in a planned and logical manner, and draft effective resumes in context of job search

TEXT BOOKS:

1. English for Engineers & Technologists, Orient Blackswan Private Ltd. Department of English, Anna University, 2020

2. Barun.K.Mithra, Personality Development and Soft Skills, OUP India, 2019

REFERENCES:

1. Jack C. Richards, "Interchange, Student's Book", 4th Edition, Cambridge University Press, New York, 2017.
2. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi
3. Muralikrishna & Sunitha Mishra, Communication Skills for Engineers andScientists, PH Learning, new Delhi, 2009.
4. DevelopingCommunicationSkillsbyKrishnaMohan,MeeraBannerji-Macmillan IndiaLtd.1990,Delhi.
5. Shalini Varma, "Development of Life Skills and Professional Practice", 1st Edition, Vikas Publishing House Pvt. Ltd., 2014.

CO's-PO's & PSO's MAPPING

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PSO 3
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CO 3	-	-	-	-	-	2	2	-	3	2	-	3	-	-	-
CO 4	-	-	-	-	-	2	2	-	3	1	-	2	-	-	-
CO 5	-	-	-	-	-	1	2	-	3	3	-	3	-	-	-

Correlation levels: 1 – low 2 – medium 3 – high "-"- no correlation

COURSE DESIGNED BY	APPROVED BY
Mrs. Brindha Devi AP / English	Dr.M.Kumaresan – Professor & Head/ S&H
Name and Department	**Name and Department of BoS Chairman**

SEMESTER 2

Category: ESC

		L	T	P	C
U23IT201	**BASICS OF DIGITAL DESIGN**				
	(Common to CSE and IT)	**3**	**0**	**2**	**4**

1. To understand and analyze thebasic digital design.
2. To Analysis various Boolean expressions for designing combinational circuits
3. To Design the synchronous sequential circuits
4. To Design the asynchronous sequential circuits
5. To Understand and analyze the computer memory

UNIT 1 **Digital Fundamentals** **6**

Number System Representation and Conversion - Logic Gates, Universal Gates – BooleanAlgebra and Simplification Techniques: SOP – POS and Karnaugh Map Methods for Boolean Expression Simplification.

UNIT 2 **Combinational Circuits** **6**

Implementing Combinational Logic - Arithmetic Circuits: Full Adder – Full Subtractor – MagnitudeComparator – Multiplexer – Demultiplexer – Encoder and Decoder.

UNIT 3 **Synchronous Sequential Circuits** **6**

Flip-Flop: RS - JK – T and D – Types of Triggering – Analysis of synchronous sequential circuit - Shift Register-Counters(up, down, ripple counters)

UNIT 4 **Asynchronous Sequential Circuits** **6**

Files, Text files, reading and writing files-format operator; Files and exception handling -Introduction to Object Oriented Programming – Basic principles of Object Oriented Programming in Python – Class definition-Object Creation - Inheritance, Composition, Operator Overloading.

UNIT 5 **Basic Computer Memory and I/O Peripherals** **6** Computer Memory –Primary memory and Secondary memory classification- Random Access Memory - Read Only Memory - Expanding Memory Capacity – Input / Output Devices - Secondary Storage, Virtual memory, cache memory.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Explain the concepts of Python.
CO2: Use appropriate constructs to represent data.
CO3: Write programs using different constructs in Python.
CO4: Develop real world applications in image processing and networking.
CO5: Develop various simple programs for real world application using python.

TEXT BOOKS:

1. Anil K. Maini, "Digital Electronics Principles, Devices and Applications", John Wiley & Sons, 1st Edition, 2007.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Naraig Manjikian, "Computer Organization and Embedded Systems", 6th Edition, McGraw-Hill, 2011.

S.NO	LIST OF EXPERIMENTS
1	Verification of Boolean theorems using digital logic gates.
2	Implementation of combinational circuits using basic gates
3	Logic verification of half adder and full adder
4	Logic verification of Multiplexer / Demultiplexer
5	Implementation of encoder and decoder using logic gates
6	Implementation of 2 bit Magnitude Comparator using logic gates
7	Logic verification of 4 bit shift register.
8	Logic verification of 3 bit binary counter.

Contact Periods:30 Hours

REFERENCES:

1. Morris Mano, Michael Ciletti, "Digital Design", 5th Edition, Pearson Publication, New Delhi, 2014.
2. Charles H.Roth, Jr. "Fundamentals of Logic Design", 7th Edition, Jaico publishing House, New Delhi, 2014.

3. Tokheim, “Digital Electronics Principles and Applications”, Tata McGraw Hill, 6th Edition, 2004.
4. Leach P Donald, Albert Paul Malvino and Goutam Saha, “Digital Principles and Applications”, 7th Edition, Mcgraw Hill, 2010.

CO's-PO's & PSO's MAPPING

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PSO 3
CO 1	3	2	1	1	2	-	-	-	1	1	2	1	3	2	1
CO 2	2	2	1	2	2	-	-	-	1	1	1	2	2	2	1
CO 3	2	1	-	1	1	-	-	-	2	1	1	2	2	1	-
CO 4	3	2	1	2	2	1	1	-	1	2	1	3	3	2	1
CO 5	3	2	2	1	2	-	-	-	1	1	2	2	3	2	2

Correlation levels: 1 – low 2 – medium 3 – high “-“- no correlation

COURSE DESIGNED BY	APPROVED BY
Mrs. N. Tamilarasi AP/IT	Dr.D.Karthikeswaran ASP/Head/IT
Name and Department	**Name and Department of BoS Chairman**

SEMESTER 2

Category: BSC

ADVANCED CALCULUS AND STATISTICS

U23MA202 **L T P C**

(Embedded Theory and Lab)

3 0 2 4

1. Familiarize the student with vector calculus ideas in order to find line, surface, and volume integrals in basic coordinate systems.
2. Understand and demonstrate basic conclusions by using Gauss, Stokes, and Greens theorems.
3. Provide the required skill to apply the statistical tools in engineering problems.
4. Learn the theory of hypothesis testing for both small as well as large samples, which is an essential skill for solving real life problems
5. Introduce the basic concepts of classifications of design of experiments which plays very important roles in the field of statistical quality control.

UNIT 1 VECTOR DIFFERENTIAL CALCULUS 9

Differentiation of Vectors–Scalar and Vector Point Functions– Gradient, divergence and curl – Directional derivative – Irrotational and Solenoidal vector fields – Application: Decision Review System in Cricket and Hit Distance Using Differentiation of Vectors.

UNIT 2 VECTOR INTEGRAL CALCULUS 9

Vector integration – Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem (excluding proofs). Simple applications involving cubes and rectangular parallelopipeds.

UNIT 3 CORRELATION AND LINEAR REGRESSION 9

Correlation – Karl Pearson's correlation coefficients – Spearman's Rank Correlation – Regression – Estimation of Regression line – Application: Measuring the influences between factors- Estimation of association among the variables.

UNIT 4 HYPOTHESIS TESTING 9

Small sample tests: Student t-test - Single mean and difference of two means – F Test for Variance - Chi square test for goodness of fit – Independence of attributes. Application: Performance analysis- Comparative analysis – Quality testing

UNIT 5 DESIGN OF EXPERIMENTS 9

Analysis of Variance: One way and two-way classifications - Completely randomized design – Randomized block design – Latin square design. Application: Response Surface Methodology.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Determine the identities that link grad, div, and curl in Cartesian and other basic coordinate systems

CO2: Apply the Gauss, Stokes, and Greens theorems to streamline integral computations and demonstrate basic outcomes.

CO3: Compute correlation between variables and use regression to predict unknown values using R studio.

CO4: Apply the idea of hypothesis testing for both small and large samples in practical problems utilizing R studio

CO5: Construct the design of experiments modeling and analysis of variance using R studio.

TEXT BOOKS:

1. Erwin Kreyszig," Advanced Engineering Mathematics ", John Wiley and Sons, 10th Edition, New Delhi, 2016.
2. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 41st Edition, 2011.
3. Veerarajan T., Probability, Statistics and Random Processes, Tata McGraw Hill, 3rd edition, 2008.

Using Sci Lab

1. Evaluating gradient, divergence and curl
2. Evaluating line integrals
3. Verifying Green's theorem in the plane

Using R Studio

1. Preparation of graphs and plots using R.
2. Applying linear regression and correlation model to real dataset
3. Hypothesis test for small samples using mean values
4. Applying Chi-square test for goodness of fit test 5. Design of experiment using ANOVA (CRD).
5. Design of experiment using ANOVA (RBD).

REFERENCES:

1. Jain R.K. and Iyengar S.R.K., " Advanced Engineering Mathematics ", Narosa Publications, New Delhi , 3rd Edition, 2007.
2. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics ", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
3. Gupta S. P, "Statistical Methods", Sultan Chand & Sons Publishers, 2014.
4. Gupta S.C, and KapurV.K "Fundamentals of Applied Statistics", Sultan Chand, New Delhi, 4th Edition, 2014.
5. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

CO's-PO's & PSO's MAPPING															
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**	**PSO 3**
CO 1	2	-	1	-	-	-	-	-	1	1	-	3	1	1	-
CO 2	2	-	1	-	-	-	-	-	1	1	-	3	1	1	-
CO 3	2	-	1	-	-	-	-	-	1	1	-	3	1	1	-
CO 4	2	3	1	-	3	-	-	1	1	1	3	3	1	1	-
CO 5	2	3	1	1	3	-	-	1	3	1	3	3	1	1	-
Correlation levels:			**1 – low**			**2 – medium**				**3 – high**			**"-"- no correlation**		

COURSE DESIGNED BY	**APPROVED BY**
Prof.Amali Therasa AP/Mathematics	Dr.M.Kumaresan – Professor & Head/ S&H
Name and Department	**Name and Department of BoS Chairman**

Category: ESC

PYTHON PROGRAMMING LAB

U23CS211

L	**T**	**P**	**C**
0	**0**	**2**	**1**

(Common to CSE and IT)

1. To understand and develop programs using Python.
2. To use the concepts of strings, control flow, data types in python programs.
3. To create programs using list, tuples, dictionaries, and files concept in Python.
4. To analyze image processing, networking and object-oriented programming in Python.
5. To create new ideas for problems in real world application using python.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Explain the concepts of Python.

CO2: Use appropriate constructs to represent data.

CO3: Write programs using different constructs in Python.

CO4: Develop real world applications in image processing and networking.
CO5: Develop various simple programs for real world application using python.

S.NO	LIST OF EXPERIMENTS
1	Simple programs to execute the concept of python for editing, saving and handling error message.
2	Python program using Statements and Expressions (exchange the values of two variables, circulate the values of n variables, distance between two points).
3	Scientific problems using Conditionals and Iterative loops (Number series, Number patterns, pyramid pattern).
4	Programs for functions using python (Factorial, larger number in a list).
5	Implementing programs using regular expressions.
6	Program for implementing strings (reverse, palindrome).
7	Implementingreal time application using List, Tuples (Items present in library, operations of list and tuples).
8	Python programs for real time using file handling (Coping from one file to another, word count, longest word)
9	Python program using image processing, networking.
10	Python program using Oops concept.
11	Mini Project

CO's-PO's & PSO's MAPPING

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PSO 3
CO 1	3	3	2	1	1	0	0	1	0	0	0	2	1	0	0
CO 2	3	3	3	1	2	0	0	1	0	0	0	2	1	3	0
CO 3	2	2	3	2	3	0	0	1	1	0	1	2	1	3	0
CO 4	2	2	2	3	2	1	1	1	0	0	0	2	1	0	2
CO 5	1	3	2	3	2	2	1	1	2	2	1	3	1	1	0

Correlation levels: 1 – low 2 – medium 3 – high "-"- no correlation

COURSE DESIGNED BY	APPROVED BY
P. Jason AP/IT	Dr.D.Karthikeswaran ASP/Head/IT
Name and Department	**Name and Department of BoS Chairman**

SEMESTER 2

		Category: ESC			
U23GE212	**ENGINEERING PRACTICES LAB**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

1. To instruct the utility of drafting & modeling packages in orthographic and isometric drawings..

2 To train the usage of 2D and 3D modeling.
3 To instruct graphical representation of machine components.

COURSE OUTCOMES:

At the end of the course, students would
CO1: Use computers as a drafting tool.
CO2: Draw isometric and orthographic drawings using CAD packages.

REFERENCES:

Computer – Aided Engineering Drawing, S. Trymbaka Murthy. University Press.
Engineering Graphics for Degree, K.C. John. PHI Publications.).

CO's-PO's & PSO's MAPPING

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PSO 3
CO 1	3	1	2		2	-	-	-	-	3	-	2	2	2	-
CO 2	3	1	2		2	-	-	-	-	3	-	2	2	2	-
CO 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Correlation levels: 1 – low 2 – medium 3 – high "-"- no correlation

COURSE DESIGNED BY	APPROVED BY
Dr. G. Shatheeshkumar AP/Physics	Dr.M.Kumaresan – Professor & Head/ S&H
Name and Department	**Name and Department of BoS Chairman**

SEMESTER 2

		Category: ESC			
U23GE213	**ENGINEERING GRAPHICS LABORATORY (Common for Computer Science and Engineering and Information Technology)**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

1. To improve imagination skills
2. To develop graphic skills for communication of concepts, ideas and design of Engineering products
3. To learn drafting & modeling packages in orthographic and isometric drawings
4. To train the usage of 2D and 3D modeling
5. To learn graphical representation of machine components

COURSE OUTCOMES:

At the end of the course, students would

CO1: Use computers as a drafting tool.
CO2: Draw isometric and orthographic drawings using CAD packages.

S.NO LIST OF EXPERIMENTS

1	Introduction to Computer Aided Drafting software packages.
2	Practice on features of a Computer Aided Drafting package
3	Practice Sheet -Title Block
4	Loci of Points
5	Engineering curves
6	Projection of Lines
7	Projection of Planes
8	Projection of Solids
9	Drafting of Isometric Projection
10	Drafting of Orthographic views of simple parts

REFERENCES:

1. K. Venugopal, V.Prabhu Raja, Engineering Drawing + Auto Cad, New Age InternationalPublishers.
2. Kulkarni D.M, AP Rastogi and AK Sarkar, Engineering Graphics with Auto Cad, PHILearning, Eastern Economy editions

CO's-PO's & PSO's MAPPING														
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**	**PSO 3**
CO 1	1		2		2				1			1	2	2	1
CO 2	1		2		2				1			1	2	2	1
CO 3	1		2		2				1			1	2	2	1
CO 4	1		2		2				1			1	2	2	1
CO 5	1		2		2				1			1	2	2	1
Correlation levels:			**1 – low**			**2 – medium**				**3 – high**			**"-"- no correlation**		

COURSE DESIGNED BY	**APPROVED BY**
Prof. A. Balthilak – AP/Mechanical	Dr.M.Kumaresan – Professor & Head/ S&H
Name and Department	**Name and Department of BoS Chairman**

Category: VEC

CAREER ENHANCEMENT TRAINING II

U23EE212 **L T P C**

(Common to CSE and IT)

0 0 3 1

1To help students demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.

2.To enable students critically evaluate various real-life situations by resorting to an analysis of key issues and factors.

3To help them improve their communicative English for Interview and corporate readiness

UNIT 1 INTRODUCTION 6

Problems on Ages – Arithmetic Reasoning - Ratio & Proportion – Alligation & Mixtures

UNIT 2 GEOMETRY & SHAPES 6

Mensuration 2D –Mensuration 3D – Height – Distance - Perimeter – Area - Volume

UNIT 3 COMBINATIONS & CALENDARS 6

Permutation and Combination – Probability-Circular Permutation - Clocks and Calendars -

UNIT 4 CLASSIC REASONING 6

Blood Relation – Direction Sense – Seating Arrangement – Syllogism – Statement & Conclusion

UNIT 5 VERBAL APTITUDE 6

Synonyms Antonyms – Spotting Error – Sentence Correction – Change of Voice – Change of Speech – Spelling – Reading Comprehension – Select Words – Closet Test

COURSE OUTCOMES:

At the end of the course, students would

CO1: Demonstrate problem-solving skills and critical thinking abilities in the context of Engineering Aptitude

CO2: To use appropriate strategies and shortcuts to improve speed and accuracy in solving aptitude problems during recruitment processes.

CO3: Evaluate and interpret aptitude test results to identify areas of improvement and develop a personalized study plan for further enhancement.

CO4: Use the correct Grammar, Vocabulary, Spelling and Comprehension ensuring the enhancement their language skills and the ability to use the skills for effective Communication

TEXT BOOKS:

1. The Pearson Guide to Quantitative Aptitude For Competitive Examinations, Dinesh Khattar. Pearson
2. Quantitative Aptitude Dr. R.S. Aggarwal S. Chand Publication
3. A modern Approach to Verbal and Non-Verbal Reasoning R.s. Aggarwal
4. A Modern Approach to Verbal & Non-Verbal Reasoning - Aggarwal R. S

REFERENCES:

1. Quantitative Aptitude for CAT, Arun Sharma
2. Fast Track Objective Arithmetic, Rajesh Verma, Arihant Publication
3. Quantitative Aptitude Quantum CAT Common Admission Tests for Admission into IIMs,
4. Sarvesh K. Verma
5. Wiley's Exam Xpert Quantitative Ability for CAT, 2ed, Ashu Jain

CO's-PO's & PSO's MAPPING															
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**	**PSO 3**
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CO 2	3	2	1	3	-	-	-	-	-	1	-	-			
CO 3	3	1	1	2	-	-	-	-	-	1	-	-			
CO 4	1	1	1	1	-	-	-	-	-	3	-	-			
CO 5			-	-	-	-	-	-	-		-	-			
Correlation levels:			**1 – low**			**2 – medium**				**3 – high**			**"-"- no correlation**		

COURSE DESIGNED BY	**APPROVED BY**
Prof. Ramesh Raja – Head/ NCPIR	Dr.D.Karthikeswaran ASP/Head/IT
Name and Department	**Name and Department of BoS Chairman**

SEMESTER III

U23MA309 DISCRETE MATHEMATICS FOR COMPUTINGCategory :BSC

L	T	P	C
3	1	0	4

COURSE OBJECTIVE:

1.. To build problem solving skills by enhancing students logical and mathematical maturity

2. To acquire the knowledge of combinatorics

3. To gain the knowledge of graph theory and to solve the practical problems.

4. To familiarize the applications of algebraic structures.

5. To Understand the basic concepts in sets and relations

UNIT 1LOGIC **9+3**

Truth Tables, Tautology and Contradiction - Logical Equivalence: The Laws of Logic, Logical Implication, - Disjunctive and Conjunctive Normal Form. Application: Knowledge representation in artificial intelligence using Basic Connectives

UNIT 2 COMBINATORICS **9+3**

Mathematical induction – Strong induction and well ordering – The basics of counting –Permutations and combinations – Recurrence relations - Solving linear recurrence relations. Application : Pigeon hole principle

UNIT 3 GRAPH THEORY **9+3**

Graphs and graph models – Graph terminology and special type of graph – Matrix representation of graphs and graph isomorphism – Degree, Connectivity – Path – Cycle – Sub Graph, Isomorphism – Eulerian and Hamiltonian paths and circuits. Application: Map for Online Food Delivery System

UNIT 4 ALGEBRAIC STRUCTURES **9+3**

Algebraic systems – Semi groups and monoids – Groups – Subgroups – Normal subgroup and cosets – Lagrange's theorem. Application: Error detection and encoding functions

UNIT 5 SET THEORY AND LATTICES **9+3**

Set theory –Operations and Laws of Sets - Cartesian Product, Binary Relation - Equivalence Relation - Partial ordering – Poset – Lattices as Posets –Hasse diagram. Application: Vehicle Model Catalogue

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Solve the problems using the concepts of sets, Truth Tables, counting techniques, properties of algebraic structures and graph network techniques to solve engineering problems.

CO2: Comprehend the concepts needed to test the relations, laws of logic, Strong induction, Groups and Properties of Graphs

CO3: Demonstrate the knowledge in functions, Logical Implication, Mathematical induction, Subgroups and Graph Coloring

CO4: Analyze the concepts and Poset, Normal Form , Permutations and combinations, Normal subgroup and Eulerian and Hamiltonian paths and circuits

CO5: Apply and Analyze Hasse diagram, Rules of Inference, linear recurrence relations, Lagrange's theorem and Matrices of Graph Isomorphism

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Rosen. K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2017.
2. Tremblay. J.P. and Manohar. R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.
3. Venkatraman M.K, Sridharan. N and Chandrasekaran N. Discrete Mathematics, The National Publishing Company, Chennai, Fourth edition, 2014.

REFERENCES:

1. Grimaldi. R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 5th Edition, Pearson Education Asia, Delhi, 2013.
2. Lipschutz. S. and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3rd Edition, 2010.
3. Koshy. T. "Discrete Mathematics with Applications", Elsevier Publications, 2006.
4. Kenneth. H. Rosen, Discrete Mathematics and its Applications, Tata McGraw Hill P.Co, New Delhi, Seventh Edition, 2014.
5. Bernard Kolman, Robert C. Busby, Sharan Cutler Ross, Discrete Mathematical Structures, Pearson Education Pvt Ltd ,New Delhi, Sixth Edition, 2013.

CO's-PO's & PSO's MAPPING															
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**	**PSO 3**
CO 1	3	3	3	1	-	-	-	-	1	-	-	1	-	-	-
CO 2	3	3	3	1	-	-	-	-	1	-	-	1	-	-	-
CO 3	3	3	3	1	-	-	-	-	1	-	-	1	-	-	-
CO 4	3	2	3	1	-	-	-	-	1	-	-	1	-	-	-
CO 5	3	3	3	1	-	-	-	-	1	-	-	1	-	-	-
Correlation levels:	**1 – low**			**2 – medium**					**3 – high**			**"-"- no correlation**			

COURSE DESIGNED BY	**APPROVED BY**
Ms.Umamahesheswari S&H (Mathemeatics)	Dr.K.Parimala Gandhi – Professor &Head/ S&H
Name and Department	**Name and Department of BoS Chairman**

SEMESTER 3

Category: HSMC

U23IT301 **OBJECT ORIENTED PROGRAMMINGUSING JAVA** **L T P C**

SDG: 4 **3 0 0 3**

COURSE OBJECTIVE:

- TounderstandObjectOrientedProgrammingconceptsandbasicsofJavaprogramming language
- Toknowtheprinciplesofpackages,inheritanceandinterfaces
- Todevelopajavaapplicationwiththreadsandgenerics classes
- TodefineexceptionsanduseI/Ostreams
- TodesignandbuildGraphicalUserInterfaceApplicationusingJAVAFX

UNIT 1 INTRODUCTION TO OOP AND JAVA **9**

Overview of OOP – Object oriented programming paradigms – Features of Object Oriented Programming – Java Buzzwords – Overview of Java – Data Types, Variables and Arrays – Operators –

Control Statements – Programming Structures in Java – Defining classes in Java – Constructors-Methods -Access specifiers - Static members- JavaDoc comments

UNIT 2 INHERITANCE, PACKAGES AND INTERFACES 9

Overloading Methods – Objects as Parameters – Returning Objects –Static, Nested and Inner Classes.Inheritance:Basics–Typesof Inheritance-Superkeyword-MethodOverriding –Dynamic Method Dispatch –Abstract Classes – final with Inheritance. Packages and Interfaces: Packages – Packages and Member Access –Importing Packages – Interfaces

UNIT 3 EXCEPTION HANDLING AND MULTITHREADING 9

Exception Handling basics – Multiple catch Clauses – Nested try Statements – Java's Built-in Exceptions – User defined Exception. Multithreaded Programming: Java Thread Model–Creating a Thread and Multiple Threads – Priorities – Synchronization – Inter Thread Communication- Suspending –Resuming, and Stopping Threads –Multithreading. Wrappers – Auto boxing.

UNIT 4 I/O, GENERICS, STRING HANDLING 9

I/O Basics – Reading and Writing Console I/O – Reading and Writing Files. Generics: Generic Programming – Generic classes – Generic Methods – Bounded Types – Restrictions and Limitations. Strings: Basic String class, methods and String Buffer Class..

UNIT 5 JAVAFX EVENT HANDLING, CONTROLS AND COMPONENTS 9

JAVAFX Events and Controls: Event Basics – Handling Key and Mouse Events. Controls: Checkbox, ToggleButton – RadioButtons – ListView – ComboBox – ChoiceBox – Text Controls – ScrollPane. Layouts – FlowPane – HBox and VBox – BorderPane – StackPane – GridPane. Menus – Basics – Menu – Menu bars – MenuItem.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, students would

CO1: Apply the concepts of classes and objects to solve simple problems

CO2: Develop programs using inheritance, packages and interfaces

CO3: Make use of exception handling mechanisms and multithreaded model to solve real world problems

CO4: Build Java applications with I/O packages, string classes, Collections and generics concepts

CO5: Integrate the concepts of event handling and JavaFX components and controls for developing GUI based applications.

TEXT BOOKS:

1. Herbert Schildt, "Java: The Complete Reference", 11 th Edition, McGraw Hill Education, New Delhi, 2019

2. Herbert Schildt, "Introducing JavaFX 8 Programming", 1 st Edition, McGraw Hill Education, New Delhi, 2015

REFERENCES:

Cay S. Horstmann, "Core Java Fundamentals", Volume 1, 11 th Edition, Prentice Hall, 2018.

CO's-PO's & PSO's MAPPING

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PSO 3
CO 1	1	1	3	1	3	-	-	-	3	2	2	2	3	1	2
CO 2	2	1	3	2	1	-	-	-	2	1	1	3	3	3	2
CO 3	3	3	1	2	2	-	-	-	3	2	1	2	3	1	3
CO 4	3	1	2	2	2	-	-	-	1	2	1	3	3	1	1
CO 5	1	1	2	3	2	-	-	-	3	2	1	2	3	3	3

Correlation levels: 1 – low 2 – medium 3 – high "-"- no correlation

COURSE DESIGNED BY	APPROVED BY
Prof. K.J Godlin Debby AP/IT	Dr.S.Jothilakshmi HOD/IT
Name and Department	**Name and Department of BoS Chairman**

SEMESTER 3

Category: HSMC

U23IT302

FUNDAMENTALS OF OPERATING SYSTEMS

L	T	P	C
3	0	0	3

SDG: 4

COURSE OBJECTIVE:

1. To understand the basics and functions of operating systems
2. To study processes, threads and scheduling algorithms
3. To impart the concept of process synchronization and handling deadlocks
4. To analyze various memory management schemes
5. To be familiar with I/O management and file systems

UNIT 1 OPERATING SYSTEM OVERVIEW **7**

Introduction – Computer System Organization – Computer System Architecture – Operations – Resource Management – Security and Protection – Virtualization – Computing Environments. Operating Systems Structures: Services – User and OS Interface – System Calls –System program– Operating system Structure – Building and Booting OS.

UNIT 2 PROCESS AND THREAD MANAGEMENT BASICS 8

Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication – IPC in Shared Memory and Message Passing Systems. Threads: Overview - Multicore Programming - Multithreading Models. CPU Scheduling: Scheduling Criteria – Scheduling Algorithms

UNIT 3 PROCESS SYNCHRONIZATION 10

Critical Section Problem – Mutex Locks – Semaphores – Monitors. Deadlocks: Deadlock Characterization – Methods for handling deadlocks – Deadlock Prevention and Avoidance – Deadlock Detection – Recovery from Deadlock

UNIT 4 MEMORY MANAGEMENT 10

Main Memory – Background – Contiguous Memory Allocation – Paging – Segmentation – Structure of the page table – Swapping. Virtual Memory: Background – Demand Paging – Page Replacement – Thrashing

UNIT 5 STORAGE MANAGEMENT 10 Mass Storage Structure – Overview – HDD Scheduling – File System: File Concept – Access Methods –
Directory Structure – Protection – File System Implementation – File System Structure-File System Operations – Directory Implementation – Allocation Methods – Free Space Management – Case study: Linux System, Mobile OS – iOS and Android..

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, students would

CO1: Understand various operating system structure, services and system calls [U]
CO2: Demonstrate various process scheduling algorithms and describe multithreading models [U]
CO3: Apply different methods for process synchronization and for handling deadlocks [A]
CO4: Categorize memory management strategies and demonstrate various page replacement [AN]
CO5: Distinguish the features of file systems and apply various disk scheduling algorithms [AN]

.

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”‖, 10th Edition, John Wiley and Sons Inc., 2018.
2. Andrew S Tanenbaum, "Modern Operating Systems", Pearson, 5th Edition, 2022 New Delhi.

REFERENCES:

1. Ramaz Elmasri, A. Gil Carrick, David Levine, “Operating Systems – A Spiral Approach”, Tata McGraw Hill Edition, 2010.
2. William Stallings, "Operating Systems: Internals and Design Principles", 7th Edition, Prentice Hall, 2018.
3. Achyut S.Godbole, Atul Kahate, “Operating Systems”, McGraw Hill Education, 2016. Contact

CO’s-PO’s & PSO’s MAPPING

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PSO 3
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CO 2	2	3	3	1	1	-	-	-	2	1	1	2	3	3	2
CO 3	1	3	2	2	1	-	-	-	2	2	1	1	3	1	3
CO 4	1	3	3	3	-	-	-	-	1	2	1	2	3	1	1
CO 5	3	1	2	1	1	-	-	-	3	2	3	2	3	3	3

Correlation levels: 1 – low 2 – medium 3 – high “-“- no correlation

COURSE DESIGNED BY	APPROVED BY
Prof. K.J Godlin Debby AP/IT	Dr.S.Jothilakshmi HOD/IT
Name and Department	**Name and Department of BoS Chairman**

SEMESTER III

Category: HSMC

U23IT303

DATA STRUCTURES AND ALGORITHMS

L	T	P	C
3	0	2	4

SDG: 4

COURSE OBJECTIVE:

1. To get exposure to the various algorithm design and analysis techniques.
2. To design linear data structures – lists, stacks, and queues
3. To implement Tree structures
4. To understand the graph structures
5. To introduce the concepts of searching, sorting and hashing

UNIT 1 INTRODUCTION TO ALGORITHMS AND ANALYSIS 6

Fundamentals of algorithm analysis, Space and time complexity of an algorithm, Types of asymptotic notations and orders of growth, Algorithm efficiency – best case, worst case, average case, Analysis of non-recursive and recursive algorithms, Asymptotic analysis for recurrence relation – Recursive Tree Method.

UNIT 2 LINEAR DATA STRUCTURES 6

List ADT – array-based implementations – linked list implementations – singly linked lists – circularly linked lists – doubly linked lists – Stack ADT – Queue ADT – double ended queues – applications

UNIT 3 NON– LINEAR DATA STRUCTURES – TREES 6

Tree Traversals – Binary Tree ADT – Expression trees – Applications of trees – Binary Search Tree ADT – Threaded Binary Trees – AVL Trees – B Tree – B+ Tree – Heap – Applications of heap.

UNIT 4 GRAPHS 6

Graph – basic definition and Terminology – Representation of Graph – Graph Traversal: Breadth First Search (BFS), Depth First Search (DFS) - Minimum Spanning Tree: Prim's, Kruskal's- Single Source Shortest Path: Dijkstra’s Algorithm.

UNIT 5 SEARCHING AND SORTING 6

Searching: Linear Search – Binary Search – Sorting : Bubble Sort – Selection Sort – Insertion Sort – Shell Sort – Radix Sort – Hashing: Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

TOTAL: 30 PERIODS

S.N O	LIST OF EXPERIMENTS
1	Program to implement Stack and Queue using array and linked list
2	Program to implement singly linked list
3	Program to implement Infix to Postfix conversion using stack
4	Program to evaluate postfix evaluation using stack
5	Program to implement binary search tree and its operations
6	Program to implement BFS and DFS
7	Graph representation and Traversal algorithms
8	Program to implement shell sort
9	Program to implement topological sort
10	Program to implement double hashing

TOTAL: 30 PERIODS

COURSE OUTCOMES:

At the end of the course, students would

CO1: Understand various algorithm design and analysis techniques [U]

CO2: Design, implement, and analyze linear data structures, such as lists, queues, and stacks, according to the needs of different applications [AN]

CO3: Construct the efficient tree structures to meet requirements such as searching, indexing, and sorting [AN]

CO4: Model problems as graph problems and implement efficient graph algorithms [A]

CO5: Implement various sorting, searching and hashing [A]

TEXT BOOKS:

1. M.A.Weiss, Data Structures and Algorithm Analysis in C, Second Edition, Pearson Education, 2016.

2. Aaron M. Tenenbaum , Yedidyah Langsam, Moshe J. Augenstein, "Data Structures Using C",Pearson India, 2019.

REFERENCES:

1. R. F. Gilberg, B.A. Forouzan, "Data Structures: A Pseudocode approach with C", Second Edition, Cengage India, 2007.

2. A. V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", Pearson India, 2009.

CO's-PO's & PSO's MAPPING

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PSO 3
CO 1	2	3	1	2	-	-	-	-	-	-	-	3	2	1	-
CO 2	1	2	1	2	-	-	-	-	-	-	-	2	2	2	-
CO 3	2	3	1	2	-	-	-	-	-	-	-	2	2	1	-
CO 4	2	1	-	1	-	-	-	-	-	-	-	3	2	3	-
CO 5	1	2	1	2	-	-	-	-	-	-	-	3	2	2	-

Correlation levels: 1 – low 2 – medium 3 – high "-"- no correlation

COURSE DESIGNED BY	APPROVED BY
Prof. P.Showmiya AP/IT	Dr.S.Jothilakshmi HOD/IT
Name and Department	**Name and Department of BoS Chairman**

SEMESTER 3

Category: HSMC

U23IT304 MICROPROCESSOR AND MICROCONTROLLER

L	T	P	C
3	0	2	4

SDG: 4 **(Common to all Branches)**

COURSE OBJECTIVE:

1. To introduce the architecture and programming of 8085 microprocessor 2. To introduce the interfacing of peripheral devices with 8085 microprocessor.
3. To introduce the architecture and programming of 8086 microprocessor.
4. To introduce the architecture and programming of 8051 micro controller and its interfacing 5. To introduce the Arduino microcontroller.

UNIT 1 8085 MICROPROCESSOR **6**

8085 Microprocessor architecture-Addressing modes- Instruction set-Programming the 8085

UNIT 2 8086 MICROPROCESSOR **6**

Intel 8086 microprocessor - Architecture - Signals- Instruction Set-Addressing Modes-Assembler Directives- Assembly Language Programming-Procedures-Macros-Interrupts and Interrupt Service Routines

UNIT 3 I/O INTERFACING 6

Memory interfacing and I/O interfacing with 8085 – parallel communication interface –serial communication interface – timer-keyboard/display controller – interrupt controller – DMA controller (8237) – applications – stepper motor – temperature control..

UNIT 4 MICROCONTROLLERS 6

Architecture of 8051 Microcontroller – signals – I/O ports – memory – counters and timers – serial data I/O – interrupts-8051 Interfacing -keyboard, LCD, ADC & DAC.

UNIT 5 ARDUINO PROGRAMMING 6

Introduction to Arduino-Types of Arduino- Arduino Tool chain -Arduino programming structureSketches-Pins-Input/output from sketches-Introduction to Arduino shields-Integration of sensors and Actuators with Arduino.

TOTAL: 30 PERIODS

S.NO	LIST OF EXPERIMENTS
1	Write a program using 8085 Microprocessor for addition and subtraction of two Numbers.
2	Write a program using 8085 Microprocessor for multiplication and division of two numbers.
3	Write a program to find the biggest and the smallest element in an array using 8085.
4	Write a program to arrange an array of data in ascending and descending order using 808 instruction set.
5	Write a program to convert given Hexadecimal number into decimal number and vice versa usin 8085 instruction set.
6	Write a program using 8086 Microprocessor for addition, subtraction, multiplication and divisio of two Numbers.
7	Stepper Motor Interfacing.
8	Introduction to Arduino programming language.
9	Interfacing of temperature sensor LM35 with Arduino.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

At the end of the course, students would

CO1: Listenandcomprehendcomplexacademictexts.
CO2: Understand the denotative and connotative meanings of technical texts.
CO3: Identify definitions, descriptions, narrations and essays on various topics.
CO4: Apply different methods of integration in solving practical problems.
CO5: Expresstheiropinionseffectivelyinbothoralandwrittenmediumofcommunication.

TEXT BOOKS:

1. "Microprocessor Architecture, Programming, and Applications with the 8085" by Ramesh Gaonkar – 25 November 2016, Penram International Publishing
2. MICROPROCESSORS AND MICROCONTROLLERS" by Pablo Mary , Panda Jeebananda , Prentice Hall India Learning Private Limited,2016

REFERENCES:

1. "MICROPROCESSORS AND MICROCONTROLLERS" by Prof. Vishwajit K. Barbudhe , Notion Press ,2020; Notion Press Media Pvt Ltd .
2. "Microprocessors and Micro-controllers" by A.P.GODSEDr.D.A.GODSE,31 August 2022, Technical Publications 3. "Advanced Microprocessor And Peripherals" by K Bhurchandi ,A. K. Ray ,3rd Edition July 2017, McGraw Hill Education

CO's-PO's & PSO's MAPPING

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PSO 3
CO 1	3	2	-	2	-	-	-	2	2	1	-	2	3	-	-
CO 2	3	2	-	2	-	-	-	2	2	-	-	2	3	-	-
CO 3	3	3	2	2	-	-	-	2	2	2	-	2	3	-	-
CO 4	3	3	2	2	-	-	-	2	2	1	-	3	3	-	-
CO 5	3	3	2	2	-	-	-	2	2	2	-	3	3	-	-

Correlation levels: 1 – low 2 – medium 3 – high "-"- no correlation

COURSE DESIGNED BY	APPROVED BY
Prof.N.Tamilarasi AP/IT	Dr.S.Jothilakshmi HOD/IT
Name and Department	**Name and Department of BoS Chairman**

SEMESTER 3

Category: HSMC

L	T	P	C	
0	**0**	**4**	**2**	**U23IT311**

COURSE OBJECTIVE:

1. To develop basic Java programs utilizing control statements and arrays for logical.
2. To Demonstrate proficiency in inheritance, interfaces, and packages.
3. To Develop applications that incorporate exception handling and multithreading.
4. To Gain expertise in using the java.io package and perform various string manipulation.
5. To Design and implement applications using collections classes, GUIs with AWT, and JDBC

COURSE OUTCOMES:

At the end of the course, students would

CO1: Understand and implement various UNIX Commands. [U]
CO2: Compare the performance of various CPU Scheduling Algorithms. [AN]
CO3: Compare and contrast various DeadLock Algorithms. [AN]
CO4: Develop various memory management strategies [A]
CO5: Implement various File Organization and File Allocation Strategies. [A]

S.NO	**LIST OF EXPERIMENTS**
1	Develop simple Java programs using control statements and arrays
2	Demonstrate inheritance using Java programs
3	Develop Java applications using interfaces and packages
4	Demonstrate exception handling in Java
5	Develop multithreaded applications in Java
6	Develop programs in Java using java.io packages
7	Demonstrate string manipulation in Java
8	Develop applications in Java using collections classes
9	Design a GUI based simple application using AWT classes
10	Write a program to register students data using JDBC with MySQL Database

CO's-PO's & PSO's MAPPING

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PSO 3
CO1	3	1	2	2	-	-	-	-	3	2	3	1	3	1	2
CO2	2	3	3	1	1	-	-	-	2	1	1	2	3	3	2
CO3	1	3	2	2	1	-	-	-	2	2	1	1	3	1	3
CO4	1	3	3	3	-	-	-	-	1	2	1	2	3	1	1
CO5	3	1	2	1	1	-	-	-	3	2	3	2	3	3	3
Correlation levels: 1 – low 2 – medium 3 – high "-"- no correlation															

COURSE DESIGNED BY	APPROVED BY
Prof. P.Jason AP/IT	Dr.S.Jothilakshmi HOD/IT
Name and Department	**Name and Department of BoS Chairman**

SEMESTER 3

U23IT312 **Category: HSMC**
SDG: 4

L	T	P	C
0	0	4	2

OPERATING SYSTEM LABORATORY LAB

COURSE OBJECTIVE:

1. To understand the basics of Unix command and shell programming.
2. To implement various CPU scheduling algorithms Algorithms.
3. To implement Deadlock Avoidance and Deadlock Detection Algorithms.
4. To implement various memory allocation methods.
5. To implement various memory allocation methods.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Understand and implement various UNIX Commands. [U]
CO2: Compare the performance of various CPU Scheduling Algorithms [AN]
CO3: Compare and contrast various DeadLock Algorithms [AN]
CO4: Develop various memory management strategies [A]
CO5:Implement various File Organization and File Allocation Strategies. [A]

CO's-PO's & PSO's MAPPING

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PSO 3
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CO 2	2	3	3	1	1	-	-	-	2	1	1	2	3	3	2
CO 3	1	3	2	2	1	-	-	-	2	2	1	3	3	1	3
CO 4	1	3	3	3	-	-	-	-	1	2	1	2	3	1	1
CO 5	3	1	2	1	1	-	-	-	3	2	3	3	3	3	3

Correlation levels: 1 – low 2 – medium 3 – high "-"- no correlation

S.NO	LIST OF EXPERIMENTS
1	Study of Basic LINUX commands and its uses
2	Implementation of UNIX System calls used in Process Management: fork, exec, getpid, exit, wait, close, stat.
3	Shell programming using operators and decision making statements for pattern generation, simulating arithmetic calculator and printing number series.

4	Write C programs to implement the various CPU Scheduling Algorithms
5	Illustrate the inter process communication strategy
6	Implement mutual exclusion by Semaphore
7	Write C programs to avoid Deadlock using Banker's Algorithm
8	Write a C program to Implement Deadlock Detection Algorithm
9	Write C program to implement Threading
10	Write C programs to implement the various Page Replacement Algorithms
11	Write C programs to implement the following Memory Allocation Methods a. First Fit b. Worst Fit c. Best Fit
12	Implement the following File Allocation Strategies using C programs a. Sequential b. Indexed c. Linked
13	Write C programs for the implementation of various disk scheduling algorithms

COURSE DESIGNED BY	APPROVED BY
Prof. Godlin Debby K J	Dr.S.Jothilakshmi HOD/IT
Name and Department	**Name and Department of BoS** **Chairman**

SEMESTER 3

U23EE313 Aptitude and Communication for Engineers -1 Category :HSMC
SDG: 4

L	T	P	C
0	0	2	1

COURSE OBJECTIVE:

1. To create an awareness regarding the internal inhibitions that prevents the students from opening out in classrooms and other forums and there by overcoming the shyness to perform..
2. To make students understand the importance of English as a global language and train them for simple English communication through various speech craft activities and improve their communicative English for industry readiness.
3. To develop an awareness about making a conscious effort towards avoiding errors in daily communication
4. To train students on clearing various placement papers with greater accuracy

UNIT 1 Introduction 3

Introduction about the Course -Learning expectations - Communication pre-assessment

UNIT 2 Speaking Skills -Novice 6

Communication skills – Shy barrier - Importance of English - Challenges faced in English communication - Developing a globally comprehensible accent -Speech Craft- Public Speaking - Squabble

UNIT 3 Speaking Skills -Intermediate 6

Speech Craft –for and against –Debate (Ship Wreck Activity)

UNIT 4 Language Gym – I 6

Tenses for various communication scenarios – Common errors in daily communication – Thought Group reading – Passage writing

UNIT 5 Aptitude for Placements - I 6

Placement Paper 1 – HCF & LCM, Problems on Numbers-Placement Paper 2 – Average, Simplification – Placement Paper 3-Percentage, Simple & compound Interest - Placement Paper 4 – Time & Distance – Placement Paper 5-Trains & Boats, Placement Paper 6 – Time & Work, Pipes & Cistern.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

Upon completion of this course,

CO1: Students will be able to participate in any learning activity without any reservations. They shall be ready to move beyond their comfort zone to acquire new skills throughout their life.

CO2: Students shall understand and appreciate the importance of English in the current global scenario and make efforts towards up skilling the same.

CO3: Students shall be able to present their view and standpoints in any scenarios confidently.

CO4: Use the correct Grammar and Vocabulary, ensuring the enhancement their language skills and effective communication.
CO5: To use appropriate strategies and shortcuts to improve speed and accuracy in solving aptitude problems during recruitment processes

TEXT BOOKS:

1. The Pearson Guide to Quantitative Aptitude for Competitive Examinations, Dinesh Khattar.
Pearson
2. Quantitative Aptitude Dr. R.S. Aggarwal S. Chand Publication
3. A modern Approach to Verbal and Non-Verbal Reasoning R.S. Aggarwal
4. A Modern Approach to Verbal & Non-Verbal Reasoning - Aggarwal R. S

REFERENCES:

1. Quantitative Aptitude for CAT, Arun Sharma
2. Fast Track Objective Arithmetic, Rajesh Verma, Arihant Publication
3. Quantitative Aptitude Quantum CAT Common Admission Tests for Admission into IIMs,Sarvesh K. Verma
4. Wiley's Exam Xpert Quantitative Ability for CAT, 2ed, Ashu Jain

CO's-PO's & PSO's MAPPING

	1	-	-	-	-	-	-	1	-	3	-	-	-	-	-
	1	-	-	-	-	-	-	1	-	3	-	-			
	1	-	-	-	-	-	-	1	-	3	-	-			
	1	-	-	-	-	-	-	1	-	3	-	-			
	3	-	-	-	-	-	-	1	1	-	-	-			

Correlation levels: 1 – low 2 – medium 3 – high "-"- no correlation

COURSE DESIGNED BY	APPROVED BY
Ramesh Raja M	
Name and Department	**Name and Department of BoS Chairman**

SEMESTER 3

U23MC301LIFE SKILLS AND ETHICS **Category :HSMC**

L	T	P	C
2	0	0	0

COURSE OBJECTIVE:

1. To introduce and understand the concepts of life skills
2. To learn about thinking ability
3. To understand the problem solving and decision making
4. To understand the concept of interpersonal relationship and stress management
5. To get exposure to the ethics and values

INTRODUCTION AND UNDERSTANDING OF LIFE SKILLS

UNIT 1 **6**

Life Skills: Benefits and Development. WHO's ten core Life Skills. Self awareness: Recognition of self & establishing personal identity. Understanding one's strength, weakness, desires and dislikes. Exploring one's potential in general, Self confidence, Self esteem.

UNIT 2 **THINKING ABILITY** **6**

Concept of critical thinking, Characteristics. Strategies, models. Concept of creative thinking. Characteristic of four components in creative thinking – fluency, flexibility, originality and elaboration. Creative solution finders. Lateral Thinking – Definition, Understanding of Lateral thinking, Lateral thinking techniques, Benefits of lateral thinking.

UNIT 3 **PROBLEM SOLVING & DECISION MAKING** **6**

Problem solving: Meaning of problem. Understanding of problem solving.Causes and consequences. Steps in problem solving. Decision making andProcess of decision making. POWER model of decision making. Practicing making decisions. Smart decisions and difficult decisions.

UNIT 4 **INTERPERSONAL RELATIONSHIP & STRESS MANAGEMENT** **6**

Meaning of Interpersonal relationship. Managing Interpersonal relationshipsNetwork of relationships Coping with stress – Recognition of stress. Factors causing stress, Positive & Negative type of stress, Effects of stress on body and mind. Stress removal technique – Therapeutic writing. Coping with emotions – Recognition of emotions, Relationship between emotions and behavior. Response to emotions. Intense emotions' effects on health.

UNIT 5 **ETHICS & VALUES** **6**

Understanding of Ethics. Essence, Determinants & Consequences of Ethics in human actions. Human Values: Lessons from the lives of teachings of great leaders, reformers. Role of family, society and educational institutions in inculcating values. Empathy & Emotional Intelligence: Concept and their utilities and application in day to day life.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Understand the significance of value inputs in a classroom and start applying them in their life and profession [U]

CO2: Distinguish between values and skills, happiness and accumulation ofphysical facilities, the Self and the Body, Intention and Competence of anindividual, etc. [AN]

CO3: Estimate the value of harmonious relationship based on trust and respectin their life and profession [AN]

CO4: Determining the role of a human being in ensuring harmony in interpersonal relationship and stress management. [A]

CO5: Displaying ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.[A]

TEXT BOOKS

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values andProfessional Ethics.
2. Bhatia, R. & Bhatia, A (2015) Role of Ethical Values in Indian Higher Education.

REFERENCE BOOKS

3. Tanu Shukla, Anupam Yadav, Gajendra Singh Chauhan, 2017, " Human Values and Professional Ethics", Cenpage.

CO's-PO's & PSO's MAPPING

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PSO 3
CO 1	-	-	-	-	-	2	3	2	3	-	-	3	-	2	-
CO 2	-	-	-	-	-	3	3	3	3	-	-	2	-	2	-
CO 3	-	-	-	-	-	3	3	3	3	-	-	2	-	2	-
CO 4	-	-	-	-	-	3	3	3	3	-	-	3	-	2	-
CO 5	-	-	-	-	-	2	2	2	2	-	-	3	-	2	-

Correlation levels: 1 – low 2 – medium 3 – high "-"- no correlation

COURSE DESIGNED BY	APPROVED BY
Dr.S.Jothilakshmi HOD/IT	Dr.S.Jothilakshmi HOD/IT
Name and Department	**Name and Department of BoS Chairman**

SEMESTER III

U23MA309 DISCRETE MATHEMATICS FOR COMPUTINGCategory :BSC

L	T	P	C
3	1	0	4

COURSE OBJECTIVE:

1.. To build problem solving skills by enhancing students logical and mathematical maturity

2. To acquire the knowledge of combinatorics

3. To gain the knowledge of graph theory and to solve the practical problems.

4. To familiarize the applications of algebraic structures.

5. To Understand the basic concepts in sets and relations

UNIT 1LOGIC **9+3**

Truth Tables, Tautology and Contradiction - Logical Equivalence: The Laws of Logic, Logical Implication, - Disjunctive and Conjunctive Normal Form. Application: Knowledge representation in artificial intelligence using Basic Connectives

UNIT 2 COMBINATORICS **9+3**

Mathematical induction – Strong induction and well ordering – The basics of counting –Permutations and combinations – Recurrence relations - Solving linear recurrence relations. Application : Pigeon hole principle

UNIT 3 GRAPH THEORY **9+3**

Graphs and graph models – Graph terminology and special type of graph – Matrix representation of graphs and graph isomorphism – Degree, Connectivity – Path – Cycle – Sub Graph, Isomorphism – Eulerian and Hamiltonian paths and circuits. Application: Map for Online Food Delivery System

UNIT 4 ALGEBRAIC STRUCTURES **9+3**

Algebraic systems – Semi groups and monoids – Groups – Subgroups – Normal subgroup and cosets – Lagrange's theorem. Application: Error detection and encoding functions

UNIT 5 SET THEORY AND LATTICES **9+3**

Set theory –Operations and Laws of Sets - Cartesian Product, Binary Relation - Equivalence Relation - Partial ordering – Poset – Lattices as Posets –Hasse diagram. Application: Vehicle Model Catalogue

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Solve the problems using the concepts of sets, Truth Tables, counting techniques, properties of algebraic structures and graph network techniques to solve engineering problems.

CO2: Comprehend the concepts needed to test the relations, laws of logic, Strong induction, Groups and Properties of Graphs

CO3: Demonstrate the knowledge in functions, Logical Implication, Mathematical induction, Subgroups and Graph Coloring

CO4: Analyze the concepts and Poset, Normal Form , Permutations and combinations, Normal subgroup and Eulerian and Hamiltonian paths and circuits

CO5: Apply and Analyze Hasse diagram, Rules of Inference, linear recurrence relations, Lagrange's theorem and Matrices of Graph Isomorphism

TOTAL: 60 PERIODS

TEXT BOOKS:

4. Rosen. K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2017.

5. Tremblay. J.P. and Manohar. R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.

6. Venkatraman M.K, Sridharan. N and Chandrasekaran N. Discrete Mathematics, The National Publishing Company, Chennai, Fourth edition, 2014.

REFERENCES:

6. Grimaldi. R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 5th Edition, Pearson Education Asia, Delhi, 2013.
7. Lipschutz. S. and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3rd Edition, 2010.
8. Koshy. T. "Discrete Mathematics with Applications", Elsevier Publications, 2006.
9. Kenneth. H. Rosen, Discrete Mathematics and its Applications, Tata McGraw Hill P.Co, New Delhi, Seventh Edition, 2014.
10. Bernard Kolman, Robert C. Busby, Sharan Cutler Ross, Discrete Mathematical Structures, Pearson Education Pvt Ltd ,New Delhi, Sixth Edition, 2013.

CO's-PO's & PSO's MAPPING															
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**	**PSO 3**
CO 1	3	3	3	1	-	-	-	-	1	-	-	1	-	-	-
CO 2	3	3	3	1	-	-	-	-	1	-	-	1	-	-	-
CO 3	3	3	3	1	-	-	-	-	1	-	-	1	-	-	-
CO 4	3	2	3	1	-	-	-	-	1	-	-	1	-	-	-
CO 5	3	3	3	1	-	-	-	-	1	-	-	1	-	-	-
Correlation levels:			**1 – low**			**2 – medium**				**3 – high**			**"-"- no correlation**		

COURSE DESIGNED BY	**APPROVED BY**
Ms.Umamahesheswari S&H (Mathemeatics)	Dr.K.Parimala Gandhi – Professor &Head/ S&H
Name and Department	**Name and Department of BoS Chairman**

SEMESTER IV

		L	T	P	C
U23MA410					
SDG: 4	**LINEAR ALGEBRA AND NUMBER THEORY**	**3**	**1**	**0**	**4**

(FOR CSE, IT,CYBER,AIML)

COURSE OBJECTIVE:

- To understand the nature of the equation AX=B
- To understand postulates of vector spaces and linear transformations
- To comprehend the ideas behind inner product spaces.
- To gain knowledge on division algorithm and fundamental theorem of arithmetic
- To solve Diophantine equations

UNIT 1 AX = B AND THE FOUR SUBSPACES 9

The Geometry of Linear equations: Linear combination – Dependence and Independence vectors – Basis and Dimension – Rank of a matrix – Elimination and Solving Ax=b in matrices: Gauss Elimination method – Gauss Jordan method – Inverse of a matrix using Gauss Jordan method

UNIT 2 VECTOR SPACES 9

Vector spaces – Subspaces – Linear combination, span, linear independence and dependence – Null space, Column space and row space – Basis and dimension of a vector space – Rank and nullity. Application: Digital Image Enhancement Using Transformations

UNIT 3 INNER PRODUCT SPACES 9

Inner product, length, angle and orthogonality – orthogonal sets – orthogonal projections – Inner product spaces – orthonormal basis; Gram-Schmidt process. Application: Designing the Movement of Robotic Arms

UNIT 4 DIVISIBILITY THEORY AND CANONICAL DECOMPOSITIONS 9

Division algorithm — Base — b representations — Number patterns — Prime and composite numbers — GCD — Euclidean algorithm — Fundamental theorem of arithmetic — LCM.

UNIT 5 DIOPHANTINE EQUATIONS AND CONGRUENCES 9

Linear Diophantine equations — Congruence?s — Linear Congruences — Applications: Divisibility tests — Modular exponentiation-Chinese remainder theorem — 2 x 2 linear systems.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Determine the existence and uniqueness of solutions based on the properties of the matrix A and the vector b

CO2: Apply the concepts of basis and dimension to describe vector spaces and subspaces.

CO3: Apply the Gram-Schmidt process to orthogonalize sets of vectors.

CO4: Solve Linear Diophantine equations and apply the Fundamental Theorem of Arithmetic

CO5: Solve congruence andUtilize the Chinese Remainder Theorem for simultaneous congruences

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Steven J. Leon., "Linear Algebra with Application" Ninth Edition, Pearson, 2015.
2. Gilbert Strang, Linear Algebra, 5th Edison, ANE Books, 2016.

Koshy .T-"Elementary Number Theory with Applications. Elsevier Publications, New Delhi,Second Edition, 2007.

REFERENCES:

1. Friedberg, A.H., Insel, A.J. and Spence, L., Linear Algebra‖, Prentice Hall of India, New Delhi, 2004.
2. David C.Lay., "Linear Algebra And Its Applications" 5th Edition, 2015.
3. Kumaresan, S., ―Linear Algebra – A Geometric Approach‖, Prentice – Hall of India, New Delhi, Reprint, 2010.
4. Bernard Kolman, Robert C. Busby, Sharan Cutler Ross, ―Discrete Mathematical Structures, sixth edition , Pearson Education Pvt Ltd., New Delhi, 2017.
5. Ralph.P.Grimaldi, ―Discrete and Combinatorial Mathematics: An Applied Introduction, Fifth Edition, Pearson Education Asia, New Delhi, Fifth Edition, 2019.

CO's-PO's & PSO's MAPPING

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PSO 3
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CO 2	3	3	3	2								2			
CO 3	3	3	3	2								2			
CO 4	3	3	3	2								2			
CO 5	3	3	3	2								2			

Correlation levels: 1 – low 2 – medium 3 – high "-"- no correlation

COURSE DESIGNED BY	APPROVED BY
Dr.A.Shobana, Professor/Mathematics	
Name and Department	Name and Department of BoS Chairman

SEMESTER IV

Category : PCC

		L	T	P	C
U23IT601					
SDG: 4	**COMPILER DESIGN**	**3**	**1**	**0**	**4**

COURSE OBJECTIVE:

1. To learn the fundamental phases and structure of a compiler
2. To understand lexical, syntax, and semantic analysis techniques
3. To study type checking and symbol table management
4. To explore intermediate and target code generation strategies
5. To learn basic code optimization techniques

UNIT 1 FRONT END OF COMPILERS 9+3

Language Processors – Structure of a Compiler – Lexical Analysis: Role of Lexical Analyzer – Specification and Recognition of Tokens – Introduction to LEX. Syntax Analysis: Context Free Grammars – Parse Trees – Top Down Parsing – Recursive Descent Parser – LL(1) Parser – Bottom Up Parsing – Shift Reduce Parser – SLR Parser – Introduction to YACC.

UNIT 2 TYPE CHECKING AND RUNTIME ENVIRONMENTS 9+3

Syntax Directed Definitions – Construction of Syntax Trees – Type Systems – Simple Type Checker – Type Conversions – Runtime Environments: Storage Organization – Stack Allocation – Parameter Passing – Symbol Table.

UNIT 3 INTERMEDIATE CODE GENERATION 9=3

Intermediate Representations – Three Address Code – Static Single Assignment (SSA) – Expression Translation – Control Flow – Backpatching – Intermediate Code for Procedures.

UNIT 4 CODE GENERATION 9+3

Target Language – Code Generation – Register Allocation – Instruction Selection – Optimal Code Generation for Expressions.

UNIT 5 CODE OPTIMIZATION 9+3

Basic Blocks – Flow Graphs – Peephole Optimization – Data Flow Analysis – Loop Optimization – Partial Redundancy Elimination.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Comprehensively explain the analysis phases of compiler and develop scanners and parsers.

CO2: Manage type checking for a given language specification

CO3: Generate the intermediate representation of programs
CO4: Produce the target machine code using the runtime environment
CO5: Transform given code into an optimized code by applying various optimization techniques

TOTAL: 60 PERIODS

TEXT BOOKS

1. Alfred Aho, Monica S Lam, Ravi Sethi, Jeffrey D Ullman, "Compilers Principles, Techniques and Tools", Pearson Education, Asia 2014.

REFERENCE BOOKS

1. Andrew W Appel, Modern Compiler Implementation in ML, Cambridge University Press, December 1997.
2. Kenneth C. Louden, Compiler Construction: Principles and Practice, Cengage Learning, 1st Edition, 1997.
3. Steven. S. Muchnick, Advanced Compiler Design and Implementation, Morgan Kaufman Publishers, First Edition, 1997.
4. Randy Allen and Ken Kennedy, Optimizing Compilers for Modern Architectures: A Dependence based Approach, Morgan Kaufman, First Edition, 2001.
5. Y. N. Srikant, Priti Shankar, The Compiler Design Handbook – Optimizations and Machine Code Generation, CRC Press, Second Edition, 2007.
6. John E Hopcroft and Jeffery D Ullman, "Introduction to Automata Theory, Languages and Computations", Narosa Publishing House, 2002.

CO-PO MAPPING

CO	PO												PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	3	2	2	2	-	-	-	2	1	2	1	2	3	1
2	1	1	3	2	2	-	-	-	2	2	1	1	3	1	2
3	1	2	1	1	2	-	-	-	3	3	1	3	2	1	3
4	2	2	3	2	3	-	-	-	3	3	2	1	2	1	3
5	2	1	3	2	2	-	-	-	2	1	1	3	2	1	1
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
Mrs. K.J.Godlin Debby AP/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

SEMESTER IV

Category: PCC

U23IT402 **COMPUTER ARCHITECTURE**

L	T	P	C
3	0	0	3

COURSE OBJECTIVE: The course aims

1. To understand the basic structure and operation of a computer
2. To learn the arithmetic and logic unit
3. To learn the basic of pipelined execution
4. To familiarize with memory, I/O, ALU design, instruction execution
5. To obtain knowledge on parallel processing

UNIT 1 BASIC STRUCTURE OF COMPUTERS 9

Functional Units - Basic Operational Concepts - Bus Structures - Performance of Computer – Memory Locations and Addresses - Instruction and Instruction Sequencing - Addressing Modes.

UNIT 2 COMPUTER ARITHMETIC 9

Addition and Subtraction of Signed Numbers - Design of Fast Adders - Multiplication of Positive Numbers - Signed Operand Multiplication - Fast Multiplication - Integer Division - Floating Point Numbers and Operations.

UNIT 3 PROCESSOR AND CONTROL UNIT 9

Basic MIPS implementation – Building data path – Control Implementation scheme – Pipelining – Pipelined data path and control – Handling Data hazards & Control hazards – Exceptions.

UNIT 4 MEMORY SYSTEMS AND I/O ORGANIZATION 9

Basic Concepts - Speed, Size and Cost - RAM Memories – Read-Only Memories– Memory Hierarchy - Cache Memories - Performance Considerations - Virtual Memories- memory management requirements. I/O fundamentals: Handshaking, buffering; I/O techniques: programmed I/O, interruptdriven I/O – Direct Memory Access - Interrupts – Enabling and disabling interrupts- Handling multiple devices

UNIT 5 PARALLELISM 9 Instruction- level - parallelism – Parallel processing challenges – Flynn's classification – Hardware multithreading – Multi-core processors Case study - ARM interrupt structure

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Upon completion of this course, student will be able to:

CO1: Describe the basic structure, arithmetic and memory operations of a digital computer and illustrate the addressing modes for set of instructions [U]

CO2: Describe and apply algorithms for performing different arithmetic operations [U]

CO3: Create the data path in a processor and apply the concepts of pipelining [C]

CO4: Analyze the ALU, memory, I/O systems and external storage system for computers [A]

CO5: Recognize the concept of parallel processing [AN]

TOTAL PERIODS 45

TEXT BOOKS:

1. V.Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky, “Computer Organisation and 1 Embedded Systems“,Mc Graw-Hill Inc, sixth edition, 2019.
2. David A. Patterson and John L. Hennessey, “Computer organization and design“, Morgan Kauffman / Elsevier, Fifth edition, 2016.

REFERENCES:

1. William Stallings, “Computer Organization and Architecture – Designing for Performance”, Pearson Education, Eighth Edition, 2013.
2. John P. Hayes, “Computer Architecture and Organization”, Tata McGraw Hill, Third Edition, 2014.

CO-PO MAPPING:

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	3	2	2	1	-	-	1	2	1	1	1	2	1	1
2	3	3	2	2	1	-	-	1	2	-	1	1	2	3	-
3	3	3	2	3	1	-	-	1	2	-	2	1	2	3	1
4	3	3	2	3	1	-		1	2	-	2	1	3	2	-
5	3	3	2	3	1	-	-	1	2	-	1	1	2	3	-

COURSE DESIGNED BY	**APPROVED BY**
Dr.S.Jothilakshmi HOD/IT	Dr.S.Jothilakshmi HOD/IT
Name and Department	**Name and Department of BoS Chairman**

SEMESTER IV

Category: PCC

U23IT403	**DATABASE DESIGN AND MANAGEMENT**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVE:

The course aims

1. To understand the objective of a database management system
2. To facilitate the creation of data structures and SQL queries
3. To understand the internal storage structures using different file and indexing techniques
4. To learn the basics of transaction processing
5. To gain knowledge on concurrency control techniques

UNIT 1 DATA MODELS AND RELATIONAL MODE 8

Introduction–Database System Applications–Purpose of database systems – View of data – Database Languages – Relational Databases– Database Architecture – Database Users and administrators - Relational Model – Structure of Relational Databases – Database Schema – Keys – Schema Diagrams – Relational Query Languages - Relational Operations- Relational Algebra.

UNIT 2 SQL AND DATABASE DESIGN 10

Introduction – Principle of Spontaneous emission and stimulated emission. Population inversion, pumping- Einstein's A and B coefficients: derivation. Types of lasers – Nd-YAG, CO_2- Industrial Applications of Lasers –Fiber Optics: Principle and propagation of light – Numerical aperture and Acceptance angle - Types of optical fibres (material, refractive index, mode) – Temperature and displacement sensors

RELATIONAL DATABASE DESIGN

UNIT 3 9

Features of good relational designs- Functional dependency theory - Decomposition using functional dependencies–Algorithms for decomposition. Normal Forms: 1NF, 2NF, 3NF, BCNF, 4NF, 5NF–Data Storage: RAID – Tertiary storage - File Organization – Organization of Records in Files – Data dictionary storage.

UNIT 4 INDEXING, HASHING AND TRANSACTIONS 9

Ordered indices– B trees - B+ Tree index files–Multiple key access - Static and Dynamic Hashing – Bitmap indices. Overview of Query Processing- Transaction concept–Transaction model–Storage structure–Transaction atomicity and durability – Isolation – Serializability.

CONCURRENCY CONTROL AND RECOVERY SYSTEM

UNIT 5 9

Lock-based Protocols - Deadlock Handling – Multiple Granularity – Timestamp and Validation Based Protocols - Failure classification – Storage – Recovery and atomicity – Algorithm – Buffer management – Failure with loss of nonvolatile storage

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Upon completion of this course, student will be able to:

CO1: Outline the features, architecture and applications of database system [U]

CO2: Design an ER model and use relational database with SQL statements [U]

CO3: Design relational database using normalization methods [A]

CO4: Apply indexing and hashing techniques in relational database, and perform transaction processing [A]

CO5: Apply the concepts of concurrency control and recovery in a relational database [A]

TOTAL PERIODS 45

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Seventh Edition, McGraw Hill, 2020.
2. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Seventh Edition, Pearson Education, 2017.

REFERENCES:

1. Carlos Coronel and Steven Morris, Database System Design and Implementation, cennage learning, 11th edition, 2013.
2. Date C.J., Kannan A. and Swamynathan S., “An Introduction to Database Systems”, 8th Edition, Pearson Education, New Delhi, 2006.

CO – PO MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	2	1	2	2	-	-	-	1	1	1	2	2	2	1
2	2	1	-	1	1	-	-	-	2	1	1	2	2	1	-
3	2	2	1	2	2	1	1	-	1	2	1	3	2	2	1
4	3	2	2	1	2	-	-	-	1	1	2	2	3	2	2
5	2	2	1	2	2	-	-	-	1	1	1	2	2	2	1

COURSE DESIGNED BY	**APPROVED BY**
Dr.P.Shanthakumar Professor/IT	Dr.S.Jothilakshmi HOD/IT
Name and Department	**Name and Department of BoS Chairman**

SEMESTER IV

Category: PCC

		L	T	P	C
U23IT404	**COMPUTER NETWORKS**	**3**	**0**	**2**	**4**

COURSE OBJECTIVES**:** ***The course aims***

1. To express the concepts of data communications and functionalities of different layers of ISO/OSI reference architecture
2. To illustrate the channelization, flow and error control methods
3. To practice the concepts of addressing, subnetting and routing mechanisms
4. To describe the process to process delivery and protocols used for it
5. To identify the suitable protocols for different applications

SYLLABUS

UNIT 1 INTRODUCTION TO PHYSICAL LAYER **9**

Introduction Data Communication - Networks – Network Types – Protocol Layering – TCP/IP Protocol suite –OSI Model – Introduction to Sockets – Socket Programming - Physical Layer: Data and Signals - Performance – Transmission media- Switching –Circuit Switching

UNIT 2 DATA LINK LAYER **9**

Data Link Layer – Framing – Flow control – Error control – Data-Link Layer Protocols – HDLC – PPP - Media Access Control – Ethernet Basics – CSMA/CD – Virtual LAN – Wireless LAN - (802.11)

NETWORK LAYER and ROUTING

UNIT 3 **9**

Switching : Packet Switching - Internet protocol - IPV4 – IP Addressing – Subnetting - IPV6, ARP,RARP, ICMP, DHCP - Routing and protocols: Unicast routing - Distance Vector Routing - RIP - Link State Routing – OSPF - – Path-vector routing - BGP - Multicast Routing: DVMRP – PIM - Internetworking, the network layer in the internet (IPv4 and IPv6), Quality of Service

UNIT 4 TRANSPORT LAYER **9**

Introduction - Transport-Layer Protocols: UDP – TCP: Connection Management – Flow control - Congestion Control - Congestion avoidance (DECbit, RED) – SCTP – Quality of Service

UNIT 5 **APPLICATION** **LAYE**

Application Layer protocols: HTTP – FTP – Email protocols(SMTP - POP3 - IMAP - MIME) – DNS – SNMP

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Upon completion of this course, student will be able to:

CO1: Explore the basics of network models and physical layer [U]

CO2: Identify error detection and correction methods and protocols at data link layer [U] CO3: Outline the different addressing schemes and apply various routing protocols at network layer [A]

CO4: Illustrate the different transport layer protocols and employ suitable flow control and QoS techniques [A]

CO5: Know various protocols and their working principles at application layer [A]

TEXT BOOKS:

1. James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Eighth Edition, Pearson Education, 2021.
2. Behrouz A. Forouzan, Data Communications and Networking with TCP/IP Protocol Suite, Sixth Edition TMH, 2022

REFERENCES:

1. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition,Morgan Kaufmann Publishers Inc., 2012.
2. William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education,2013.
3. Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall, 2014. 4. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, “Computer Networks: An Open Source Approach”, McGraw Hill, 2012.

CO's-PO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1	2	2	-	-	-	-	3	2	3	1	3	1	2
2	2	3	3	1	1	-	-	-	2	1	1	2	2	3	3
3	1	3	2	2	1	-	-	-	2	2	1	1	1	3	2
4	1	3	3	3	-	-	-	-	1	2	1	2	1	3	3
5	3	1	2	1	1	-	-	-	3	2	3	2	3	1	2

1. Learn to use commands like tcpdump, netstat, ifconfig, nslookup and traceroute. Capture ping and trace route PDUs using a network protocol analyzer and examine.
2. Write a HTTP web client program to download a web page using TCP sockets. 3. Applications using TCP sockets like: a) Echo client and echo server b) Chat
4. Simulation of DNS using UDP sockets.
5. Use a tool like Wireshark to capture packets and examine the packets
6. Write a code simulating ARP /RARP protocols.
7. Study of Network simulator (NS) and Simulation of Congestion Control Algorithms using NS.
8. Study of TCP/UDP performance using Simulation tool.
9. Simulation of Distance Vector/ Link State Routing algorithm.
10. Simulation of an error correction code (like CRC)

Total Hours 30Hrs

Total Contact Periods:

Lecture: 45 **Tutorial: 0** **Practical: 30** **Project: 0**

TOTAL PERIODS: 45+30=75

COURSE DESIGNED BY	**APPROVED BY**
P.Jason AP/IT	Dr.S.Jothilakshmi HOD/IT
Name and Department	**Name and Department of BoS Chairman**

SEMESTER IV **Category: PCC**

		L	T	P	C
U23IT405	**FOUNDATION OF DATA SCIENCE**	**3**	**0**	**2**	**4**

COURSE OBJECTIVE: The course aims

1. **To introduce the fundamentals of data science and its applications**
2. **To illustrate the concept of data analysis techniques**
3. **To learn to describe the data for the data science process**
4. **To learn the fundamental technique for grouping the set of similar data**
5. **To develop the skills required to perform data visualization**

UNIT 1 INTRODUCTION TO DATASCIENCE 9

Introduction to data science - Big Data and Data Science - Data Science Life Cycle– Datafication – Current landscape of perspectives – Skill sets needed; Matrices –Relations between data - linear algebraic operations - Tools for Data Science -Data Exploration, Feature Engineering - Decompositions
(SVD and PCA)

UNIT 2 INTRODUCTION TO STATISTICS 9

Descriptive Statistics - Measures of Central Tendency: Mean, Median, Mode, Measures of Variability: Variance, Standard deviation, Skewness, Percentiles, Ranges, Measures of Normality: Skewness, Kurtosis, Measures of Correlation: Positive, Negative, Weak Correlations- Statistical Inference: Populations and samples – Statistical modeling – probability distributions – fitting a model – Hypothesis Testing.

UNIT 3 DATA PREPROCESSING 9

Data cleaning – Data integration – Data Reduction - Data Transformation and Data Discretization. Evaluation of classification methods – Confusion matrix, Students T-tests and ROC curves - Exploratory Data Analysis – Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA.

UNIT 4 CLUSTERING 9

Choosing distance metrics – Different clustering approaches – hierarchical agglomerative clustering, kmeans (Lloyd's algorithm) – DBSCAN – Relative merits of each method – clustering tendency and quality.

UNIT 5 DATA VISUALIZATION 9

Documentation and deployment – Producing effective presentations – Introduction to graphical analysis – plot() function – Displaying multivariate data – Matrix plots–Multiple plots in one window – Exporting graph – Using graphics parameters–Visualizations – Visual data analysis techniques, interaction techniques; Systems and applications.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Upon completion of this course, student will be able to:

CO1: Understand and master the fundamentals of Data Science [U]

CO2: Build, and prepare data for use with a variety of statistical methods and models [C]

CO3: Explain how data is collected, managed and stored for data science [U] CO4: Examine the statistical data and use computation tools for data analysis [AN]

CO5: Makeup and transfer the results and effectively communicate the findings using visualization techniques [C]

TOTAL PERIODS 30

LISTOF EXPERIMENTS:

1. Download,installandexplorethefeaturesofNumPy,SciPy, Jupyter,Statsmodelsand Pandas packages.
2. WorkingwithNumpyarrays
3. WorkingwithPandasdataframes
4. Reading data from text files, Excel and the web and exploring various commandsfor doing descriptive analytics on the Iris data set.
5. Use the diabetes data set from UCI and Pima Indians Diabetes data set for performing the following:
   a. Univariateanalysis:Frequency,Mean,Median,Mode,Variance,Standard Deviation, Skewness and Kurtosis.
   b. Bivariateanalysis:Linearandlogisticregressionmodeling
   c. MultipleRegressionanalysis
   d. Alsocomparetheresultsoftheaboveanalysisforthetwodatasets.
6. ApplyandexplorevariousplottingfunctionsonUCIdatasets.
   a. Normalcurves
   b. Densityandcontourplots
   c. Correlationandscatterplots
   d. Histograms
   e. Threedimensionalplotting
7. VisualizingGeographicDatawithBasemap
8. **TOTAL PERIODS 30**

TEXT BOOKS:

1. Avrim Blum, John Hopcroft, and Ravindran Kannan, “Foundations of Data Science”, Cambridge University Press, 2018
2. Matt Harrison, “Learning the Pandas Library: Python Tools for Data Munging, Analysis, and Visualization , O’Reilly, 2016.

3. Cathy O'Neil and Rachel Schutt, " Doing Data Science, Straight Talk From The Frontline", O'Reilly, 2014.

CO-PO MAPPING:

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	2	1	2	2	-	-	-	1	1	1	2	3	2	2
2	2	1	-	1	1	-	-	-	2	1	1	2	3	3	2
3	2	2	1	2	2	1	1	-	1	2	1	3	3	1	3
4	3	2	2	1	2	-	-	-	1	1	2	2	2	3	3
5	2	2	1	2	2	-	-	-	1	1	1	2	3	2	2

REFERENCES:

1. Robert S. Witte and John S. Witte, "Statistics", Eleventh Edition, Wiley Publications, 2017.
2. Jake VanderPlas, "Python Data Science Handbook", O'Reilly, 2016.
3. Allen B. Downey, "Think Stats: Exploratory Data Analysis in Python", Green Tea Press, 2014.

COURSE DESIGNED BY	**APPROVED BY**
Mrs. P.Showmiya AP/IT	Dr.S.Jothilakshmi HOD/IT
Name and Department	**Name and Department of BoS Chairman**

SEMESTER 4

Category: PCC

DATABASE DESIGN AND MANAGEMENT

		L	T	P	C
U23IT411	LABORATORY	0	0	4	2

COURSE OBJECTIVE:

1. To learn and implement important commands in SQL
2. To learn the usage of nested and joint queries
3. To understand functions, procedures and procedural extensions of databases.
4. To understand design and implementation of typical database applications.
5. To be familiar with the use of a front end tool for GUI based application development.

Upon completion of this course, student will be able to:

CO1: Create databases with different types of key constraints

CO2: Construct simple and complex SQL queries using DML and DCL commands.

CO3: Use advanced features such as stored procedures and triggers and incorporate in GUI based application development.

CO4: Create an XML database and validate with meta-data (XML schema).

CO5: Create and manipulate data using NOSQL database.

S.NO	LIST OF EXPERIMENTS
0	Create a database table, add constraints (primary key, unique, check, Not null), insert rows, update and delete rows using SQL DDL and DML commands
1	Create a set of tables, add foreign key constraints and incorporate referential integrity.
2	Query the database tables using different ‘where’ clause conditions and also implement aggregate functions.
3	Query the database tables and explore sub queries and simple join operations.
4	Query the database tables and explore natural, equi and outer joins.
5	Write user defined functions and stored procedures in SQL.
6	Execute complex transactions and realize DCL and TCL commands.
7	Write SQL Triggers for insert, delete, and update operations in a database table.
8	Create View and index for database tables with a large number of records.
9	Create an XML database and validate it using XML schema.
10	Create Document, column and graph based data using NOSQL database tools.
11	Develop a simple GUI based database application and incorporate all the abovementioned features 13 Mini project: (Application Development using Oracle/ SQL SERVER / MYSQL) Sample

Applications:
Inventory Control System
Hospital Management System
Railway Reservation System
Web Based User Identification System
Hotel Management System
Student Information System
Library Information System and etc.,

COURSE DESIGNED BY	**APPROVED BY**
Dr.P.Shanthakumar Professor/IT	Dr.S.Jothilakshmi HOD/IT
Name and Department	**Name and Department of BoS Chairman**

SEMESTER IV

U23EE414 Aptitude and Communication for Engineers - II
SDG: 4 (Common to all Branches) Category : EEC

L	T	P	C
3	0	0	1

COURSE OBJECTIVE:

1. To enhance the students' ability to contribute effectively and confidently in classroom and other forums and thereby they can exhibit their skills and gain attention.
2. To further enhance and improve their communicative English for industry readiness through various speech craft activities.
3. To take a stock of internal strength and weakness and prepare a plan to manage external threats and opportunities
4. To get ready to kick start their career journey by assessing their current skills and talents.
5. To train students on clearing various placement papers with greater accuracy

UNIT 1 Course Introduction **2**

Introduction about the Course - Learning expectations

UNIT 2 Speaking Skills -Vantage **12**

Speech Craft –My buddy - Impromptu

UNIT 3 Personality Development **3**

Psychometric Assessments - SWOT analysis

UNIT 4 Placement Readiness **4**

Placement inventory-– Resume - Grooming

UNIT 5 Aptitude for Placements - II **9**

Placement Paper 7–Permutation & Combination – Probability, Placement Paper 8 – Arithmetic Reasoning – Problems on Ages, Placement Paper 9 – Ratio Proportion & Alligation Mixture, Placement Paper 10 – Clocks & Calendars.

COURSE OUTCOMES:

Upon completion of this course,

CO1:Students will be able to participate in any learning activity without any reservations. They shall be ready to move beyond their comfort zone to acquire new skills throughout their life.

CO2:Students shall understand and appreciate the importance of English in the current global scenario and make efforts towards up skilling the same.

CO3:They must be able to identify their strength and enhance the same.

CO4:They shall prepare themselves to kick start their career by taking a stock of their existing skills and plan to acquire new skills required to achieve their goals.

CO5:They shall demonstrate a good understanding of basic mathematical concepts required to learn engineering. To use appropriate strategies and shortcuts to improve speed and accuracy in solving aptitude problems during recruitment processes

TOTAL: 30 PERIODS

TEXT BOOKS:

1. The Pearson Guide to Quantitative Aptitude for Competitive Examinations, Dinesh Khattar. Pearson
2. Quantitative Aptitude Dr. R.S. Aggarwal S. Chand Publication
3. A modern Approach to Verbal and Non-Verbal Reasoning R.S. Aggarwal
4. A Modern Approach to Verbal & Non-Verbal Reasoning - Aggarwal R. S

REFERENCES:

1. Quantitative Aptitude for CAT, Arun Sharma
2. Fast Track Objective Arithmetic, Rajesh Verma, Arihant Publication
3. Quantitative Aptitude Quantum CAT Common Admission Tests for Admission into IIMs,Sarvesh K. Verma
4. Wiley's Exam Xpert Quantitative Ability for CAT, 2ed, Ashu Jain

CO's-PO's & PSO's MAPPING

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO 1	1	-	-	-	-	-	-	2	-	3	-	3	-	-	-
CO 2	-	-	-	-	-	2	2	1	-	3	-	-	-	-	-
CO 3	3	3	3	3	-	-	-	-	-	1	-	-	-	-	-
CO 4	3	2	1	3	-	-	-	-	-	1	-	-	-	-	-
CO 5	1	1	1	1	-	-	-	-	-	3	-	-	-	-	-

Correlation levels: 1 – low 2 – medium 3 – high "-"- no correlation

COURSE DESIGNED BY	APPROVED BY
Ramesh Raja M	
Name and Department	**Name and Department of BoS Chairman**

SEMESTER IV

U23MC402 SDG:	Environmental Ecosystem and Sustainability (Common to CSE & IT)	Category : ESC			
		L	T	P	C
		2	0	0	2

COURSE OBJECTIVE:

1. Study the interrelationship between living organism and environment
2. Assess the environmental pollution and its impact.
3. Understand the significance of natural resources and their conservation.
4. Identify and implement scientific, economic and political solutions to environmental problems.
5. Understand the influence of human population on environmental issues and role of information technology as a tool to minimize the environmental problems.

UNIT 1	ECOSYSTEMS AND BIODIVERSITY	6

Definition, Scope and importance of environment - Concept of an ecosystem - Structure and function of an ecosystem (Grassland and River ecosystem only) - Food chains, Food webs and ecological pyramids - Introduction to biodiversity- Definition- Genetic, Species and ecosystem diversity - Value of biodiversity - Threats to biodiversity- Conservation of biodiversity. Case study of simple ecosystems -pond, river, hill slopes, etc.

UNIT 2	ENVIRONMENTAL POLLUTION	6

Definition - Causes, Effects and control measures of (a) Air pollution (b) Water pollution (c) Thermal pollution - Solid waste management: Causes, Effects and control measures of municipal solid wastes - Role of an individual in prevention of pollution - Pollution case studies -Disaster management - Floods, Earthquake, Cyclone and landslides. Case study of local polluted site - Urban / Rural / Industrial / Agricultural.

UNIT 3	NATURAL RESOURCES	6

Forest resources - Use and over-exploitation, Deforestation - Water resources - Use and overutilization of surface and ground water, Drought, Conflicts over water, dams-Benefits and problems - Food resources- Changes caused by agriculture and overgrazing, Effects of modern agriculture, Fertilizer-pesticide problems, water logging, Salinity-Role of an individual in conservation of natural resources (National and International level).

UNIT 4	SOCIAL ISSUES AND SUSTAINABILITY MANAGEMENT	6

Unsustainable to sustainable development- millennium development goals, and protocols- Sustainable Development Goals-targets- Zero waste and R concept - ISO 14000 Series- Material Life cycle assessment, Environmental Impact Assessment. Sustainable habitat: Green buildings, Green materials-Sustainable transports –Carbon credit, Carbon footprint.

UNIT 5	CLIMATE CHANGE AND THE ENVIRONMENT	6

Population growth, Variation among nations -Population explosion - Family welfare programme - Environment and human health -Value education - Pandemic issues and management-Women and child welfare - Role of information technology in environment and human health - Case studies

COURSE OUTCOMES:

Upon completion of this course, student will be able to:

CO1: The students will able to understand the basis of ecological principles and environmental regulations which in turn helps in sustainable development and human population and environment.

Use and over exploitation of forest and water and food resources.

CO2: The students will able to understand various schemes for the protection of species, role of an individual in prevention of pollution and conservation of natural resources

CO3: The students will able to understand design of pollution control structures, resettlement and rehabilitation of people, welfare about the women and child.

CO4: The students will able to apply enough knowledge of implement various Environmental ethics, regulations and schemes, Pandemic issues and management, dams-benefits and problems, conservation of biodiversity.

CO5: The students will able to analyze the climate change and its impact on environment. Climate change, global warming, acid rain and ozone layer depletion.

TOTAL: 30 PERIODS

TEXT BOOKS:

1. Benny Joseph, “Environmental Science and Engineering”, Tata McGrawHill, New Delhi, 2017.
2. Gilbert M.Masters, “Introduction to Environmental Engineering and Science”, 2nd Edition, Pearson Education, 2016.
3.George Tchobanoglous, Frank Kreith, “Handbook of Solid Waste Management” (McGrawHill Handbooks), McGraw-Hill Education, 2ndEdition July 2017.

REFERENCES:

1. R.K. Trivedi, “Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards”, Vol. I and II, Enviro Media. 2015.
2. ErachBharucha, “Textbook of Environmental Studies”, Universities Press (I) Private Limited, Hydrabad, 2015.
3. Rajagopalan R, “Environmental Studies-From Crisis to Cure”, Oxford University Press, 2005.

CO's-PO's & PSO's MAPPING															
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**	**PS O3**
CO 1	3	1	1	1	-	-	1	-	1	1	-	1			
CO 2	3	1	1	1	-	-	1	-	1	1	-	1			
CO 3	3	1	1	1	-	-	1	-	1	1	-	1			
CO 4	3	1	1	1	-	-	1	-	1	1	-	1			
CO 5	3	1	1	1	-	-	1	-	1	1	-	1			
Correlation levels:			**1 – low**			**2 – medium**				**3 – high**			**"-"- no correlation**		

COURSE DESIGNED BY	**APPROVED BY**
Dr. P. Selvakumar Proferssor/S&H	Dr.K.Parimala Gandhi – Professor &Head/ S&H
Name and Department	**Name and Department of BoS Chairman**

SEMESTER V

THEORY OF COMPUTATION **Category : PCC**

U23IT501 **L T P C**

SDG:4 **3 1 0 4**

COURSE OBJECTIVE:

1. To understand foundations of computation including automata theory
2. To construct models of regular expressions and languages.
3. To design context free grammar and push down automata
4. To understand Turing machines and their capability
5. To understand Undecidability and NP class problems.

UNIT 1 AUTOMATA AND REGULAR EXPRESSIONS 12

Need for automata theory - Introduction to formal proof – Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Equivalence between NFA and DFA – Finite Automata with Epsilon transitions – Equivalence of NFA and DFA- Equivalence of NFAs with and without ε-moves- Conversion of NFA into DFA – Minimization of DFAs.

UNIT 2 REGULAR EXPRESSIONS AND LANGUAGES 12

Regular expression – Regular Languages- Equivalence of Finite Automata and regular expressions – Proving languages to be not regular (Pumping Lemma) – Closure properties of regular languages

UNIT 3 CONTEXT FREE GRAMMAR AND PUSH DOWN AUTOMATA 12

Types of Grammar - Chomsky‘s hierarchy of languages -Context-Free Grammar (CFG) and Languages – Derivations and Parse trees – Ambiguity in grammars and languages – Push Down Automata (PDA): Definition – Moves - Instantaneous descriptions -Languages of pushdown automata – Equivalence of pushdown automata and CFG-CFG to PDA-PDA to CFG – Deterministic Pushdown Automata

UNIT 4 NORMAL FORMS AND TURING MACHINES 12

Normal forms for CFG – Simplification of CFG- Chomsky Normal Form (CNF) and Greibach Normal
Form (GNF) – Pumping lemma for CFL – Closure properties of Context Free Languages – Turing Machine : Basic model – definition and representation – Instantaneous Description – Language acceptance by TM – TM as Computer of Integer functions – Programming techniques for Turing machines (subroutines).

UNIT 5 UNDECIDABILITY 12

Unsolvable Problems and Computable Functions –PCP-MPCP- Recursive and recursively enumerable languages – Properties - Universal Turing machine -Tractable and Intractable problems - P and NP completeness – Kruskal's algorithm – Travelling Salesman Problem- 3-CNF SAT problems

COURSE OUTCOMES:

At the end of the course, students would

CO1: Construct automata theory using Finite Automata

CO2: Write regular expressions for any pattern

CO3: Design context free grammar and Pushdown Automata

CO4: Design Turing machine for computational functions

CO5: Differentiate between decidable and undecidable problems

TOTAL:60 PERIODS

TEXT BOOKS

1. Hopcroft J.E., Motwani R. & Ullman J.D., "Introduction to Automata Theory, Languages and Computations", 3rd Edition, Pearson Education, 2008.
2. John C Martin , "Introduction to Languages and the Theory of Computation", 4th Edition, Tata McGraw Hill, 2011.

REFERENCE BOOKS

1. Allen B.Downey,"Think Stats: ExploratHarry R Lewis and Christos H Papadimitriou , "Elements of the Theory of Computation", 2nd Edition, Prentice Hall of India, 2015.
2. Peter Linz, "An Introduction to Formal Language and Automata", 6th Edition, Jones & Bartlett, 2016
3. K.L.P.Mishra and N.Chandrasekaran, "Theory of Computer Science: Automata Languages and Computation", 3rd Edition, Prentice Hall of India, 2006.

CO's-PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	2	1	-	-	-	-	-	-	1	1	1	-
CO2	3	3	3	2	2	-	-	-	1	-	-	2	3	2	-
CO3	3	3	3	3	2	-	-	-	1	-	-	2	3	3	-
CO4	3	3	3	3	2	-	-	-	1	-	-	2	3	3	-
CO5	3	2	2	2	3	2	-	-	1	-	-	2	2	3	-
Correlation levels: 1 – low 2 – medium 3 – high "-"- no correlation															

COURSE DESIGNED BY	APPROVED BY
Mrs. Franklin Doli AP/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

SEMESTER V

DISTRIBUTED COMPUTING **Category : PCC**

	L	T	P
U23IT502C			
SDG: 43	**3**	**0**	**0**

COURSE OBJECTIVE:

1. To introduce the computation and communication models of distributed systems
2. To illustrate the issues of synchronization and collection of information in distributed systems
3. To describe distributed mutual exclusion and distributed deadlock detection techniques
4. To elucidate agreement protocols and fault tolerance mechanisms in distributed systems
5. To explain the cloud computing models and the underlying concepts

UNIT 1 INTRODUCTION **9**

Introduction: Definition-Relation to Computer System Components – Motivation – Message - Passing Systems versus Shared Memory Systems – Primitives for Distributed Communication – Synchronous versus Asynchronous Executions – Design Issues and Challenges; A Model of Distributed Computations: A Distributed Program – A Model of Distributed Executions – Models of Communication Networks – Global State of a Distributed System

UNIT 2 LOGICAL TIME AND GLOBAL STATE **9**

Logical Time: Physical Clock Synchronization: NTP – A Framework for a System of Logical Clocks – Scalar Time – Vector Time; Message Ordering and Group Communication: Message Ordering Paradigms – Asynchronous Execution with Synchronous Communication – Synchronous Program Order on Asynchronous System – Group Communication – Causal Order – Total Order; Global State and Snapshot Recording Algorithms: Introduction – System Model and Definitions – Snapshot Algorithms for FIFO Channels.

UNIT 3 DISTRIBUTED MUTEX AND DEADLOCK **9**

Distributed Mutual exclusion Algorithms: Introduction – Preliminaries – Lamport's algorithm – Ricart- Agrawala's Algorithm — Token-Based Algorithms – Suzuki-Kasami's Broadcast

Algorithm; Deadlock Detection in Distributed Systems: Introduction – System Model – Preliminaries – Models of Deadlocks – Chandy-Misra-Haas Algorithm for the AND model and OR Model.

UNIT 4 CONSENSUS AND RECOVERY 9

Consensus and Agreement Algorithms: Problem Definition – Overview of Results – Agreement in a Failure-Free System(Synchronous and Asynchronous) – Agreement in Synchronous Systems with Failures; Checkpointing and Rollback Recovery: Introduction – Background and Definitions – Issues in
Failure Recovery – Checkpoint-based Recovery – Coordinated Checkpointing Algorithm
-- Algorithm for Asynchronous Checkpointing and Recovery

UNIT 5 CLOUD COMPUTING 9

Definition of Cloud Computing – Characteristics of Cloud – Cloud Deployment Models – Cloud Service Models – Driving Factors and Challenges of Cloud – Virtualization – Load Balancing – Scalability and Elasticity – Replication – Monitoring – Cloud Services and Platforms: Compute Services – Storage Services – Application Services

COURSE OUTCOMES:

At the end of the course, students would

CO1: Explain the foundations of distributed systems (K2)

CO2: Solve synchronization and state consistency problems (K3)

CO3: Use resource sharing techniques in distributed systems (K3)

CO4: Apply working model of consensus and reliability of distributed systems (K3)

CO5: Explain the fundamentals of cloud computing (K2)

TOTAL:45 PERIODS

TEXT BOOKS

1. Kshemkalyani Ajay D, Mukesh Singhal, “Distributed Computing: Principles, Algorithms and Systems”, Cambridge Press, 2011.
2. Mukesh Singhal, Niranjan G Shivaratri, “Advanced Concepts in Operating systems”, Mc- Graw Hill Publishers, 1994.

REFERENCE BOOKS

1. George Coulouris, Jean Dollimore, Time Kindberg, “Distributed Systems Concepts and Design”, Fifth Edition, Pearson Education, 2012
2. Pradeep L Sinha, “Distributed Operating Systems: Concepts and Design”, Prentice Hall of India, 2007
3. Tanenbaum A S, Van Steen M, “Distributed Systems: Principles and Paradigms”, Pearson Education, 2007.

4. Liu M L, "Distributed Computing: Principles and Applications", Pearson Education, 2004.
5. Nancy A Lynch, "Distributed Algorithms", Morgan Kaufman Publishers, 2003.
6. Arshdeep Bagga, Vijay Madisetti, " Cloud Computing: A Hands-On Approach", Universities Press, 2014

CO's-PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	2	1	-	-	-	-	-	-	1	1	1	-
CO2	3	3	3	2	2	-	-	-	1	-	-	2	3	2	-
CO3	3	3	3	3	2	-	-	-	1	-	-	2	3	3	-
CO4	3	3	3	3	2	-	-	-	1	-	-	2	3	3	-
CO5	3	2	2	2	3	2	-	-	1	-	-	2	2	3	-

Correlation levels: 1 – low 2 – medium 3 – high "-"- no correlation

COURSE DESIGNED BY	APPROVED BY
P. Jason AP/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

SEMESTER V

U23IT503		**Category : PCC**
SDG: 4	**EMBEDDED SYSTEMS AND IOT**	**L T P** **3 0 2**

COURSE OBJECTIVE:

1 To learn the internal architecture and programming of an embedded processor.
2 To introduce interfacing I/O devices to the processor.
3 To introduce the evolution of the Internet of Things (IoT).
4 To build a small low-cost embedded and IoT system using Arduino/Raspberry Pi/ open platfor
5 To apply the concept of Internet of Things in real world scenario. 5

8-BIT EMBEDDED PROCESSOR

UNIT 1 **6**

8-Bit Microcontroller – Architecture – Instruction Set and Programming – Programming Parallel Ports – Timers and Serial Port – Interrupt Handling.

EMBEEDEDN 'C' PROGRAMMING

6

UNIT 2

Memory And I/O Devices Interfacing – Programming Embedded Systems in C – Need For RTOS – Multiple Tasks and Processes – Context Switching – Priority Based Scheduling Policies

UNIT 3 **IOT AND ARDUINO PROGRAMMING** **6**

Introduction to the Concept of IoT Devices – IoT Devices Versus Computers – IoT Configurations – Basic Components – Introduction to Arduino – Types of Arduino – Arduino Toolchain – Arduino Programming Structure – Sketches – Pins – Input/Output From Pins Using Sketches – Introduction to Arduino Shields – Integration of Sensors and Actuators with Arduino

UNIT 4 **IOT COMMUNICATION AND OPEN PLATFORMS** 6

IoT Communication Models and APIs – IoT Communication Protocols – Bluetooth – WiFi – ZigBee – GPS – GSM modules – Open Platform (like Raspberry Pi) – Architecture –
Programming – Interfacing – Accessing GPIO Pins – Sending and Receiving Signals Using GPIO Pins – Connecting to the Cloud

UNIT 5 **APPLICATIONS DEVELOPMENT** **6**

Complete Design of Embedded Systems – Development of IoT Applications – Home Automation – Smart Agriculture – Smart Cities – Smart Healthcare.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Explain the architecture of embedded processors.
CO2: Write embedded C programs.
CO3: Design simple embedded applications.
CO4: Compare the communication models in IOT
CO5: Design IoT applications using Arduino/Raspberry Pi /open platform.

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO	**LIST OF EXPERIMENTS**
1	Write 8051 Assembly Language experiments using simulator.
2	Test data transfer between registers and memory.
3	Perform ALU operations.
4	Write Basic and arithmetic Programs Using Embedded C.
5	Introduction to Arduino platform and programming
6	Explore different communication methods with IoT devices (Zigbee, GSM, Bluetooth)
7	Introduction to Raspberry PI platform and python programming
8	Interfacing sensors with Raspberry PI
9	Communicate between Arduino and Raspberry PI using any wireless medium
10	Setup a cloud platform to log the data
11	Log Data using Raspberry PI and upload to the cloud platform

TOTAL:30 PERIODS

TEXT BOOKS

1. Robert Barton, Patrick Grossetete, David Hanes, Jerome Henry, Gonzalo Salgueiro, “IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things.
2. Muhammed Ali Mazidi, Janice Gillispie Mazidi, Rolin D.McKinlay, “The 8051 Microcontroller and Embedded Systems”, Pearson Education, Second Edition, 2014

REFERENCE BOOKS

1. Michael J. Pont, “Embedded C”, Pearson Education, 2007.
2. Wayne Wolf, “Computers as Components: Principles of Embedded Computer System Design”,

Elsevier, 2006.
3. Andrew N Sloss, D. Symes, C. Wright, "Arm System Developer's Guide", Morgan Kauffman/ Elsevier, 2006.
4. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, 2015

CO-PO MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	3	3	3	-	-	-	-	1	2	3	3	2	1	3
2	2	1	3	2	2	-	-	-	1	2	2	3	3	1	3
3	3	1	3	3	1	-	-	-	1	2	1	1	1	3	3
4	3	2	3	2	1	-	-	-	1	2	2	3	2	2	1
5	2	3	3	2	2	-	-	-	1	3	3	2	3	1	3

Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation

COURSE DESIGNED BY	**APPROVED BY**
Mrs. N. Tamilarasi AP/S&H	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

SEMESTER V

Category : PCC

		L	T	P	C
U23IT504	**OBJECT ORIENTED SOFTWARE ENGINEERING**	**3**	**0**	**2**	**4**

COURSE OBJECTIVE:

1. To understand Software Engineering Lifecycle Models
2. To Perform software requirements analysis
3. To gain knowledge of the System Analysis and Design concepts using UML.
4. To understand software testing and maintenance approaches
5. To work on project management scheduling using DevOps

SOFTWARE PROCESS AND AGILE DEVELOPMENT

UNIT 1 **6**

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models –Introduction to Agility-Agile process-Extreme programming-XP Process-Case Study.

REQUIREMENTS ANALYSIS AND SPECIFICATION

UNIT 2 **6**

Requirement analysis and specification – Requirements gathering and analysis – Software Requirement Specification – Formal system specification – Finite State Machines – Petrinets – 101 Object modelling using UML – Use case Model – Class diagrams – Interaction diagrams – Activity diagrams – State chart diagrams – Functional modelling – Data Flow Diagram- CASE TOOLS.

UNIT 3 **SOFTWARE DESIGN** **6**

Software design – Software design – Design process – Design concepts – Coupling – Cohesion – Functional independence – Design patterns – Model-view-controller – Publish-subscribe – Adapter – Command – Strategy – Observer – Proxy – Facade – Architectural styles – Layered - Client Server - Tiered - Pipe and filter- User interface design-Case Study

UNIT 4 **SOFTWARE TESTING AND MAINTENANCE** **6**

Testing – Unit testing – Black box testing– White box testing – Integration and System testing– Regression testing – Debugging - Program analysis – Symbolic execution – Model Checking Case Study

UNIT 5 **PROJECT MANAGEMENT** **6**

Software Project Management- Software Configuration Management - Project Scheduling- DevOps: Motivation-Cloud as a platform-Operations- Deployment Pipeline:Overall Architecture Building and Testing-Deployment- Tools- Case Study

COURSE OUTCOMES:

At the end of the course, students would

CO1: Compare various Software Development Lifecycle Models

CO2: Evaluate project management approaches as well as cost and schedule estimation strategies.

CO3: Perform formal analysis on specifications.

CO4: Use UML diagrams for analysis and design.

CO5: Architect and design using architectural styles and design patterns, and test the system

TOTAL:60 PERIODS

PRACTICAL EXERCISES:

S.NO	LIST OF EXPERIMENTS
1	Identify a software system that needs to be developed.
2	Document the Software Requirements Specification (SRS) for the identified system.
3	Identify use cases and develop the Use Case model.
4	Identify the conceptual classes and develop a Domain Model and also derive a Class Diagram from that.
5	Using the identified scenarios, find the interaction between objects and represent them using UML Sequence and Collaboration Diagrams
6	Draw relevant State Chart and Activity Diagrams for the same system.
7	Implement the system as per the detailed design
8	Test the software system for all the scenarios identified as per the usecase diagram
9	Improve the reusability and maintainability of the software system by applying appropriate design patterns.
10	Implement the modified system and test it for various scenarios.

TEXT BOOKS

1. Bernd Bruegge and Allen H. Dutoit, “Object-Oriented Software Engineering: Using UML, Patterns and Java”, Third Edition, Pearson Education, 2009.
2. Roger S. Pressman, Object-Oriented Software Engineering: An Agile Unified Methodology, First Edition, Mc Graw-Hill International Edition, 2014.

REFERENCE BOOKS

1. Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, Fundamentals of Software Engineering, 2nd edition, PHI Learning Pvt. Ltd., 2010.
2. Craig Larman, Applying UML and Patterns, 3rd ed, Pearson Education, 2005.

3. Len Bass, Ingo Weber and Liming Zhu, ―DevOps: A Software Architect‘s Perspective‖, Pearson Education, 2016
4. Rajib Mall, Fundamentals of Software Engineering, 3rd edition, PHI Learning Pvt. Ltd., 2009.
5. Stephen Schach, Object-Oriented and Classical Software Engineering, 8th ed, McGraw Hill, 2010.

CO-PO MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	3	2	2	2	-	-	-	-	1	1	2	3	2	1
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3	3	3	2	2	2	-	-	-	2	2	3	2	2	2	1
4	2	3	2	2	3	-	-	-	2	2	3	2	3	3	1
5	2	3	1	2	2	-	-	-	2	2	2	2	3	3	1
Correlation levels:1 –low 2 – medium 3 – high “-“-no correlation															

COURSE DESIGNED BY	**APPROVED BY**
Dr. P. Shanthakumar Professor/Head/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

SEMESTER V

U23EE517	**Campus to Corporate- I**	**Category:EEC**
SDG: 4	**(Common to all Branches)**	**L T P C**
		0 0 3 1

COURSE OBJECTIVE:

1. To orient students to the course structure, clarify learning expectations, and reinforce the importance of aptitude skills in the placement process through a quick recap of concepts and practice from previous placement papers.
2. To develop students' verbal communication proficiency through speech crafting, role-play exercises, and structured presentation practice, enabling them to communicate ideas confidently and effectively in academic and professional contexts.
3. To enhance students' understanding of current industry trends, expectations, and hiring practices, and to equip them with a structured resume inventory that reflects their skills, qualifications, and achievements accurately.
4. To strengthen students' analytical and visual reasoning skills by practicing figure series, figure matrices, analogies, mirror and water images, counting figures, and embedded figures, preparing them for aptitude and competitive assessments.
5. To improve grammatical accuracy and fluency in English through targeted practice in tenses for daily conversation, sentence correction (focusing on tenses and subject–verb agreement), and correct usage of articles, thereby enhancing overall language competence for interviews and workplace communication.

UNIT 1 Introduction **4**

Course Introduction: Introduction about the Course - Learning expectations - Recap of Aptitude (Placement Papers)

UNIT 2 Speaking Skills -Novice **12**

Speaking Skills –Vantage: Speech Craft – Role Play - Presentation Skills

UNIT 3 Placement Readiness II **2**

Industry Awareness - Resume Inventory

UNIT 4 Non-Verbal Reasoning **6**

Figure series, Figure Matrix, Figure Analogy, Mirror and Water Image, Counting Figures – Embedded Figures

UNIT 5 Language Gym – English Proficiency **6**

Tenses for daily conversation, Sentence Correction (Tenses & SV Agreement) – Articles

COURSE OUTCOMES:

Upon completion of this course,

CO1: Students will be able to participate in any learning activity without any reservations. They shall be ready to move beyond their comfort zone to acquire new skills throughout their life.

CO2: Explain the expectations, and the role of aptitude in the placement process .

CO3: Analyse current industry trends and prepare a comprehensive resume that aligns with employer expectations.

CO4: They shall prepare themselves to kick start their career by taking a stock of their existing skills and plan to acquire new skills required to achieve their goals **.**

CO5: Solve non-verbal reasoning problems including figure series, matrices, analogies, mirror/water images, counting, and embedded figures with accuracy and speed.

TOTAL: 30 PERIODS

TEXT BOOKS:

1. The Pearson Guide to Quantitative Aptitude for Competitive Examinations, Dinesh Khattar. Pearson
2. Quantitative Aptitude Dr. R.S. Aggarwal S. Chand Publication
3. A modern Approach to Verbal and Non-Verbal Reasoning R.S. Aggarwal
4. A Modern Approach to Verbal & Non-Verbal Reasoning - Aggarwal R. S

REFERENCES:

1. Quantitative Aptitude for CAT, Arun Sharma
2. Fast Track Objective Arithmetic, Rajesh Verma, Arihant Publication
3. Quantitative Aptitude Quantum CAT Common Admission Tests for Admission into IIMs,Sarvesh K. Verma
4. Wiley's Exam Xpert Quantitative Ability for CAT, 2ed, Ashu Jain

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	-	-	-	-	-	-	1	-	3	-	-	-	-	-
2	1	-	-	-	-	-	-	1	-	3	-	-	-	-	-
3	1	-	-	-	-	-	-	1	-	3	-	-	-	-	-
4	1	-	-	-	-	-	-	1	-	3	-	-	-	-	-
5	3	-	-	-	-	-	-	1	1	-	-	-	-	-	-
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
Ramesh Raja M	
Name and Department	**Name and Department of BoS Chairman**

SEMESTER V

UC2301 ENTREPRENEURSHIP DEVELOPMENT L T P C
2 0 2 3

COURSE OBJECTIVES:

1. Learn basic concepts in entrepreneurship, develop mind-set and skills necessary to explore entrepreneurship
2. Apply process of problem - opportunity identification and validation through human centred approach to design thinking in building solutions as part of engineering projects
3. Analyse market types, conduct market estimation, identify customers, create customer persona, develop the skills to create a compelling value proposition and build a Minimum Viable Product

4. Explore business models, create business plan, conduct financial analysis and feasibility analysis to assess the financial viability of a venture ideas & solutions built with domain expertise
5. Prepare and present an investible pitch deck of their practice venture to attract stakeholders

MODULE – I: ENTREPRENEURIAL MINDSET **4L,8P**

Introduction to Entrepreneurship: Definition – Types of Entrepreneurs – Emerging Economics – Developing and Understanding an Entrepreneurial Mindset – Importance of Technology Entrepreneurship – Benefits to the Society. Case Analysis: Study cases of successful & failed engineering entrepreneurs - Foster Creative Thinking: Engage in a series of Problem-Identification and Problem-Solving tasks

MODULE – II: OPPORTUNITIES **4L,8P**

Problems and Opportunities – Ideas and Opportunities – Identifying problems in society – Creation of opportunities – Exploring Market Types – Estimating the Market Size, - Knowing the Customer and Consumer - Customer Segmentation - Identifying niche markets – Customer discovery and validation; Market research techniques, tools for validation of ideas and opportunities Activity Session: Identify emerging sectors / potential opportunities in existing markets - Customer Interviews: Conduct preliminary interviews with potential customers for Opportunity Validation - Analyse feedback to refine the opportunity.

MODULE – III: PROTOTYPING & ITERATION **4L,8P**

Prototyping – Importance in entrepreneurial process – Types of Prototypes - Different methods – Tools & Techniques. Hands-on sessions on prototyping tools (3D printing, electronics, software), Develop a prototype based on identified opportunities; Receive feedback and iterate on the prototypes.

MODULE – IV: BUSINESS MODELS & PITCHING **4L,8P**

Business Model and Types - Lean Approach - 9 block Lean Canvas Model - Riskiest assumptions to Business Models – Using Business Model Canvas as a Tool – Pitching Techniques: Importance of pitching - Types of pitches - crafting a compelling pitch – pitch presentation skills - using storytelling to gain investor/customer attention. Activity Session: Develop a business model canvas for the prototype; present and receive feedback from peers and mentors - Prepare and practice pitching the business ideas- Participate in a Pitching Competition and present to a panel of judges - receive & reflect feedback

MODULE – V: ENTREPRENEURIAL ECOSYSTEM **4L,8P**

Understanding the Entrepreneurial Ecosystem – Components: Angels, Venture Capitalists, Maker Spaces, Incubators, Accelerators, Investors. Financing models – equity, debt, crowdfunding, etc, Support from the government and corporates. Navigating Ecosystem Support: Searching & Identifying the Right Ecosystem Partner – Leveraging the Ecosystem - Building the right stakeholder network Activity Session: Arrangement of Guest Speaker Sessions by successful entrepreneurs and entrepreneurial ecosystem leaders (incubation managers; angels; etc), Visit one or two entrepreneurial ecosystem players (Travel and visit a research park or incubator or makerspace or interact with startup founders).

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1: Develop an Entrepreneurial Mind-set and Understand the Entrepreneurial Ecosystem Components and Funding types

CO2: Comprehend the process of opportunity identification through design thinking, identify market potential and customers

CO3: Generate and develop creative ideas through ideation techniques

CO4: Create prototypes to materialize design concepts and conduct testing to gather feedback and refine prototypes to build a validated MVP

CO5: Analyse and refine business models to ensure sustainability and profitability Prepare and deliver an investible pitch deck of their practice venture to attract stakeholders

REFERENCES:

1. Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, Sabyasachi Sinha (2020). Entrepreneurship, McGrawHill, 11th Edition

2.Ries, E. (2011). The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. Crown Business

3. Blank, S. G., & Dorf, B. (2012). The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company. K&S Ranch

4. Roy, R. (2017). Indian Entrepreneurship: Theory and Practice. New Delhi: Oxford University Press

5. Osterwalder, A., & Pigneur, Y. (2010). Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers. John Wiley & Sons

SEMESTER VI

Category: PCC

		L	T	P	C
U23IT401	**AI FUNDAMENTALS AND MACHINE LEARNING**	**3**	**0**	**0**	**3**

COURSE OBJECTIVE:

1. To learn about uninformed and Heuristic search techniques
2. To learn techniques for reasoning under uncertainty
3. To enable students to understand different techniques related to Machine Learning
4. To Study about unsupervised learning algorithms
5. To familiarize the reinforcement learning and neural networks

UNIT 1 **PROBLEM SOLVING** **9**

Introduction to AI - AI Applications - Problem solving agents – search algorithms – uninformed search strategies – Heuristic search strategies – Local search and optimization problems – adversarial search – constraint satisfaction problems (CSP)

UNIT 2 **PROBABILISTIC REASONING** **9**

Acting under uncertainty – Bayesian inference – naïve bayes models. Probabilistic reasoning – Bayesian networks – exact inference in BN – approximate inference in BN – causal networks.

UNIT 3 **SUPERVISED LEARNING** **9**

Supervised Learning: **Regression-Linear - Support vector regression - Decision Tree. Random Forest-**
Classification - Logistic - Support vector classification – KNN - naïve bayes

UNSUPERVISED LEARNING

UNIT 4 **9**

Clustering basics (Partitioned, Hierarchical and Density based) - K-Means clustering – K-Mode clustering – Self organizing maps – Expectation maximization – Principal Component Analysis **ENSEMBLE**

ENSEMBLE LEARNING AND NEURAL NETWORKS

UNIT 5 **9**

Bagging and Boosting (Random forests, Ada boost, XG boost inclusive) -
Neural Networks - Training a Perceptron - Learning Boolean Functions - Multilayer Perceptrons - Back propagation Algorithm - Training Procedures - Tuning the Network Size - Radial Basis Functions

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Upon completion of this course, student will be able to:

CO1:	Use appropriate search algorithms for problem solving	[U]
CO2:	Understand the reasoning under uncertainty	[U]
CO3:	To analyze the principles, advantages, limitations and possible applications of machine learning	[AN]
CO4:	Solve problems using unsupervised learning	[A]
CO5:	Apply the concepts of reinforcement learning and other types of machine learning algorithms	[A]

TEXT BOOKS:

1. Stuart Russell and Peter Norvig, “Artificial Intelligence – A Modern Approach”, Fourth Edition, Pearson Education, 2021.
2. EthemAlpaydin, “Introduction to Machine Learning”, MIT Press, Fourth Edition, 2020.

3. Hui Jiang, “Machine Learning Fundamentals”, Cambridge University Press, 2021

REFERENCES:

1. Dan W. Patterson, “Introduction to Artificial Intelligence and Expert Systems”, Pearson Education,2007
2. Kevin Night, Elaine Rich, and Nair B., “Artificial Intelligence”, McGraw Hill, 2008
3. Patrick H. Winston, "Artificial Intelligence", Third Edition, Pearson Education, 2006
4. Deepak Khemani, “Artificial Intelligence”, Tata McGraw Hill Education, 2013
(http://nptel.ac.in/)
5. Charu C. Aggarwal, “Data Classification Algorithms and Applications”, CRC Press, 2014
6. MehryarMohri, AfshinRostamizadeh, Ameet Talwalkar, “Foundations of Machine Learning”, MIT Press, 2012.

CO – PO MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2	3	3	-	-	-	-	1	3	3	3	1	2	2
2	1	1	1	3	1	-	-	-	1	2	1	3	2	3	2
3	2	1	2	1	1	-	-	-	2	1	1	3	1	1	1
4	3	1	3	1	-	-	-	-	2	1	2	1	2	2	2
5	3	1	1	2	2	-	-		3	1	2	3	2	1	2

COURSE DESIGNED BY	APPROVED BY
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Name and Department	Name and Department of BoS Chairman

SEMESTER VI

Category : PCC

U23IT602 **L T P C**

SDG: 4 **CRYPTOGRAPHY AND NETWORK SECURITY** **3 0 2 4**

COURSE OBJECTIVE:

1. To learn the fundamentals of cryptography
2. To learn the key management techniques and authentication approaches
3. To explore the network and transport layer security techniques.
4. To understand the application layer security standards.
5. To learn the real time security practices.

UNIT 1 INTRODUCTION 6

Basics of cryptography, conventional and public-key cryptography, hash functions, authentication, and digital signatures.

UNIT 2 KEY MANAGEMENT AND AUTHENTICATION 6

Symmetric Key Distribution – Public Key Distribution – X.509 Certificates – Public-Key Infrastructure (PKI) – Authentication using Symmetric Encryption - Authentication using Asymmetric Encryption.

UNIT 3 ACCESS CONTROL AND SECURITY 6

Network Access Control, Extensible Authentication Protocol, IEEE 802.1X Port-Based Network Access Control - IP Security - Internet Key Exchange (IKE), Transport Layer Security, HTTPS standard, Secure Shell (SSH) application.

UNIT 4 APPLICATION LAYER SECURITY 6

Electronic Mail Security: S/MIME, DomainKeys Identified Mail. Wireless Network Security: Mobile Device Security

UNIT 5 SECURITY PRACTICES 6

Firewalls and Intusion Detection Systems: Intrusion Detection Password Management, Firewall Characteristics Types of Firewalls, Firewall Configurations.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Comprehensively explain the analysis phases of compiler and develop scanners and parsers.
CO2: Manage type checking for a given language specification
CO3: Generate the intermediate representation of programs
CO4: Produce the target machine code using the runtime environment
CO5: Transform given code into an optimized code by applying various optimization techniques

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO LIST OF EXPERIMENTS

1. Implement symmetric key algorithms
2. Implement asymmetric key algorithms and key exchange algorithms
3. Implement digital signature schemes
4. Check message integrity and confidentiality using SSL
5. Explore network monitoring tools
6. Study to configure Firewall, VPN

TOTAL:30 PERIODS

TEXT BOOKS

1. Cryptography and Network Security: Principles and Practice; 8th edition, William Stallings, 9 April 2024, Pearson, ISBN 13: 978-9357054911.

REFERENCE BOOKS

1. Network Security: Private Communications in a Public World, M. Speciner, R. Perlman, C. Kaufman, Prentice Hall, 2002.
2. Linux iptables Pocket Reference, Gregor N. Purdy, O'Reilly, 2004, ISBN-13: 978- 0596005696.
3. Linux Firewalls, by Michael Rash, No Starch Press, October 2007, ISBN: 978-1-59327- 141-1.
4. Network Security, Firewalls And VPNs, J. Michael Stewart, Jones & Bartlett Learning, 2013, ISBN10: 1284031675, ISBN-13: 978-1284031676.
5. The Network Security Test Lab: A Step-By-Step Guide, Michael Gregg, Dreamtech Press, 2015, ISBN-10:8126558148, ISBN-13: 978-8126558148.

CO-PO MAPPING

CO	PO												PSO		
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1	3	3	2	2	2	-	-	-	2	1	2	1	2	3	1
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4	2	2	3	2	3	-	-	-	3	3	2	1	2	1	3
5	2	1	3	2	2	-	-	-	2	1	1	3	2	1	1
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
Mr. K.Nagaraj AP/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

SEMESTER VI

Category: PCC

U23IT611

		L	T	P	C
	COMPILER DESIGN				
SDG:4	**LABORITORY**	**0**	**0**	**4**	**2**

COURSE OBJECTIVE:

1. To learn the fundamental phases and structure of a compiler
2. To understand lexical, syntax, and semantic analysis techniques
3. To study type checking and symbol table management
4. To explore intermediate and target code generation strategies
5. To learn basic code optimization techniques

LIST OFEXPERIMENTS

1. Programs using LEX for tokenization.
2. Programs using YACC for parsing.
3. Implementation of error recovery procedures using LEX.
4. Programs for validating C–like constructs using YACC.
5. Implementation of Symbol Table for a programming language like C.
6. Simple Type Checking System for basic data types in a programming languages like C.
7. Implementation of three–address code generation for arithmetic expressions.
8. Three–address code generation for Switch–case statements.
9. Implementation of Register allocation using Graph Coloring.
10. Implementation of peephole optimization to the generated code.

COURSE OUTCOMES:	
Upon completion of this course, student will be able to:	
CO1:	Comprehensively explain the analysis phases of compiler and develop scanners and parsers.
CO2:	Manage type checking for a given language specification
CO3:	Generate the intermediate representation of programs
CO4:	Produce the target machine code using the runtime environment
CO5:	Transform given code into an optimized code by applying various optimization techniques

TOTAL: 60 PERIODS

CO	PO												PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	2	1	1		2	-	-	-	-	1	-	-	3	-	2
2	2	1	1	1	2	-	-	-	-	1	-	-	3	-	2
3	2	1	1	1	2	-	-	-	-	1	-	-	3	-	2
4	2	1	1	1	2	-	-	-	-	1	-	-	3	-	2
5	2	1	1	1	2	-	-	-	-	1	-	-	3	-	2
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	**APPROVED BY**
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SEMESTER VII

Category : HSMC

U23HS701 **L T P C**

SDG: 4 **HUMAN RESOURCE MANAGEMENT** **3 0 0 3**

COURSE OBJECTIVE:

- To provide knowledge about management issues related to staffing,
- To provide knowledge about management issues related to training,
- To provide knowledge about management issues related to performance
- To provide knowledge about management issues related to compensation
- To provide knowledge about management issues related to human factors consideration and compliance with human resource requirements.

UNIT 1 **INTRODUCTION TO HUMAN RESOURCE MANAGEMENT** **9**

The importance of human resources – Objective of Human Resource Management - Human resource policies - Role of human resource manager.

UNIT 2 **HUMAN RESOURCE PLANNING** 9

Importance of Human Resource Planning – Internal and External sources of Human Resources Recruitment - Selection – Socialization

UNIT 3 **TRAINING AND EXECUTIVE DEVELOPMENT** **9**

Types of training and Executive development methods – purpose – benefits.

UNIT 4 EMPLOYEE COMPENSATION **9**

Compensation plan – Reward – Motivation – Career Development - Mentor – Protege relationships.

UNIT 5 **PERFORMANCE EVALUATION AND CONTROL** **9**

Performance evaluation – Feedback - The control process – Importance – Methods – grievances – Causes – Redressal methods.

COURSE OUTCOMES:

At the end of the course, students would

CO1:	Students would have gained knowledge on the various aspects of HRM
CO2:	Students will gain knowledge needed for success as a human resources professional.
CO3:	Students will develop the skills needed for a successful HR manager.
CO4:	Students would be prepared to implement the concepts learned in the workplace.
CO5:	Students would be aware of the emerging concepts in the field of HRM

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO LIST OF EXPERIMENTS

1. Implement symmetric key algorithms
2. Implement asymmetric key algorithms and key exchange algorithms
3. Implement digital signature schemes
4. Check message integrity and confidentiality using SSL
5. Explore network monitoring tools
6. Study to configure Firewall, VPN

TOTAL:30 PERIODS

TEXT BOOKS

1. Decenzo and Robbins, "Human Resource Management", 8th Edition, Wiley, 2007.
2. John Bernardin. H., "Human Resource Management – An Experimental Approach", 5th Edition, Tata McGraw Hill, 2013, New Delhi.

REFERENCE BOOKS

1. Luis R,. Gomez-Mejia, DavidB. Balkin and Robert L. Cardy, "Managing Human Resources", 7th Edition, PHI, 2012.
2. Dessler, "Human Resource Management", Pearson Education Limited, 2007.

CO-PO MAPPING

CO	PO												PSO		
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4	3	3	2	3	3	2	2	2	2	1	1	1	1	1	1
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Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
Mr. K.Nagaraj AP/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

PROFESSONAL ELECVTIVE 1

U23ITP11 **Category : PE**

		L	T	P	C
SDG: 4	**BIG DATA ANALYTICS**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

1 To understand big data.
2 To learn and use NoSQL big data management.
3 To learn mapreduce analytics using Hadoop and related tools.
4 To work with map reduce applications
5 To understand the usage of Hadoop related tools for Big Data Analytics

UNIT 1 UNDERSTANDING BIG DATA 6

Introduction to big data – convergence of key trends – unstructured data – industry examples of big data – web analytics – big data applications– 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 2 NOSQL DATA MANAGEMENT 6

Introduction to NoSQL – aggregate data models – key-value and document data models – relationships – graph databases – schemaless databases – materialized views – distribution models – master-slave replication – consistency - Cassandra – Cassandra data model – Cassandra examples – Cassandra clients

UNIT 3 MAP REDUCE APPLICATIONS 6

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 and sort – task execution – MapReduce types – input formats – output formats.

UNIT 4 BASICS OF HADOOP 6

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 - Cassandra – Hadoop integration.

UNIT 5 **HADOOP RELATED TOOLS** **6**

Hbase – data model and implementations – Hbase clients – Hbase examples – praxis. 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.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Describe big data and use cases from selected business domains.
CO2: Explain NoSQL big data management.
CO3: Install, configure, and run Hadoop and HDFS.
CO4: Perform map-reduce analytics using Hadoop.
CO5: Use Hadoop-related tools such as HBase, Cassandra, Pig, and Hive for big data

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO	**LIST OF EXPERIMENTS**
1	Downloading and installing Hadoop; Understanding different Hadoop modes. Startup scripts, Configuration files.
2	Hadoop Implementation of file management tasks, such as Adding files and directories, retrieving files and Deleting files
3	Implement of Matrix Multiplication with Hadoop Map Reduce
4	Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.
5	Installation of Hive along with practice examples.
6	Installation of HBase, Installing thrift along with Practice examples
7	Practice importing and exporting data from various databases.

TOTAL:30 PERIODS

TEXT BOOKS

1. Michael Minelli, Michelle Chambers, and AmbigaDhiraj, "Big Data, Big Analytics: Emerging
Business
Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
2. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.
3. Sadalage, Pramod J. “NoSQL distilled”, 2013

REFERENCE BOOKS

1. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.
2. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.
3. Eben Hewitt, "Cassandra: The Definitive Guide", O'Reilley, 2010.
4. Alan Gates, "Programming Pig", O'Reilley, 2011.

CO-PO MAPPING

CO	PO												PSO		
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5	3	3	3	3	3	-	-	-	3	1	3	2	3	2	3
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
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Name and Department	**Name and Department of BoS Chairman**

PROFESSONAL ELECVTIVE 1

Category : PE

		L	T	P	C
U23ITP12					
SDG: 4	**BUSINESS ANALYTICS**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

1 To understand the Analytics Life Cycle.
2 To comprehend the process of acquiring Business Intelligence
3 To understand various types of analytics for Business Forecasting
4 To model the supply chain management for Analytics.
5 To apply analytics for different functions of a business

UNIT 1 INTRODUCTION TO BUSINESS ANALYTICS 6

Analytics and Data Science – Analytics Life Cycle – Types of Analytics – Business Problem Definition –
Data Collection – Data Preparation – Hypothesis Generation – Modeling – Validation and Evaluation – Interpretation – Deployment and Iteration

UNIT 2 BUSINESS INTELLIGENCE 6

Data Warehouses and Data Mart - Knowledge Management –Types of Decisions - Decision Making Process - Decision Support Systems – Business Intelligence –OLAP – Analytic functions

UNIT 3 BUSINESS FORECASTING 6

Introduction to Business Forecasting and Predictive analytics - Logic and Data Driven Models – Data Mining and Predictive Analysis Modelling –Machine Learning for Predictive analytics

UNIT 4 HR & SUPPLY CHAIN ANALYTICS 6

Human Resources – Planning and Recruitment – Training and Development - Supply chain network - Planning Demand, Inventory and Supply – Logistics – Analytics applications in HR & Supply Chain - Applying HR Analytics to make a prediction of the demand for hourly employees for a year.

UNIT 5 MARKETING & SALES ANALYTICS 6

Marketing Strategy, Marketing Mix, Customer Behaviour –selling Process – Sales Planning – Analytics applications in Marketing and Sales - predictive analytics for customers' behaviour in marketing and sales.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Explain the real world business problems and model with analytical solutions.
CO2: Identify the business processes for extracting Business Intelligence
CO3: Apply predictive analytics for business fore-casting
CO4: Apply analytics for supply chain and logistics management
CO5: Use analytics for marketing and sales.

TOTAL:60 PERIODS

PRACTICAL EXERCISES:

S.NO LIST OF EXPERIMENTS

Use MS-Excel and Power-BI to perform the following experiments using a Business data set, and make presentations. Students may be encouraged to bring their own real-time socially relevant data set.**I Cycle – MS Excel**

1 Explore the features of Ms-Excel.

2 (i) Get the input from user and perform numerical operations (MAX, MIN, AVG, SUM, SQRT, ROUND)

(ii) Perform data import/export operations for different file formats

3 Perform statistical operations - Mean, Median, Mode and Standard deviation, Variance, Skewness, Kurtosis

4 Perform Z-test, T-test & ANOVA

5 Perform data pre-processing operations i) Handling Missing data ii) Normalization 6 Perform dimensionality reduction operation using PCA, KPCA & SVD 7 Perform bivariate and multivariate analysis on the dataset.

8 Apply and explore various plotting functions on the data set.

II Cycle – Power BI Desktop

9 Explore the features of Power BI Desktop

10 Prepare & Load data

11 Develop the data model

12 Perform DAX calculations

13 Design a report

14 Create a dashboard and perform data analysis

15 Presentation of a case study

TEXT BOOKS

1. R. Evans James, Business Analytics, 2nd Edition, Pearson, 2017
2. R N Prasad, Seema Acharya, Fundamentals of Business Analytics, 2nd Edition, Wiley, 2016 3. Philip Kotler and Kevin Keller, Marketing Management, 15th edition, PHI, 2016

4. VSP RAO, Human Resource Management, 3rd Edition, Excel Books, 2010.
5. Mahadevan B, "Operations Management -Theory and Practice",3rd Edition, Pearson Education,2018.

CO-PO MAPPING

CO	PO												PSO		
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Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	**APPROVED BY**
Dr. P. Shanthakumar Professor/Head/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

PROFESSONAL ELECVTIVE 1

U23ITP13 **Category : PE**

		L	T	P	C
SDG: 4	**COMPUTER VISION**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

1 To understand the fundamental concepts related to Image formation and processing.
2 To learn feature detection, matching and detection
3 To become familiar with feature based alignment and motion estimation
4 To develop skills on 3D reconstruction
To understand image based rendering and recognition 5

UNIT 1 **INTRODUCTION TO IMAGE FORMATION AND PROCESSING** **6**

Computer Vision - Geometric primitives and transformations - Photometric image formation - The digital camera - Point operators - Linear filtering - More neighborhood operators - Fourier transforms - Pyramids and wavelets - Geometric transformations - Global optimization.

UNIT 2 **FEATURE DETECTION, MATCHING AND SEGMENTATION** **6**

Points and patches - Edges - Lines - Segmentation - Active contours - Split and merge - Mean shift and mode finding - Normalized cuts - Graph cuts and energy-based methods.

UNIT 3 **FEATURE-BASED ALIGNMENT & MOTION ESTIMATION** **6**

2D and 3D feature-based alignment - Pose estimation - Geometric intrinsic calibration - Triangulation - Two-frame structure from motion - Factorization - Bundle adjustment - Constrained structure and motion - Translational alignment - Parametric motion - Spline-based motion - Optical flow - Layered motion.Oss

UNIT 4 **3D RECONSTRUCTION** **6**

Shape from X - Active rangefinding - Surface representations - Point-based representations- Volumetric representations - Model-based reconstruction - Recovering texture maps and albedosos

UNIT 5 **IMAGE-BASED RENDERING AND RECOGNITION** **6**

View interpolation Layered depth images - Light fields and Lumigraphs - Environment mattes - Videobased rendering-Object detection - Face recognition - Instance recognition - Category recognition - Context and scene understanding- Recognition databases and test sets.

COURSE OUTCOMES:

At the end of the course, students would

CO1: To understand basic knowledge, theories and methods in image processing and computer visio

CO2: To implement basic and some advanced image processing techniques in OpenCV.

CO3: To apply 2D a feature-based based image alignment, segmentation and motion estimations.

CO4: To apply 3D image reconstruction techniques

CO5: To design and develop innovative image processing and computer vision applications

TOTAL:60 PERIODS

PRACTICAL EXERCISES:

S.NO	LIST OF EXPERIMENTS
1	OpenCV Installation and working with Python
2	Basic Image Processing - loading images, Cropping, Resizing, Thresholding, Contour analysis, Bolb detection
3	Image Annotation – Drawing lines, text circle, rectangle, ellipse on images
4	Image Enhancement - Understanding Color spaces, color space conversion, Histogram equialization, Convolution, Image smoothing, Gradients, Edge Detection
5	Image Features and Image Alignment – Image transforms – Fourier, Hough, Extract ORB Image features, Feature matching, cloning, Feature matching based image alignment
6	Image segmentation using Graphcut / Grabcut
7	Camera Calibration with circular grid
8	Pose Estimation
9	3D Reconstruction – Creating Depth map from stereo images
10	Object Detection and Tracking using Kalman Filter, Camshift

TEXT BOOKS

1. Richard Szeliski, “Computer Vision: Algorithms and Applications”, Springer- Texts in Computer Science, Second Edition, 2022.
2. Computer Vision: A Modern Approach, D. A. Forsyth, J. Ponce, Pearson Education, Second Edition, 2015.

REFERENCE BOOKS

1. Richard Hartley and Andrew Zisserman, Multiple View Geometry in Computer Vision, Second Edition,
Cambridge University Press, March 2004..
2. Christopher M. Bishop; Pattern Recognition and Machine Learning, Springer, 2006
3. E. R. Davies, Computer and Machine Vision, Fourth Edition, Academic Press, 2012.

CO-PO MAPPING

CO	PO												PSO		
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Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
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Name and Department	**Name and Department of BoS Chairman**

PROFESSONAL ELECVTIVE 1

U23ITP14 **Category : PE**

		L	T	P	C
SDG: 4	**EXPLORATORY DATA ANALYSIS**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

1 To outline an overview of exploratory data analysis 2 To implement data visualization using Matplotlib
3 To perform univariate data exploration and analysis.
4 To apply bivariate data exploration and analysis.
5 To use Data exploration and visualization techniques for multivariate and time series data

UNIT 1 EXPLORATORY DATA ANALYSIS 6

EDA fundamentals – Understanding data science – Significance of EDA – Making sense of data – Comparing EDA with classical and Bayesian analysis – Software tools for EDA - Visual Aids for EDA- Data transformation techniques-merging database, reshaping and pivoting, Transformation techniques.

UNIT 2 EDA USING PYTHON 6

Data Manipulation using Pandas – Pandas Objects – Data Indexing and Selection – Operating on Data – Handling Missing Data – Hierarchical Indexing – Combining datasets – Concat, Append, Merge and Join – Aggregation and grouping – Pivot Tables – Vectorized String Operations

UNIT 3 UNIVARIATE ANALYSIS 6

Introduction to Single variable: Distribution Variables - Numerical Summaries of Level and Spread- Scaling and Standardizing – Inequality

UNIT 4 BIVARIATE ANALYSIS 6

Relationships between Two Variables - Percentage Tables - Analysing Contingency Tables - Handling Several Batches - Scatterplots and Resistant Lines.

UNIT 5 MULTIVARIATE AND TIME SERIES ANALYSIS 6

Introducing a Third Variable - Causal Explanations - Three-Variable Contingency Tables and Beyond – Fundamentals of TSA – Characteristics of time series data – Data Cleaning – Time-based indexing – Visualizing – Grouping – Resampling

COURSE OUTCOMES:

At the end of the course, students would

CO1: Understand the fundamentals of exploratory data analysis
CO2: Implement the data visualization using Matplotlib
CO3: Perform univariate data exploration and analysis.
CO4: Apply bivariate data exploration and analysis.
CO5: Use Data exploration and visualization techniques for multivariate and time series data.

TOTAL:60 PERIODS

PRACTICAL EXERCISES:

S.NO	LIST OF EXPERIMENTS
1	Install the data Analysis and Visualization tool: R/ Python /Tableau Public/ Power BI.
2	Perform exploratory data analysis (EDA) with datasets like email data set. Export all your emails as a dataset, import them inside a pandas data frame, visualize them and get different insights from the data.
3	Working with Numpy arrays, Pandas data frames , Basic plots using Matplotlib.
4	Explore various variable and row filters in R for cleaning data. Apply various plot features in R on sample data sets and visualize.
5	Perform Time Series Analysis and apply the various visualization techniques
6	Perform Data Analysis and representation on a Map using various Map data sets with Mouse Rollover effect, user interaction, etc..
7	Build cartographic visualization for multiple datasets involving various countries of the world; states and districts in India etc.
8	Perform EDA on Wine Quality Data Set
9	Use a case study on a data set and apply the various EDA and visualization techniques and present an analysis report.

TEXT BOOKS

1. Suresh Kumar Mukhiya, Usman Ahmed, “Hands-On Exploratory Data Analysis with Python”, Packt Publishing, 2020. (Unit 1)
2. Jake Vander Plas, "Python Data Science Handbook: Essential Tools for Working with Data", First Edition, O Reilly, 2017. (Unit 2)
3. Catherine Marsh, Jane Elliott, “Exploring Data: An Introduction to Data Analysis for Social Scientists”, Wiley Publications, 2nd Edition, 2008. (Unit 3,4,5)

REFERENCE BOOKS

1. Eric Pimpler, Data Visualization and Exploration with R, GeoSpatial Training service, 2017.
2. Claus O. Wilke, "Fundamentals of Data Visualization", O'reilly publications, 2019.
3. Matthew O. Ward, Georges Grinstein, Daniel Keim, "Interactive Data Visualization: Foundations, Techniques, and Applications", 2nd Edition, CRC press, 2015.

CO-PO MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2	3	3	3	-	-	-	2	2	3	2	3	3	2
2	2	2	2	3	3	-	-	-	3	2	2	2	1	2	3
3	2	3	2	2	3	-	-	-	2	2	2	1	2	3	1
4	2	2	2	2	3	-	-	-	3	2	2	1	2	2	2
5	2	2	3	2	1	-	-	-	1	2	2	1	2	2	3
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	**APPROVED BY**
Dr. P. Shanthakumar Professor/Head/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

PROFESSONAL ELECVTIVE 1

Category : PE

U23ITP15

	L	T	P	C
IMAGE AND VIDEO ANALYTICS	**2**	**0**	**2**	**3**

SDG: 4

COURSE OBJECTIVE:

1 To understand the basics of image processing techniques for computer vision.
2 To learn the techniques used for image pre-processing.
3 To discuss the various object detection techniques.
4 To understand the various Object recognition mechanisms.
5 To elaborate on the video analytics techniques.

UNIT 1 INTRODUCTION **6**

Computer Vision – Image representation and image analysis tasks - Image representations – digitization – properties – color images – Data structures for Image Analysis - Levels of image data representation - Traditional and Hierarchical image data structures

UNIT 2 IMAGE PRE-PROCESSING **6**

Local pre-processing - Image smoothing - Edge detectors - Zero-crossings of the second derivative - Scale in image processing - Canny edge detection - Parametric edge models - Edges in multi-speralct images - Local pre-processing in the frequency domain - Line detection by local pre-processing operators - Image restoration.

UNIT 3 OBJECT DETECTION USING MACHINE LEARNING **6**

Object detection– Object detection methods – Deep Learning framework for Object detection– bounding box approach-Intersection over Union (IoU) –Deep Learning Architectures-R-CNN-Faster R-CNN-You Only Look Once(YOLO)-Salient features-Loss Functions-YOLO architecturesOss

UNIT 4 FACE RECOGNITION AND GESTURE RECOGNITION **6**

Face Recognition-Introduction-Applications of Face Recognition-Process of Face Recognition-DeepFace solution by Facebook-FaceNet for Face Recognition- Implementation using FaceNet-Gesture Recognition

UNIT 5 VIDEO ANALYTICS **6**

Video Processing – use cases of video analytics-Vanishing Gradient and exploding gradient problemRestNet architecture-RestNet and skip connections-Inception Network-GoogleNet architectureImprovement in Inception v2-Video analytics-RestNet and Inception v3.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Understand the basics of image processing techniques for computer vision and video analysis.

CO2: Explain the techniques used for image pre-processing.

CO3: Develop various object detection techniques.

CO4: Understand the various face recognition mechanisms.

CO5: Elaborate on deep learning-based video analytics..

TOTAL:60 PERIODS

PRACTICAL EXERCISES:

S.NO	LIST OF EXPERIMENTS
1	Write a program that computes the T-pyramid of an image.
2	Write a program that derives the quad tree representation of an image using the homogeneity criterion of equal intensity
3	Develop programs for the following geometric transforms: (a) Rotation (b) Change of scale (c) Skewing (d) Affine transform calculated from three pairs of corresponding points (e) Bilinear transform calculated from four pairs of corresponding points.
4	Develop a program to implement Object Detection and Recognition
5	Develop a program for motion analysis using moving edges, and apply it to your image sequences
6	Develop a program for Facial Detection and Recognition
7	Write a program for event detection in video surveillance system

TEXT BOOKS

1. Milan Sonka, Vaclav Hlavac, Roger Boyle, “Image Processing, Analysis, and Machine Vision”, 4nd edition, Thomson Learning, 2013.
2. Vaibhav Verdhan,(2021, Computer Vision Using Deep Learning Neural Network Architectures with Python and Keras,Apress 2021(UNIT-III,IV and V)

REFERENCE BOOKS

1. Richard Szeliski, “Computer Vision: Algorithms and Applications”, Springer Verlag London Limited,2011
2. Caifeng Shan, FatihPorikli, Tao Xiang, Shaogang Gong, “Video Analytics for Business Intelligence”, Springer, 2012.

3. D. A. Forsyth, J. Ponce, "Computer Vision: A Modern Approach", Pearson Education, 2003.
4. E. R. Davies, (2012), "Computer & Machine Vision", Fourth Edition, Academic

CO-PO MAPPING

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4	1	2	3	2	3	-	-	-	2	2	2	3	2	2	2
5	3	2	1	3	2	-	-	-	2	1	1	3	3	2	1
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	**APPROVED BY**
Dr. N.Naveenkumar Professor/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

PROFESSONAL ELECVTIVE 1

Category : PE

		L	T	P	C
U23ITP16					
SDG: 4	**NEURAL NETWORKS AND DEEP LEARNING**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

1 To understand the basics in deep neural networks
2 To understand the basics of associative memory and unsupervised learning networks
3 To apply CNN architectures of deep neural networks
4 To analyze the key computations underlying deep learning, then use them to build and train deep
5 neural networks for various tasks.
6 To apply autoencoders and generative models for suitable applications.

UNIT 1 INTRODUCTION **6**

Neural Networks-Application Scope of Neural Networks-Artificial Neural Network: An Introduction- Evolution of Neural Networks-Basic Models of Artificial Neural Network-Important Terminologies of ANNs-Supervised Learning Network

UNIT 2 ASSOCIATIVE MEMORY AND UNSUPERVISED LEARNING NETWORKS **6**

Training Algorithms for Pattern Association-Autoassociative Memory Network-Heteroassociative Memory Network-Bidirectional Associative Memory (BAM)-Hopfield Networks-Iterative Autoassociative Memory Networks-Temporal Associative Memory Network-Fixed Weight Competitive Nets-Kohonen Self-Organizing Feature Maps-Learning Vector Quantization-Counter propagation Networks-Adaptive Resonance Theory Network

UNIT 3 THIRD-GENERATION NEURAL NETWORKS **6**

Spiking Neural Networks-Convolutional Neural Networks-Deep Learning Neural Networks-Extreme Learning Machine Model-Convolutional Neural Networks: The Convolution Operation – Motivation –
Pooling – Variants of the basic Convolution Function – Structured Outputs – Data Types – Efficient Convolution Algorithms – Neuroscientific Basis – Applications: Computer Vision, Image Generation, Image Compression

UNIT 4 DEEP FEEDFORWARD NETWORKS **6**

History of Deep Learning- A Probabilistic Theory of Deep Learning- Gradient Learning – Chain Rule and Backpropagation - Regularization: Dataset Augmentation – Noise Robustness -Early Stopping, Bagging and Dropout - batch normalization- VC Dimension and Neural Nets.

UNIT 5 **RECURRENT NEURAL NETWORKS** **6**

Recurrent Neural Networks: Introduction – Recursive Neural Networks – Bidirectional RNNs – Deep
Recurrent Networks – Applications: Image Generation, Image Compression, Natural Language Processing. Complete Auto encoder, Regularized Autoencoder, Stochastic Encoders and Decoders, Contractive Encoders

COURSE OUTCOMES:

At the end of the course, students would

CO1: Apply Convolution Neural Network for image processing.

CO2: Understand the basics of associative memory and unsupervised learning networks.

CO3: Apply CNN and its variants for suitable applications.

Analyze the key computations underlying deep learning and use them to build and train deep **CO4:**

neural networks for various tasks.

CO5: Apply autoencoders and generative models for suitable applications.

TOTAL:60 PERIODS

PRACTICAL EXERCISES:

S.NO	LIST OF EXPERIMENTS
1	Implement simple vector addition in TensorFlow.
2	Implement a regression model in Keras.
3	Implement a Feed-Forward Network in TensorFlow/Keras.
4	Implement a perceptron in TensorFlow/Keras Environment 5 Implement an Image Classifier using CNN in TensorFlow/Keras. 6 Improve the Deep learning model by fine tuning hyper parameters 7 Implement a Transfer Learning concept in Image Classification.
8	Using a pre trained model on Keras for Transfer Learning
9	Perform Sentiment Analysis using RNN
10	Implement an LSTM based Autoencoder in TensorFlow/Keras.
11	Image generation using GAN **Additional Experiments:**
12	Train a Deep learning model to classify a given image using pre trained model
13	Recommendation system from sales data using Deep Learning
14	Implement Object Detection using CNN
15	Implement any simple Reinforcement Algorithm for an NLP problem

TEXT BOOKS

1. Ian Goodfellow, Yoshua Bengio, Aaron Courville, “Deep Learning”, MIT Press, 2016.
2. Francois Chollet, “Deep Learning with Python”, Second Edition, Manning Publications, 2021.

REFERENCE BOOKS

1. Aurélien Géron, "Hands-On Machine Learning with Scikit-Learn and TensorFlow", Oreilly, 2018.
2. Josh Patterson, Adam Gibson, "Deep Learning: A Practitioner's Approach", O'Reilly Media, 2017.
3. Charu C. Aggarwal, "Neural Networks and Deep Learning: A Textbook", Springer International Publishing, 1st Edition, 2018.
4. Learn Keras for Deep Neural Networks, Jojo Moolayil, Apress,2018

CO-PO MAPPING

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5	1	1	-	2	1	-	-	-	-	-	-	1	-	-	-
6	2	1	1	1	-	-	-	-	-	-	1	-	-	-	2
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	**APPROVED BY**
Dr. N.Naveenkumar Professor/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

PROFESSONAL ELECVTIVE 1

Category : PE

U23ITP17 **L T P C**

SDG: 4 **TEXT AND SPEECH ANALYSIS** **2 0 2 3**

COURSE OBJECTIVE:

1 Understand natural language processing basics
2 Apply classification algorithms to text documents
3 Build question-answering and dialogue systems
4 Develop a speech recognition system
5 Develop a speech synthesizer

UNIT 1 **NATURAL LANGUAGE BASICS** **6**

Foundations of natural language processing – Language Syntax and Structure- Text Preprocessing and Wrangling – Text tokenization – Stemming – Lemmatization – Removing stop- words – Feature Engineering for Text representation – Bag of Words model- Bag of N-Grams model – TF-IDF model

Suggested Activities

- Flipped classroom on NLP
- Implementation of Text Preprocessing using NLTK
- Implementation of TF-IDF models

Suggested Evaluation Methods

- Quiz on NLP Basics
- Demonstration of Programs

UNIT 2 **TEXT CLASSIFICATION** **6**

Vector Semantics and Embeddings -Word Embeddings - Word2Vec model – Glove model – FastText model – Overview of Deep Learning models – RNN – Transformers – Overview of Text summarization and Topic Models

Suggested Activities

- Flipped classroom on Feature extraction of documents
- Implementation of SVM models for text classification
- External learning: Text summarization and Topic models

Suggested Evaluation Methods

- Assignment on above topics
- Quiz on RNN, Transformers

UNIT 3 **QUESTION ANSWERING AND DIALOGUE SYSTEMS** **6**

Information retrieval – IR-based question answering – knowledge-based question answering – language models for QA – classic QA models – chatbots – Design of dialogue systems -– evaluating dialogue systems

Suggested Activities:

- Flipped classroom on language models for QA
- Developing a knowledge-based question-answering system
- Classic QA model development

Suggested Evaluation Methods

- Assignment on the above topics
- Quiz on knowledge-based question answering system

UNIT 4 TEXT-TO-SPEECH SYNTHESIS 6

Overview. Text normalization. Letter-to-sound. Prosody, Evaluation. Signal processing - Concatenative and parametric approaches, WaveNet and other deep learning-based TTS systems

Suggested Activities:

- Flipped classroom on Speech signal processing
- Data collection
- Implementation of TTS systems

Suggested Evaluation Methods

- Assignment on the above topics
- Quiz on wavenet, deep learning-based TTS systems

UNIT 5 AUTOMATIC SPEECH RECOGNITION 6

Speech recognition: Acoustic modelling – Feature Extraction - HMM, HMM-DNN systems

Suggested Activities:

- Flipped classroom on Speech recognition.
- Exploring Feature extraction

Suggested Evaluation Methods

- Assignment on the above topics Quiz on acoustic modelling

COURSE OUTCOMES:

At the end of the course, students would

CO1: Explain existing and emerging deep learning architectures for text and speech processing translation

CO2: Apply deep learning techniques for NLP tasks, language modelling and machine

CO3: Explain coreference and coherence for text processing

CO4: Build question-answering systems, chatbots and dialogue systems

CO5: Apply deep learning models for building speech recognition and text-to-speech

PRACTICAL EXERCISES:

S.N	LIST OF EXPERIMENTS
•	Create Regular expressions in Python for detecting word patterns and tokenizing text
•	Getting started with Python and NLTK - Searching Text, Counting Vocabulary, Frequency Distribution, Collocations, Bigrams
•	Accessing Text Corpora using NLTK in Python
•	Write a function that finds the 50 most frequently occurring words of a text that are not stop words.
•	Implement the Word2Vec model
•	Use a transformer for implementing classification
•	Design a chatbot with a simple dialog system
•	Convert text to speech and find accuracy
•	Design a speech recognition system and find the error rate

TOTAL:60 PERIODS

TEXT BOOKS

1. Michael T. Simpson, Kent Backman, and James E. Corley, Hands-On Ethical Hacking and Network Defense, Course Technology, Delmar Cengage Learning, 2010.
2. The Basics of Hacking and Penetration Testing - Patrick Engebretson, SYNGRESS, Elsevier, 2013.
3. The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws, Dafydd Stuttard and Marcus Pinto, 2011.

REFERENCE BOOKS

1 Black Hat Python: Python Programming for Hackers and Pentesters, Justin Seitz , 2014.

CO-PO MAPPING

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Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
Dr. N.Naveenkumar Professor/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE II

U23ITP21 **Category : PE**

SDG: 4	**APP DEVELOPMENT**	**L**	**T**	**P**	**C**
		2	**0**	**2**	**3**

COURSE OBJECTIVE:

1 To learn development of native applications with basic GUI Components
2 To develop cross-platform applications with event handling
3 To develop applications with location and data storage capabilities
4 To develop web applications with database access
To learn about the security issues in the cloud environment 5

FUNDAMENTALS OF MOBILE & WEB

UNIT 1 **APPLICATION DEVELOPMENT** **6**

Basics of Web and Mobile application development, Native App, Hybrid App, Cross-platform App, What is Progressive Web App, Responsive Web design,

UNIT 2 **NATIVE APP DEVELOPMENT USING JAVA** **6**

Native Web App, Benefits of Native App, Scenarios to create Native App, Tools for creating Native App, Cons of Native App, Popular Native App Dev elopment Frameworks, Java & Kotlin for Android, Swift & Objective-C for iOS, Basics of React Native, Native Components, JSX, State, Props

UNIT 3 **HYBRID APP DEVELOPMENT** **6**

Hybrid Web App, Benefits of Hybrid App, Criteria for creating Native App, Tools for creating Hybrid App, Cons of Hybrid App, Popular Hybrid App Development Frameworks, Ionic, Apache Cordova,

CROSS-PLATFORM APP DEVELOPMENT

UNIT 4 **USING REACT-NATIVE** **6**

What is Cross-platform App, Benefits of Cross-platform App, Criteria for creating Cross-platform App,
Tools for creating Cross-platform App, Cons of Cross-platform App, Popular Cross- platform App Development Frameworks, Flutter, Xamarin, React-Native, Basics of React Native, Native Components, JSX, State, Props

NON-FUNCTIONAL CHARACTERISTICS OF

UNIT 5 **APP FRAMEWORKS** **6**

Comparison of different Ap p frameworks, Build Performance, App Performance, Debugging capabilities, Time to Market, Maintainability, Ease of Development, UI/UX, Reusability.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Develop Native applications with GUI Components.
CO2: Develop hybrid applications with basic event handling.
CO3: Implement cross-platform applications with location and data storage capabilities.
CO4: Implement cross platform applications with basic GUI and event handling.
CO5: Develop web applications with cloud database access.

TOTAL:60 PERIODS

PRACTICAL EXERCISES:

S.NO	LIST OF EXPERIMENTS
1	Using react native, build a cross platform application for a BMI calculator.
2	Build a cross platform application for a simple expense manager which allows entering expenses and income on each day and displays category wise weekly income and expense.
3	Develop a cross platform application to convert units from imperial system to metric system (km to miles, kg to pounds etc.,)
4	Design and develop a cross platform application for day to day task (to-do) management.
5	Design an android application using Cordova for a user login screen with username, password, reset button and a submit button. Also, include header image and a label. Use layout managers
6	Design and develop an android application using Apache Cordova to find and display the current location of the user
7	Write programs using Java to create Android application having Databases • For a simple library application. • For displaying books available, books lend, book reservation. Assume that student information is available in a database which has been stored in a database server.

TEXT BOOKS

1. Head First Android Development, Dawn Griffiths, O'Reilly, 1st edition
2. Apache Cordova in Action, Raymond K. Camden, Manning. 2015
3. Full Stack React Native: Create beautiful mobile apps with JavaScript and React Native, Anthony Accomazzo, Houssein Djirdeh, Sophia Shoemaker, Devin Abbott, FullStack publishing

REFERENCE BOOKS

1. Android Programming for Beginners, John Horton, Packt Publishing, 2nd Edition.
2. Native Mobile Development by Shaun Lewis, Mike Dunn
3. Building Cross-Platform Mobile and Web Apps for Engineers and Scientists: An Active Learning

Approach, Pawan Lingras, Matt Triff, Rucha Lingras
4. Apache Cordova 4 Programming, John M Wargo, 2015
5. React Native Cookbook, Daniel Ward, Packt Publishing, 2nd Edition

CO-PO MAPPING

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3	2	2	2	1	2	-	-	-	1	1	1	1	1	1	2
4	1	3	1	1	3	-	-	-	1	1	3	2	1	3	1
5	1	1	3	1	3	-	-	-	1	1	2	1	3	2	1
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
P. Jason AP/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE II

U23ITP22 **Category : PE**

		L	T	P	C
SDG: 4	**WEB APPLICATION SECURITY**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

- To understand the fundamentals of web application security
- Tofocusonwideaspectsofsecuredevelopmentanddeploymentofwebapplications
- TolearnhowtobuildsecureAPIs
- Tolearnthebasicsofvulnerabilityassessmentandpenetrationtesting
- To get an insight about Hacking techniques and Tools

UNIT 1 FUNDAMENTALS OF WEB APPLICATION SECURITY 6

The history of Software Security-Recognizing Web Application Security Threats, Web Application Security, Authentication and Authorization, Secure Socket layer, Transport layer Security, Session Management-Input Validation

UNIT 2 SECURE DEVELOPMENT AND DEPLOYMENT 6

Web Applications Security - Security Testing, Security Incident Response Planning,The Microsoft Security Development Lifecycle (SDL), OWASP Comprehensive Lightweight Application Security Process (CLASP), The Software Assurance Maturity Model (SAMM)

UNIT 3 SECURE API DEVELOPMENT 6

API Security- Session Cookies,Token Based Authentication, Securing Natter APIs: Addressing threats with Security Controls, Rate Limiting for Availability, Encryption, Audit logging, Securing service-to-service APIs: API Keys, OAuth2, Securing Microservice APIs: Service Mesh, Locking Down Network Connections, Securing Incoming Requests

UNIT 4 VULNERABILITY ASSESSMENT AND PENETRATION TESTING 6

Vulnerability Assessment Lifecycle, Vulnerability Assessment Tools: Cloud-based vulnerability scanners, Host-based vulnerability scanners, Network-based vulnerability scanners, Database- based vulnerability scanners, Types of Penetration Tests: External Testing, Web Application Testing, Internal Penetration Testing, SSID or Wireless Testing, Mobile Application Testing.

UNIT 5 HACKING TECHNIQUES AND TOOLS 6

Social Engineering, Injection, Cross-Site Scripting(XSS), Broken Authentication and Session Management, Cross-Site Request Forgery, Security Misconfiguration, Insecure Cryptographic Storage, Failure to Restrict URL Access, Tools: Comodo, OpenVAS, Nexpose, Nikto, Burp Suite, etc.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Understandingthebasicconceptsofwebapplicationsecurityandtheneedfor it

CO2: Beacquaintedwiththeprocessforsecuredevelopmentanddeploymentofwebapplications

CO3: AcquiretheskilltodesignanddevelopSecureWebApplicationsthatuseSecureAPIs

CO4: Be able to get the importance of carrying out vulnerability assessment and penetration testing

CO5: Acquiretheskilltothinklikeahackerandtousehackerstoolsets

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO**LIST OF EXPERIMENTS**

1. Installwiresharkandexplorethevariousprotocols
    a. AnalyzethedifferencebetweenHTTPvsHTTPS
    b. Analyzethevarioussecuritymechanismsembeddedwithdifferentprotocols.
2. IdentifythevulnerabilitiesusingOWASPZAPtool
3. CreatesimpleRESTAPIusingpythonforfollowingoperation
    a. GET
    b. PUSH
    c. POST
    d. DELETE
4. InstallBurpSuitetodofollowingvulnerabilities:
    . SQLinjection
    a. cross-sitescripting(XSS)
5. AttackthewebsiteusingSocialEngineeringmethod

TOTAL:30 PERIODS

TEXT BOOKS

1. Andrew Hoffman, Web Application Security:Exploitation and Countermeasures for ModernWeb Applications, First Edition, 2020, O'Reilly Media, Inc.
2. BryanSullivan,VincentLiu,WebApplicationSecurity:ABeginnersGuide,2012,The McGraw-Hill Companies.
3. NeilMadden,APISecurityinAction,2020,ManningPublicationsCo.,NY,USA.

REFERENCE BOOKS

1. MichaelCross,Developer's GuidetoWebApplicationSecurity, 2007, SyngressPublishing, Inc.
2. RaviDasandGregJohnson,TestingandSecuringWebApplications,2021,Taylor& Francis Group, LLC.
3. PrabathSiriwardena,AdvancedAPISecurity,2020,A pressMediaLLC,USA.
4. MalcomMcDonald,WebSecurityforDevelopers,2020,NoStarchPress, Inc.
5. Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, Gideon Lenkey, and Terron Williams Grey Hat Hacking: The Ethical Hacker's Handbook, Third Edition, 2011, The McGraw-Hill Companies.

CO-PO MAPPING

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3	1	1	1	2	3	-	-	-	-	-	-	1	-	-	-
4	1	2	1	1	2	-	-	-	-	-	-	-	-	-	-
5	1	2	2	2	2	-	-	-	-	-	-	1	-	-	-
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	**APPROVED BY**
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Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE II

U23ITP23 **Category : PE**

		L	T	P	C
SDG: 4	**KNOWLEDGE ENGINEERING**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

- TounderstandthebasicsofKnowledgeEngineering.
- TodiscussmethodologiesandmodelingforAgentDesignandDevelopment.
- Todesignanddevelopontologies.
- Toapplyreasoningwithontologiesandrules.
- Tounderstandlearningandrulelearning.

UNIT 1 REASONING UNDER UNCERTAINTY 6

Introduction – Abductive reasoning – Probabilistic reasoning: Enumerative Probabilities – Subjective Bayesian view – Belief Functions – Baconian Probability – Fuzzy Probability – Uncertainty methods - Evidence-based reasoning – Intelligent Agent – Mixed-Initiative Reasoning– Knowledge Engineering

UNIT 2 METHODOLOGY AND MODELING 6

Conventional Design and Development – Development tools and Reusable Ontologies – Agent Design and Development using Learning Technology – Problem Solving through Analysis and Synthesis – Inquiry-driven Analysis and Synthesis – Evidence-based Assessment – Believability Assessment – Drill-Down Analysis, Assumption-based Reasoning, and What-If Scenarios.

UNIT 3 ONTOLOGIES – DESIGN AND DEVELOPMENT 6

Concepts and Instances – Generalization Hierarchies – Object Features – Defining Features – Representation – Transitivity – Inheritance – Concepts as Feature Values – Ontology Matching. Design and Development Methodologies – Steps in Ontology Development – Domain Understanding and Concept Elicitation – Modelling-based Ontology Specification.

UNIT 4 REASONIING WITH ONTOLOGIES AND RULES 6

Production System Architecture – Complex Ontology-based Concepts – Reduction and Synthesis rules and the Inference Engine – Evidence-based hypothesis analysis – Rule and Ontology Matching – Partially Learned Knowledge – Reasoning with Partially Learned Knowledge.

UNIT 5 LEARNING AND RULE LEARNING 6

Machine Learning – Concepts – Generalization and Specialization Rules – Types – Formal definition of Generalization. Modelling, Learning and Problem Solving – Rule learning and Refinement – Overview – Rule Generation and Analysis – Hypothesis Learning.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Understand the basics of Knowledge Engineering.

CO2: Apply methodologies and modelling for Agent Design and Development.

CO3: Design and develop ontologies.

CO4: Apply reasoning with ontologies and rules.

CO5: Understand learning and rule learning.

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NOLIST OF EXPERIMENTS

1. PerformoperationswithEvidenceBasedReasoning.
2. PerformEvidencebasedAnalysis.
3. PerformoperationsonProbabilityBasedReasoning.
4. PerformBelievabilityAnalysis.
5. ImplementRuleLearningandrefinement.
6. Performanalysisbasedonlearnedpatterns.
7. ConstructionofOntologyforagivendomain.

TOTAL:30 PERIODS

TEXT BOOKS

1. Gheorghe Tecuci, Dorin Marcu, Mihai Boicu, David A. Schum, Knowledge Engineering Building Cognitive Assistants for Evidence-based Reasoning, Cambridge University Press, First Edition, 2016.
   (Unit 1 - Chapter 1 / Unit 2 – Chapter 3,4 / Unit 3 – Chapter 5, 6 / Unit 4 - 7 , Unit 5-Chapter 8, 9)

REFERENCE BOOKS

1. Ronald J. Brachman, Hector J. Levesque: Knowledge Representation and Reasoning, Morgan Kaufmann, 2004.
2. Ela Kumar, Knowledge Engineering, I K International Publisher House, 2018.
3. John F. Sowa: Knowledge Representation: Logical, Philosophical, and Computational Foundations, Brooks/Cole, Thomson Learning, 2000.
4. King , Knowledge Management and Organizational Learning , Springer, 2009.
5. Jay Liebowitz, Knowledge Management Learning from Knowledge Engineering, 1st Edition,2001.

CO-PO MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1	1	1	1	1	-	-	1	2	1	2	1	1	1
2	3	2	3	2	2	-	-	-	2	1	2	1	3	3	1
3	2	2	3	2	2	-	-	-	3	2	2	2	3	2	3
4	2	2	3	1	1	-	-	-	2	2	2	2	2	1	1
5	2	2	2	1	1	-	-	-	2	1	1	1	2	1	1
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
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U23ITP24 **PRINCIPLES OF PROGRAMMING** **Category : PE**

SDG: 4 **LANGUAGES**

L	T	P	C
2	0	2	3

PROFESSIONAL ELECTIVE II

1 To understand and describe syntax and semantics of programming languages
2 To understand data, data types, and basic statements
3 To understand call-return architecture and ways of implementing them
4 To understand object-orientation, concurrency, and event handling in programming languages
5 To develop programs in non-procedural programming paradigms

UNIT 1 SYNTAX AND SEMANTICS 6

Evolution of programming languages – describing syntax – context-free grammars – attribute grammars – describing semantics – lexical analysis – parsing – recursive-descent – bottom up parsing

UNIT 2 DATA, DATA TYPES, AND BASIC STATEMENTS 6

Names – variables – binding – type checking – scope – scope rules – lifetime and garbage collection – primitive data types – strings – array types – associative arrays – record types – union types – pointers and references – Arithmetic expressions – overloaded operators – type conversions – relational and boolean expressions – assignment statements – mixed mode assignments – control structures – selection – iterations – branching – guarded statements

UNIT 3 SUBPROGRAMS AND IMPLEMENTATIONS 6

Subprograms – design issues – local referencing – parameter passing – overloaded methods – generic methods – design issues for functions – semantics of call and return – implementing simple subprograms – stack and dynamic local variables – nested subprograms – blocks – dynamic scoping

UNIT 4 OBJECT-ORIENTATION, CONCURRENCY, AND EVENT HANDLING 6

Object-orientation – design issues for OOP languages – implementation of object-oriented constructs – concurrency – semaphores – monitors – message passing – threads – statement level concurrency – exception handling – event handling

UNIT 5 FUNCTIONAL AND LOGIC PROGRAMMING LANGUAGES 6

Introduction to lambda calculus- fundamentals of functional programming languages- and logic programming Programming with Scheme Programming with ML– Introduction to logic and logic programming – Programming with Prolog – multi-paradigm languages- Programming with Scheme Programming with ML– Introduction to logic– Programming with Scheme- Programming with ML–

Introduction to logic and logic programming – Programming with Prolog – multi-paradigm languages – Programming with ML– Introduction to logic and logic programming Programming with Prolog – multi-paradigm languages fundamentals of functional programming languages Programming with Scheme

COURSE OUTCOMES:

At the end of the course, students would

CO1: Describe syntax and semantics of programming languages

CO2: Explain data, data types, and basic statements of programming languages

CO3: Design and implement subprogram constructs

CO4: Apply object-oriented, concurrency, and event handling programming constructs and Develop programs in Scheme, ML, and Prolog

CO5: Understand and adopt new programming languages

TOTAL:30 PERIODS

TEXT BOOKS

1. Robert W. Sebesta, "Concepts of Programming Languages", Twelfth Edition (Global Edition), Pearson, 2022.
2. Michael L. Scott, "Programming Language Pragmatics", Fourth Edition, Elsevier, 2018.
3. R. Kent Dybvig, "The Scheme programming language", Fourth Edition, Prentice Hall, 2011.
4. Jeffrey D. Ullman, "Elements of ML programming", Second Edition, Pearson, 1997.
5. W. F. Clocksin and C. S. Mellish, "Programming in Prolog: Using the ISO Standard", Fifth Edition, Springer, 2003.

CO-PO MAPPING

CO	PO												PSO		
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3	3	3	3	2	2	-	-	-	-	-	-	3	2	3	-
4	3	3	3	3	2	2	-	-	-	-	-	-	3	2	-
5	3	3	3	3	3	3	2	2	1	3	1	3	3	3	-

Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation

COURSE DESIGNED BY	APPROVED BY
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Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE II

Category : PE

		L	T	P	C
U23ITP25					
SDG: 4	**UI AND UX DESIGN**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

1 To provide a sound knowledge in UI & UX
2 To understand the need for UI and UX
3 To understand the various Research Methods used in Design
4 To explore the various Tools used in UI & UX
5 Creating a wireframe and prototype

UNIT 1 FOUNDATIONS OF DESIGN 6

UI vs. UX Design - Core Stages of Design Thinking - Divergent and Convergent Thinking - Brainstorming and Game storming - Observational Empathy

UNIT 2 FOUNDATIONS OF UI DESIGN 6

Visual and UI Principles - UI Elements and Patterns - Interaction Behaviors and Principles – Branding - Style Guides

UNIT 3 FOUNDATIONS OF UX DESIGN 6

Introduction to User Experience - Why You Should Care about User Experience - Understanding User Experience - Defining the UX Design Process and its Methodology - Research in User Experience Design - Tools and Method used for Research - User Needs and its Goals - Know about Business Goals

UNIT 4 WIREFRAMING, PROTOTYPING AND TESTING 6

Sketching Principles - Sketching Red Routes - Responsive Design – Wireframing - Creating Wireflows - Building a Prototype - Building High-Fidelity Mockups - Designing Efficiently with Tools- Interaction Patterns - Conducting Usability Tests - Other Evaluative User Research Methods - Synthesizing Test Findings - Prototype Iteration

UNIT 5 RESEARCH, DESIGNING, IDEATING, & INFORMATION ARCHITECTURE 6

Identifying and Writing Problem Statements - Identifying Appropriate Research Methods - Creating Personas - Solution Ideation - Creating User Stories - Creating Scenarios - Flow Diagrams - Flow Mapping - Information Architecture.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Build UI for user Applications
CO2: Evaluate UX design of any product or application
CO3: Demonstrate UX Skills in product development
CO4: Implement Sketching principles
CO5: Create Wireframe and Prototype

TOTAL:60 PERIODS

PRACTICAL EXERCISES:

S.NO	LIST OF EXPERIMENTS
1	Designing a Responsive layout for an societal application
2	Exploring various UI Interaction Patterns
3	Developing an interface with proper UI Style Guides
4	Developing Wireflow diagram for application using open source software.
5	Exploring various open source collaborative interface Platform
6	Hands on Design Thinking Process for a new product 7 Brainstorming feature for proposed product
8	Defining the Look and Feel of the new Project
9	Create a Sample Pattern Library for that product (Mood board, Fonts, Colors based on UI principles)
10	Identify a customer problem to solve
11	Conduct end-to-end user research - User research, creating personas, Ideation process (User stories, Scenarios), Flow diagrams, Flow Mapping

TEXT BOOKS

1. Joel Marsh, “UX for Beginners”, O’Reilly , 2022
2. Jon Yablonski, “Laws of UX using Psychology to Design Better Product & Services” O’Reilly 2021

REFERENCE BOOKS

1. Jenifer Tidwell, Charles Brewer, Aynne Valencia, “Designing Interface” 3 rd Edition , O’Reilly 2020
2. Steve Schoger, Adam Wathan “Refactoring UI”, 2018
3. Steve Krug, “Don't Make Me Think, Revisited: A Commonsense Approach to Web & Mobile”, Third Edition, 2015
4. https://www.nngroup.com/articles/
5. https://www.interaction-design.org/literature

CO-PO MAPPING

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4	1	2	3	3	1	-	-	-	3	2	1	3	3	3	3
5	1	2	3	2	1	-	-	-	2	1	1	1	3	2	2
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

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Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE II

Category : PE

	L	T	P	C
U23ITP26				
SDG: 4 SOFTWARE TESTING AND AUTOMATION	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

1 To understand the basics of software testing
2 To learn how to do the testing and planning effectively
3 To build test cases and execute them
4 To focus on wide aspects of testing and understanding multiple facets of testing
5 To get an insight about test automation and the tools used for test automation

UNIT 1 FOUNDATIONS OF SOFTWARE TESTING 6

Why do we test Software?, Black-Box Testing and White-Box Testing, Software Testing Life Cycle, Vmodel of Software Testing, Program Correctness and Verification, Reliability versus Safety, Failures, Errors and Faults (Defects), Software Testing Principles, Program Inspections, Stages of Testing: Unit Testing, Integration Testing, System Testing

UNIT 2 TEST PLANNING 6

The Goal of Test Planning, High Level Expectations,Intergroup Responsibilities, Test Phases, Test Strategy, Resource Requirements, Tester Assignments, Test Schedule, Test Cases, Bug Reporting, Metrics and Statistics

UNIT 3 TEST DESIGN AND EXECUTION 6

Test Objective Identification, Test Design Factors, Requirement identification, Testable Requirements, Modeling a Test Design Process, Modeling Test Results, Boundary Value Testing, Equivalence Class Testing, Path Testing, Data Flow Testing, Test Design Preparedness Metrics, Test Case Design Effectiveness, Model-Driven Test Design, Test Procedures, Test Case Organization and Tracking, Bug Reporting, Bug Life Cycle

UNIT 4 ADVANCED TESTING CONCEPTS 6

Performance Testing: Load Testing, Stress Testing, Volume Testing, Fail-Over Testing, Recovery Testing, Configuration Testing, Compatibility Testing, Usability Testing, Testing the Documentation, Security testing, Testing in the Agile Environment, Testing Web and Mobile Applications

UNIT 5 TEST AUTOMATION AND TOOLS 6

Automated Software Testing, Automate Testing of Web Applications, Selenium: Introducing Web Driver and Web Elements, Locating Web Elements, Actions on Web Elements, Different Web Drivers, Understanding Web Driver Events, Testing: Understanding Testing.xml, Adding Classes, Packages, Methods to Test, Test Reports.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Understand the basic concepts of software testing and the need for software testing
CO2: Design Test planning and different activities involved in test planning
CO3: Design effective test cases that can uncover critical defects in the application
CO4: Carry out advanced types of testing
CO5: Automate the software testing using Selenium and TestNG

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO	LIST OF EXPERIMENTS
1	Develop the test plan for testing an e-commerce web/mobile application (www.amazon.in).
2	Design the test cases for testing the e-commerce application
3	Test the e-commerce application and report the defects in it.
4	Develop the test plan and design the test cases for an inventory control system.
5	Execute the test cases against a client server or desktop application and identify the defects.
6	Test the performance of the e-commerce application.
7	Automate the testing of e-commerce applications using Selenium.
8	Integrate TestNG with the above test automation.
9	Mini Project: • Build a data-driven framework using Selenium and TestNG • Build Page object Model using Selenium and TestNG • Build BDD framework with Selenium, TestNG and Cucumber

TOTAL:30 PERIODS

TEXT BOOKS

1. Yogesh Singh, “Software Testing”, Cambridge University Press, 2012
2. Unmesh Gundecha, Satya Avasarala, "Selenium WebDriver 3 Practical Guide" - Second Edition 2018

REFERENCE BOOKS

1. Glenford J. Myers, Corey Sandler, Tom Badgett, The Art of Software Testing, 3rd Edition, 2012, John Wiley & Sons, Inc.
2. Ron Patton, Software testing, 2nd Edition, 2006, Sams Publishing
3. Paul C. Jorgensen, Software Testing: A Craftsman's Approach, Fourth Edition, 2014, Taylor & Francis Group.
4. Carl Cocchiaro, Selenium Framework Design in Data-Driven Testing, 2018, Packt Publishing.
5. Elfriede Dustin, Thom Garrett, Bernie Gaurf, Implementing Automated Software Testing, 2009, Pearson Education, Inc.
6. Satya Avasarala, Selenium WebDriver Practical Guide, 2014, Packt Publishing.
7. Varun Menon, TestNg Beginner's Guide, 2013, Packt Publishing.

CO-PO MAPPING

CO	PO												PSO		
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3	2	2	1	3	1	-	-	-	1	3	1	2	2	3	2
4	2	1	3	2	1	-	-	-	1	1	1	2	3	1	2
5	2	2	1	3	1	-	-	-	1	3	2	1	2	1	3
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
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Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE II

Category : PE

U23ITP27 **VIRTUALIZATION**

L	T	P	C
2	0	2	3

SDG: 4

COURSE OBJECTIVE:

1. To Learn the basics and types of Virtualization
2. To understand the Hypervisors and its types
3. To Explore the Virtualization Solutions
4. To Experiment the virtualization platforms

UNIT 1 INTRODUCTION TO VIRTUALIZATION 6

Virtualization and cloud computing - Need of virtualization – cost, administration, fast deployment, reduce infrastructure cost – limitations- Types of hardware virtualization: Full virtualization - partial virtualization - Paravirtualization-Types of Hypervisors

UNIT 2 SERVER AND DESKTOP VIRTUALIZATION 6

Virtual machine basics- Types of virtual machines- Understanding Server Virtualization- types of server virtualization- Business Cases for Server Virtualization – Uses of Virtual Server Consolidation – Selecting Server Virtualization Platform-Desktop Virtualization-Types of Desktop Virtualization

UNIT 3 NETWORK VIRTUALIZATION 6

Introduction to Network Virtualization-Advantages- Functions-Tools for Network Virtualization-VLANWAN Architecture-WAN Virtualization

UNIT 4 STORAGE VIRTUALIZATION 6

Memory Virtualization-Types of Storage Virtualization-Block, File-Address space Remapping-Risks of Storage Virtualization-SAN-NAS-RAID

UNIT 5 VIRTUALIZATION TOOLS 6

VMWare-Amazon AWS-Microsoft HyperV- Oracle VM Virtual Box - IBM PowerVM- Google Virtualization- Case study.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Analyse the virtualization concepts and Hypervisor

CO2: Apply the Virtualization for real-world applications
CO3: Install & Configure the different VM platforms
CO4: Experiment with the VM with various software

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.N O	LIST OF EXPERIMENTS
1	Create type 2 virtualization in VMWARE or any equivalent Open Source Tool. Allocate memory and storage space as per requirement. Install Guest OS on that VMWARE.
2	a. Shrink and extend virtual disk b. Create, Manage, Configure and schedule snapshots c. Create Spanned, Mirrored and Striped volume d. Create RAID 5 volume
3	a. Desktop Virtualization using VNC b. Desktop Virtualization using Chrome Remote Desktop
4	Create type 2 virtualization on ESXI 6.5 server
5	Create a VLAN in CISCO packet tracer
6	Install KVM in Linux
7	Create Nested Virtual Machine(VM under another VM)

TOTAL:30 PERIODS

TEXT BOOKS

1. Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010
2. Cloud Computing (Principles and Paradigms), Edited by Rajkumar Buyya, James Broberg, Andrzej Goscinski, John Wiley & Sons, Inc. 2011
3. David Marshall, Wade A. Reynolds, Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center, Auerbach
4. Chris Wolf, Erick M. Halter, “Virtualization: From the Desktop to the Enterprise”, APress, 2005.
5. James E. Smith, Ravi Nair, “Virtual Machines: Versatile Platforms for Systems and Processes”, Elsevier/Morgan Kaufmann, 2005.
6. David Marshall, Wade A. Reynolds, “Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center”, Auerbach Publications, 2006.

CO-PO MAPPING

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3	3	2	1	3	1	-	-	-	2	2	1	3	3	3	2
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5	1	3	2	3	1	-	-	-	2	1	3	3	1	1	2
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
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Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE II

Category : PE

		L	T	P	C
U23ITP27	**WEB APPLICATION SECURITY**	**2**	**0**	**2**	**3**
SDG: 4					

COURSE OBJECTIVE:

1 To understand the fundamentals of web application security
2 To focus on wide aspects of secure development and deployment of web applications
3 To learn how to build secure APIs
4 To learn the basics of vulnerability assessment and penetration testing
5 To get an insight about Hacking techniques and Tools

UNIT 1 FUNDAMENTALS OF WEB APPLICATION SECURITY 6

The history of Software Security-Recognizing Web Application Security Threats, Web Application Security, Authentication and Authorization, Secure Socket layer, Transport layer Security, Session Management-Input Validation

UNIT 2 SECURE DEVELOPMENT AND DEPLOYMENT 6

Web Applications Security - Security Testing, Security Incident Response Planning,The Microsoft Security Development Lifecycle (SDL), OWASP Comprehensive Lightweight Application Security Process (CLASP), The Software Assurance Maturity Model (SAMM)

UNIT 3 SECURE API DEVELOPMENT 6

API Security- Session Cookies, Token Based Authentication, Securing Natter APIs: Addressing threats with Security Controls, Rate Limiting for Availability, Encryption, Audit logging, Securing service-toservice APIs: API Keys , OAuth2, Securing Microservice APIs: Service Mesh, Locking Down Network Connections, Securing Incoming Requests

UNIT 4 VULNERABILITY ASSESSMENT AND PENETRATION TESTING 6

Vulnerability Assessment Lifecycle, Vulnerability Assessment Tools: Cloud-based vulnerability scanners, Host-based vulnerability scanners, Network-based vulnerability scanners, Database- based vulnerability scanners, Types of Penetration Tests: External Testing, Web Application Testing, Internal Penetration Testing, SSID or Wireless Testing, Mobile Application Testing.

UNIT 5 HACKING TECHNIQUES AND TOOLS 6

Social Engineering, Injection, Cross-Site Scripting(XSS), Broken Authentication and Session Management, Cross-Site Request Forgery, Security Misconfiguration, Insecure Cryptographic Storage, Failure to Restrict URL Access, Tools: Comodo, OpenVAS, Nexpose, Nikto, Burp Suite, etc.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Understanding the basic concepts of web application security and the need for it

CO2: Be acquainted with the process for secure development and deployment of web applications
CO3: Acquire the skill to design and develop Secure Web Applications that use Secure APIs
CO4: Be able to get the importance of carrying out vulnerability assessment and penetration testing
CO5: Acquire the skill to think like a hacker and to use hackers tool sets

TOTAL:60 PERIODS

PRACTICAL EXERCISES:

S.NO	LIST OF EXPERIMENTS
1	Install wireshark and explore the various protocols a. Analyze the difference between HTTP vs HTTPS b. Analyze the various security mechanisms embedded with different protocols.
2	Identify the vulnerabilities using OWASP ZAP tool
3	Create simple REST API using python for following operation GET, PUSH, POST, DELETE
4	Install Burp Suite to do following vulnerabilities SQL injection cross-site scripting (XSS)
5	Attack the website using Social Engineering method

TEXT BOOKS

1. Andrew Hoffman, Web Application Security: Exploitation and Countermeasures for Modern Web Applications, First Edition, 2020, O'Reilly Media, Inc.
2. Bryan Sullivan, Vincent Liu, Web Application Security: A Beginners Guide, 2012, The McGraw Hill Companies.
3. Neil Madden, API Security in Action, 2020, Manning Publications Co., NY, USA.

REFERENCE BOOKS

1. Michael Cross, Developer's Guide to Web Application Security, 2007, Syngress Publishing, Inc.
2. Ravi Das and Greg Johnson, Testing and Securing Web Applications, 2021, Taylor & Francis Group, LLC.
3. Prabath Siriwardena, Advanced API Security, 2020, Apress Media LLC, USA.
4. Malcom McDonald, Web Security for Developers, 2020, No Starch Press, Inc.
5. Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, Gideon Lenkey, and Terron Williams Grey Hat Hacking: The Ethical Hacker's Handbook, Third Edition, 2011, The McGraw-Hill Companies.

CO-PO MAPPING

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5	1	2	2	2	2	-	-	-	-	-	-	1	-	-	-
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
Dr. P. Shanthakumar Professor/Head/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE III

Category : PE

U23ITP31		L	T	P	C
SDG: 4	**SECURITY AND PRIVACY IN CLOUD**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

1 To Introduce Cloud Computing terminology, definition & concepts
2 To understand the security design and architectural considerations for Cloud
3 To understand the Identity, Access control in Cloud
4 To follow best practices for Cloud security using various design patterns
5 To be able to monitor and audit cloud applications for security

UNIT 1 FUNDAMENTALS OF CLOUD SECURITY CONCEPTS **6**

Overview of cloud security- Security Services - Confidentiality, Integrity, Authentication, Nonrepudiation, Access Control - Basic of cryptography - Conventional and public-key cryptography, hash functions, authentication, and digital signatures.

SECURITY DESIGN AND ARCHITECTURE FOR **6**

UNIT 2 **CLOUD**

Access control requirements for Cloud infrastructure - User Identification - Authentication and Authorization - Roles-based Access Control - Multi-factor authentication - Single Sign-on, Identity Federation - Identity providers and service consumers - Storage and network access control options - OS Hardening and minimization - Verified and measured boot - Intruder Detection and prevention

UNIT 3 **ACCESS CONTROL AND IDENTITY MANAGEMENT** **6**

Access control requirements for Cloud infrastructure - User Identification - Authentication and Authorization - Roles-based Access Control - Multi-factor authentication - Single Sign-on, Identity Federation - Identity providers and service consumers - Storage and network access control options - OS Hardening and minimization - Verified and measured boot - Intruder Detection and prevention

UNIT 4 **CLOUD SECURITY DESIGN PATTERNS** **6**

Introduction to Design Patterns, Cloud bursting, Geo-tagging, Secure Cloud Interfaces, Cloud Resource Access Control, Secure On-Premise Internet Access, Secure External Cloud

UNIT 5 **MONITORING, AUDITING AND MANAGEMENT** **6**

Proactive activity monitoring - Incident Response, Monitoring for unauthorized access, malicious traffic, abuse of system privileges - Events and alerts - Auditing – Record generation, Reporting and
Management, Tamper-proofing audit logs, Quality of Services, Secure Management, User management, Identity management, Security Information and Event Management

COURSE OUTCOMES:

At the end of the course, students would

CO1: Understand the cloud concepts and fundamentals.
CO2: Explain the security challenges in the cloud.
CO3: Define cloud policy and Identity and Access Management.
CO4: Understand various risks and audit and monitoring mechanisms in the cloud.
CO5: Define the various architectural and design considerations for security in the cloud.

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO	LIST OF EXPERIMENTS
1	Simulate a cloud scenario using Cloud Sim and run a scheduling algorithm not present in Cloud Sim
2	Simulate resource management using cloud sim
3	Simulate log forensics using cloud sim
4	Simulate a secure file sharing using a cloud sim
5	Implement data anonymization techniques over the simple dataset (masking, k-anonymization, etc)
6	Implement any encryption algorithm to protect the images
7	Implement any image obfuscation mechanism
8	Implement a role-based access control mechanism in a specific scenario
9	Implement an attribute-based access control mechanism based on a particular scenario
10	Develop a log monitoring system with incident management in the cloud

TOTAL:30 PERIODS

TEXT BOOKS

1. Raj Kumar Buyya , James Broberg, andrzejGoscinski, —Cloud Computing:‖, Wiley 2013
2. Dave shackleford, —Virtualization Security‖, SYBEX a wiley Brand 2013.
3. Mather, Kumaraswamy and Latif, —Cloud Security and Privacy‖, OREILLY 2011

REFERENCE BOOKS

1. Mark C. Chu-Carroll —Code in the Cloud‖,CRC Press, 2011
2. Mastering Cloud Computing Foundations and Applications Programming RajkumarBuyya, Christian Vechhiola, S. Tham

CO-PO MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	2	1	2	2	-	-	-	1	1	1	2	2	2	-
2	2	1	-	1	1	-	-	-	2	1	1	2	2	1	-
3	2	2	1	2	2	1	1	-	1	2	1	3	2	2	-
4	3	2	2	1	2	-	-	-	1	1	2	2	3	2	-
5	2	2	1	2	2	-	-	-	1	1	1	2	2	2	-
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

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Mr.P.Jason AP/IT	Dr. P. Shanthakumar Professor/Head/IT
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2. To understand the functions of control plane

U23ITP32 **SOFTWARE DEFINED NETWORKS** **Category : PE**

SDG: 4

L	T	P	C
2	0	2	3

COURSE OBJECTIVE:

1. To understand the need for SDN and its data plane operations
3 To comprehend the migration of networking functions to SDN environment
4. To explore various techniques of network function virtualization
5. To comprehend the concepts behind network virtualization

PROFESSIONAL ELECTIVE III

UNIT 1 **SDN: INTRODUCTION** **6**

Evolving Network Requirements – The SDN Approach – SDN architecture - SDN Data Plane , Control plane and Application Plane

UNIT 2 **SDN DATA PLANE AND CONTROL PLANE** **6**

Data Plane functions and protocols - OpenFLow Protocol - Flow Table - Control Plane Functions - Southbound Interface, Northbound Interface – SDN Controllers - Ryu, OpenDaylight, ONOS - Distributed Controllers

UNIT 3 **SDN APPLICATIONS** **6**

SDN Application Plane Architecture – Network Services Abstraction Layer – Traffic Engineering – Measurement and Monitoring – Security – Data Center Networking

UNIT 4 **NETWORK FUNCTION VIRTUALIZATION** **6**

Network Virtualization - Virtual LANs – OpenFlow VLAN Support - NFV Concepts – Benefits and Requirements – Reference Architecture

UNIT 5 **NFV FUNCTIONALITY** **6**

NFV Infrastructure – Virtualized Network Functions – NFV Management and Orchestration – NFV Use cases – SDN and NFV

COURSE OUTCOMES:

At the end of the course, students would

CO1: Describe the motivation behind SDN
CO2: Identify the functions of the data plane and control plane
CO3: Design and develop network applications using SDN
CO4: Orchestrate network services using NFV
CO5: Explain various use cases of SDN and NFV

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO	LIST OF EXPERIMENTS
1	Setup your own virtual SDN lab i) Virtualbox/Mininet Environment for SDN - http://mininet.org ii) https://www.kathara.org iii) GNS3
2	Create a simple mininet topology with SDN controller and use Wireshark to capture and visualize the OpenFlow messages such as OpenFlow FLOW MOD, PACKET IN, PACKET OUT etc.
3	Create a SDN application that uses the Northbound API to program flow table rules on the switch for various use cases like L2 learning switch, Traffic Engineering, Firewall etc.
4	Create a simple end-to-end network service with two VNFs using vim-emu https://github.com/containernet/vim-emu
5	Install OSM and onboard and orchestrate network service

TOTAL:30 PERIODS

TEXT BOOKS

1. William Stallings, "Foundations of Modern Networking: SDN, NFV, QoE, IoT and Cloud", Pearson Education, 1st Edition, 2015.

REFERENCES

1. Ken Gray, Thomas D. Nadeau, "Network Function Virtualization", Morgan Kauffman, 2016.
2. Thomas D Nadeau, Ken Gray, "SDN: Software Defined Networks", O'Reilly Media, 2013.
3. Fei Hu, "Network Innovation through OpenFlow and SDN: Principles and Design", 1st Edition, CRC Press, 2014.
4. Paul Goransson, Chuck Black Timothy Culver, "Software Defined Networks: A Comprehensive Approach", 2nd Edition, Morgan Kaufmann Press, 2016.
5. Oswald Coker, Siamak Azodolmolky, "Software-Defined Networking with OpenFlow", 2nd Edition, O'Reilly Media, 2017

CO-PO MAPPING

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Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

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Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE III

Category : PE

		L	T	P	C
U23ITP33					
SDG: 4	**SOFT COMPUTING**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

1. To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience.
2. To provide the mathematical background for carrying out the optimization associated with neural network learning
3. To learn various evolutionary Algorithms.
4. To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inference systems.
5. To introduce case studies utilizing the above and illustrate the Intelligent behavior of programs based on soft computing

UNIT 1 INTRODUCTION TO SOFT COMPUTING AND FUZZY LOGIC 6

Introduction - Fuzzy Logic - Fuzzy Sets, Fuzzy Membership Functions, Operations on Fuzzy Sets, Fuzzy Relations, Operations on Fuzzy Relations, Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems

UNIT 2 NEURAL NETWORKS 6

Supervised Learning Neural Networks – Perceptrons - Backpropagation -Multilayer Perceptrons – Unsupervised Learning Neural Networks – Kohonen Self-Organizing Networks

UNIT 3 GENETIC ALGORITHMS 6

Chromosome Encoding Schemes -Population initialization and selection methods - Evaluation function - Genetic operators- Cross over – Mutation - Fitness Function – Maximizing function

UNIT 4 NEURO FUZZY MODELING **6**

ANFIS architecture – hybrid learning – ANFIS as universal approximator – Coactive Neuro fuzzy modeling – Framework – Neuron functions for adaptive networks – Neuro fuzzy spectrum - Analysis of Adaptive Learning Capability.

UNIT 5 APPLICATIONS 6

Modeling a two input sine function - Printed Character Recognition – Fuzzy filtered neural networks – Plasma Spectrum Analysis – Hand written neural recognition - Soft Computing for Color Recipe Prediction.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Understandthefundamentalsoffuzzylogicoperatorsandinferencemechanisms
CO2: UnderstandneuralnetworkarchitectureforAIapplicationssuchasclassificationand clustering
CO3: LearnthefunctionalityofGeneticAlgorithmsinOptimizationproblems
CO4: Use hybrid techniques involving Neural networks and Fuzzy logic
CO5: Apply soft computing techniques in real world applications

PRACTICAL EXERCISES **TOTAL:30 PERIODS**

1. Implementation of fuzzy control/ inference system
2. Programming exercise on classification with a discrete perceptron
3. Implementation of XOR with backpropagation algorithm

4. Implementation of self organizing maps for a specific application
5. Programming exercises on maximizing a function using Genetic algorithm
6. Implementation of two input sine function
7. Implementation of three input non linear function

TOTAL:30 PERIODS

TEXT BOOKS

1. SaJANG, J.-S. R., SUN, C.-T., & MIZUTANI, E. (1997). Neuro-fuzzy and soft computing: A computational approach to learning and machine intelligence. Upper Saddle River, NJ, Prentice Hall,1997
2. Himanshu Singh,Yunis Ahmad Lone, Deep Neuro-Fuzzy Systems with Python
3. With Case Studies and Applications from the Industry, Apress, 2020

REFERENCES

1. roj Kaushik and Sunita Tiwari, Soft Computing-Fundamentals Techniques and Applications, 1st Edition, McGraw Hill, 2018.
2. S. Rajasekaran and G.A.V.Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithms”, PHI, 2003.
3. Samir Roy, Udit Chakraborthy, Introduction to Soft Computing, Neuro Fuzzy and Genetic Algorithms, Pearson Education, 2013.
4. S.N. Sivanandam, S.N. Deepa, Principles of Soft Computing, Third Edition, Wiley India Pvt Ltd, 2019.
5. R.Eberhart, P.Simpson and R.Dobbins, “Computational Intelligence - PC Tools”, AP Professional, Boston, 1996

CO-PO MAPPING

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Correlation levels:1 –low 2 – medium 3 – high “-“-no correlation															

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PROFESSIONAL ELECTIVE III

Category : PE

U23ITP34	**L**	**T**	**P**	**C**
STREAM PROCESSING	**2**	**0**	**2**	**3**

SDG: 4

COURSE OBJECTIVE:

1 Introduce Data Processing terminology, definition & concepts
2 Define different types of Data Processing
3 Explain the concepts of Real-time Data processing
4 Select appropriate structures for designing and running real-time data services in a business environment
5 Illustrate the benefits and drive the adoption of real-time data services to solve real world problems

UNIT 1 FOUNDATIONS OF DATA SYSTEMS 6

Introduction to Data Processing, Stages of Data processing, Data Analytics, Batch Processing, Stream processing, Data Migration, Transactional Data processing, Data Mining, Data Management Strategy, Storage, Processing, Integration, Analytics, Benefits of Data as a Service, Challenges

UNIT 2 REAL-TIME DATA PROCESSING 6

Introduction to Big data, Big data infrastructure, Real-time Analytics, Near real-time solution, Lambda architecture, Kappa Architecture, Stream Processing,Understanding Data Streams, Message Broker, Stream Processor, Batch & Real-time ETL tools, Streaming Data Storage

UNIT 3 DATA MODELS AND QUERY LANGUAGES 6

Relational Model, Document Model, Key-Value Pairs, NoSQL, Object-Relational Mismatch, Many-toOne and Many-to-Many Relationships, Network data models, Schema Flexibility, Structured Query Language, Data Locality for Queries, Declarative Queries, Graph Data models, Cypher Query Language, Graph Queries in SQL, The Semantic Web, CODASYL, SPARQL

UNIT 4 EVENT PROCESSING WITH APACHE KAFKA 6

Apache Kafka, Kafka as Event Streaming platform, Events, Producers, Consumers, Topics, Partitions, Brokers, Kafka APIs, Admin API, Producer API, Consumer API, Kafka Streams API, Kafka Connect API

REAL-TIME PROCESSING USING SPARK

UNIT 5 STREAMING 6

Structured Streaming, Basic Concepts, Handling Event-time and Late Data, Fault-tolerant Semantics, Exactly-once Semantics, Creating Streaming Datasets, Schema Inference, Partitioning of Streaming datasets, Operations on Streaming Data, Selection, Aggregation, Projection, Watermarking, Window operations, Types of Time windows, Join Operations, Deduplication

COURSE OUTCOMES:

At the end of the course, students would

CO1: Understand the applicability and utility of different streaming algorithms.
CO2: Describe and apply current research trends in data-stream processing.
CO3: Analyze the suitability of stream mining algorithms for data stream systems.
CO4: Program and build stream processing systems, services and applications.
CO5: Solve problems in real-world applications that process data streams.

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO	LIST OF EXPERIMENTS
1	Install MongoDB
2	Design and Implement Simple application using MongoDB
3	Query the designed system using MongoDB
4	Create a Event Stream with Apache Kafka
5	Create a Real-time Stream processing application using Spark Streaming
6	Build a Micro-batch application
7	Real-time Fraud and Anomaly Detection,
8	Real-time personalization, Marketing, Advertising

TOTAL:30 PERIODS

TEXT BOOKS

1. Streaming Systems: The What, Where, When and How of Large-Scale Data Processing by Tyler Akidau, Slava Chemyak, Reuven Lax, O'Reilly publication
2. Designing Data-Intensive Applications by Martin Kleppmann, O'Reilly Media
3. Practical Real-time Data Processing and Analytics : Distributed Computing and Event Processing using Apache Spark, Flink, Storm and Kafka, Packt Publishing

REFERENCES

1. https://spark.apache.org/docs/latest/streaming-programming-guide.html
2. Kafka.apache.org

CO-PO MAPPING

CO	PO												PSO		
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PROFESSIONAL ELECTIVE III

		Category : PE			
U23ITP35		**L**	**T**	**P**	**C**
SDG: 4	**DATA WAREHOUSING**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

1 To know the details of data warehouse Architecture
2 To understand the OLAP Technology
3 To understand the partitioning strategy
4 To differentiate various schema
5 To understand the roles of process manager & system manager

UNIT 1 INTRODUCTION TO DATA WAREHOUSE 6

Datawarehouse Introduction - Data warehouse components- operational database Vs data warehouse – Data warehouse Architecture – Three-tier Data Warehouse Architecture - Autonomous Data Warehouse- Autonomous Data Warehouse Vs Snowflake - Modern Data Warehouse

UNIT 2 ETL AND OLAP TECHNOLOGY 6

What is ETL – ETL Vs ELT – Types of Data warehouses - Data warehouse Design and Modeling - Delivery Process - Online Analytical Processing (OLAP) - Characteristics of OLAP - Online Transaction Processing (OLTP) Vs OLAP - OLAP operations- Types of OLAP- ROLAP Vs MOLAP Vs HOLAP.

UNIT 3 META DATA, DATA MART AND PARTITION STRATEGY 6

Meta Data – Categories of Metadata – Role of Metadata – Metadata Repository – Challenges for Meta Management - Data Mart – Need of Data Mart- Cost Effective Data Mart- Designing Data Marts- Cost of Data Marts- Partitioning Strategy – Vertical partition – Normalization – Row Splitting – Horizontal Partition

UNIT 4 DIMENSIONAL MODELING AND SCHEMA 6

Dimensional Modeling- Multi-Dimensional Data Modeling – Data Cube- Star Schema- Snowflake schema- Star Vs Snowflake schema- Fact constellation Schema- Schema Definition - Process Architecture- Types of Data Base Parallelism – Datawarehouse Tools

UNIT 5 SYSTEM & PROCESS MANAGERS 6

Data Warehousing System Managers: System Configuration Manager- System Scheduling Manager - System Event Manager - System Database Manager - System Backup Recovery Manager - Data

Warehousing Process Managers: Load Manager – Warehouse Manager- Query Manager – Tuning – Testing

COURSE OUTCOMES:

At the end of the course, students would

CO1: Design data warehouse architecture for various Problems
CO2: Apply the OLAP Technology
CO3: Analyse the partitioning strategy
CO4: Critically analyze the differentiation of various schema for given problem
CO5: Frame roles of process manager & system manager

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO	LIST OF EXPERIMENTS
1	Data exploration and integration with WEKA
2	Apply weka tool for data validation
3	Plan the architecture for real time application
4	Write the query for schema definition
5	Design data ware house for real time applications
6	Analyse the dimensional Modeling
7	Case study using OLAP
8	Case study using OTLP

TEXT BOOKS

1. Alex Berson and Stephen J. Smith “Data Warehousing, Data Mining & OLAP”, Tata McGraw – Hill Edition, Thirteenth Reprint 2008.
2. Ralph Kimball, “The Data Warehouse Toolkit: The Complete Guide to Dimensional Modeling”, Third edition, 2013.

REFERENCES

1. Paul Raj Ponniah, “Data warehousing fundamentals for IT Professionals”, 2012.
2. K.P. Soman, ShyamDiwakar and V. Ajay “Insight into Data mining Theory and Practice”, Easter Economy Edition, Prentice Hall of India, 2006

CO-PO MAPPING

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3	3	3	3	3	-	-	-	-	-	-	-	3	3	3	3
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Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
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Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE III

		Category : PE			
U23ITPE36		**L**	**T**	**P**	**C**
SDG: 4	**CLOUD COMPUTING**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

1 To understand the principles of cloud architecture, models and infrastructure.
2 To understand the concepts of virtualization and virtual machines.
3 To gain knowledge about virtualization Infrastructure.
4 To explore and experiment with various Cloud deployment environments. To learn about the security issues in the cloud environment 5

UNIT 1 **CLOUD ARCHITECTURE MODELS AND INFRASTRUCTURE** **6**

Cloud Architecture: System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture – Cloud deployment models – Cloud service models; Cloud Infrastructure: Architectural Design of Compute and Storage Clouds – Design Challenges

UNIT 2 **VIRTUALIZATION BASICS** **6**

Virtual Machine Basics – Taxonomy of Virtual Machines – Hypervisor – Key Concepts – Virtualization structure – Implementation levels of virtualization – Virtualization Types: Full Virtualization – Para Virtualization – Hardware Virtualization – Virtualization of CPU, Memory and I/O devices.

UNIT 3 **VIRTUALIZATION INFRASTRUCTURE AND DOCKER** **6**

Desktop Virtualization – Network Virtualization – Storage Virtualization – System-level of Operating Virtualization – Application Virtualization – Virtual clusters and Resource Management – Containers vs. Virtual Machines – Introduction to Docker – Docker Components – Docker Container – Docker Images and Repositories.

UNIT 4 **CLOUD DEPLOYMENT ENVIRONMENT** **6**

Hacking Google App Engine – Amazon AWS – Microsoft Azure; Cloud Software Environments – Eucalyptus – OpenStack

UNIT 5 CLOUD SECURITY **6**

Virtualization System-Specific Attacks: Guest hopping – VM migration attack – hyperjacking. Data Security and Storage; Identity and Access Management (IAM) - IAM Challenges - IAM Architecture and Practice

COURSE OUTCOMES:

At the end of the course, students would

CO1: Understand the design challenges in the cloud.
CO2: Apply the concept of virtualization and its types.
CO3: Experiment with virtualization of hardware resources and Docker.
CO4: Develop and deploy services on the cloud and set up a cloud environment.
CO5: Explain security challenges in the cloud environment.

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO	LIST OF EXPERIMENTS
1	Install Virtualbox/VMware/ Equivalent open source cloud Workstation with different flavours of Linux or Windows OS on top of windows 8 and above.
2	Install a C compiler in the virtual machine created using a virtual box and execute Simple Programs
3	Install Google App Engine. Create a hello world app and other simple web applications using python/java
4	Use the GAE launcher to launch the web applications.
5	Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
6	Find a procedure to transfer the files from one virtual machine to another virtual m 7 Install Hadoop single node cluster and run simple applications like wordcount.
8	Creating and Executing Your First Container Using Docker.
9	Run a Container from Docker Hub

TOTAL:30 PERIODS

TEXT BOOKS

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, “Distributed and Cloud Computing, From Parallel Processing to the Internet of Things”, Morgan Kaufmann Publishers, 2012.
2. James Turnbull, “The Docker Book”, O’Reilly Publishers, 2014.
3. Krutz, R. L., Vines, R. D, “Cloud security. A Comprehensive Guide to Secure Cloud Computing”, Wiley Publishing, 2010.

REFERENCE BOOKS

1. James E. Smith, Ravi Nair, “Virtual Machines: Versatile Platforms for Systems and Processes”, Elsevier/Morgan Kaufmann, 2005.
2. Tim Mather, Subra Kumaraswamy, and Shahed Latif, “Cloud Security and Privacy: an enterprise perspective on risks and compliance”, O’Reilly Media, Inc., 2009

CO-PO MAPPING

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Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
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Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE III

Category : PE

		L	T	P	C
U23ITP37					
SDG: 4	**CLOUD SERVICES MANAGEMENT**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

1. Introduce Cloud Service Management terminology, definition & concepts
2. Compare and contrast cloud service management with traditional IT service management
3. Identify strategies to reduce risk and eliminate issues associated with adoption of cloud services
4. Select appropriate structures for designing, deploying and running cloud-based services in a business environment
5. Illustrate the benefits and drive the adoption of cloud-based services to solve real world problems

CLOUD SERVICE MANAGEMENT

UNIT 1 **FUNDAMENTALS** **6**

Cloud Ecosystem, The Essential Characteristics, Basics of Information Technology Service Management and Cloud Service Management, Service Perspectives, Cloud Service Models, Cloud Service Deployment Models

UNIT 2 **CLOUD SERVICES STRATEGY** **6**

Cloud Strategy Fundamentals, Cloud Strategy Management Framework, Cloud Policy, Key Driver for Adoption, Risk Management, IT Capacity and Utilization, Demand and Capacity matching, Demand Queueing, Change Management, Cloud Service Architecture

UNIT 3 **CLOUD SERVICE MANAGEMENT** **6**

Cloud Service Reference Model, Cloud Service LifeCycle, Basics of Cloud Service Design, Dealing with Legacy Systems and Services, Benchmarking of Cloud Services, Cloud Service Capacity Planning, Cloud Service Deployment and Migration, Cloud Marketplace, Cloud Service Operations Management

UNIT 4 **CLOUD SERVICE ECONOMICS** **6**

Pricing models for Cloud Services, Freemium, Pay Per Reservation, Pay per User, Subscription based Charging, Procurement of Cloud-based Services, Capex vs Opex Shift, Cloud service Charging, Cloud Cost Models.

UNIT 5 **CLOUD SERVICE GOVERNANCE & VALUE** **6**

IT Governance Definition, Cloud Governance Definition, Cloud Governance Framework, Cloud Governance Structure, Cloud Governance Considerations, Cloud Service Model Risk Matrix, Understanding Value of Cloud Services, Measuring the value of Cloud Services, Balanced Scorecard, Total Cost of Ownership.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Exhibit cloud-design skills to build and automate business solutions using cloud technologies.

CO2: Possess Strong theoretical foundation leading to excellence and excitement towards adoption of cloud-based services

CO3: Solve the real world problems using Cloud services and technologies

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO	LIST OF EXPERIMENTS
1	Create a Cloud Organization in AWS/Google Cloud/or any equivalent Open Source cloud softwares like Openstack, Eucalyptus, OpenNebula with Role-based access control
2	Create a Cost-model for a web application using various services and do Cost-benefit analysis
3	Create alerts for usage of Cloud resources
4	Create Billing alerts for your Cloud Organization
5	Compare Cloud cost for a simple web application across AWS, Azure and GCP and suggest the best one

TOTAL:30 PERIODS

TEXT BOOKS

1. Cloud Service Management and Governance: Smart Service Management in Cloud Era by Enamul Haque, Enel Publications
2. Cloud Computing: Concepts, Technology & Architecture by Thomas Erl, Ricardo Puttini, Zaigham Mohammad 2013
3. Cloud Computing Design Patterns by Thomas Erl, Robert Cope, Amin Naserpour

REFERENCE BOOKS

1. Economics of Cloud Computing by Praveen Ayyappa, LAP Lambert Academic Publishing
2. Mastering Cloud Computing Foundations and Applications Programming Rajkumar Buyya, Christian Vechhiola, S. Thamarai Selvi

CO-PO MAPPING

CO	PO												PSO		
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Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	**APPROVED BY**
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Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE IV

Category : PE

		L	T	P	C
U23ITP41	**CRYPTOCURRENCY AND BLOCKCHAIN TECHNOLOGIES**	**2**	**0**	**2**	**3**
SDG: 4					

COURSE OBJECTIVE:

1 To understand the basics of Blockchain
2 To learn Different protocols and consensus algorithms in Blockchain
3 To learn the Blockchain implementation frameworks
4 To understand the Blockchain Applications
5 To experiment the Hyperledger Fabric, Ethereum networks

UNIT 1 INTRODUCTION TO BLOCKCHAIN 6

Blockchain- Public Ledgers, Blockchain as Public Ledgers - Block in a Blockchain, TransactionsThe Chain and the Longest Chain - Permissioned Model of Blockchain, Cryptographic -Hash Function, Properties of a hash function-Hash pointer and Merkle tree

UNIT 2 BITCOIN AND CRYPTOCURRENCY 6

A basic crypto currency, Creation of coins, Payments and double spending, FORTH – the precursor for Bitcoin scripting, Bitcoin Scripts , Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay

UNIT 3 BITCOIN CONSENSUS 6

Bitcoin Consensus, Proof of Work (PoW)- Hashcash PoW , Bitcoin PoW, Attacks on PoW ,monopoly problem- Proof of Stake- Proof of Burn - Proof of Elapsed Time - Bitcoin Miner, Mining Difficulty, Mining Pool-Permissioned model and use cases.

UNIT 4 HYPERLEDGER FABRIC & ETHEREUM 6

Architecture of Hyperledger fabric v1.1- chain code- Ethereum: Ethereum network, EVM, Transaction fee, Mist Browser, Ether, Gas, Solidity.

UNIT 5 BLOCKCHAIN APPLICATIONS 6

Smart contracts, Truffle Design and issue- DApps- NFT. Blockchain Applications in Supply Chain Management, Logistics, Smart Cities, Finance and Banking, Insurance,etc- Case Study.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Understand emerging abstract models for Blockchain Technology
Identify major research challenges and technical gaps existing between theory and practice in the crypto currency domain.

CO2: It provides conceptual understanding of the function of Blockchain as a method of securing

CO3: distributed ledgers, how consensus on their contents is achieved, and the new applications that they enable

CO4: Apply hyperledger Fabric and Ethereum platform to implement the Block chain Application

CO5: Apply Smart Contracts to emerging systems.

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO	**LIST OF EXPERIMENTS**
1	Install and understand Docker container, Node.js, Java and Hyperledger Fabric, Ethereum and perform necessary software installation on local machine/create instance on cloud to run.
2	Create and deploy a blockchain network using Hyperledger Fabric SDK for Java Set up and initialize the channel, install and instantiate chain code, and perform invoke and query on your blockchain network.
3	Interact with a blockchain network. Execute transactions and requests against a blockchain network by creating an app to test the network and its rules.
4	Deploy an asset-transfer app using blockchain. Learn app development within a Hyperledger Fabric network.
5	Use blockchain to track fitness club rewards. Build a web app that uses Hyperledger Fabric to track and trace member rewards.

TOTAL:30 PERIODS

TEXT BOOKS

1. Bashir and Imran, Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks, 2017.
2. Andreas Antonopoulos, “Mastering Bitcoin: Unlocking Digital Cryptocurrencies”, O’Reilly, 2014

REFERENCE BOOKS

1 Black 1. Daniel Drescher, “Blockchain Basics”, First Edition, Apress, 2017.
2. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton University Press, 2016.
3. Melanie Swan, “Blockchain: Blueprint for a New Economy”, O’Reilly, 2015
4. Ritesh Modi, “Solidity Programming Essentials: A Beginner’s Guide to Build Smart Contracts for Ethereum and Blockchain”, Packt Publishing
5. Handbook of Research on Blockchain Technology, published by Elsevier Inc. ISBN: 9780128198162, 2020.

Python: Python Programming for Hackers and Pentesters, Justin Seitz , 2014.

CO-PO MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
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5	2	2	1	2	2	-	-	-	1	1	1	2	2	2	-
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
Mrs. K.J.Godlin Debby AP/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE IV

U23ITP42 **Category : PE**

		L	T	P	C
SDG: 4	**DIGITAL AND MOBILE FORENSICS**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

1 To develop semantic web related simple applications
2 To explain Privacy and Security issues in Social Networking
3 To explain the data extraction and mining of social networks
4 To discuss the prediction of human behavior in social communities
5 To describe the Access Control, Privacy and Security management of social networks

UNIT 1 INTRODUCTION TO DIGITAL FORENSICS 6

Forensic Science – Digital Forensics – Digital Evidence – The Digital Forensics Process – Introduction – The Identification Phase – The Collection Phase – The Examination Phase – The Analysis Phase – The Presentation Phase

UNIT 2 DIGITAL CRIME AND INVESTIGATION 6

Digital Crime – Substantive Criminal Law – General Conditions – Offenses – Investigation Methods for Collecting Digital Evidence – International Cooperation to Collect Digital Evidence

UNIT 3 DIGITAL FORENSIC READINESS 6

Introduction – Law Enforcement versus Enterprise Digital Forensic Readiness – Rationale for Digital Forensic Readiness – Frameworks, Standards and Methodologies – Enterprise Digital Forensic Readiness – Challenges in Digital Forensics

UNIT 4 iOS FORENSICS 6

Mobile Hardware and Operating Systems - iOS Fundamentals – Jailbreaking – File System – Hardware – iPhone Security – iOS Forensics – Procedures and Processes – Tools – Oxygen Forensics – MobilEdit – iCloud

UNIT 5 ANDROID FORENSICS 6

Android basics – Key Codes – ADB – Rooting Android – Boot Process – File Systems – Security – Tools Android Forensics – Forensic Procedures – ADB – Android Only Tools – Dual Use Tools – Oxygen Forensics – MobilEdit – Android App Decompiling

COURSE OUTCOMES:

At the end of the course, students would

CO1: Have knowledge on digital forensics.
CO2: Know about digital crime and investigations
CO3: Be forensic ready.
CO4: Investigate, identify and extract digital evidence from iOS devices
CO5: Investigate, identify and extract digital evidence from Android devices

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO LIST OF EXPERIMENTS

1 Installation of Sleuth Kit on Linux. List all data blocks. Analyze allocated as well as Unallocated blocks of a disk image.
2. Data extraction from call logs using Sleuth Kit.
3. Data extraction from SMS and contacts using Sleuth Kit.
4. Install Mobile Verification Toolkit or MVT and decrypt encrypted iOS backups.
5. Process and parse records from the iOS system.
6. Extract installed applications from Android devices.
7. Extract diagnostic information from Android devices through the adb protocol.

TOTAL:30 PERIODS

TEXT BOOKS

1. Andre Arnes, "Digital Forensics", Wiley, 2018.
2. Chuck Easttom, "An In-depth Guide to Mobile Device Forensics", First Edition, CRC Press, 2022.

REFERENCE BOOKS

1. Vacca, J, Computer Forensics, Computer Crime Scene Investigation, 2nd Ed, Charles River Media, 2005, ISBN: 1-58450-389.

CO-PO MAPPING

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Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
Mrs. Franklin Doli AP?IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE IV

Category : PE

		L	T	P	C
U23ITP43					
SDG: 4	**SOCIAL NETWORK SECURITY**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

1 To develop semantic web related simple applications
2 To explain Privacy and Security issues in Social Networking
3 To explain the data extraction and mining of social networks
4 To discuss the prediction of human behavior in social communities
5 To describe the Access Control, Privacy and Security management of social networks

UNIT 1 FUNDAMENTALS OF SOCIAL NETWORKING 6

Introduction to Semantic Web, Limitations of current Web, Development of Semantic Web, Emergence of the Social Web, Social Network analysis, Development of Social Network Analysis, Key concepts and measures in network analysis, Historical overview of privacy and security, Major paradigms, for understanding privacy and security

UNIT 2 SECURITY ISSUES IN SOCIAL NETWORKS 6

The evolution of privacy and security concerns with networked technologies, Contextual influences on privacy attitudes and behaviors, Anonymity in a networked world

UNIT 3 EXTRACTION AND MINING IN SOCIAL NETWORKING DATA 6

Extracting evolution of Web Community from a Series of Web Archive, Detecting communities in social networks, Definition of community, Evaluating communities, Methods for community detection and mining, Applications of community mining algorithms, Tools for detecting communities social network infrastructures and communities, Big data and Privacy

UNIT 4 PREDICTING HUMAN BEHAVIOR AND PRIVACY ISSUES 6

Understanding and predicting human behavior for social communities, User data Management, Inference and Distribution, Enabling new human experiences, Reality mining, Context, Awareness, Privacy in online social networks, Trust in online environment, What is Neo4j, Nodes, Relationships, Properties

UNIT 5 **ACCESS CONTROL, PRIVACY AND IDENTITY MANAGEMENT** **6**

Understand the access control requirements for Social Network, Enforcing Access Control Strategies, Authentication and Authorization, Roles-based Access Control, Host, storage and network access control options, Firewalls, Authentication, and Authorization in Social Network, Identity & Access Management, Single Sign-on, Identity Federation, Identity providers and service consumers, The role of Identity provisioning

COURSE OUTCOMES:

At the end of the course, students would

CO1: Develop semantic web related simple applications
CO2: Address Privacy and Security issues in Social Networking
CO3: Explain the data extraction and mining of social networks
CO4: Discuss the prediction of human behavior in social communities
CO5: Describe the applications of social networks

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO	**LIST OF EXPERIMENTS**
1	Design own social media application
2	Create a Network model using Neo4j
3	Read and write Data from Graph Database
4	Find “Friend of Friends” using Neo4j
5	Implement secure search in social media
6	Create a simple Security & Privacy detector

TOTAL:30 PERIODS

TEXT BOOKS

1. Andre Arnes, “Digital Forensics”, Wiley, 2018.
2. Chuck Easttom, “An In-depth Guide to Mobile Device Forensics”, First Edition, CRC Press, 2022.

REFERENCE BOOKS

1. Vacca, J, Computer Forensics, Computer Crime Scene Investigation, 2nd Ed, Charles River Media, 2005, ISBN: 1-58450-389.

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Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
Mrs. Mrs. K.J.Godlin Debby AP/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE IV

Category : PE

		L	T	P	C
U23ITP44					
SDG: 4	**ETHICAL HACKING**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

1 To understand the basics of computer based vulnerabilities
2 To explore different foot printing, reconnaissance and scanning methods.
3 To expose the enumeration and vulnerability analysis methods
4 To understand hacking options available in Web and wireless applications.
5 To explore the options for network protection

UNIT 1 INTRODUCTION 6

Ethical Hacking Overview - Role of Security and Penetration Testers .- Penetration-Testing Methodologies- Laws of the Land - Overview of TCP/IP- The Application Layer - The Transport Layer - The Internet Layer - IP Addressing .- Network and Computer Attacks - Malware - Protecting Against Malware Attacks.- Intruder Attacks - Addressing Physical Security

UNIT 2 FOOT PRINTING, RECONNAISSANCE AND SCANNING NETWORKS 6

Footprinting Concepts - Footprinting through Search Engines, Web Services, Social Networking Sites, Website, Email - Competitive Intelligence - Footprinting through Social Engineering - Footprinting Tools - Network Scanning Concepts - Port-Scanning Tools - Scanning Techniques - Scanning Beyond IDS and Firewall

UNIT 3 ENUMERATION AND VULNERABILITY ANALYSIS 6

Enumeration Concepts - NetBIOS Enumeration – SNMP, LDAP, NTP, SMTP and DNS Enumeration - Vulnerability Assessment Concepts - Desktop and Server OS Vulnerabilities - Windows OS Vulnerabilities - Tools for Identifying Vulnerabilities in Windows- Linux OS Vulnerabilities- Vulnerabilities of Embedded Oss

UNIT 4 SYSTEM HACKING 6

Hacking Web Servers - Web Application Components- Vulnerabilities - Tools for Web Attackers and Security Testers Hacking Wireless Networks - Components of a Wireless Network – Wardriving- Wireless Hacking - Tools of the Trade

UNIT 5 NETWORK PROTECTION SYSTEMS 6

Access Control Lists. - Cisco Adaptive Security Appliance Firewall - Configuration and Risk Analysis Tools for Firewalls and Routers - Intrusion Detection and Prevention Systems - NetworkBased and HostBased IDSs and IPSs - Web Filtering - Security Incident Response Teams – Honeypots.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Comprehensively explain the analysis phases of compiler and develop scanners and parsers.
CO2: Manage type checking for a given language specification
CO3: Generate the intermediate representation of programs
CO4: Produce the target machine code using the runtime environment
CO5: Transform given code into an optimized code by applying various optimization techniques

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO	**LIST OF EXPERIMENTS**
1	Install Kali or Backtrack Linux / Metasploitable/ Windows XP
2	Practice the basics of reconnaissance.
3	Using FOCA / SearchDiggity tools, extract metadata and expanding the target list.
4	Aggregates information from public databases using online free tools like Paterva's Maltego.
5	Information gathering using tools like Robtex.
6	Scan the target using tools like Nessus.

TOTAL:30 PERIODS

TEXT BOOKS

1. Michael T. Simpson, Kent Backman, and James E. Corley, Hands-On Ethical Hacking and Network Defense, Course Technology, Delmar Cengage Learning, 2010.
2. The Basics of Hacking and Penetration Testing - Patrick Engebretson, SYNGRESS, Elsevier, 2013.
3. The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws, Dafydd Stuttard and Marcus Pinto, 2011.

REFERENCE BOOKS

1 Black Hat Python: Python Programming for Hackers and Pentesters, Justin Seitz , 2014.

CO-PO MAPPING

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Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
Mr. K.Nagaraj AP/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE IV

Category : PE

		L	T	P	C
U23ITP45					
SDG: 4	**NETWORK SECURITY**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

1 To learn the fundamentals of cryptography
2 To learn the key management techniques and authentication approaches.
3 To explore the network and transport layer security techniques.
4 To understand the application layer security standards.
5 To learn the real time security practices.

UNIT 1 INTRODUCTION 6

Basics of cryptography, conventional and public-key cryptography, hash functions, authentication, and digital signatures.

UNIT 2 KEY MANAGEMENT AND AUTHENTICATION 6

Key Management and Distribution: Symmetric Key Distribution, Distribution of Public Keys, X.509 Certificates, Public-Key Infrastructure. User Authentication: Remote User-Authentication Principles, Remote User-Authentication Using Symmetric Encryption, Kerberos Systems, Remote User Authentication Using Asymmetric Encryption.

UNIT 3 ACCESS CONTROL AND SECURITY 6

Network Access Control: Network Access Control, Extensible Authentication Protocol, IEEE 802.1X Port-Based Network Access Control - IP Security - Internet Key Exchange (IKE). Transport-Level Security: Web Security Considerations, Secure Sockets Layer, Transport Layer Security, HTTPS standard, Secure Shell (SSH) application

UNIT 4 APPLICATION LAYER SECURITY 6

Electronic Mail Security: Pretty Good Privacy, S/MIME, DomainKeys Identified Mail. Wireless Network Security: Mobile Device Security

UNIT 5 SECURITY PRACTICES 6

Firewalls and Intrusion Detection Systems: Intrusion Detection Password Management, Firewall Characteristics Types of Firewalls, Firewall Basing, Firewall Location and Configurations. Blockchains, Cloud Security and IoT security

TOTAL:30 PERIODS

COURSE OUTCOMES:

At the end of the course, students would

CO1: Classify the encryption techniques
CO2: Illustrate the key management technique and authentication.
CO3: Evaluate the security techniques applied to network and transport layer
CO4: Discuss the application layer security standards.
CO5: Apply security practices for real time applications.

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO	**LIST OF EXPERIMENTS**
1	Implement symmetric key algorithms
2	Implement asymmetric key algorithms and key exchange algorithms
3	Implement digital signature schemes
4	Installation of Wire shark, tcpdump and observe data transferred in client-server communication using UDP TCP and identify the UDP/TCP datagram.
5	Check message integrity and confidentiality using SSL
6	Experiment Eavesdropping, Dictionary attacks, MITM attacks
7	Experiment with Sniff Traffic using ARP Poisoning
8	Demonstrate intrusion detection system using any tool.
9	Explore network monitoring tools
10	Study to configure Firewall, VPN

TEXT BOOKS

1. Cryptography and Network Security: Principles and Practice, 6th Edition, William Stallings, 2014, Pearson, ISBN 13:9780133354690.

REFERENCE BOOKS

2. Network Security: Private Communications in a Public World, M. Speciner, R. Perlman, C. Kaufman, Prentice Hall, 2002.
3. Linux iptables Pocket Reference, Gregor N. Purdy, O'Reilly, 2004, ISBN-13: 978- 0596005696.
4. Linux Firewalls, by Michael Rash, No Starch Press, October 2007, ISBN: 978-1-59327- 141-1.
5. Network Security, Firewalls And VPNs, J. Michael Stewart, Jones & Bartlett Learning, 2013, ISBN-10: 1284031675, ISBN-13: 978-1284031676.
6. The Network Security Test Lab: A Step-By-Step Guide, Michael Gregg, Dreamtech Press, 2015, ISBN10:8126558148, ISBN-13: 978-8126558148.

CO-PO MAPPING

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Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
Mrs. K.J.Godlin Debby AP/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE IV

Category : PE

U23ITP31		**L**	**T**	**P**	**C**
SDG: 4	**SECURITY AND PRIVACY IN CLOUD**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

1. To Introduce Cloud Computing terminology, definition & concepts
2. To understand the security design and architectural considerations for Cloud
3. To understand the Identity, Access control in Cloud
4. To follow best practices for Cloud security using various design patterns
5. To be able to monitor and audit cloud applications for security

UNIT 1 **FUNDAMENTALS OF CLOUD SECURITY CONCEPTS** **6**

Overview of cloud security- Security Services - Confidentiality, Integrity, Authentication, Nonrepudiation, Access Control - Basic of cryptography - Conventional and public-key cryptography, hash functions, authentication, and digital signatures.

UNIT 2 **SECURITY DESIGN AND ARCHITECTURE FOR CLOUD** **6**

Access control requirements for Cloud infrastructure - User Identification - Authentication and Authorization - Roles-based Access Control - Multi-factor authentication - Single Sign-on, Identity Federation - Identity providers and service consumers - Storage and network access control options - OS Hardening and minimization - Verified and measured boot - Intruder Detection and prevention

UNIT 3 **ACCESS CONTROL AND IDENTITY MANAGEMENT** **6**

Access control requirements for Cloud infrastructure - User Identification - Authentication and Authorization - Roles-based Access Control - Multi-factor authentication - Single Sign-on, Identity Federation - Identity providers and service consumers - Storage and network access control options - OS Hardening and minimization - Verified and measured boot - Intruder Detection and prevention

UNIT 4 **CLOUD SECURITY DESIGN PATTERNS** **6**

Introduction to Design Patterns, Cloud bursting, Geo-tagging, Secure Cloud Interfaces, Cloud Resource Access Control, Secure On-Premise Internet Access, Secure External Cloud

UNIT 5 **MONITORING, AUDITING AND MANAGEMENT** **6**

Proactive activity monitoring - Incident Response, Monitoring for unauthorized access, malicious traffic, abuse of system privileges - Events and alerts - Auditing – Record generation, Reporting and Management, Tamper-proofing audit logs, Quality of Services, Secure Management, User management, Identity management, Security Information and Event Management

COURSE OUTCOMES:

At the end of the course, students would

CO1: Understand the cloud concepts and fundamentals.
CO2: Explain the security challenges in the cloud.
CO3: Define cloud policy and Identity and Access Management.
CO4: Understand various risks and audit and monitoring mechanisms in the cloud.
CO5: Define the various architectural and design considerations for security in the cloud.

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO**LIST OF EXPERIMENTS**

1. Simulate a cloud scenario using Cloud Sim and run a scheduling algorithm not present in Cloud Sim
2. Simulate resource management using cloud sim3 Simulate log forensics using cloud sim
3. Simulate a secure file sharing using a cloud sim
4. Implement data anonymization techniques over the simple dataset (masking, k-anonymization, etc)
5. Implement any encryption algorithm to protect the images
6. Implement any image obfuscation mechanism
7. Implement a role-based access control mechanism in a specific scenario
8. Implement an attribute-based access control mechanism based on a particular scenario
9. Develop a log monitoring system with incident management in the cloud

TOTAL:30 PERIODS

TEXT BOOKS

4. Raj Kumar Buyya , James Broberg, andrzejGoscinski, ―Cloud Computing:‖, Wiley 2013
5. Dave shackleford, ―Virtualization Security‖, SYBEX a wiley Brand 2013.
6. Mather, Kumaraswamy and Latif, ―Cloud Security and Privacy‖, OREILLY 2011

REFERENCE BOOKS

3. Mark C. Chu-Carroll ―Code in the Cloud‖,CRC Press, 2011
4. Mastering Cloud Computing Foundations and Applications Programming RajkumarBuyya, Christian Vechhiola, S. Tham

CO-PO MAPPING

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Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
Mr.P.Jason AP/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE IV

U23ITP47 **Category : PE**

		L	T	P	C
SDG: 4	**ENGINEERING SECURE SOFTWARE SYSTEMS**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

1 To develop semantic web related simple applications
2 To explain Privacy and Security issues in Social Networking
3 To explain the data extraction and mining of social networks
4 To discuss the prediction of human behavior in social communities
5 To describe the Access Control, Privacy and Security management of social networks

UNIT 1 NEED OF SOFTWARE SECURITY AND LOW-LEVEL ATTACKS 6

Software Assurance and Software Security - Threats to software security - Sources of software insecurity - Benefits of Detecting Software Security - Properties of Secure Software – MemoryBased Attacks: Low-Level Attacks Against Heap and Stack - Defense Against Memory-Based Attacks

UNIT 2 SECURE SOFTWARE DESIGN 6

Requirements Engineering for secure software - SQUARE process Model - Requirements elicitation and prioritization- Isolating The Effects of Untrusted Executable Content - Stack Inspection – Policy Specification Languages – Vulnerability Trends – Buffer Overflow – Code Injection - Session Hijacking. Secure Design - Threat Modeling and Security Design Principles

UNIT 3 SECURITY RISK MANAGEMENT 5

Risk Management Life Cycle – Risk Profiling – Risk Exposure Factors – Risk Evaluation and Mitigation – Risk Assessment Techniques – Threat and Vulnerability Management

UNIT 4 SECURITY TESTING 8

Traditional Software Testing – Comparison - Secure Software Development Life Cycle - Risk Based Security Testing – Prioritizing Security Testing With Threat Modeling – Penetration Testing – Planning and Scoping - Enumeration – Remote Exploitation – Web Application Exploitation - Exploits and Client Side Attacks – Post Exploitation – Bypassing Firewalls and Avoiding Detection - Tools for Penetration Testing

UNIT 5 SECURE PROJECT MANAGEMENT 4

Governance and security - Adopting an enterprise software security framework - Security and project management - Maturity of Practice

COURSE OUTCOMES:

At the end of the course, students would

CO1: Identify various vulnerabilities related to memory attacks.
CO2: Apply security principles in software development.
CO3: Evaluate the extent of risks.
CO4: Involve selection of testing techniques related to software security in the testing phase of software development.
CO5: Use tools for securing software.

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO**LIST OF EXPERIMENTS**

1. Implement the SQL injection attack.
2. Implement the Buffer Overflow attack.
3. Implement Cross Site Scripting and Prevent XSS.
4. Perform Penetration testing on a web application to gather information about the system, then initiate XSS and SQL injection attacks using tools like Kali Linux.
5. Develop and test the secure test cases
6. Penetration test using kali Linux

TOTAL:30 PERIODS

TEXT BOOKS

1. Julia H. Allen, “Software Security Engineering”, Pearson Education, 2008
2. Evan Wheeler, “Security Risk Management: Building an Information Security Risk Management Program from the Ground Up”, First edition, Syngress Publishing, 2011
3. Chris Wysopal, Lucas Nelson, Dino Dai Zovi, and Elfriede Dustin, “The Art of Software Security Testing: Identifying Software Security Flaws (Symantec Press)”, Addison-Wesley Professional, 2006

REFERENCE BOOKS

1. Robert C. Seacord, “Secure Coding in C and C++ (SEI Series in Software Engineering)”, Addison-Wesley Professional, 2005.
2. Jon Erickson, “Hacking: The Art of Exploitation”, 2nd Edition, No Starch Press, 2008.
3. Mike Shema, “Hacking Web Apps: Detecting and Preventing Web Application Security Problems”, First edition, Syngress Publishing, 2012
4. Bryan Sullivan and Vincent Liu, “Web Application Security, A Beginner's Guide”, Kindle Edition, McGraw Hill, 2012
5. Lee Allen, “Advanced Penetration Testing for Highly-Secured Environments: The Ultimate Security Guide (Open Source: Community Experience Distilled)”, Kindle Edition, Packt Publishing,2012
6. Jason Grembi, “Developing Secure Software”

CO-PO MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	3	2	3	2	-	-	-	2	1	2	2	2	2	1
2	2	2	2	3	3	-	-	-	2	1	2	2	1	2	1
3	1	2	2	2	1	-	-	-	1	1	2	1	2	2	1
4	2	3	2	2	2	-	-	-	2	1	2	2	2	2	1
5	2	1	2	2	3	-	-	-	2	1	1	2	2	1	2
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
Mrs. R. Malathy AP/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE V

U23ITP51 **Category : PE**

		L	T	P	C
SDG: 4	**AUGMENTED REALITY/VIRTUAL REALITY**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

1. To impart the fundamental aspects and principles of AR/VR technologies.
2. To know the internals of the hardware and software components involved in the development of AR/VR enabled applications.
3. To learn about the graphical processing units and their architectures.
4. To gain knowledge about AR/VR application development.
5. To know the technologies involved in the development of AR/VR based applications.

UNIT 1 INTRODUCTION 7

Introduction to Virtual Reality and Augmented Reality – Definition – Introduction to Trajectories and Hybrid Space-Three I's of Virtual Reality – Virtual Reality Vs 3D Computer Graphics – Benefits of Virtual Reality – Components of VR System – Introduction to AR-AR TechnologiesInput Devices – 3D Position Trackers – Types of Trackers – Navigation and Manipulation Interfaces – Gesture Interfaces – Types of Gesture Input Devices – Output Devices – Graphics Display – Human Visual System – Personal Graphics Displays – Large Volume Displays – Sound Displays – Human Auditory System.

UNIT 2 VR MODELING 6

Modeling – Geometric Modeling – Virtual Object Shape – Object Visual Appearance – Kinematics Modeling – Transformation Matrices – Object Position – Transformation Invariants –Object Hierarchies – Viewing the 3D World – Physical Modeling – Collision Detection – Surface Deformation – Force Computation – Force Smoothing and Mapping – Behavior Modeling – Model Management.

UNIT 3 VR PROGRAMMING 6

VR Programming – Toolkits and Scene Graphs – World ToolKit – Java 3D – Comparison of World ToolKit and Java 3D

UNIT 4 APPLICATIONS 6

Human Factors in VR – Methodology and Terminology – VR Health and Safety Issues – VR and Society-Medical Applications of VR – Education, Arts and Entertainment – Military VR Applications – Emerging Applications of VR – VR Applications in Manufacturing – Applications of VR in Robotics – Information Visualization – VR in Business – VR in Entertainment – VR in Education

UNIT 5 AUGMENTED REALITY 5

Introduction to Augmented Reality-Computer vision for AR-Interaction-Modelling and AnnotationNavigation-Wearable devices

COURSE OUTCOMES:

At the end of the course, students would

CO1: Understand the basic concepts of AR and VR
CO2: Understand the tools and technologies related to AR/VR
CO3: Know the working principle of AR/VR related Sensor devices
CO4: Design of various models using modeling techniques
CO5: Develop AR/VR applications in different domains

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

1.Study of tools like Unity, Maya, 3DS MAX, AR toolkit, Vuforia and Blender.
2.Use the primitive objects and apply various projection types by handling camera.
3.Download objects from asset store and apply various lighting and shading effects.
4.Model three dimensional objects using various modelling techniques and apply textures over them.
5.Create three dimensional realistic scenes and develop simple virtual reality enabled mobile applications which have limited interactivity.
6.Add audio and text special effects to the developed application.
7.Develop VR enabled applications using motion trackers and sensors incorporating full haptic interactivity.
8.Develop AR enabled applications with interactivity like E learning environment, Virtual walkthroughs and visualization of historic places.
9.Develop AR enabled simple applications like human anatomy visualization, DNA/RNA structure visualization and surgery simulation.
10.Develop simple MR enabled gaming applications.

TOTAL:30 PERIODS

TEXT BOOKS

1. Charles Palmer, John Williamson, “Virtual Reality Blueprints: Create compelling VR experiences for mobile”, Packt Publisher, 2018
2. Dieter Schmalstieg, Tobias Hollerer, “Augmented Reality: Principles & Practice”, Addison Wesley, 2016
3. John Vince, “Introduction to Virtual Reality”, Springer-Verlag, 2004.
4. William R. Sherman, Alan B. Craig: Understanding Virtual Reality – Interface, Application, Design”, Morgan Kaufmann, 2003

CO-PO MAPPING

CO	PO												PSO		
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3	3	3	2	2	3	-	-	-	3	2	1	2	3	2	2
4	3	3	3	2	3	-	-	-	3	2	2	3	3	2	2
5	3	3	3	3	3	-	-	-	3	3	3	3	3	3	3
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
Mrs. R. Malathy AP/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE V

U23ITP52 **Category : PE**

		L	T	P	C
SDG: 4	**MULTIMEDIA AND ANIMATION**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

- TograspthefundamentalknowledgeofMultimediaelementsandsystems
- TogetfamiliarwithMultimediafileformatsandstandards
- TolearntheprocessofAuthoringmultimediapresentations
- Tolearnthetechniquesofanimationin2Dand3Dandforthemobile UI
- Toexploredifferentpopularapplicationsofmultimedia

UNIT 1 INTRODUCTION TO MULTIMEDIA 6

Definitions, Elements, Multimedia Hardware and Software, Distributed multimedia systems, challenges: security, sharing / distribution, storage, retrieval, processing, computing. Multimedia metadata, Multimedia databases, Hypermedia, Multimedia

Learning.

UNIT 2 MULTIMEDIA FILE FORMATS AND STANDARDS 6

File formats – Text, Image file formats, Graphic and animation file formats, Digital audio and Video file formats, Color in image and video, Color Models. Multimedia data and file formats for the web.

UNIT 3 MULTIMEDIA AUTHORING 6

Authoring metaphors, Tools Features and Types: Card and Page Based Tools, Icon and Object Based Tools, Time Based Tools, Cross Platform Authoring Tools, Editing Tools,
Painting and Drawing Tools, 3D Modeling and Animation Tools, Image Editing Tools,
audio Editing Tools, Digital Movie Tools, Creating interactive presentations, virtual learning, simulations.

UNIT 4 ANIMATION 6

Principles of animation: staging, squash and stretch, timing, onion skinning, secondary action, 2D, 2 ½ D, and 3D animation, Animation techniques: Keyframe, Morphing, Inverse Kinematics, Hand Drawn, Character rigging, vector animation, stop motion, motion graphics, , Fluid Simulation, skeletal animation, skinning Virtual Reality, Augmented Reality.

UNIT 5 MULTIMEDIA APPLICATIONS 6

Multimedia Big data computing, social networks, smart phones, surveillance, Analytics, Multimedia Cloud Computing, Multimedia streaming cloud, media on demand, security and forensics, Online social networking, multimedia ontology, Content based retrieval from digital libraries.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Get the bigger picture of the context of Multimedia and its applications
CO2: Use the different types of media elements of different formats on content pages
CO3: Author 2D and 3D creative and interactive presentations for different target multimedia applications.
CO4: Use different standard animation techniques for 2D, 21/2 D, 3D applications
CO5: Understand the complexity of multimedia applications in the context of cloud, security, bigdata streaming, social networking, CBIR etc.,

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

Working with Image Editing tools:

Install tools like GIMP/ InkScape / Krita / Pencil and perform editing operations:

- Use different selection and transform tools to modify or improve an image
- Create logos and banners for home pages of websites.

Working with Audio Editing tools:

- Install tools like, Audacity / Ardour for audio editing, sound mixing and special effects like fade- in or fade-out etc.,
- Perform audio compression by choosing a proper codec.

Working with Video Editing and conversion tools:

Install tools like OpenShot / Cinelerra / HandBrake for editing video content. Ø Edit and mix video content, remove noise, create special effects, add captions. Ø Compress and convert video file format to other popular formats.

Working with web/mobile authoring tools:

Adapt / KompoZer/ BlueGriffon / BlueFish / Aptana Studio/ NetBeans / WordPress /Expression Web:

- Design simple Home page with banners, logos, tables quick links etc
- Provide a search interface and simple navigation from the home page to the inside pages of the website.
- Design Responsive web pages for use on both web and mobile interfaces.

Working with Animation tools:

Install tools like, Krita, Wick Editor, Blender:

- Perform a simple 2D animation with sprites
- Perform simple 3D animation with keyframes, kinematics

Working with Mobile UI animation tools: Origami studio / Lottie / Framer etc.,

Working with E-Learning authoring tools:

- Install tools like EdApp / Moovly / CourseLab/ IsEazy and CamStudio/Ampache, VideoLAN:
- Demonstrate screen recording and further editing for e-learning content.
- Create a simple E-Learning module for a topic of your choice.

Creating VR and AR applications:

Any affordable VR viewer like Google Cardboard and any development platform like Openspace 3D / ARCore etc.

Note: all tools listed are open source. Usage of any proprietary tools in place of open source tools is not restricted.

TOTAL:30 PERIODS

TEXT BOOKS

Ze-Nian Li, Mark S. Drew, Jiangchuan Liu, Fundamentals of Multimedia", Third Edition, Springer Texts in Computer Science, 2021. (UNIT-I, II, III)

REFERENCE BOOKS

1. John M Blain, The Complete Guide to Blender Graphics: Computer Modeling & Animation, CRC press, 3rd Edition, 2016.
2. Gerald Friedland, Ramesh Jain, "Multimedia Computing", Cambridge University Press, 2018.
3. Prabhat K.Andleigh, Kiran Thakrar, "Multimedia SystemDesign", Pearson Education, 1st Edition, 2015.
4. Mohsen Amini Salehi, Xiangbo Li, "Multimedia Cloud Computing Systems", Springer Nature, 1st Edition, 2021.
5. Mark Gaimbruno, "3D Graphics and Animation", Second Edition, New Riders, 2002.
6. Rogers David, "Animation: Master – A Complete Guide (Graphics Series)", Charles River Media, 2006.

7. Rick parent, “Computer Animation: Algorithms and Techniques”, Morgan Kauffman, 3rd Edition, 2012.
8. Emilio Rodriguez Martinez, Mireia Alegre Ruiz, “UI Animations with Lottie and After Effects: Create, render, and ship stunning After Effects animations natively on mobile with React Native”, Packt Publishing, 2022.

CO-PO MAPPING

CO	PO												PSO		
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Correlation levels:1 –low 2 – medium 3 – high “-“-no correlation															

COURSE DESIGNED BY	APPROVED BY
Mrs. R. Malathy AP/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE V

U23ITP53 **Category : PE**

		L	T	P	C
SDG: 4	**VIDEO CREATION AND EDITING**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

- To introduce the broad perspective of linear and nonlinear editing concepts.
- To understand the concept of Storytelling styles.
- To be familiar with audio and video recording. To apply different media tools.
- To learn and understand the concepts of AVID XPRESS DV 4.

UNIT 1 FUNDAMENTALS **6**

Evolution of filmmaking - linear editing - non-linear digital video - Economy of Expression - risks associated with altering reality through editing.

UNIT 2 STORYTELLING **6**

Storytelling styles in a digital world through jump cuts, L-cuts, match cuts, cutaways, dissolves, split edits - Consumer and pro NLE systems - digitizing images - managing resolutions - mechanics of digital editing - pointer files - media management.

UNIT 3 USING AUDIO AND VIDEO **6**

Capturing digital and analog video importing audio putting video on exporting digital video to tape recording to CDs and VCDs.

UNIT 4 WORKING WITH FINAL CUT PRO **6**

Working with clips and the Viewer - working with sequences, the Timeline, and the canvas - Basic Editing - Adding and Editing Testing Effects - Advanced Editing and Training Techniques - Working with Audio - Using Media Tools - Viewing and Setting Preferences.

UNIT 5 WORKING WITH AVID XPRESS DV 4 **6**

Starting Projects and Working with Project Window - Using Basic Tools and Logging - Preparing to Record and Recording - Importing Files - Organizing with Bins - Viewing and Making Footage - Using Timeline and Working in Trim Mode - Working with Audio - Output Options

COURSE OUTCOMES:

At the end of the course, students would

CO1: Compare the strengths and limitations of Nonlinear editing.

CO2: Identify the infrastructure and significance of storytelling.

CO3: Apply suitable methods for recording to CDs and VCDs
CO4: Address the core issues of advanced editing and training techniques
CO5: Design and develop projects using AVID XPRESS DV 4

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO**LIST OF EXPERIMENTS**

1. Write a Movie Synopsis (Individual/Team Writing)
2. Present team stories in class Read and write Data from Graph Database
3. Script/Storyboard Writing(Individual Assignment)
4. Pre-Production: Personnel, budgeting, scheduling, location scouting, casting, contracts & agreements
5. Production: Single camera production personnel & equipment, Documentary Production
6. Writing The Final Proposal: Overview, Media Treatments, Summary, Pitching
7. Write Documentary & Animation Treatment.
8. Post-production: Editing, Sound design, Finishing

TOTAL:30 PERIODS

TEXT BOOKS

1. Avid Xpress DV 4 User Guide, 2007.
2. Final Cut Pro 6 User Manual, 2004.
3. Keith Underdahl, "Digital Video for Dummies", Third Edition, Dummy Series, 2001.
4. Robert M. Goodman and Partick McGarth, "Editing Digital Video: The Complete Creative and Technical Guide", Digital Video and Audio, McGraw – Hill 2003.

CO-PO MAPPING

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5	2	1	3	3	1	-	-	-	3	2	1	2	2	2	1
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
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Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE V

U23ITP54 **Category : PE**

SDG: 4 **MULTIMEDIA DATA COMPRESSION AND STORAGE**

L	T	P	C
2	0	2	3

COURSE OBJECTIVE:

- Tounderstandthebasicsofcompressiontechniques
- Tounderstandthecategoriesofcompressionfortext,imageandvideo
- Toexplorethemodalitiesoftext,imageandvideocompressionalgorithms
- Toknowaboutbasicsofconsistencyofdataavailabilityinstoragedevices
- Tounderstandtheconceptsofdatastreamingservices

UNIT 1 BASICS OF DATA COMPRESSION **6**

Introduction —Lossless and LossyCompression– Basics of Huffmann coding- Arithmetic coding- Dictionary techniques- Context based compression – Applications

UNIT 2 IMAGE COMPRESSION **6**

Lossless Image compression – JPEG-CALIC-JPEG LS-Prediction using conditional averages – Progressive Image Transmission – Lossless Image compression formats – Applications - Facsimile encoding

UNIT 3 VIDEO COMPRESSION **6**

Introduction – Motion Compensation – Video Signal Representation – H.261 – MPEG-1- MPEG-2- H.263

UNIT 4 DATA PLACEMENT ON DISKS **6**

Statistical placement on Disks – Striping on Disks – Replication Placement on Disks – Constraint allocation on Disks – Tertiary storage Devices – Continuous Placement on Hierarchical storage system – Statistical placement on Hierarchical storage systems – Constraint allocation on Hierarchical storage system

UNIT 5 DISK SCHEDULING METHODS **6**

Scheduling methods for disk requests – Feasibility conditions of concurrent streams– Scheduling methods for request streams

COURSE OUTCOMES:

At the end of the course, students would

CO1: Understand the basics of text, Image and Video compression
CO2: Understandthevariouscompressionalgorithmsformultimediacontent
CO3: Exploretheapplicationsofvariouscompressiontechniques
CO4: Exploreknowledgeonmultimediastorageondisks
CO5: Understandschedulingmethodsforrequeststreams

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO **LIST OF EXPERIMENTS**

1. ConstructHuffmancodesforgivensymbolprobabilities.
2. Encoderunlengthswithfixed-lengthcode.
3. Lempel-Zivalgorithmforadaptivevariable-lengthencoding
4. Compressthegivenwordusingarithmeticcodingbasedonthefrequencyoftheletters.
5. Writeashellscript,whichconvertsallimagesinthecurrentdirectoryinJPEG.
6. Writeaprogramtosplitimagesfromavideowithoutusinganyprimitives.
7. Createaphotoalbumofatripbyapplyingappropriateimagedimensionsandformat.
8. Writethecodeforidentifyingthepopularityofcontentretrievalfrommediaserver.
9. Writethecodeforensuringdataavailabilityindisksusingstrip-basedmethod
10. Programforschedulingrequestsfordatastreams.

TOTAL:30 PERIODS

TEXT BOOKS

1. Khalid Sayood, Introduction to Data Compression, Morgan Kaufmann Series in Multimedia Information and Systems, 2018, 5th Edition.
2. Philip K.C.Tse, Multimedia Information Storage and Retrieval: Techniques and Technologies, 2008

REFERENCES

1. DavidSalomon,Aconciseintroductiontodatacompression,2008.
2. .LenaldBest,Best'sGuidetoLiveStreamVideoBroadcasting,BCBLiveTeachingseries, 2017.
3. Yun-QingShi,ImageAndVideoCompressionForMultimediaEngineeringFundamentals Algorithms And Standards,Taylor& Francis,2019
4. Irina Bocharova,CompressionforMultimedia,CambridgeUniversityPress;1stedition,

2009

CO-PO MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2	2	1	1	-	-	-	-	-	-	-	2	2	2
2	3	2	2	1	2	-	-	-	-	-	-	-	2	2	2
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Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
Mrs. R. Malathy AP/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE V

U23ITP55 **Category : PE**

		L	T	P	C
SDG: 4	**DIGITAL MARKETING**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

- Theprimaryobjectiveof thismoduleistoexamineandexploretheroleandimportanceof digital marketing in today's rapidly changing business environment.
- Italsofocusesonhowdigitalmarketingcanbeutilizedbyorganizationsandhow itseffectiveness can be measured.

UNIT 1 INTRODUCTION TO ONLINE MARKET **6**

Online Market space- Digital Marketing Strategy- Components - Opportunities for building Brand Website - Planning and Creation - Content Marketing.

UNIT 2 SEARCH ENGINE OPTIMISATION 6

Search Engine optimisation - Keyword Strategy- SEO Strategy - SEO success factors -On-Page Techniques - Off-Page Techniques. Search Engine Marketing- How Search Engine works- SEM components- PPC advertising -Display Advertisement

UNIT 3 E- MAIL MARKETING 6

E- Mail Marketing - Types of E- Mail Marketing - Email Automation - Lead Generation - Integrating Email with Social Media and Mobile- Measuring and maximizing email campaign effectiveness. Mobile Marketing- Mobile Inventory/channels- Location based; Context based; Coupons and offers, Mobile Apps, Mobile Commerce, SMS Campaigns-Profiling and targeting

UNIT 4 SOCIAL MEDIA MARKETING 6

Social Media Marketing - Social Media Channels- Leveraging Social media for brand conversations and buzz. Successful /benchmark Social media campaigns. Engagement Marketing- Building Customer relationships - Creating Loyalty drivers - Influencer Marketing.

UNIT 5 DIGITAL TRANSFORMATION 6

Digital Transformation & Channel Attribution- Analytics- Ad-words, Email, Mobile, Social Media, Web Analytics - Changing your strategy based on analysis- Recent trends in Digital marketing.

COURSE OUTCOMES:

At the end of the course, students would

CO1: To examine and explore the role and importance of digital marketing in today's rapidly changing business environment.

CO2: To focuses on how digital marketing can be utilized by organizations and how its effectiveness can be measured.

CO3: To know the key elements of a digital marketing strategy.

CO4: To study how the effectiveness of a digital marketing campaign can be measured

CO5: To demonstrate advanced practical skills in common digital marketing tools such as SEO, SEM, social media and Blogs.

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO LIST OF EXPERIMENTS

1. Subscribe to a weekly/quarterly newsletter and analyze how its content and structure aid with the branding of the company and how it aids its potential customer segments.
2. Perform keyword search for a skincare hospital website based on search volume and competition using Google keyword planner tool.
3. Demonstrate how to use the Google Webmasters Indexing API
4. Discuss an interesting case study regarding how an insurance company manages leads.
5. Discuss negative and positive impacts and ethical implications of using social media for political advertising.
6. Discuss how Predictive analytics is impacting marketing automation

TOTAL:30 PERIODS

TEXT BOOKS

1. Fundamentals of Digital Marketing by Puneet Singh Bhatia; Publisher: Pearson Education;
2. First edition (July 2017); ISBN-10: 933258737X; ISBN-13: 978-9332587373.
3. Digital Marketing by Vandana Ahuja; Publisher: Oxford University Press (April 2015). ISBN-10: 0199455449
4. Marketing 4.0: Moving from Traditional to Digital by Philip Kotler;Publisher: Wiley; 1st edition (April 2017); ISBN10: 9788126566938; ISBN 13: 9788126566938; ASIN: 8126566930.
1. Ryan, D. (2014). Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, Kogan Page Limited.
2. Barker, Barker, Bormann and Neher (2017), Social Media Marketing: A Strategic Approach, 2E South-Western, Cengage Learning.
3. Pulizzi,JBeginner'sGuidetoDigitalMarketing,McgrawHillEducation

CO-PO MAPPING

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Correlation levels:1 –low 2 – medium 3 – high “-“-no correlation															

COURSE DESIGNED BY	APPROVED BY
Mrs. R. Malathy AP/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE V

U23ITP56 **Category : PE**

		L	T	P	C
SDG: 4	**VISUAL EFFECTS**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

- To get a basic idea on animation principles and techniques
- To get exposure to CGI, color and light elements of VFX
- To have a better understanding of basic special effects techniques
- To have a knowledge of state-of-the-art vfx techniques
- To become familiar with popular compositing techniques

UNIT 1 ANIMATION BASICS 6

VFX production pipeline, Principles of animation, Techniques: Keyframe, kinematics, Full animation, limited animation, Rotoscoping, stop motion, object animation, pixilation, rigging, shape keys, motion paths.

UNIT 2 CGI, COLOR, LIGHT 6

CGI – virtual worlds, Photorealism, physical realism, function realism, 3D Modeling and Rendering: color - Color spaces, color depth, Color grading, color effects, HDRI, Light – Area and mesh lights, image based lights, PBR lights, photometric light, BRDF shading model

UNIT 3 SPECIAL EFFECTS 6

Special Effects – props, scaled models, animatronics, pyrotechniques, Schüfftan process, Particle effects – wind, rain, fog, fire

UNIT 4 VISUAL EFFECTS TECHNIQUES 6

Motion Capture, Matt Painting, Rigging, Front Projection.Rotoscoping, Match Moving – Tracking, camera reconstruction, planar tracking, Calibration, Point Cloud Projection, Ground plane determination, 3D Match Moving

UNIT 5 COMPOSITING 6

Compositing – chroma key, blue screen/green screen, background projection, alpha compositing, deep image compositing, multiple exposure, matting, VFX tools - Blender, Natron, GIMP.

COURSE OUTCOMES:

At the end of the course, students would

CO1: To implement animation in 2D / 3D following the principles and techniques

CO2: To use CGI, color and light elements in VFX applications

CO3: To create special effects using any of the state-of-the-art tools

CO4: To apply popular visual effects techniques using advanced tools

CO5: To use compositing tools for creating VFX for a variety of applications

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

LaboratoryExperiments:

Using Natron:

- Understanding Natron Environment:
- Working with color and using color grading
- using Channels
- Merging images
- Using Rotopaint
- performing Tracking and stabilizing
- Transforming elements
- Stereoscopic compositing

Using Blender:

- Motion Tracking – camera and object tracking
- Camera fx, color grading, vignettes
- Compositing images and video files
- Multilayer rendering

TOTAL:30 PERIODS

TEXT BOOKS

1. Chris Roda, Real Time Visual Effects for the Technical Artist, CRC Press, 1st Edition, 2022.
2. Steve Wright, Digital Compositing for film and video, Routledge, 4th Edition, 2017.
3. John Gress, Digital Visual Effects and Compositing, New Riders Press, 1st Edition, 2014.

REFERENCE BOOKS

1 Jon Gress, “Digital Visual Effects and Compositing”, New Riders Press, 1st Edition, 2014.

2. Robin Brinkman, The Art and Science of Digital Compositing: Techniques for Visual Effects, Animation and Motion Graphics”, Morgan Kauffman, 2008.

3. Luiz Velho, Bruno Madeira, “Introduction to Visual Effects A Computational Approach”, Routledge, 2023.

4. Jasmine Katatikarn, Michael Tanzillo, "Lighting for Animation: The art of visual storytelling, Routledge, 1st Edition, 2016
5. Eran Dinur, "The Complete guide to Photorealism, for Visual Effects, Visualization
6. Jeffrey A. Okun, Susan Zwerman, Christopher McKittrick, "The VES Handbook of Visual Effects: Industry Standard VFX Practices and Procedures", Third Edition, 2020.and Games", Routledge, 1st Edition, 2022.
7. https://www.blender.org/features/vfx/
8. https://natrongithub.github.io/

CO-PO MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	3	3	3	1	-	-	-	1	2	1	1	3	3	2
2	1	3	3	2	1	-	-	-	3	2	2	2	1	1	1
3	2	3	3	2	1	-	-	-	1	2	1	2	2	2	2
4	3	3	2	2	3	-	-	-	3	3	2	2	2	3	1
5	1	2	1	1	2	-	-	-	1	3	2	3	2	3	1
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
Mrs. R. Malathy AP/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE V

U23ITP57 **Category : PE**

		L	T	P	C
SDG: 4	**GAME DEVELOPMENT**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

- Toknowthebasicsof 2Dand3Dgraphicsforgame development.
- Toknowthestagesofgamedevelopment.
- Tounderstandthebasicsofagameengine.
- Tosurveythegamingdevelopmentenvironmentandtoolkits.
- TolearnanddevelopsimplegamesusingPygameenvironment

UNIT 1 3D GRAPHICS FOR GAME DESIGN 6

Genres of Games, Basics of 2D and 3D Graphics for Game Avatar, Game Components – 2D and 3D Transformations – Projections – Color Models – Illumination and Shader Models – Animation – Controller Based Animation.

UNIT 2 GAME DESIGN PRINCIPLES 6

Character Development, Storyboard Development for Gaming – Script Design – Script Narration, Game Balancing, Core Mechanics, Principles of Level Design – Proposals – Writing for Preproduction, Production and Post – Production.

UNIT 3 GAME ENGINE DESIGN 6

Rendering Concept – Software Rendering – Hardware Rendering – Spatial Sorting Algorithms – Algorithms for Game Engine– Collision Detection – Game Logic – Game AI – Pathfinding.

UNIT 4 OVERVIEW OF GAMING PLATFORMS AND FRAMEWORKS 6

Pygame Game development – Unity – Unity Scripts –Mobile Gaming, Game Studio, Unity Single player and multi-Player games.

UNIT 5 GAME DEVELOPMENT USING PYGAME 6

Developing 2D and 3D interactive games using Pygame – Avatar Creation – 2D and 3D Graphics Programming – Incorporating music and sound – Asset Creations – Game Physics algorithms Development – Device Handling in Pygame – Overview of Isometric and Tile Based arcade Games – Puzzle Games.

COURSE OUTCOMES:

At the end of the course, students would
CO1: Explain the concepts of 2D and 3d Graphics
CO2: Design game design documents.
CO3: Implementation of gaming engines.
CO4: Survey gaming environments and frameworks.
CO5: Implement a simple game in Pygame.

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO LIST OF EXPERIMENTS

1. Installation of a game engine, e.g., Unity, Unreal Engine, familiarization of the GUI.

Conceptualize the theme for a 2D game.
2. Character design, sprites, movement and character control
3. Level design: design of the world in the form of tiles along with interactive and collectible objects.
4. Design of interaction between the player and the world, optionally using the physics engine.
5. Developing a 2D interactive using Pygame
6. Developing a Puzzle game
7. Design of menus and user interaction in mobile platforms.
8. Developing a 3D Game using Unreal
9. Developing a Multiplayer game using unity

TOTAL:30 PERIODS

REFERENCE BOOKS

1. Sanjay Madhav, "Game Programming Algorithms and Techniques: A Platform Agnostic Approach", Addison Wesley,2013.
2. Will McGugan, "Beginning Game Development with Python and Pygame: From Novice to Professional", Apress,2007.
3. Paul Craven, "Python Arcade games", Apress Publishers,2016
4. David H. Eberly, "3D Game Engine Design: A Practical Approach to Real-Time Computer Graphics", Second Edition, CRC Press,2006.
5. Jung Hyun Han, "3D Graphics for Game Programming", Chapman and Hall/CRC, 2011.

CO-PO MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2	2	1	2	-	-	-	-	-	-	-	2	2	2
2	1	2	2	1	2	-	-	-	-	-	-	-	2	2	1
3	1	1	1	2	1	-	-	-	-	-	-	-	2	2	2
4	3	3	1	3	3	-	-	-	-	-	-	-	2	2	3
5	3	3	2	1	3	-	-	-	-	-	-	-	2	2	3
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

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PROFESSIONAL ELECTIVE VI

Category : PE

		L	T	P	C
U23ITP61	**3D PRINTING AND DESIGN**	**2**	**0**	**2**	**3**

SDG: 4

COURSE OBJECTIVE:

- Todiscussonbasicsof3D printing
- Toexplaintheprinciplesof3Dprintingtechnique
- Toexplainandillustrateinkjettechnology
- Toexplainandillustratelasertechnology
- Todiscusstheapplicationsof3Dprinting

UNIT 1 INTRODUCTION 6

Introduction; Design considerations – Material, Size, Resolution, Process; Modelling and viewing - 3D; Scanning; Model preparation – Digital; Slicing; Software; File formats

UNIT 2 PRINCIPLE 6

Processes – Extrusion, Wire, Granular, Lamination, Photopolymerisation; Materials - Paper, Plastics, Metals, Ceramics, Glass, Wood, Fiber, Sand, Biological Tissues, Hydrogels, Graphene; Material Selection - Processes, applications, limitations;

UNIT 3 INKJET TECHNOLOGY 6

Printer - Working Principle, Positioning System, print head, print bed, Frames, Motion control; Print head Considerations – Continuous Inkjet, Thermal Inkjet, Piezoelectric Drop-On-Demand; Material Formulation for jetting; Liquid based fabrication – Continuous jet, Multijet; Powder based fabrication – Colourjet.

UNIT 4 LASER TECHNOLOGY 6

Light Sources – Types, Characteristics; Optics – Deflection, Modulation; Material feeding and flow – Liquid, powder; Printing machines – Types, Working Principle, Build Platform, Print bed Movement, Support structures;

UNIT 5 INDUSTRIAL APPLICATIONS 6

Product Models, manufacturing – Printed electronics, Biopolymers, Packaging, Healthcare, Food, Medical, Biotechnology, Displays; Future trends;

COURSE OUTCOMES:

At the end of the course, students would

CO1: Outlineandexaminethebasicconceptsof3Dprintingtechnology

CO2: Outline3Dprintingworkflow`

CO3 Explainandcategorisetheconceptsandworkingprinciplesof3Dprintingusinginkjet technique

CO4: Explainandcategorisetheworkingprinciplesof3Dprintingusinglasertechnique

CO5: Explainvariousmethodfordesigningandmodelingforindustrialapplications

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO LIST OF EXPERIMENTS

1. StudytheinterfaceandbasictoolsintheCADsoftware.
2. Study 3D printer(s) including print heads, build envelope, materials used and related support removal system(s).
3. Review of geometry terms of a 3D mesh.
4. Commands for moving from 2D to 3D.
5. Advanced CAD commands to navigate models in 3D space
6. Design any four everyday objects
   Refer to web sites like Thingiverse, Shapeways and GitFab to design four everyday objects that utilize the advantages of 3D printing
   Choose four models from a sharing site like Thingiverse, Shapeways or Gitfab.
   a. Improve upon a file and make it your own. Some ideas include:
      - Redesign it with a specific user in mind
      - Redesign it for a slightly different purpose
      - Improve the look of the product
7. Use the CAM software to prepare files for 3D printing.
8. Manipulate machine movement and material layering.
9. Repair a 3D mesh using
   - Freeware utilities: Autodesk MeshMixer (http://goo.gl/x5nhYc), MeshLab (http://goo.gl/fgztLl) or Netfabb Basic or Cloud Service (http://goo.gl/Q1P47a)
   - Freeware tool tutorials: Netfabb Basic or Cloud Service (http://goo.gl/Q1P47a), Netfabb and MeshLab (http://goo.gl/WPOVec)
   - Professional tools: Magics or Netfabb

Equipment : one 3D printer for every 10-15 students

TOTAL:30 PERIODS

TEXT BOOKS

1. Christopher Barnatt, 3D Printing: The Next Industrial Revolution, CreateSpace Independent Publishing Platform, 2013.
2. Ian M. Hutchings, Graham D. Martin, Inkjet Technology for Digital Fabrication, John Wiley & Sons, 2013.

REFERENCE BOOKS

1.Chua, C.K., Leong K.F. and Lim C.S., Rapid prototyping: Principles and applications, second edition, World Scientific Publishers, 2010
2. Ibrahim Zeid, Mastering CAD CAM Tata McGraw-Hill Publishing Co., 2007
3. Joan Horvath, Mastering 3D Printing, APress, 2014

CO-PO MAPPING

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1	1	1	2	2	3	1	-	-	2	-	2	2	3	2	1
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3	2	2	2	2	2	2	-	-	2	-	2	2	3	2	2
4	2	2	2	2	3	2	-	-	2	-	2	2	3	3	2
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PROFESSIONAL ELECTIVE VI

Category : PE

U23ITP62	COGNITIVE SCIENCE	L	T	P	C
SDG: 4		2	0	2	3

COURSE OBJECTIVE:

- Toknowthetheoreticalbackgroundofcognition.
- Tounderstandthelinkbetweencognitionandcomputationalintelligence.
- Toexploreprobabilisticprogramminglanguage.
- Tostudythecomputationalinferencemodelsofcognition.
- Tostudythecomputationallearningmodelsofcognition.

UNIT 1 PHILOSOPHY, PSYCHOLOGY AND NEUROSCIENCE 6

Philosophy: Mental-physical Relation – From Materialism to Mental Science – Logic and the Sciences of the Mind – Psychology: Place of Psychology within Cognitive Science – Science of Information Processing –Cognitive Neuroscience – Perception – Decision – Learning and Memory – Language Understanding and Processing.

UNIT 2 COMPUTATIONAL INTELLIGENCE 6

Processes – Extrusion, Wire, Granular, Lamination, Photopolymerisation; Materials - Paper, Plastics, Metals, Ceramics, Glass, Wood, Fiber, Sand, Biological Tissues, Hydrogels, Graphene; Material Selection - Processes, applications, limitations;

UNIT 3 INKJET TECHNOLOGY 6

WebPPL Language – Syntax – Using Javascript Libraries – Manipulating probability types and distributions – Finding Inference – Exploring random computation – Coroutines: Functions that receive continuations –Enumeration

UNIT 4 INFERENCE MODELS OF COGNITION 6

Generative Models – Conditioning – Causal and statistical dependence – Conditional dependence – Data Analysis – Algorithms for Inference.

UNIT 5 LEARNING MODELS OF COGNITION 6

Learning as Conditional Inference – Learning with a Language of Thought – Hierarchical Models– Learning (Deep) Continuous Functions – Mixture Models.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Understand the underlying theory behind cognition.

CO2: Connect to the cognition elements computationally.

CO3: Implement mathematical functions through WebPPL.

CO4: Developapplicationsusingcognitiveinferencemodel.

CO5: Develop applications using cognitive learning model.

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO	LIST OF EXPERIMENTS
1.	DemonstrationofMathematicalfunctionsusingWebPPL.
2.	Implementationofreasoningalgorithms.
3.	Developinganapplicationsystemusinggenerativemodel.
4.	Developinganapplicationusingconditionalinferencelearningmodel.
5.	Applicationdevelopmentusinghierarchicalmodel.
6.	ApplicationdevelopmentusingMixturemodel.

TOTAL:30 PERIODS

TEXT BOOKS

1. Vijay V Raghavan,Venkat N.Gudivada, VenuGovindaraju, C.R. Rao, Cognitive Computing: Theory and Applications: (Handbook of Statistics 35), Elsevier publications, 2016
2. JudithHurwitz,MarciaKaufman,AdrianBowles,CognitiveComputingandBigData Analytics, Wiley Publications, 2015
3. RobertA.Wilson,FrankC.Keil,“TheMITEncyclopediaoftheCognitiveSciences”,The MIT Press, 1999.
4. JoseLuisBermúdez,CognitiveScience-AnIntroductiontotheScienceoftheMind, Cambridge University Press 2020

REFERENCE BOOKS

1.Noah D. Goodman, Andreas Stuhlmuller, “The Design and Implementation of Probabilistic Programming Languages”, Electronic version of book, https://dippl.org/.
2. Noah D. Goodman, Joshua B. Tenenbaum, The ProbMods Contributors, “Probabilistic Models of Cognition”, Second Edition, 2016, https://probmods.org/.

CO-PO MAPPING

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1	3	1	3	2	2	-	-	-	1	1	2	2	1	2	2
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3	1	3	1	3	3	-	-	-	1	3	1	3	3	1	2
4	2	1	1	2	3	-	-	-	1	2	3	1	3	3	1
5	1	2	3	2	2	-	-	-	1	2	2	2	2	2	1
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PROFESSIONAL ELECTIVE VI

U23ITP63 **Category : PE**

		L	T	P	C
SDG: 4	**DEVOPS**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

- TointroduceDevOpsterminology,definition& concepts
- TounderstandthedifferentVersioncontroltoolslikeGit,Mercurial
- TounderstandtheconceptsofContinuousIntegration/ContinuousTesting/Continuous Deployment)
- TounderstandConfigurationmanagementusingAnsible
- Illustratethebenefitsanddrivetheadoptionof cloud-basedDevopstoolstosolvereal world problems

UNIT 1 INTRODUCTION TO DEVOPS 6

Devops Essentials - Introduction To AWS, GCP, Azure - Version control systems: Git and Github.

UNIT 2 COMPILE AND BUILD USING MAVEN & GRADLE 6

Introduction, Installation of Maven, POM files, Maven Build lifecycle, Build phases(compile build, test, package) Maven Profiles, Maven repositories(local, central, global),Maven plugins, Maven create and build Artificats, Dependency management, Installation of Gradle, Understand build using Gradle

UNIT 3 CONTINUOUS INTEGRATION USING JENKINS 6

Install & Configure Jenkins, Jenkins Architecture Overview, Creating a Jenkins Job, Configuring a Jenkins job, Introduction to Plugins, Adding Plugins to Jenkins, Commonly used plugins (Git Plugin, Parameter Plugin, HTML Publisher, Copy Artifact and Extended choice parameters). Configuring Jenkins to work with java, Git and Maven, Creating a Jenkins Build and Jenkins workspace.

UNIT 4 CONFIGURATION MANAGEMENT USING ANSIBLE 6

Ansible Introduction, Installation, Ansible master/slave configuration, YAML basics, Ansible modules, Ansible Inventory files, Ansible playbooks, Ansible Roles, adhoc commands in ansible

UNIT 5 BUILDING DEVOPS PIPELINES USING AZURE 6

Create Github Account, Create Repository, Create Azure Organization, Create a new pipeline, Build a sample code, Modify azure-pipelines.yaml file

COURSE OUTCOMES:

At the end of the course, students would

CO1: Understand different actions performed through Version control tools like Git.

CO2: Perform Continuous Integration and Continuous Testing and Continuous Deployment using Jenkins by building and automating test cases using Maven & Gradle.

CO3: Ability to Perform Automated Continuous Deployment

CO4: Ability to do configuration management using Ansible

CO5: Understand to leverage Cloud-based DevOps tools using Azure DevOps

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NOLIST OF EXPERIMENTS

1. Create Maven Build pipeline in Azure
2. Run regression tests using Maven Build pipeline in Azure
3. Install Jenkins in Cloud
4. Create CI pipeline using Jenkins
5. Create a CD pipeline in Jenkins and deploy in Cloud
6. Create an Ansible playbook for a simple web application infrastructure
7. Build a simple application using Gradle
8. Install Ansible and configure ansible roles and to write playbooks

TOTAL:30 PERIODS

TEXT BOOKS

1. Roberto Vormittag, "A Practical Guide to Git and GitHub for Windows Users: From Beginner to Expert in Easy Step-By-Step Exercises", Second Edition, Kindle Edition, 2016.
2. Jason Cannon, "Linux for Beginners: An Introduction to the Linux Operating System and Command Line", Kindle Edition, 2014

REFERENCE BOOKS

1. Hands-On Azure Devops: Cicd Implementation For Mobile, Hybrid, And Web Applications Using Azure Devops And Microsoft Azure: CICD Implementation for ... DevOps and Microsoft Azure (English Edition) Paperback – 1 January 2020
2. by Mitesh Soni
3. Jeff Geerling, "Ansible for DevOps: Server and configuration management for humans", First Edition, 2015.
4. David Johnson, "Ansible for DevOps: Everything You Need to Know to Use Ansible for DevOps", Second Edition, 2016.
5. Mariot Tsitoara, "Ansible 6. Beginning Git and GitHub: A Comprehensive Guide to Version Control, Project Management, and Teamwork for the New Developer", Second Edition, 2019.
6. https://www.jenkins.io/user-handbook.pdf
7. https://maven.apache.org/guides/getting-started/

CO-PO MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	3	3	2	3	-	-	-	-	-	-	-	2	2	2
2	3	3	3	2	3	-	-	-	-	-	-	-	2	2	2
3	3	3	3	2	3	-	-	-	-	-	-	-	2	2	2
4	3	3	3	2	3	-	-	-	-	-	-	-	2	2	2
5	3	3	3	2	3	-	-	-	-	-	-	-	2	2	2
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

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PROFESSIONAL ELECTIVE VI

U23ITP64 **Category : PE**

		L	T	P	C
SDG: 4	**QUANTUM COMPUTING**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

- To know the background of classical computing and quantum computing.
- To learn the fundamental concepts behind quantum computation.
- To study the details of quantum mechanics and its relation to Computer Science.
- To gain knowledge about the basic hardware and mathematical models of quantum computation.
- To learn the basics of quantum information and the theory behind it.

UNIT 1 QUANTUM COMPUTING BASIC CONCEPTS 6

Complex Numbers - Linear Algebra - Matrices and Operators - Global Perspectives Postulates of Quantum Mechanics – Quantum Bits - Representations of Qubits - Superpositions

UNIT 2 QUANTUM GATES AND CIRCUITS 5

Universal logic gates - Basic single qubit gates - Multiple qubit gates - Circuit development - Quantum error correction

UNIT 3 QUANTUM ALGORITHMS 7

Quantum parallelism - Deutsch's algorithm - The Deutsch–Jozsa algorithm - Quantum Fourier transform and its applications - Quantum Search Algorithms: Grover's Algorithm

UNIT 4 QUANTUM INFORMATION THEORY 6

Data compression - Shannon's noiseless channel coding theorem - Schumacher's quantum noiseless channel coding theorem - Classical information over noisy quantum channels

UNIT 5 QUANTUM CRYPTOGRAPHY 6

Classical cryptography basic concepts - Private key cryptography - Shor's Factoring Algorithm –

Quantum Key Distribution - BB84 - Ekart 91

COURSE OUTCOMES:

At the end of the course, students would

CO1: Understand the basics of quantum computing.
CO2: Understand the background of Quantum Mechanics.
CO3: Analyse the computation models.
CO4: Model the circuits using quantum computation. environments and frameworks.
CO5: Understand the quantum operations such as noise and error–correction

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO**LIST OF EXPERIMENTS**

1. Singlequbitgatesimulation-QuantumComposer
2. Multiplequbitgatesimulation-QuantumComposer
3. Composingsimplequantumcircuitswithq-gatesandmeasuringtheoutputintoclassical bits.
4. IBMQiskitPlatformIntroduction
5. ImplementationofShor'sAlgorithms
6. ImplementationofGrover'sAlgorithm
7. ImplementationofDeutsch'sAlgorithm
8. ImplementationofDeutsch-Jozsa'sAlgorithm
9. IntegerfactorizationusingShor'sAlgorithm
10. QKDSimulation
11. MiniProjectsuchasimplementinganAPIforefficientsearchusingGrover'sAlgorithms

TOTAL:30 PERIODS

TEXT BOOKS

1. Parag K Lala, Mc Graw Hill Education, "Quantum Computing, A Beginners Introduction", First edition (1 November 2020).
2. Michael A. Nielsen, Issac L. Chuang, "Quantum Computation and Quantum Information", Tenth Edition, Cambridge University Press, 2010.
3. Chris Bernhardt, The MIT Press; Reprint edition (8 September 2020), "Quantum Computing for Everyone".

REFERENCE BOOKS

1. Scott Aaronson, "Quantum Computing Since Democritus", Cambridge University Press, 2013.
2. N. David Mermin, "Quantum Computer Science: An Introduction", Cambridge University Press, 2007.

CO-PO MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2	2	2	-	-	-	-	2	-	-	-	2	3	2
2	3	2	2	2	-	-	-	-	2	-	-	-	2	3	1
3	3	3	3	3	2	-	-	-	3	-	-	-	3	2	2
4	3	3	3	3	3	-	-	-	3	-	-	-	1	3	2
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Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

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PROFESSIONAL ELECTIVE VI

U23ITP65 **Category : PE**

		L	T	P	C
SDG: 4	**MODERN CRYPTOGRAPHY**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

- TolearnaboutModernCryptography.
- Tofocusonhowcryptographicalgorithmsandprotocolsworkandhowtousethem.
- TobuildaPseudorandompermutation.
- ToconstructBasiccryptanalytictechniques.
- Toprovideinstructiononhowtousetheconceptsof block ciphersandmessage authentication codes.

UNIT 1 INTRODUCTION 6

Basics of Symmetric Key Cryptography, Basics of Asymmetric Key Cryptography, Hardness of Functions. Notions of Semantic Security (SS) and Message Indistinguishability (MI): Proof of Equivalence of SS and MI, Hard Core Predicate, Trap-door permutation, Goldwasser-Micali Encryption. Goldreich-Levin Theorem: Relation between Hardcore Predicates and Trap-door permutations.

UNIT 2 FORMAL NOTIONS OF ATTACKS 6

Attacks under Message Indistinguishability: Chosen Plaintext Attack (IND-CPA), Chosen Ciphertext Attacks (IND-CCA1 and IND-CCA2), Attacks under Message Non-malleability: NM-CPA and NM-CCA2, Inter-relations among the attack model

UNIT 3 RANDOM ORACLES 6

Provable Security and asymmetric cryptography, hash functions. One-way functions: Weak and Strong one-way functions. Pseudo-random Generators (PRG): Blum-Micali-Yao Construction, Construction of more powerful PRG, Relation between One-way functions and PRG, Pseudo- random Functions (PRF)

UNIT 4 BUILDING A PSEUDORANDOM PERMUTATION 6

The LubyRackoff Construction: Formal Definition, Application of the LubyRackoff Construction to the construction of Block Ciphers, The DES in the light of LubyRackoff Construction.

UNIT 5 MESSAGE AUTHENTICATION CODES 6

Left or Right Security (LOR). Formal Definition of Weak and Strong MACs, Using a PRF as a MAC, Variable length MAC. Public Key Signature Schemes: Formal Definitions, Signing and Verification, Formal Proofs of Security of Full Domain Hashing. Assumptions for Public Key Signature Schemes: One-way functions Imply Secure One-time Signatures. Shamir's Secret Sharing Scheme. Formally Analyzing Cryptographic Protocols. Zero Knowledge Proofs and Protocols.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Understand the basics of quantum computing.
CO2: Understand the background of Quantum Mechanics.
CO3: Analyse the computation models.
CO4: Model the circuits using quantum computation. environments and frameworks.
CO5: Understand the quantum operations such as noise and error–correction

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO**LIST OF EXPERIMENTS**

1. ImplementFeige-Fiat-Shamiridentificationprotocol.
2. ImplementGQidentificationprotocol.
3. ImplementSchnorridentificationprotocol.
4. ImplementRabinone-timesignaturescheme.
5. ImplementMerkleone-timesignaturescheme.
6. ImplementAuthenticationtreesandone-timesignatures.
7. ImplementGMRone-timesignaturescheme

TOTAL:30 PERIODS

TEXT BOOKS

1. Hans Delfs and Helmut Knebl, Introduction to Cryptography: Principles and Applications, Springer Verlag.
2. Wenbo Mao, Modern Cryptography, Theory and Practice, Pearson Education (Low Priced Edition)

REFERENCE BOOKS

1.ShaffiGoldwasser and MihirBellare, Lecture Notes on Cryptography, Available at http://citeseerx.ist.psu.edu/.

2.OdedGoldreich, Foundations of Cryptography, CRC Press (Low Priced Edition Available), Part 1 and Part 23

3.William Stallings, "Cryptography and Network Security: Principles and Practice", PHI 3rd Edition, 2006.

CO-PO MAPPING

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Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

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PROFESSIONAL ELECTIVE VI

U23ITP66 **Category : PE**

		L	T	P	C
SDG: 4	**CYBER SECURITY**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

- Tolearncybercrimeandcyberlaw.
- Tounderstandthecyber-attacksandtoolsformitigatingthem.
- Tounderstandinformationgathering.
- Tolearnhowtodetect acyber-attack.
- Tolearnhowtopreventacyberattack

UNIT 1 INTRODUCTION 6

Cyber Security – History of Internet – Impact of Internet – CIA Triad; Reason for Cyber Crime – Need for Cyber Security – History of Cyber Crime; Cybercriminals – Classification of Cybercrimes – A Global Perspective on Cyber Crimes; Cyber Laws – The Indian IT Act – Cybercrime and Punishment.

UNIT 2 ATTACKS AND COUNTERMEASURES 6

OSWAP; Malicious Attack Threats and Vulnerabilities: Scope of Cyber-Attacks – Security Breach – Types of Malicious Attacks – Malicious Software – Common Attack Vectors – Social engineering Attack – Wireless Network Attack – Web Application Attack – Attack Tools – Countermeasures.

UNIT 3 RECONNAISSANCE 5

Harvester – Whois – Netcraft – Host – Extracting Information from DNS – Extracting Information from E-mail Servers – Social Engineering Reconnaissance; Scanning – Port Scanning – Network Scanning and Vulnerability Scanning – Scanning Methodology – Ping Sweer Techniques – Nmap Command Switches – SYN – Stealth – XMAS – NULL – IDLE – FIN Scans – Banner Grabbing and OS Finger printing Techniques.

UNIT 4 INTRUSION DETECTION 5

Host -Based Intrusion Detection – Network -Based Intrusion Detection – Distributed or Hybrid Intrusion Detection – Intrusion Detection Exchange Format – Honeypots – Example System Snort.

UNIT 5 INTRUSION PREVENTION 5

Firewalls and Intrusion Prevention Systems: Need for Firewalls – Firewall Characteristics and Access Policy – Types of Firewalls – Firewall Basing – Firewall Location and Configurations – Intrusion Prevention Systems – Example Unified Threat Management Products.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Explain the basics of cyber security, cybercrime and cyber law (K2)
CO2: Classify various types of attacks and learn the tools to launch the attacks (K2)
CO3 Apply various tools to perform information gathering (K3)
CO4: Apply intrusion techniques to detect intrusion (K3)
CO5: Apply intrusion prevention techniques to prevent intrusion (K3)

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO**LIST OF EXPERIMENTS**

1. InstallKaliLinuxonVirtualbox
2. ExploreKaliLinuxandbashscripting
3. Performopen-sourceintelligencegatheringusingNetcraft,WhoisLookups,DNS Reconnaissance, Harvester and Maltego
4. Understandthenmapcommanddandscanatargetusingnmap
5. Installmetasploitable2onthevirtualboxandsearchforunpatchedvulnerabilities
6. UseMetasploittoexploitanunpatchedvulnerability
7. InstallLinusseveronthevirtualboxandinstallssh
8. UseFail2bantoscanlogfilesandbanIpsthatshowthemalicious signs
9. Launchbrute-forceattacksontheLinuxserverusing Hydra.
10. Performreal-timenetworktrafficanalysisanddatapocketloggingusingSnort

TOTAL:30 PERIODS

TEXT BOOKS

1. AnandShinde,"IntroductiontoCyberSecurityGuidetotheWorldofCyberSecurity", Notion Press, 2021 (Unit 1)
2. Nina Godbole, SunitBelapure, "Cyber Security: UnderstandingCyber Crimes, Computer Forensics and Legal Perspectives", Wiley Publishers, 2011 (Unit 1)
3. https://owasp.org/www-project-top-ten/

REFERENCE BOOKS

1. David Kim, Michael G. Solomon, "Fundamentals of Information Systems Security", Jones & Bartlett Learning Publishers, 2013 (Unit 2)
2. Patrick Engebretson, "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made easy", Elsevier, 2011 (Unit 3)
3. Kimberly Graves, "CEH Official Certified Ethical hacker Review Guide", Wiley Publishers, 2007 (Unit 3)
4. William Stallings, Lawrie Brown, "Computer Security Principles and Practice", Third Edition, Pearson Education, 2015 (Units 4 and 5)
5. Georgia Weidman, "Penetration Testing: A Hands-On Introduction to Hacking", No Starch Press, 2014 (Lab)

CO-PO MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	1	1	1	-	1	-	-	-	-	1	-	2	2	2
2	1	3	1	3	2	1	-	-	-	-	-	-	2	2	1
3	2	1	1	1	-	1	-	-	-	-	1	-	2	2	2
4	3	3	2	2	2	1	-	-	-	-	-	-	2	2	3
5	3	2	1	1	1	1	-	1	-	-	1	-	2	2	2
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
Mrs.R.Malathy AP/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

PROFESSIONAL ELECTIVE VI

U23ITP67 **Category : PE**

		L	T	P	C
SDG: 4	**ETHICS AND AI**	**2**	**0**	**2**	**3**

COURSE OBJECTIVE:

- StudythemoralityandethicsinAI
- LearnaeEthicalinitiativesinthefieldofartificialintelligence
- StudyaboutAIstandardsandRegulations
- StudyaboutsocialandethicalissuesofRobotEthics
- StudyaboutAIandEthics-challengesandopportunities

UNIT 1 INTRODUCTION 6

Definition of morality and ethics in AI-Impact on society-Impact on human psychology-Impact on the legal system-Impact on the environment and the planet-Impact on trust

UNIT 2 ETHICAL INITIATIVES IN AI 6

International ethical initiatives-Ethical harms and concerns-Case study: healthcare robots, Autonomous Vehicles, Warfare and weaponization.

UNIT 3 AI STANDARDS AND REGULATION 6

Model Process for Addressing Ethical Concerns During System Design - Transparency of Autonomous Systems-Data Privacy Process- Algorithmic Bias Considerations - Ontological Standard for Ethically Driven Robotics and Automation Systems

UNIT 4 ROBOETHICS: SOCIAL AND ETHICAL IMPLICATION OF ROBOTICS 6

Robot-Roboethics- Ethics and Morality- Moral Theories-Ethics in Science and Technology - Ethical Issues in an ICT Society- Harmonization of Principles- Ethics and Professional Responsibility-Roboethics Taxonomy.

UNIT 5 AI AND ETHICS- CHALLENGES AND OPPORTUNITIES 6

Challenges - Opportunities- ethical issues in artificial intelligence- Societal Issues Concerning the Application of Artificial Intelligence in Medicine- decision-making role in industries-National and International Strategies on AI.

COURSE OUTCOMES:

At the end of the course, students would

CO1: LearnaboutmoralityandethicsinAI

CO2: Acquiretheknowledgeofrealtimeapplicationethics,issuesanditschallenges.

CO3: Understandtheethicalharmsandethicalinitiativesin AI

CO4: LearnaboutAIstandardsand Regulations like AIAgent,SafeDesignofAutonomousand Semi-Autonomous Systems
CO5: UnderstandtheconceptsofRoboethicsandMoralitywithprofessionalresponsibilities.
CO6: LearnaboutthesocietalissuesinAIwithNationalandInternationalStrategieson AI

TOTAL:30 PERIODS

PRACTICAL EXERCISES:

S.NO	LIST OF EXPERIMENTS
1	Recent case study of ethical initiatives in healthcare, autonomous vehicles and defense
2	Exploratory data analysis on a 2 variable linear regression model
3	Experiment the regression model without a bias and with bias
4	Classification of a dataset from UCI repository using a perceptron with and without bias
5	Case study on ontology where ethics is at stake
6	Identification on optimization in AI affecting ethics

TOTAL:30 PERIODS

TEXT BOOKS

1. y. Eleanor Bird, Jasmin Fox-Skelly, Nicola Jenner, Ruth Larbey, Emma Weitkamp and Alan Winfield ,"The ethics of artificial intelligence: Issues and initiatives", EPRS | European Parliamentary Research Service Scientific Foresight Unit (STOA) PE 634.452 – March 2020
2. Patrick Lin, Keith Abney, George A Bekey," Robot Ethics: The Ethical and Social Implications of Robotics", The MIT Press- January 2014.

REFERENCE BOOKS

1. Towards a Code of Ethics for Artificial Intelligence (Artificial Intelligence: Foundations, Theory, and Algorithms) by Paula Boddington, November 2017
2. Mark Coeckelbergh," AI Ethics", The MIT Press Essential Knowledge series, April 2020
3. Web link:
4. https://sci-hub.mksa.top/10.1007/978-3-540-30301-5_65
5. https://www.scu.edu/ethics/all-about-ethics/artificial-intelligence-and-ethics-sixteen- challenges-and-opportunities/
6. https://www.weforum.org/agenda/2016/10/top-10-ethical-issues-in-artificial-intelligence/
7. https://sci-hub.mksa.top/10.1159/000492428.

CO-PO MAPPING

CO	PO												PSO		
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3	2	3	1	1	3	-	-	-	2	1	1	2	3	2	2
4	3	1	3	3	2	-	-	-	2	2	3	1	2	1	3
5	3	1	1	3	3	-	-	-	2	3	3	3	1	3	3
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
Mrs. R.Malathy AP/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

OPEN ELECTIVE I

U23ITO11 **Category : OE**

		L	T	P	C
SDG: 4	**PHP andMYSQL**	**3**	**0**	**0**	**3**

COURSE OBJECTIVE:

1. To Understand Scripting Language Power in Portal Development.
2. To analyze the usage of Object-Oriented Techniques in Web Serverinteraction.
3. To Apply Session and transaction management in MYSQL.
4. To learn the intricacies in Client Server Management and Data Storage.

UNIT 1 INTRODUCTION TO PHP 15

Installing PHP (WAMP SERVER/XAMPP SERVER), Lexical Structure, Data Types, Variables, Expressions and Operators, Flow Control Statements, Including Code, Embedding PHP in Web Pages, Functions-Calling a Function, Defining Function, Function Parameters, Return Values, Variable Scope, Variable Functions, Built-in Functions, Anonymous Functions.

UNIT 2 STRINGS,ARRAYSANDCLASSES 15

Strings-Accessing Individual Characters, Encoding and Escaping, Regular Expressions, Arrays-Identifying elements in Array, Single and Multi-Dimensional Arrays, converting between Arrays and Variables, Sorting Arrays, Class-Declaring Class, Accessing Methods and Properties, Inheritance in class, Introspection and Serialization

UNIT 3 ACCESSING MYSQL DATABASES USING PHP 15

Global variables and Form Data, concealing PHP libraries, File Permissions and File Uploads, Using PHP to Access Databases-connection establishment, Basic SQL Commands, Creating Database, Accessing Record Set, Updating records, MYSQL functions. CASE STUDY-Design an Online Examination System, Design an interactive Marketing Portal for Customer Business Interaction

COURSE OUTCOMES:

At the end of the course, students would

CO1: Interprettheobject-orientedparametersrequiredfor web development
CO2: DemonstratetheSessionManagementbetweenvariousClients effectively
CO3: IntegratingtheSecuritymechanismsinDatabaseTransaction Management
CO4: Illustrate the Concept of Code Reusability B2B and B2C Application Development.
CO5: Investigate the Database Security rules and ensure Backup and Restoration of MYSQL Data

TOTAL:45 PERIODS

TEXT BOOKS

1. Rasmus Lerdorf, Kevin Tatroe, “Programming PHP”, O’REILLY Publications, 2020
2. StevenHolzner,“PHP:TheCompleteReference”,McGrawHillEducation,2017

REFERENCE BOOKS

1. MarioLurig,“PHPReference:BeginnertoIntermediatePHP5”, 2008
2. LarryUllman,“PHPand MYSQLforDynamicwebsites”,PearsonEducationIndia,2017.
3. KevinTatroe,PeterMacIntyre,“ProgrammingPHP:CreatingDynamicwebpages”, O'Reilly Media, Inc, 2020.

WEB REFERENCES:

1. http://www.nptelvideos.com/php/php_video_tutorials.php
2. https://www.w3schools.com/php
3. https://www.javatpoint.com/php-tutorial
4. https://www.studytonight.com/php/

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5	3	3	1	2	3	2	1	-	2	-	2	2	3	3	2
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
Mrs. K.J.Godlin Debby AP/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**

OPEN ELECTIVE I

U23ITO12 **Category : OE**

		L	T	P	C
SDG: 4	**BLOCKCHAIN ESSENTIALS**	**3**	**0**	**0**	**3**

COURSE OBJECTIVE:

1 To Provide an understanding skill of blockchain technologies
2 To introduce the technicalaspects of cryptocurrencies, blockchain technologies, and distributed consensus.companies.
3 To learn the laws and challenges related to crowdfunding and digital assets.
4 To make students understand the innovative application models using Blockchain technology., how these systems work and how to engineer securesoftware that interacts with the Bitcoin network and other cryptocurrencies.

UNIT 1 INTRODUCTION 15

Introduction to Cryptography and Network Security- Classical Encryption Techniques-Block Cipher and Data Encryption Standards- Authentications and Hash Functions- SHA3- Introduction to Block Chain- Features of Blockchain- -Types of Block Chain-Decentralization in Block Chain-Tiers of Blockchain Technology. Blockchain 1.0: Currency

UNIT 2 BLOCK CHAIN AND CRYPTOCURRENCY 15

Blockchain 2.0: Contracts. Blockchain 3.0: Justice Applications Beyond Currency, Economics, and Markets-Name coin: Decentralized Domain Name System- Digital Identity Verification- Introduction to Bitcoin, Transactions, Bitcoin Address-Wallet- Network- How to store and use Bitcoin- Legal aspects of Bitcoin.

UNIT 3 HYPERLEDGER 15

Structure of a Block, Linking Blocks in the Blockchain, Merkle Trees, Bitcoin's Test Blockchains - Bitcoin Mining- Mining the Block - Mining and the Hashing Race-Altcoin and cryptocurrencyecosystem-IntroductiontoHyperledger-HyperledgerasaProtocol-Fabric- Applications of Blockchain Technology - Blockchain in Government - Colored Coins- Payment Channels and State Channels. Case study- Wazirx trading tool.

TOTAL:45 PERIODS

COURSE OUTCOMES:

At the end of the course, students would

CO1: Relate cryptography concepts in emerging abstract models for Blockchain Technology

CO2: Demonstrate the working principles of blockchain, bitcoin, and cryptocurrency in a real-time environment

CO3: Classify the concept of bitcoin and the technological background behind it

CO4: Make use of the Bitcoin transaction and its implementation.

CO5: Relate the concept of Hyperledger to blockchain.

TEXT BOOKS

1. William Stallings," Cryptography and Network Security- Principles and Practices", 7th Edition, Prentice Hall of India, 2017
2. Melanie Swan, "Block Chain: Blueprint for a New Economy", O"Reilly, 1st Edition – 2015.
3. Andreas M. Antonopoulos, "Mastering Bitcoin: Programming the Open Blockchain", O'Reilly, 2016
4. Imran Bashir, Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, 2017.

REFERENCE BOOKS

1. Daniel Drescher, "Block Chain Basics", Apress; 1st Edition, 2017
2. AnshulKaushik,"BlockChainandCryptoCurrencies",KhannaPublishingHouse, Delhi, 2018
3. S.Shukla,M.Dhawan,S.Sharma,S.Venkatesan,"BlockchainTechnology: Cryptocurrency and Applications", Oxford University Press, 2019
4. BikramadityaSinghal,GautamDhameja,PriyansuSekharPanda,"Beginning Blockchain, A Beginner's Guide to Building Blockchain Solutions", Apress, 2018.

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Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
Mrs. K.J.Godlin Debby AP/IT	Dr. P. Shanthakumar Professor&Head/IT
Name and Department	**Name and Department of BoS Chairman**

OPEN ELECTIVE I

U23ITO13 **Category : OE**

		L	T	P	C
SDG: 4	**FOGANDEDGECOMPUTING**	**3**	**0**	**0**	**3**

COURSE OBJECTIVE:

1. To explore major components of fog and edge computing architectures.
2. To identify potential technical challenges of the transition process and suggest solutions.
3. To analyze data and application requirements and pertaining issues.
4. To discover the need for new computing paradigms.

UNIT 1 FOG COMPUTING **15**

IntroductiontoFogComputing,LimitationofCloudComputing,DifferencesbetweenCloud and Fog Computing, Advantages, Business Models, Architecture, Opportunities and Challenges, Challenges in Fog Resources: Taxonomy and Characteristics, Resource Management Challenge, Optimization Challenges, Miscellaneous Challenges.

UNIT 2 EDGE COMPUTING **15**

Introduction to Edge Computing, Origins of Edge, Edge Helping Low-End IoT Nodes, Architecture, Edge Helping Higher-Capability Mobile Devices: Mobile Offloading, Edge Helping the Cloud, Programming Paradigms, Research Challenges and Research Directions, Fog Protocols, Management and Orchestration of Network Slices in 5G, Fog, Edge and Clouds, Data Management and Analysis in Fog Computing.

UNIT 3 NUTRITION AND ENVIRONMENT **15**

Edge/Fog for Augmented Reality, Data Processing on the Edge/Fog, Dispersed Learning with Edge/Fog Computing, Video Analytics on the Edge/Fog, Smart e-Health, Smart surveillance, Smart transportation, Predictive analysis for Edge/Fog applications deployment, Testing of Edge/Fog IoT apps, ML techniques for defending IoT systems.

COURSE OUTCOMES:

At the end of the course, students would

CO1: Demonstratethesoftwareusingstandardopen-sourcefogand edge computing software for data analytics.

CO2: Understandthekeyarchitecturesandapplicationsinfogandedge computing.

CO3: Identifythebasicprinciplesandconceptsoffogandedge computingsystemsandtheirrelationtoothermodelssuchas Cloud Computing.

CO4: Analyzethechallengesofdevelopingfogandedge-based applicationsandmiddleware,andthepossiblesolutionstodeal with them.

CO5: Selectthebestapproachforaparticularproblemregardingthe design and development of a fog and edge computing system.

TOTAL:45 PERIODS

TEXT BOOKS

1. Rajkumar Buyya, Satish Narayana Srirama, “Fog and Edge Computing”, Wiley Publications, 2019.

2. Wei Change and Jie Wu, "Fog/Edge Computing for Security, Privacy and Applications", Springer, 2021.
3. Perry Lea, "IoT and Edge Computing for Architects" Packt Publishing, 2nd Edition, 2020.

REFERENCE BOOKS

1. Seong-eun Yoo, Taehong Kim, Youngsoo Kim, "Edge/Fog Computing Technologies for IoT Infrastructure", Multidisciplinary Digital Publishing, 2021
2. Taheri J. & Deng S. (eds.): "Edge Computing: Models, Technologies and Applications", IET, 2020
3. Al-Turjman F. (ed.): "Edge Computing: from hype to reality", Springer, 2019.

WEB REFERENCES:

1. https://www.automationworld.com/fog-computing-vs-edge-computing-whats- difference
2. https://a16z.com/2016/12/16/the-end-of-cloud-computing/
3. http://www.faredge.eu/#/
4. https://opcfoundation.org/markets-collaboration/openfog/
5. https://www.docker.com/

CO-PO MAPPING

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1	3	3	2	3	2						2	2	3	3	3
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3	2	3	2	3	3						2	2	3	3	2
4	3	2	2	3	3						2	2	2	3	2
5	3	3	2	3	2				1	1	2	2	3	3	3
Correlation levels:1 –low 2 – medium 3 – high "-"-no correlation															

COURSE DESIGNED BY	APPROVED BY
Dr. N.Naveenkumar Professor/IT	Dr. P. Shanthakumar Professor/Head/IT
Name and Department	**Name and Department of BoS Chairman**